

CITY OF ALAMEDA
MAINTENANCE SPECIFICATIONS
AND PLANS

FOR

REMOVE AND REPLACE HVAC
DIRECT DIGITAL CONTROLS AT
ALAMEDA CITY HALL

(2263 Santa Clara Avenue, Alameda, CA)

P.W. No. 08-14-11

NO PREBID MEETING

BID DUE DATE:
BID OPENING TIME:
LOCATION:

October 27, 2014 by 2 p.m.
2:01 p.m.
City of Alameda
Public Works Department
950 W. Mall Square, Room 110
Alameda, CA 94501



Jesse Barajas
Public Works Superintendent

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CITY OF ALAMEDA, CALIFORNIA

SPECIFICATIONS, SPECIAL PROVISIONS AND PLANS
FOR
MAINTENANCE

SECTION I. PROPOSAL AND CONTRACT REQUIREMENTS

A. GENERAL INFORMATION. The City of Alameda will receive sealed bids at the time and place specified in the advertisement calling for bids for:

**REMOVE AND REPLACE HVAC DIRECT DIGITAL CONTROLS AT
ALAMEDA CITY HALL (2263 Santa Clara Avenue, Alameda, CA) , P.W. No. 08-14-11**

Electronic specifications and bidders forms for bidding this project can only be obtained at the City of Alameda website, www.cityofalamedaca.gov/Business/Bids-RFPs or by calling (510) 747-7900. There is no cost for the specification.

B. EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS AND SITE OF WORK. The bidder is required to examine carefully the site and the proposal, plans, specifications and contract forms for the work contemplated, and it will be assumed that the bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality and quantities of work to be performed and materials to be furnished, and as to the requirements of the specifications, the special provisions and the contract.

C. DESIGNATIONS. As used herein "City" shall mean the City of Alameda; "Council" or "City Council" shall mean the Council of the City; "City Manager" shall mean the City Manager of the City; "Engineer" or "PW Supervisor" shall mean the Public Works Supervisor or Public Works Supervisor's designee of the City; "Director" shall mean the Public Works Director of the City; and "Contractor" shall mean the bidder who is awarded the contract for the work.

D. PROPOSAL FORM. All bids must be made upon blank forms which are included in these specifications (A).

All bids must give the prices proposed, **both in writing and in figures.** Bids must be signed by the Bidder. If the proposal is signed by an individual, that individual's name and business address must be shown. If made by a firm or partnership, the name and the post office address of each member of the firm or partnership must be shown. If made by a corporation, the proposal must show the name of the state under the laws of which the corporation was chartered and the names, titles, and business addresses of the president, secretary and treasurer.

E. PRESENTING AND MARKING OF BIDS. Bids must be presented to the Public Works Department, 950 W. Mall Square, Room 110, Alameda, California, under sealed cover, plainly marked on the outside, **"REMOVE AND REPLACE HVAC DIRECT DIGITAL CONTROLS AT ALAMEDA CITY HALL (2263 Santa Clara Avenue, Alameda, CA), P.W. No. 08-14-11,** not later than **2:00 p.m.** on the date set forth in the following paragraph.

Bids will be opened in the City of Alameda Public Works Department, 950 W. Mall Square, Room 110, Alameda, CA at **2:01 p.m. on Monday, October 27, 2014.**

F. BIDDER'S GUARANTY. All bids shall be accompanied by one of the following forms of bidder's guaranty: cash, a cashier's check, a certified check, or a bidder's bond executed by an admitted surety insurer, made payable to the City of Alameda. The security shall be in an amount equal to at least ten percent (10%) of the amount bid. A bid shall not be considered unless one of the forms of bidder's security is enclosed with it. If, in lieu of depositing cash, a cashier's check, or a certified check, the bidder submits a bidder's bond, the said bond shall, in form, be satisfactory to the City Attorney of the City of Alameda. A Bid Bond form is provided in Exhibit G.

Said bidder's guaranty which is submitted according to the above paragraph shall, in the event of the failure, for any reason, of the successful bidder or bidders to execute the contract as awarded, be deemed to be liquidated damages to be retained in full by the City of Alameda, but shall not be construed as a penalty for failure to execute said contract. The full amount of the said bidder's guaranty shall also be retained in full by the City of Alameda as consideration payable to the City of Alameda for engineering, accounting and clerical services in formulating specifications for such bid or bids, for advertising costs to the City of Alameda in connection with such bid or bids, and further, as consideration for the award of such contract to such bidder or bidders.

Any bid bond submitted under this Section shall incorporate therein by reference, or otherwise, all of the provisions of Section I, Item F, of these specifications.

G. RETURN OF BIDDER'S GUARANTIES. Within ten (10) days after the award of the contract, the Public Works staff will return the proposal guaranties accompanying the bids which are not to be considered in making the award. All other proposal guaranties will be held until the contract has been finally executed, after which they will be returned to the respective bidders whose bids they accompanied.

H. TAXES. Bids must include all state and federal taxes applicable to the transaction.

I. SUBCONTRACTORS. All contractors shall comply with the State Subletting and Subcontracting Fair Practices Act, located in Sections 4100 through 4112 of the California Public Contract Code. A copy of said Act is available in the office of the PW Supervisor. Said Act is hereby made a part of the specifications on the above-mentioned job and all contractors submitting bids shall accompany the bid with information regarding subcontractors as therein provided. All Subcontractors shall have a current City of Alameda business license.

J. REJECTION OR RETURN OF BIDS. Bids may be rejected if they show any alterations of form, additions not called for, conditional or alternative bids, incomplete bids, erasures or irregularities of any kind. The right is reserved to reject any and all bids. The City reserves the right to return bids unopened.

K. BID PROTEST. Any bid protest must be submitted in writing to the Public Works Director, City of Alameda Public Works Department, City Hall West, 950 West Mall Square, Room 110, Alameda, CA 94501 before 5:00 p.m. of the 10th business day following bid opening.

1. The initial protest document shall contain a complete statement of the basis for the protest.
2. The protest shall refer to the specific portion of the document which forms the basis for the protest.
3. The protest shall include the name, address, and telephone number of the person representing the protesting party.
4. The party filing the protest shall concurrently transmit a copy of the initial protest document and any attached documentation to all other parties with a direct financial interest which may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.
5. The Public Works Director will issue a decision on the protest. If the Public Works Director determines that a protest is frivolous, the party originating the protest may be determined to be irresponsible and that party may be determined to be ineligible for future contract awards.
6. The procedure and time limits set forth in this paragraph are mandatory and are the Bidder's sole and exclusive remedy in the event of Bid protest and failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.

L. AWARD OF CONTRACT. The award of contract, if it be awarded, will be to the responsible bidder who submits the lowest and best bid and whose proposal complies with all requirements described herein. The award, if made, will be made within ninety (90) days after the opening of the bids. All bids will be compared on the basis of the Engineer's estimate of quantities of work to be done. In the event of a delay the City reserves the right to hold the Bidder to its bid for 90 days from the date the contract is awarded.

Bid protests, contracts, bonds, insurance, and other documents identified in these specifications and these special provisions are to be delivered to the following City address: City of Alameda, City Hall West, Public Works Department, 950 West Mall Square, Room 110, Alameda, CA 94501.

M. EXECUTION OF CONTRACT. The contract, in form and content satisfactory to the City, if over \$75,000.00 then will be awarded at a regular City Council meeting (first and third Tuesdays of each month, except August). At least five (5) business days prior to the anticipated award date, the Contractor will be notified of apparent award status and requested to provide the documents necessary to complete the contract process. Required documentation shall include two (2) copies of the contract executed by the Contractor, proof of insurance and Payment and Performance bonds. The Contractor will be given five (5) business days from the date the City Council awards the contract to obtain the relevant bonds and insurance along with any other documents required for submission.

No proposal shall be considered binding upon the City until the execution of the contract. Failure to execute a contract and file acceptable bonds and insurance as provided herein within the time frame outlined above shall be just cause for the annulment of the award and the forfeiture of the bidder's guaranty.

N. CONTRACT BONDS. The Contractor shall furnish two good and sufficient bonds. One of the bonds shall be executed in a sum equal to at least one hundred percent (100%) of the contract price, which shall be furnished as required by the Terms of Section 3247 to 3252 of the Civil Code of the State of California (see Exhibit F). The other bond shall guaranty faithful performance of the said contract by the Contractor and shall be executed in a sum equal to at least one hundred percent (100%) of the contract price (see Exhibit E). Bonds shall be furnished by a surety company satisfactory to the City of Alameda.

Whenever any surety or sureties on any such bonds, or any bonds required by law for the protection of the claims of laborers and materials, become insufficient or the City PW Supervisor has cause to believe that such surety or sureties have become insufficient, a demand in writing may be made of the Contractor for further bond or bonds or additional surety not exceeding that originally required, as is considered necessary, taking into account the extent of the work remaining to be done. Thereafter no payment shall be made upon such contract to the Contractor, or any assignee of the Contractor, until such further bond or bonds or additional surety has been furnished. Faithful performance bonds, whether by individual or corporate surety, shall in addition to other terms and conditions, contain the conditions that (1) death of the named principal shall not operate as a release of the obligation hereunder of the surety, and (2) extensions of time, if any, granted by the City to Contractor for performance of the work covered by said bond shall extend for a like time the period of limitations during which surety shall remain bound by the said undertaking.

SECTION II. LEGAL RELATIONS AND RESPONSIBILITIES

A. LAWS TO BE OBSERVED. The Contractor shall keep himself fully informed of all existing and future state and federal laws and all municipal ordinances and regulations of the City of Alameda which in any manner affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

B. PREVAILING WAGES:

1. The Contractor is aware of the requirements of California Labor Code sections 1720 et seq. and 1770 et seq., as well as California Code of Regulations, Title 8, section 16000 et seq. ("Prevailing Wage Laws"), which require the payment of prevailing wage rates and the performance of other requirements on certain "public works" projects. Since this Project involves a "public work" project, as defined by the Prevailing Wage Laws, Contractor shall fully comply with such Prevailing Wage Laws. Contractor's failure to comply with the Prevailing Wage Law may constitute a default under the contract for performance of the Work which would entitle the City to rescind the contract or exercise other remedies as provided by law or the contract.

2. The Contractor shall obtain a copy of the prevailing rates of per diem wages at the commencement of this Contract from the website of the Division of Labor Statistics and Research of the Department of Industrial Relations located at www.dir.ca.gov/dlsr/. In the alternative, the Contractor may view a copy of the prevailing rates of per diem wages at the City's Public Works Department, Building 1, 950 W. Mall Square, Room 110, Alameda. The Contractor shall make copies of the prevailing rates of per diem wages for each craft, classification or type of worker needed to perform work on the Project available to interested parties upon request, and shall post copies at the Contractor's principal place of business and at the Project site. The Contractor shall defend, indemnify and hold the City, its elected officials, officers, employees and agents free and harmless from any claims, liabilities, costs, penalties or interest arising out of any failure or alleged failure to comply with the Prevailing Wage Laws and/or the City's Labor Compliance Program (hereinafter referred to as "LCP"), if any.

3. If this project is funded in whole or in part with Federal monies and subject to the provisions of the Davis-Bacon Act, the successful bidder shall pay not less than the wage rates determined by the Secretary of Labor. The Federal wage rates shall apply unless the State wage rates are higher. The Federal Wage Rates applicable to the contract are those current within ten (10) days of the bid due date.

4. The Contractor and all subcontractors shall pay and shall cause to be paid each worker engaged in work on the Project not less than the general prevailing rate of *per diem* wages determined by the Director, regardless of any contractual relationship which may be alleged to exist between the Contractor or any Subcontractor and such workers.

5. The Contractor and all subcontractors shall pay and shall cause to be paid to each worker needed to execute the work on the Project travel and subsistence payments, as such travel and subsistence payments are defined in the applicable collective bargaining Contracts filed with the Department of Industrial Relations in accordance with Labor Code § 1773.8.

6. If during the period any bid for work on this Project remains open, the Director of Industrial Relations determines that there has been a change in any prevailing rate of *per diem* wages in the locality in which this public work is to be performed, such change shall not alter the wage rates in the Notice calling for Bids or the contract subsequently awarded.

7. Pursuant to Labor Code § 1775, the Contractor shall as a penalty to the City, forfeit Fifty Dollars (\$50.00) for each calendar day, or portion thereof, for each worker paid less than the prevailing rate of *per diem* wages, determined by the Director, for such craft or classification in which such worker is employed for any public work done under the Contract by the Contractor or by any Subcontractor under it. The amount of the penalty shall be determined by the Labor Commission. In addition, the difference between such prevailing rate of *per diem* wage and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing rate of *per diem* wage shall be paid to each work by the Contractor.

8. Any worker employed to perform work on the Project, which work is not covered by any craft or classification listed in the general prevailing rate of *per diem* wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the craft or classification which most nearly corresponds to the work on the Project to be performed by them, and such minimum wage rate shall be retroactive to time of initial employment of such person in such craft or classification.

9. For those crafts or job classifications requiring special prevailing wage determinations, please contact the Division of Labor Statistics and Research, Prevailing Wage Unit, P.O. Box 420603, San Francisco, CA 94142-0603, (415) 703-4774 or check out the web site at www.dir.ca.gov.

C. HOURS OF LABOR.

1. As provided in Article 3 (commencing at § 1810), Chapter 1, Part 7, Division 2 of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by the Contractor or by any Subcontractor on any subcontract under this Contract, upon the work or upon any part of the work contemplated by this Contract, is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided. Notwithstanding the provision hereinabove set forth, work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week shall be permitted upon this public work provided that the employees' compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1-1/2) times the basic rate of pay.

2. The Contractor shall pay to the City a penalty of Twenty-five Dollars (\$25.00) for each worker employed in the execution of this Contract by the Contractor, or by any Subcontractor, for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one (1) calendar week, in violation of the provisions of Article 3 (commencing at § 1810), Chapter 1, Part 7, Division 2 of the Labor Code, unless compensation for the workers so employed by Contractor is not less than one and one-half (1-1/2) times the basic rate of pay for all hours worked in excess of eight (8) hours per day.

3. Holiday and overtime work, when permitted by law, shall be paid for at a rate of at least one and one-half (1½) times the above specified rate of *per diem* wages, unless otherwise specified. Holidays shall be defined in the Collective Bargaining Contract applicable to each particular craft, classification, or type of worker employed.

D. CERTIFIED PAYROLL.

1. Contractor's attention is directed to California Labor Code Section 1776, which requires Contractor and any subcontractors to keep an accurate payroll record and which imposes inspection requirements and penalties for non-compliance. Certified payrolls shall be prepared and submitted weekly to the Labor Compliance Officer, Gail Carlson, Public Works Department, 950 W. Mall Square, Room 110, Alameda, CA 94501 by the Contractor and each subcontractor. Contractor is responsible for the submission of copies of payrolls by all subcontractors. Each payroll submitted shall be accompanied by a "Statement of Compliance", signed by the Contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract, and shall certify the following:

a. That the payroll for each payroll period contains the name, social security number, and address of each employee, his or her correct classification, including applicable area and group code, hourly rates of wages paid, daily and weekly number of hours worked, deductions made and actual wages paid, and that such information is correct and complete;

b. That such laborer or mechanic (including each helper, apprentice and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions; and

c. That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

2. If the Contractor or a subcontractor does not work during the payroll period, a Statement of Non-Working Days must be submitted for each day not worked.

3. In the event of noncompliance with the requirements of such section after 10 Days written notice specifying in what respects compliance is required, the CONTRACTOR shall forfeit as a penalty to the CITY, \$25.00 for each calendar Day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due.

E. APPRENTICES.

1. Attention is directed to the provisions in sections 1777.5 and 1777.6 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him on contracts greater than \$30,000 or 20 working days. The Contractor and any subcontractor under him shall comply with the requirements of Sections 1777.5 and 1777.6 in the employment of apprentices.

2. Section 1777.5 requires the Contractor or subcontractor employing workers in any apprenticeable occupation to apply to the joint apprenticeship committee nearest the site of the public works project, and which administers the apprenticeship program in that trade, for a certificate of approval, if they have not previously applied and are covered by the local apprenticeship standards.

3. The Contractor is required to make contributions to funds established for the administration of apprenticeship programs if: (1) the Contractor employs registered apprentices or journeymen in any apprenticeable trade on such contracts and if other contractors on the public works site are making such contributions; or (2) if the Contractor is not a signatory to an apprenticeship fund and if the funds administrator is unable to accept Contractor' required contribution. The Contractor or subcontractor shall pay a like amount to the California Apprenticeship Council.

4. Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, ex-officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

F. LABOR DISCRIMINATION. No discrimination shall be made in the employment of persons upon public works because of the race, color, sex, religion, age, national origin, sexual orientation, or physical disability of such persons and every Contractor for public works violating this section is subject to all the penalties imposed for a violation of the provisions of the Labor Code, and, in particular, Section 1735.

G. REGISTRATION OF CONTRACTORS. Before submitting bids, contractors shall be licensed in accordance with the provisions of Chapter 9, Division 3, of the Business and Professional Code of the State of California.

H. PERMITS AND LICENSES. The Contractor shall procure all permits and licenses, including City of Alameda business licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work. However, the contractor will be reimbursed for construction permit fees. The estimated cost shown as an allowance in the bid proposal is only for bidding purposes. Payment shall be made for the actual cost of the permit. The cost for a City of Alameda business license is not reimbursable. Each Subcontractor shall have a current City of Alameda business license.

The following permit(s) and/or license(s) are required for this project:

1. **A City of Alameda Business License from the City of Alameda, 2263 Santa Clara Avenue, Finance Department, Room 220, Alameda.**

I. PATENTS. The Contractor shall assume all costs arising from the use of patented materials, equipment, devices or processes used on or incorporated in the work, and agrees to indemnify and hold harmless the City of Alameda, its officers, employees and agents from all suits at law or actions of any nature, damages, royalties and costs on account of the use of any patented materials, equipment, devices or processes.

J. RESPONSIBILITY FOR DAMAGES. The City of Alameda, its officers, employees and agents shall not be answerable or accountable in any manner for any loss or damage to the work or any part thereof, nor to any material or equipment used in performing the work, nor for injury or damage to any person or persons, either workers or the public, nor for damage to adjoining property from any cause whatsoever during the progress of the work nor at any time before final acceptance.

K. CONTRACTOR'S RESPONSIBILITY FOR THE WORK. Except as provided above, until formal acceptance of the work by the City, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof, except such injuries or damages occasioned by acts of the Federal Government or the public enemy. The Contractor will not be responsible for the cost of repairing or restoring damage to the work, which damage is determined to have been proximately caused by an act of God, in excess of 5% of the contracted amount.

L. SAFETY PROVISIONS. The Contractor shall conform to the rules and regulations pertaining to safety established by the California Division of Occupational Safety and Health of the Industrial Relations Department (CAL-OSHA).

M. NO PERSONAL LIABILITY. Neither the City Council, City Manager, the City PW Supervisor, nor any other City officer, authorized assistant or agent shall be personally responsible for any liability arising under this contract.

N. RESPONSIBILITY OF CITY. The City of Alameda shall not be held responsible for the care or protection of any material or parts of the work prior to final acceptance, except as expressly provided in these specifications.

O. PUBLIC CONVENIENCE AND SAFETY. The Contractor shall so conduct operations as to cause the least possible obstruction and inconvenience to public traffic. The Contractor shall furnish, erect and maintain such fences, barriers, lights and signs as are necessary or as required by the PW Supervisor to give adequate warning to the public at all times that the work is in progress and of any dangerous conditions to be encountered as a result of the work or of the presence of the Contractor's equipment or machinery.

P. NOTICES TO CONTRACTOR. Any notice required to be given to the Contractor by the City of Alameda or by the City PW Supervisor or by any officer of said City may be given to said Contractor at the address shown in the Contractor's proposal. Such notice may be given by mailing a copy of said notice to the Contractor to such address by United States certified mail. Evidence of such mailing shall be deemed the equivalent of personal services of said notice.

Q. UTILITIES. The location of railroad tracks, utility facilities and other structures shall be the responsibility of the Contractor. The Contractor shall contact the owners of those tracks, facilities and structures for any information that may be required. The Contractor shall contact Underground Services Alert (USA) at 800-642-2444 forty-eight (48) hours prior to commencement of work.

Where existing sewers and storm drains cross or interfere in any way with construction under this contract, they shall be left in place and the Contractor shall work around them, or where feasible and practical, the Contractor may, with the permission of the City PW Supervisor, remove and replace them at his/her own expense. Precautions shall be exercised to provide bearing under existing sewer lines so encountered to preclude settlement during or after the term of the contract. In the event that some of these sewers are abandoned, they may, with the permission of the City PW Supervisor, be removed and not replaced. The Contractor shall provide submittals for the PW Supervisor's review and approval for supporting utilities.

The owners of pipes, wires, conduits, vaults and other utilities (other than sewers) located in the City streets which could conflict with the proposed work will be notified by the City PW Supervisor to remove or adjust the same, without cost to the Contractor, to such extent as will allow the prosecution of the work described herein according to the necessities thereof and in accordance with these specifications. Wherever and whenever the Contractor anticipates working in an area from which utilities must be removed at the expense of others, he/she shall notify the City PW Supervisor sufficiently in advance (a minimum of ten (10) working days) to permit the owners thereof to rearrange or abandon such utilities, and he/she shall cooperate with the owners thereof in the performance of the work under this contract.

The work will be so prosecuted that a minimum of damage will result to utility services. In the event that utility services are damaged or interrupted, the Contractor shall immediately, at his/her own expense, restore such services in a manner satisfactory to the PW Supervisor. In the event that an interruption of utility services is sustained for a period of longer than one-half hour, it shall be the responsibility of the Contractor to notify the occupants of the premises to which said services are connected, so that no damage will accrue on or to said premises.

The Contractor shall perform all work in such manner as to prevent damage to utilities lying outside of or below a required excavation of trench area.

R. SOUND CONTROL REQUIREMENTS. Sound control shall conform to Section 4-10 of the Alameda Municipal Code, which prohibits weekday construction activities between 7:00 pm and 7:00 am.

S. CONSTRUCTION SITE CONTROLS. Within five (5) business days of the date the work is to commence pursuant to the NTP the Contractor shall submit an Erosion/Stormwater Pollution Prevention Plan (SWPPP) to the PW Supervisor for review. The SWPPP shall include appropriate erosion and sediment control measures to effectively prevent the entry of soil, dirt, debris and other pollutants to storm water runoff, the storm drain system, lagoons and the bay/estuary during construction. No work in the field under this Contract may begin until the PW Supervisor has approved the Contractor's SWPPP.

Erosion and sediment control plans/sheets shall indicate the specifications and maintenance schedules for the installation and upkeep of the erosion control mechanisms. Specifications shall be provided for the erosion control practices, perimeter protection(s), any silt fencing and fiber rolls to be used, storm drain inlet protections, stabilized construction entrance(s) and exits, site and excavation dewatering activities, vehicle tire wash area(s), vehicle and equipment servicing area(s), and the materials handling and storage area(s). These specifications should meet the same level of erosion and sediment control effectiveness established by practices identified in the San Francisco Bay Regional Water Quality Control Board's Erosion and Sediment Control Field Manual (510-622-2465), the Association of Bay Area Government's Manual of Standards for Erosion and Sediment Control (510-464-7900) and/or the California Stormwater Quality Association's Stormwater Best Management Practice Handbook – Construction (2003) (www.cabmphandbooks.com). Contact City Public Works Department Clean Water Program Specialist Jim Barse (510-747-7930) for additional assistance in obtaining copies of these reference documents.

The Contractor is responsible for ensuring that all of his/her workers and subcontractors are aware of and implement the specific stormwater quality control measures under the approved SWPPP. The Contractor(s) shall avoid creating excess dust when breaking asphalt/concrete and during excavation and grading. If water is to be used as a measure for dust control, use as little as possible. All wash water shall be kept out of streets, gutters and storm drains. Controls shall be implemented before construction begins and maintained until the end of construction at which time they shall be removed.

Failure to comply with the following approved construction Best Management Practices ("BMPs") shall result in the issuance of correction notices, citations and/or a project stop order:

1. Gather all construction debris on a regular basis and place it in a dumpster or other container which is emptied or removed on a weekly basis. When appropriate, use tarps on the ground to collect fallen debris or splatters that could contribute to stormwater pollution. After breaking old pavement, remove all pieces to avoid contact with rainfall or runoff.

2. Remove on-site piles from the site on a regular basis. Only temporary storage is allowed. All temporary soil or other stockpiles on site shall be securely covered with a tarp, plastic sheeting or similar material.
3. Remove all dirt/mud, gravel, rubbish, refuse and green waste from the sidewalk, street pavement, and storm drain system adjoining the project site daily and prior to rain. Clean up leaks, drips and spills immediately. Avoid unnecessary driving on unpaved areas during wet weather.
4. Install and maintain stabilized construction entrances to minimize the tracking of dirt, mud, dust and debris onto the public right-of-way.
5. Broom-sweep the sidewalk and public street pavement adjoining the project site daily and prior to rain. Caked-on mud or dirt shall be scraped from these areas before sweeping. At the completion of work the street shall be washed and the wash water collected and disposed offsite.
6. Install filter materials (such as block and gravel bags, sandbags, filter fabric) at the storm drain inlets surrounding the project site. Such inlet protections shall be installed before: the start of the rainy season (October 1st), site de-watering activities, saw-cutting activities, or any other activity that may result in the discharge of material to the storm drain. Filter materials shall be maintained and/or replaced as necessary to minimize short-cutting and to remove sediment deposits and buildup. Accumulated sediment/debris shall be disposed of properly.
7. Vacuum saw-cutting slurry and remove from site. Do not allow saw-cut slurry to enter the storm water conveyance system.
8. Create a contained and covered area on the site for the storage of cement bags, paints, flammables, oils, fertilizers, pesticides, or any other materials used on the project site that have the potential for being discharged to the storm drain system by wind, exposure to rainfall or in the event of a material spill.
9. Never clean machinery, tools, brushes, etc. or rinse containers into a street, gutter, storm drain or stream. See the *Building Maintenance and Remodeling* BMP flyer and ACCWP BMP brochures for more information. Contact the Public Works Department at 747-7930 for assistance with obtaining these documents.
10. Ensure that concrete/gunite supply trucks or concrete/plaster finishing operations do not discharge wash water into street gutters or drains. Concrete trucks shall have a self-contained washout system or discharge to a dedicated, secure site washout in order to avoid the possibility of debris on city streets or discharge of wash water to the storm water conveyance system.
11. Minimize removal of natural vegetation or ground cover from the site in order to minimize the potential for erosion and sedimentation problems. Re-plant the area, and stabilize all cut and fill slopes as soon as possible after grading is completed. At a minimum, 4,000 pounds/acre of straw with tackifier should be placed on all exposed soils including those within active work areas and flat lots. **No site grading shall occur between October 1 and May 31 unless approved erosion and sedimentation control measures are in place.**

12. Provide erosion “prevention” and perimeter protection measures (soil stabilization) such as fiber rolls, silt fence, and/or sediment traps or basins. Ensure control measures are adequately maintained and in operable condition. Sediment controls, including inlet protection, are necessary but should be a secondary defense behind good erosion control and site perimeter measures.

13. Design site de-watering operations to prevent the discharge of any sediment, debris or other pollutants to the municipal storm water conveyance system.

14. Maintain and if necessary, repair, all erosion prevention and sediment control measures throughout the contract term. Replacement supplies should be kept on site. Site inspections shall be conducted before and after each storm event, and every 24 hours for extended storm events, to identify areas that contribute to erosion and sediment problems or any other pollutant discharges. If additional measures are needed, inform the PW Supervisor immediately and document all inspection findings and actions taken.

15. Conduct visual observations before, during, and after storm events. Any breach, malfunction, leakage, or spill observed that could result in the discharge of pollutants to surface waters that might not be visually detectable in stormwater shall trigger the collection of a sample of discharge. The following procedures shall be followed during sampling:

Sampling Procedures:

- For all construction activity, identify a sampling and analysis strategy and sampling schedule for potential discharges discovered through visual monitoring.
- Any breach, malfunction, leakage, or spill observed during visual monitoring which could result in the discharge of pollutants to surface waters that would not be visually detectable in stormwater shall trigger the collection of a sample of discharge.
- Samples shall be collected at all discharge locations which drain the areas identified by the visual observations and which can be safely accessed.
- Personnel trained in water quality sampling procedures shall collect stormwater samples.
- An uncontaminated sample shall be collected for comparison with the discharge sample.
- Sampling shall be conducted during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.
- The uncontaminated sample shall be compared to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and TDS
- All field and/or analytical data shall be kept in the SWPPP document, which is to remain at the construction site at all times.

16. Contact the City of Alameda Public Works Department at 510-747-7930 in the event of any slope failure, sediment pond overflow, or any other malfunction resulting in sediment-laden runoff. The City shall, in turn, report such incidents to the Regional Water Quality Control Board.

17. Clearly mark with the words, “No Dumping! Drains to Bay” or the equivalent, using methods approved by the City of Alameda, onto the on-site storm drain inlets. All on-site storm drains must be inspected and, if necessary, cleaned, at least once a year immediately prior to the rainy season. Additional cleaning may be required by the City of Alameda.

18. Require all concrete trucks used in the performance of the work to have a self-contained washout system, rather than do washout on the site. The idea is to avoid:

- a. An undesirable pile of concrete on the jobsite, and
- b. The possibility of debris on city streets.

The objective of these Standard Conditions is to ensure that the City’s municipal storm water Permit, the National Pollutant Discharge Elimination System (NPDES) Permit provisions and additional Regional Water Quality Control Board requirements are adequately enforced.

These recommendations are intended to be used in conjunction with the State's Best Management Practices Municipal and Construction Handbooks, local program guidance materials from municipalities, Section 7.1.01, of the Standard Specifications and any other appropriate documents on storm water quality controls for construction. If you need assistance in checking these documents, contact Clean Water Program Specialist at 510-747-7930.

Failure to comply with the above program will result in issuance of noncompliance notices, citations, project stop orders or fines. The fine for noncompliance of the above program is two hundred and fifty dollars (\$250.00) per occurrence per day. The State under the Federal Clean Water Act can also impose a fine on the Contractor.

T. ASBESTOS AND LEAD BASED PAINTS. Reports of a survey of possible asbestos and lead based paints, in the path of construction, was prepared by ACC Environmental.

U. CLEAN AIR ACT OF 1970, ET SEQ. AND FEDERAL WATER POLLUTION CONTROL ACT AS AMENDED BY THE CLEAN WATER ACT OF 1977. The Contractor agrees to comply with federal clean air and water standards during the performance of this contract and specifically agrees to the following:

- The term “facility” means any building, plant, installation, structure, mine, vessel or other floating craft, location or site of operations owned, leased, or supervised by the Contractor and the subcontractors for the construction, supply and service contracts entered into by the Contractor;
- Any facility to be utilized in the accomplishment of this contract is not listed on the Environmental Protection Agency’s List of Violating Facilities pursuant to 40 CFR, Part 15.20;
- In the event a facility utilized in the accomplishment of this contract becomes listed on the EPA list, this contract may be canceled, terminated, or suspended in whole or in part;

- It will comply with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Water Pollution Control Act relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 and Section 308, respectively, and all regulations and guidelines issued thereunder;
- It will promptly notify the Government of the receipt of any notice from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that any facility utilized or to be utilized in the accomplishment of this contract is under consideration for listing on the EPA List of Violating Facilities;
- It will include the provisions of Paragraph a. through g. in every subcontract or purchase order entered into for the purpose of accomplishing this contract, unless otherwise exempted pursuant to the EPA regulations implementing the Air or Water Acts above (40 CFR, Part 15.5), so that such provisions will be binding on each subcontractor or vendor;

In the event that the Contractor or the subcontractor for the construction, supply and service contracts entered into for the purpose of accomplishing this contract were exempted from complying with the above requirements under the provisions of 40 CFR, Part 15.5 (a), the exemption shall be nullified should the facility give rise to a criminal conviction (see 40 CFR 15.20) during the accomplishment of this contract. Furthermore, with the nullification of the exemption, the above requirements shall be effective. The Contractor shall notify the Government, as soon as the Contractor's or the subcontractors' facility is listed for having given rise to a criminal conviction noted in 40 CFR, Part 15.20.

V. SUBMITTALS AND REQUEST FOR INFORMATION (RFI'S). The Contractor shall submit an RFI within five (5) business days of an event or question of fact arising under the Contract. The PW Supervisor in charge of the project shall have ten (10) business days to respond to an RFI or any Submittal required to be made under the Contract.

W. COMPLIANCE WITH THE CITY'S INTEGRATED PEST MANAGEMENT POLICY: The Contractor shall follow the requirements of the City's Integrated Pest Management (IPM) Policy to ensure the City is in compliance with its Municipal Regional Stormwater NPDES Permit, Order No. R2-2009-0074, issued by the California Regional Water Quality Control Board. Contractor shall follow the City's IPM Policy and utilize generally accepted IPM Best Management Practices (BMPs) to the maximum extent practicable for the control or management of pests in and around City buildings and facilities, parks and golf courses, urban landscape areas, rights-of-way, and other City properties.

Contractor will ensure that applicators will use the most current IPM technologies available to ensure the long-term prevention or suppression of pest problems and to minimize negative impacts on the environment, non-target organisms, and human health. Contractor will consider the options or alternatives listed below in the following order, before recommending the use of or applying any pesticide on City property:

1. No controls (e.g., tolerating the pest infestation, use of resistant plant varieties or allowing normal life cycle of weeds)
2. Physical or mechanical controls (e.g., hand labor, mowing, exclusion)

3. Cultural controls (e.g., mulching, disking, alternative vegetation), good housekeeping (e.g. cleaning desk area)
4. Biological controls (e.g., natural enemies or predators)
5. Reduced-risk chemical controls (e.g., soaps or oils)
6. Other chemical controls

Contractor shall ensure that only appropriate licensed applicators who are authorized and trained in pesticide application and who shall implement the City department's IPM standard operating procedures may apply pesticides to or within City property.

Restricted Chemicals

The term pesticide applies to herbicides, insecticides, fungicides, rodenticides and other substances used to control pests. Antimicrobial agents are not included in this definition of pesticides.

Contractor shall avoid the use of pesticides that threaten water quality, human health and the environment. Thus, the Contractor shall not use or promote the use of the following chemicals:

1. Acute Toxicity Category I chemicals as identified by the Environmental Protection Agency (EPA),
2. Organophosphate pesticides (e.g., those containing Diazinon, chlorpyrifos or malathion)
3. Pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin),
4. Carbamates (e.g., carbaryl),
5. Fipronil,
6. Copper-based pesticides unless:
 - a) Their use is judicious,
 - b) Other approaches and techniques have been considered, and;
 - c) Threat of impact to water-quality is prevented.

General Pesticide Usage Practices

Contractor shall ensure implementation of the following practices:

1. All pesticide applications shall be performed according to the manufacturer's instructions as detailed on the product label, and in accordance with all applicable state and local laws and regulations set forth to protect the environment, the public, and the applicator; and properly dispose of unused pesticides and their containers.
2. Pesticides that are not approved for aquatic use will not be applied to areas immediately adjacent to water bodies where through drift, drainage, or erosion, there is a reasonable possibility of a pesticide being transported into surface water.
3. Applicators will always avoid applications of pesticides that directly contact water, unless the pesticide is registered under Federal and California law for aquatic use.

4. Obtain coverage under the Statewide General NPDES Permit prior to discharging pollutants from the use of aquatic pesticides directly to the waters of the United States, or onto aquatic plants growing in waters of the United States (as required by the State Water Quality Resources Control Board).

Posting of Warning Notices Prior to Pesticide Application

1. If a pesticide with a “Warning” or “Danger” label indicator must be applied, the Contractor shall post sufficient copies of warning notices (Notice of Scheduled Chemical Application for Pest Management) and MSDS to effectively alert the public (i.e., at all entrances to a building) no less than 48 hours in advance of the pesticide application. The warning notice must be completely filled out, including name of the pesticide (both chemical and brand name), time and date of application, and with a fully legible re-entry time.

Annual Pesticide Use Summary Report

Contractor shall track pesticide use on City properties and provide an annual pesticide use summary report of pesticide application on City properties. The annual pesticide use summary report shall be submitted to the City’s Public Works Department Clean Water Program staff by a date to be determined in the scope of work and shall include the following information:

1. Product name and manufacturer
2. Active ingredient
3. The total quantity of each pesticide used during the prior fiscal year (from July 1 to June 30)
4. Target pest(s) for pesticide application(s).
5. Reasons for increases in use of pesticides that threaten water quality, specifically organophosphorous pesticides, pyrethroids, carbamates, fipronil, and copper-based pesticides.

Best Management Practices (BMPs)

To protect water quality, the Contractor shall implement the BMPs and control measures described below:

1. Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of pesticides and training of pest control advisors and applicators.
2. Use the most effective, least toxic pesticides that will do the job, provided there is a choice. The agency will take into consideration the LD50, overall risk to the applicator, and impact to the environment (chronic and acute effects).
3. Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging pesticides in stormwater runoff. Avoid application of pesticides if rain is expected (this does not apply to the use of pre-emergent herbicide applications when required by the label for optimal results.)
4. Employ techniques to minimize off-target application (i.e. spray drift) of pesticides, including consideration of alternative application techniques. For example, when spraying is required, increase drop size, lower application pressure, use surfactants and adjuvants, use wick application, etc.
5. Apply pesticides only when wind speeds are low.

6. Mix and apply only as much material as is necessary for treatment. Calibrate application equipment prior to and during use to ensure desired application rate.
7. Do not mix or load pesticides in application equipment adjacent to a storm drain inlet, culvert, or watercourse.
8. Properly inspect applicator equipment to prevent accidental pesticide leaks, spills and hazards to applicators and the environment.
9. Meet local fire department and Alameda County Agricultural Commissioner storage requirements for pesticide products. Provide secondary containment for liquids if required.
10. Prepare spill kits, store the kits near pesticides, and train employees to use them.
11. Store pesticides and other chemicals indoors in a locked and posted storage unit, as per California Code of Regulations.
12. Store pesticides in labeled containers, as per California Code of Regulations.
13. Rinse empty pesticide/herbicide containers, and empty in the spray, as per California Code of Regulations.
14. Dispose of triple-rinsed empty pesticide containers according to recommendations of the Alameda County Agricultural Commissioner and the manufacturer.
15. Try to find a qualified user for any unwanted pesticides, or return to the manufacturer if unopened. If disposal is required, contact Alameda County's Household Hazard Waste Collection Program at (510) 670-6460 between 8:30 AM and 5:00 PM., Monday through Friday, to make appropriate disposal arrangements, or to recycle the material.
16. If changing pesticides or cleaning spray tanks, use tank rinse water as the product, over a targeted area within the application site.
17. Irrigate slowly to prevent runoff, and do not over-water.

SECTION III. SCOPE OF WORK

A. **WORK TO BE DONE.** The work to be done consists of furnishing all labor, tools, equipment, materials, implementing Best Management Practices (BMPs), except as herein specified, and doing all work associated with the removal of existing Landis & Gyr System 600 control system and installation of JCI Facility Explorer and associated City provided Direct Digital Controls (DDC) of the building HVAC to automate the system using manufacturer engineered/installation design using JCU Facility Explorer Controls- Web Based BAC net control system utilizing FX PCG and PCX-4711 expansion Module control panels, replacing existing 29 FCU control modules, utilizing existing enclosures and wiring and running new cabling to new thermostats as per plans. Additional Supply and Return Air Sensors, Fan Proof Current Sensors, CO2 Monitoring using wireless t-stat. Control system to include programming, HVAC systems graphics, all miscellaneous supplies will be supplied by the contractor and all work will be completed under the personal supervision of the Controls Contractor. Controls Contractor shall certify all work as proper and complete. Under no circumstances shall the design, scheduling, coordination, programming, training, and warranty requirements for the project be delegated to a subcontractor. Contractor shall properly dispose of spoils and re-establish the site to the condition as it was prior to work. Contractor shall implement BMPs during the entire period of the project.

Contractor shall demonstrate proof of experience through product certification. Within 24 hours of request by City Representative, Contractor shall provide City with proof of completion of Johnson Controls, Inc. (JCI's) 301.

The Notice to Proceed (NTP) for this project is tentatively scheduled to be issued in November 2014

The Contractor shall provide a SWPPP and project schedule for review at the time of the preconstruction meeting. Contractor shall not commence work in the field until the PW Supervisor has approved the SWPPP and project schedule.

The Contractor shall have 30 consecutive working days from the date the work is to commence pursuant to the Notice to Proceed to complete the work.

Contractor will provide license, labor, materials, services, skills, supervision, and necessary tools and equipment to insure that all work is executed in a professional workmanship manner. Contractor shall have the capability to perform and complete the services in all respects in accordance with the solicitation documents. Contractor hereby warrants that all services shall be performed in a timely and first-class workmanlike manner. Contractor shall keep the property and equipment free and clear at all times of litter and interferences. All materials, preparation and workmanship shall conform to the requirements of Standards of the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), the American Society of Mechanical Engineers (ASME), and Public Works Construction, Inc. latest version, and the plans and specification.

Contractor is required to contact and coordinate with Total Control, 1040 Commercial Street, Suite 106, San Jose, CA 95112, Ph.: (408) 441-1811 during the entire period of the project

Contractor shall provide the following services within the boundaries of the facility. **The work will be done at the Alameda City Hall located at 2263 Santa Clara Avenue Alameda, CA 94501.**

Remedial Description

Contractor shall verify all field measurements prior to ordering, and verify measurements, as all structural measurements are factor-sized to fit as detailed in the plans. Procure all material prior to commencement of work.

Demolition/Removal

Demolition of the existing control system will occur after the new temperature control system is in place including new sensors and new field interface devices. Switch over from the existing control system to the new system will be fully coordinated with the Owner. A representative of the Owner will be on site during switch-over. The contractor shall minimize control system downtime during switch-over. Sufficient installation mechanics will be on site so that the entire switch-over can be accomplished in a reasonable time frame. Remove controls which do not remain as part of the building automation system, all associated abandoned wiring and conduit. The Owner will inform the Contractor of any equipment which is to be removed that will remain the property of the Owner. All other equipment which is removed will be properly disposed of by the Contractor. Using BMPs the Contractor will provide dust and noise protection to the residents, and secure the opening during transition time of installation of new controls, conduits or other dust/noise generating operations. Contractor shall remove debris from work site daily..

Preparation

On a daily basis Contractor shall fully complete all work begun. Flexible metallic conduit (max.3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduits shall be used in exterior locations and interior locations subject to moisture. All wiring will meet the most current code compliance and all wiring will be required to be installed in conduit. Following the provided engineered plans from the manufactures strict adherence shall be followed. Site conditions that may cause deviations from the design must be pre-approved by Controls Contractors before presenting it to the City Representative. Disruption of operations within the facility will not be approved without prior approval from the City representative and Public Works Representative. Waterline mounted sensors shall be removable without shutting down the system in which they are installed. All outside mounted enclosures shall meet the4 NEMA-4 rating. Industry standards and application/ project specific sequence of operation shall be established before switch over, become completely familiar with the existing sequence of operation and the set points shall be established after concurrence with City Representative and Controls Contractor. Contractor shall respond to any and all complaints from residents.

Installation

Installation shall adhere to engineered plans and applicable codes. All wiring, raceways, enclosures, junctions and splice boxes shall be installed in accordance with all applicable electrical codes and wire comply with equipment manufacturer’s recommendations. All wire will be copper and meet the minimum wire size and insulation class listed in the most current wire class size. Programming set points shall be set to current standards and changes shall be approved by the City Representative and tested for at least two weeks prior to establishing finalized and acceptance from responsible party. Insert electronic thermostat and perform proper system operation. Cover all exposed walls and foam, insulate openings. Make necessary repairs to alterations to original finish, clean sites, remove debris, foam, and properly dispose of spoils.

Contractor shall not work during City holidays. City holidays for 2014 include:

Veteran’s Day	Tuesday, November 11, 2014
Thanksgiving Day	Thursday, November 27, 2014
Day after Thanksgiving Day	Friday, November 28, 2014
Christmas Day	Thursday, December 25, 2014

The following City events are planned for Calendar Year 2014:

<u>Event</u>	<u>Date</u>
July 4th Parade	July 4, 2014
Art and Wine Faire (Park Street)	July 26 and 27, 2014
Webster Street Jam	September 6 and 7, 2014
Classic Car Show (Park Street)	October 11, 2014
Trick or Treat at Webster Street	October 31, 2014
Santa on Webster Street	December 13, 2014
Concerts at the Cove	2nd Friday in June, July and August 2014

Farmer's Market (Webster Street at Haight Avenue)
Every Tuesday and Saturday (year-round) from 9 a.m. to 1 p.m.

C. CLEAN UP. Contractor shall leave the work site in an acceptable clean manner at the end of each work day. Upon completion and before making application for acceptance of the work, the Contractor shall clean the street or road, borrow pits, and all ground occupied by the Contractor in connection with the work, of all rubbish, excess materials, temporary structures, and equipment; and all parts of the work shall be left in a neat and presentable condition.

SECTION IV. CONTROL

A. AUTHORITY OF THE PW SUPERVISOR. The PW Supervisor shall decide all questions which may arise as to the quality or acceptability of materials furnished and work performed; the manner of performance and rate of progress of the work; the interpretation of the plans and specifications; the acceptable fulfillment of the contract on the part of Contractor; and all questions as to claims and compensation.

The PW Supervisor's decision shall be final and he/she shall have executive authority to enforce and make effective such decisions and orders that the Contractor fails to carry out promptly.

B. PLANS. All authorized alterations affecting the requirements and information given on the approved plans shall be in writing. No changes shall be made to any plans or drawings after the same have been approved by the PW Supervisor, except by direction of the PW Supervisor.

C. SUPERINTENDENCE. Whenever the Contractor is not present on any part of the work where it may be desired to give directions, orders will be given by the PW Supervisor in writing and shall be received and obeyed by the superintendent or foreman in charge of the particular work in reference to which orders are given.

D. INSPECTION. The PW Supervisor shall at all times have access to the work during construction and shall be furnished with every reasonable facility for ascertaining full knowledge respecting the progress, workmanship, and character of materials used and employed in the work.

The Contractor shall give at least 48 hours notice in writing when he will require inspection on subgrade, formwork, concrete paving, etc. Inspection will routinely be carried out at pre-scheduled time established at the pre-construction meeting. Inspection will only be carried out for substantial quantities of work ready for inspection.

Whenever the Contractor varies the period during which work is carried on each day, he shall give due notice to the PW Supervisor, so that proper inspection may be provided. Any work done in the absence of the PW Supervisor is subject to rejection.

The inspection of the work shall not relieve the Contractor of any of his/her obligations to fulfill the contract as prescribed. Defective work shall be made good and unsuitable materials may be rejected, notwithstanding the fact that such defective work and unsuitable materials have been previously overlooked by the PW Supervisor and accepted or estimated for payment.

Working hours in the field are restricted to 8 AM through 5 PM, Monday through Thursday, excluding City Holidays, and shall constitute “normal working hours.” The Public Works Department Inspectors work on Friday’s and can be reached at 510-747-7900. In some locations, as noted on the Plans, normal working hours may be further restricted to avoid traffic and/or school-related conflicts. Any work in the field performed outside of these hours, including but not limited to construction, clean up, placement of traffic control devices, and mobilization/demobilization, shall be subject to removal and the Contractor fined \$5,000 per incident, unless such work has been previously authorized by the PW Supervisor in writing.

Inspection hours for construction shall be from 8 AM through 4 PM, Monday through Thursday, excluding City Holidays, and shall constitute “normal inspection hours.” The Public Works Department Inspectors work on Friday’s and can be reached at 510-747-7900. Unless prior written authorization has been received from the PW Supervisor, the Contractor shall not perform any work outside of these hours except for general clean up, demobilization, and placement of no-parking signs. The Contractor shall pay the salary and benefits, including overtime, of the City employee(s) for inspection of any work performed outside of the normal inspection hours. Projects financed in whole or in part with state funds shall be subject to inspection at all times by the Director of Public Works of the State of California, or his agents.

E. REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK. All work which is defective in its construction or deficient in any of the requirements of these specifications shall be remedied, or removed and replaced by the Contractor in an acceptable manner and no compensation will be allowed for such correction.

Any work done beyond the lines and grades shown on the plans or established by the PW Supervisor, or any extra work done without written authority, shall be considered as unauthorized and will not be paid for.

Upon failure on the part of the Contractor to comply forthwith with any order of the PW Supervisor made under the provisions of this article, the PW Supervisor shall have the authority to cause defective work to be remedied, or removed and replaced, and unauthorized work to be removed, and to deduct the cost thereof from any monies due or to become due the Contractor.

The fact that the work and materials have been inspected from time to time, and payments on account have been made, does not relieve the Contractor from the responsibility of replacing and making good any defective work or materials that may be discovered within one year from the date of the completion of the work by the Contractor and its acceptance by the City.

F. FINAL INSPECTION. Whenever the work provided and contemplated by the contract shall have been satisfactorily completed, the PW Supervisor will make the final inspection.

G. FINAL GUARANTEE. It is understood that the Contractor is skilled in the trade or calling necessary to perform the work set forth within the plans and specifications, and that the City of Alameda, not being skilled in such matters, relies upon the Contractor to do and perform all work, acts, and things necessary to carry out the contract in the most skilled and desirable manner, and the Contractor guarantees the workmanship and materials to be the best of their kind. The acceptance of any part or of the whole of the work by the City does not operate to release the Contractor or the Contractor's surety from said guarantee.

The Contractor shall be held responsible for and must make good any defects through faulty, improper or inferior workmanship or materials arising from or discovered in any part of the contract work within one year of the completion and acceptance of the same. The bond for faithful performance, furnished by the Contractor, shall cover such defects and protect the City of Alameda against any and all such defects.

Nothing in this section supersedes contractor obligations for repair and replacement of work pursuant to the Public Contract Code.

SECTION V. MEASUREMENTS AND PAYMENT

A. MEASUREMENTS AND PAYMENT. Payment for work done under the contract shall be made on the basis of the sums as calculated from the finally measured quantities of work done and the agreed unit and lump sum prices. Payment shall be full compensation for furnishing all labor, materials, tools and equipment and doing all the work necessary to construct the items for which payment is being made, complete in place as shown on the plans (if provided) and per manufacturer and described in the specifications.

Payment of all, or any part, of an estimate in writing may be withheld on account of any of the following:

1. Defective work not remedied;
2. Third-party claims against Contractor or City arising from the acts or omissions of Contractor or subcontractors;
3. Stop Notices;
4. Failure of Contractor to make timely payments due to subcontractors for material or labor;
5. Damage to the City or others for which Contractor is responsible;
6. Failure of Contractor to maintain, update, and submit record documents;
7. Failure of Contractor to submit schedules or their updates as required by the Contract Documents;
8. Performance of the work by Contractor without properly processed shop drawings;
9. Liquidated damages assessed;
10. Any other failure of Contractor to perform its obligations under the Contract Documents.

SECTION VI. QUANTITIES

The following preliminary estimate of the quantities of work to be done and materials to be furnished is approximate only, and the City of Alameda does not expressly or by implication agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work or to omit portions of the work that may be deemed necessary or expedient to the PW Supervisor.

Quantities shall be determined by the Contractor from plans and specifications, and /or pre-construction meeting and walk - through. The basis of award of contract shall be by the City of Alameda for the lowest and best bid that will best serve the City's need. The contract may be awarded at the discretion of the City or depending on available funding.

The City reserves the right to reject any, any portion, or all bids.

TABULATION OF PRELIMINARY ESTIMATE OF QUANTITIES

Item No.	Description	Quantity	Unit
1.	Removal and Replacement of Current Control Hardware	1	Lump Sum.
2.	Installation/ Upgrade of 29 FCU and all associated controls as per Controls Plan	1	Lump Sum.
3.	Installation of Supply and Return Sensor with all Fan Proof Current Sensor and associated controls as per Controls Plan	1	Lump Sum
4.	Installation and Programming New Thermostat control panels as per plan.	1	Lump Sum
5.	Programming and Commissioning System as per plan including start-up and user training	1	Lump sum
6.	Permits	1	Allowance

SECTION VII. CONSTRUCTION DETAILS

The construction details covered under this Section VII shall be Special Provisions.

A. MAINTAINING TRAFFIC. Attention is directed to Section 7-1.08, "Public Convenience", 7-1.09, "Public Safety", of the State of California Standard Specifications, and to Section II, Article O of these specifications.

B. EXTENT OF CONTRACT. The Contractor shall furnish all labor, material has herein specified, tools and equipment necessary and shall do all the work necessary to construct and put in complete order for use the construction project contemplated by these specifications, the various items, and in the approximate quantities tabulated in the Proposal (Exhibit A).

The work to be done shall be included in the service, repairs and updates in the installation unit price and all related services, including applying BMP's, and consist of furnishing all labor, vehicles, tools, equipment, materials, parts, components, except as herein specified, and doing all the work associated with the installation of HVAC Direct Digital Controls system at the Alameda City Hall in accordance with all plans and specifications.

C. PLANS. The following drawings are incorporated into these Specifications:

TITLE

1. Alameda City Hall HVAC Controls Replacement (10 sheets) Dated: August 23, 2013
2. Johnson Controls Cut Sheets (23 pages)

Exhibit ‘A’

BIDDER’S PROPOSAL FORM

Bidder’s Proposal

Subcontractors to be used in the Performance of this Contract (Form)

Security For Compensation Certificate

Important Instructions

BIDDER'S PROPOSAL

**REMOVE AND REPLACE DIRECT DIGITAL CONTROL (DDC) AT THE
ALAMEDA CITY HALL (2263 Santa Clara Avenue, Alameda, CA)**

SCOPE OF WORK:

The work involves the removal of existing Landis & Gyr System 600 control system and installation of JCI Facility Explorer and associated City provided Direct Digital Controls (DDC) of the building HVAC to automate the system using manufacturer engineered/installation design using JCU Facility Explorer Controls- Web Based BAC net control system utilizing FX PCG and PCX-4711 expansion Module control panels, replacing existing 29 FCU control modules, utilizing existing enclosures and wiring and running new cabling to new thermostats as per plans. Additional Supply and Return Air Sensors, Fan Proof Current Sensors, CO2 Monitoring using wireless t-stat. Control system to include programming, HVAC systems graphics, all miscellaneous supplies will be supplied by the contractor and all work will be completed under the personal supervision of the Controls Contractor. Controls Contractor shall certify all work as proper and complete. Under no circumstances shall the design, scheduling, coordination, programming, training, and warranty requirements for the project be delegated to a subcontractor. Contractor shall properly dispose of spoils and re-establish the site to the condition as it was prior to work. Contractor shall implement BMPs during the entire period of the project.

Contractor shall demonstrate proof of experience through product certification. Within 24 hours of request by City Representative, Contractor shall provide City with proof of completion of Johnson Controls, Inc. (JCI's) 301.

Contractor will provide license, labor, materials, services, skills, supervision, and necessary tools and equipment to insure that all work is executed in a professional workmanship manner. Contractor shall have the capability to perform and complete the services in all respects in accordance with the solicitation documents. Contractor hereby warrants that all services shall be performed in a timely and first-class workmanlike manner. Contractor shall keep the property and equipment free and clear at all times of litter and interferences. All materials, preparation and workmanship shall conform to the requirements of Standards of the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), the American Society of Mechanical Engineers (ASME), and Public Works Construction, Inc. latest version, and the plans and specification. **Contractor is required to contact and coordinate with Total Control, 1040 Commercial Street, Suite 106, San Jose, CA 95112, Ph.: (408) 441-1811 during the entire period of the project.**

Contractor shall provide the following services within the boundaries of the facility. **The work will be done at the Alameda City Hall located at 2263 Santa Clara Avenue, Alameda, CA 94501.**

Remedial Description

Contractor shall verify all field measurements prior to ordering, and verify measurements, as all structural measurements are factor-sized to fit as detailed in the plans. Procure all material prior to commencement of work.

Demolition/Removal

Demolition of the existing control system will occur after the new temperature control system is in place including new sensors and new field interface devices. Switch over from the existing control system to the new system will be fully coordinated with the Owner. A representative of the Owner will be on site during switch-over. The contractor shall minimize control system downtime during switch-over. Sufficient installation mechanics will be on site so that the entire switch-over can be accomplished in a reasonable time frame. Remove controls which do not remain as part of the building automation system, all associated abandoned wiring and conduit. The Owner will inform the Contractor of any equipment which is to be removed that will remain the property of the Owner. All other equipment which is removed will be properly disposed of by the Contractor. Using BMPs the Contractor will provide dust and noise protection to the residents, and secure the opening during transition time of installation of new controls, conduits or other dust/noise generating operations. Contractor shall remove debris from work site daily.

Preparation

On a daily basis Contractor shall fully complete all work begun. Flexible metallic conduit (max.3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduits shall be used in exterior locations and interior locations subject to moisture. All wiring will meet the most current code compliance and all wiring will be required to be installed in conduit. Following the provided engineered plans from the manufactures strict adherence shall be followed. Site conditions that may cause deviations from the design must be pre-approved by Controls Contractors before presenting it to the City Representative. Disruption of operations within the facility will not be approved without prior approval from the City representative and Public Works Representative. Waterline mounted sensors shall be removable without shutting down the system in which they are installed. All outside mounted enclosures shall meet the4 NEMA-4 rating. Industry standards and application/ project specific sequence of operation shall be established before switch over, become completely familiar with the existing sequence of operation and the set points shall be established after concurrence with City Representative and Controls Contractor. Contractor shall respond to any and all complaints from residents.

Installation

Installation shall adhere to engineered plans and applicable codes. All wiring, raceways, enclosures, junctions and splice boxes shall be installed in accordance with all applicable electrical codes and wire comply with equipment manufacturer's recommendations. All wire will be copper and meet the minimum wire size and insulation class listed in the most current wire class size. Programming set points shall be set to current standards and changes shall be approved by the City Representative and tested for at least two weeks prior to establishing finalized and acceptance from responsible party. Insert electronic thermostat and perform proper system operation. Cover all exposed walls and foam, insulate openings. Make necessary repairs to alterations to original finish, clean sites, remove debris, foam, and properly dispose of spoils.

**BIDDER'S PROPOSAL - REMOVE AND REPLACE HVAC DIRECT DIGITAL
CONTROLS AT ALAMEDA CITY HALL
(2263 Santa Clara Avenue, Alameda, CA 94501)**

Item No.	Approximate Quantity	Items with Unit Prices Written in Words	Unit Price	Total Price
1.	1 LS	Removal and Replacement of Current Control Hardware. @ _____ _____	\$ _____	\$ _____
		Per Lump Sum		
2.	1 LS	Installation of 29 FCU and all associated controls as per Controls Plan @ _____ _____	\$ _____	\$ _____
		Per Lump Sum		
3.	1 LS	Installation of Supply and Return, Fan Sensors controls as per Controls\ Plan @ _____ _____	\$ _____	\$ _____
		Per Lump Sum		
4.	1 LS	Installation and Programming of New Thermostat as per plan @ _____ _____	\$ _____	\$ _____
		Per Lump Sum		

Item No.	Approximate Quantity	Items with Unit Prices Written in Words	Unit Price	Total Price
5.	1 LS	Programming and Commissioning System as per plan including start-up and user training @ _____ _____ Per Lump Sum	\$ _____	\$ _____
6.	Allowance	Permits @ <u>Two Thousand Dollars</u> Allowance	<u>\$2,000.00</u>	<u>\$2,000.00</u>
TOTAL BID:			\$ _____	

The undersigned agrees to execute the contract required in said Specifications, to the satisfaction of the Council of the City of Alameda, with the necessary bonds, if any be required, within ten days, not including Sundays or legal holidays, after receiving notice that the contract has been awarded and is ready for signature; and further agrees that, in case of his default in any of the foregoing provisions, the proceeds of any check which may accompany his bid in lieu of a bid bond shall become the property of the City of Alameda as agreed and liquidated damages.

Firm Name (Please Print) _____

Signature of Person on Behalf of Firm _____

Business Address _____

City, State, Zip _____

Dated: _____

Phone No _____

Name	Title	Address
(Of Officers or Partners)		

Incorporated under the laws of the State of _____

Contractor's License No. _____ Expiration Date: _____

The signature above certifies that the foregoing information given on this document is true and correct under penalty of perjury. (Section 7028.15 California Business and Professionals Code.)

PROPOSED SUBCONTRACTORS

**Remove & Replace HVAC Direct Digital Controls at Alameda City Hall
P.W. # 08-14-11**

The Contractor shall perform with his organization, contract work amounting to not less than 60% of the original total contract price.

Pursuant to California Public Contract Code Section 4100 et seq., the following list gives the name, business address, and portion of work (description of work to be one) for each subcontractor who will perform work or labor, or render service to the prime contractor in or about the construction of the work or improvements, or a subcontractor licensed by the State of California who, under subcontract to the prime contractor, specifically fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of 1 percent of the prime contractor's total bid or, in the case of bids or offers for the construction of streets or highways, including bridges, in excess of one-half of 1 percent of the prime contractor's total bid or ten thousand dollars (\$10,000) whoever is greater. Additional supporting data may be attached to this page. Each page shall be sequentially numbered, headed "Proposed Subcontractors" and shall be signed.

NAME & LICENSE NO.	BUSINESS ADDRESS	PORTION OF WORK	% OF WORK	*STATUS	DIR NO.
-----------------------------------	-----------------------------	----------------------------	----------------------	----------------	--------------------

(This form may be duplicated if necessary to list additional subcontractors)

*STATUS M = Minority Owned Business Enterprise
 W = Women Owned Business Enterprise
 DV = Disabled Veteran
 (Required for federally funded project only.)

The Prime Contractor shall perform at least 60% of the work with his own forces.

SECURITY FOR COMPENSATION CERTIFICATE

(Required by Paragraph 1861, California Labor Code)

To:

I am aware of the provisions of Section 3700 of the Labor Code of the State of California which requires every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this contract.

(Signature of Bidder)

Business Address

Exhibit 'B'

CERTIFIED PAYROLL AND PREVAILING WAGES FORMS

Contractor's Certification Concerning Labor Standards and Prevailing Wage Requirements
Subcontractor's Certification Concerning Labor Standards and Prevailing Wage Requirements
Certification of Bidder Regarding Section 3 and Segregated Facilities
Certification of Proposed Subcontractor Regarding Section 3 and Segregated Facilities
Certification of Understanding and Authorization
Certification For Applicable Fringe Benefit Payments
Authorization For Deductions

EXHIBIT B: Certified Payroll Forms

CITY OF ALAMEDA PUBLIC WORKS DEPARTMENT CONTRACTOR'S CERTIFICATION CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS		
(Appropriate Recipient):	DATE	
c/o	PROJECT NUMBER (if any)	
	PROJECT NAME	
1. The undersigned, having executed a contract with _____ for the construction of the above-identified project acknowledges that: (a) The Labor Standards provisions are included in the aforesaid contract; (b) Correction of any infractions of the aforesaid conditions, including infractions any of his subcontractors and Any lower tier subcontractor, is his responsibility.		
2. He certifies that: (a) Neither he nor any firm, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary Labor, part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act as amended (40 U.S.C. 276u-2(a)). (b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.		
He agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards at Prevailing Wage Requirements executed by the subcontractors.		
He certified that:		
(a) The legal name and the business address of the undersigned are:		
(b) The undersigned is:		
(1) A SINGLE PROPRIETORSHIP		(3) A CORPORATION ORGANIZED IN THE STATE OF
(2) A PARTNERSHIP		(4) OTHER ORGANIZATION (Describe)
(c) The name, title and address of the owner, partners or officers of the undersigned are:		
NAME	TITLE	ADDRESS

EXHIBIT B: Certified Payroll Forms

(d) The names and address of all other persons, both natural and corporate, having a substantial interest in the undersigned, and the nature of the interest are (if none, so state):		
NAME	TITLE	ADDRESS
(e) The names, address and trade classification of all other building construction contractors in which the undersigned, has a substantial interest are (if none, so state):		
NAME	TITLE	ADDRESS

3. He certifies:
(a) The company's Federal Tax Identification Number is:
(b) The ethnicity of the company's owner(s) is/are:
(c) Is the company a female owned business: _____ Yes _____ No

Date _____

(Contractor)

By _____
(Signature)

WARNING

U.S. Criminal Code, Section 1010, Title 18, U.S. C. Provides in part "Whoever ..makes, passes, utters, or publishes any statement, knowing the same to be false .shall be fined not more than \$5,000 or imprisoned not more than two years or both."

EXHIBIT B: Certified Payroll Forms

CITY OF ALAMEDA PUBLIC WORKS DEPARTMENT SUBCONTRACTOR'S CERTIFICATION CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS	
(Appropriate Recipient):	DATE
c/o	PROJECT NUMBER (if any)
	PROJECT NAME
<p>1. The undersigned, having executed a contract with _____ for</p> <p>in the amount of \$_____ In the construction of the above-identified project, certifies that:</p> <p>(a) The Labor Standards provisions of the contract for construction are included in the aforesaid contract;</p> <p>(b) Neither he nor any firm, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary Labor, part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act as amended (40 U.S.C.. 276u-2(a)).</p> <p>(b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.</p>	
<p>2. He agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards at Prevailing Wage Requirements executed by the subcontractors.</p> <p>(a) The workmen will report for duty on or about _____ (date).</p>	
<p>3. He certifies that:</p> <p>(a) The legal name and the business address of the undersigned are:</p>	
<p>(b) The undersigned is:</p>	
(1) A SINGLE PROPRIETORSHIP	(3) A CORPORATION ORGANIZED IN THE STATE OF
(2) A PARTNERSHIP	(4) OTHER ORGANIZATION (Describe)
<p>(c) The name, title and address of the owner, partners or officers of the undersigned are:</p>	
NAME	ADDRESS

EXHIBIT B: Certified Payroll Forms

(d) The names and address of all other persons, both natural and corporate, having a substantial interest in the undersigned, and the nature of the interest are (if none, so state):		
NAME	TITLE	ADDRESS
(e) The names, address and trade classification of all other building construction contractors in which the undersigned, has a substantial interest are (if none, so state):		
NAME	TITLE	ADDRESS

3. He certifies:
(a) The company's Federal Tax Identification Number is:
(b) The ethnicity of the company's owner(s) is/are:
(c) Is the company a female owned business: _____ Yes _____ No

Date: _____ (Contractor)

By _____ (Signature)

WARNING

U.S. Criminal Code, Section 1010, Title 18, U.S. C. Provides in part "Whoevermakes, passes, utters, or publishes any statement, knowing the same to be falseshall be fined not more than \$5,000 or imprisoned not more than two years or both."

EXHIBIT B: Certified Payroll Forms

**CERTIFICATION OF BIDDER REGARDING SECTION 3
AND SEGREGATED FACILITIES**

Name of Prime Contractor

Project Name and Number

The undersigned hereby certified that:

- (a) Section 3 provisions are included in the Contract.
- (b) A written Section 3 plan was prepared and submitted as part of the bid proceedings (if bid equals or exceeds \$10,000).
- (c) No segregated facilities will be maintained.

Name

Name and Title of Signer (Print or Type)

Signature

Date

EXHIBIT B: Certified Payroll Forms

**CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING
SECTION 3 AND SEGREGATED FACILITIES**

Name of Subcontractor

Project Name and Number

The undersigned hereby certified that:

- (a) Section 3 provisions are included in the Contract.
- (b) A written Section 3 plan was prepared and submitted as part of the bid proceedings (if bid equals or exceeds \$10,000).
- (c) No segregated facilities will be maintained, as required by Title VI of the Civil Right Act of 1964.

Name _____
Name and Title of Signer (Print or Type)

Signature

Date

EXHIBIT B: Certified Payroll Forms

**CERTIFICATION OF UNDERSTANDING
AND AUTHORIZATION**

Project Name: _____

This is to certify that the principals, and the authorized payroll officer, below, have read and understand the Minutes of the Preconstruction Conference and the labor standards clauses pertaining to the subject project.

The following person(s) is designated as the payroll officer for the undersigned and is authorized to sign the Statement of Compliance which will accompany our weekly certified payroll reports for this project:

Designated Payroll Officer (Name)

Designated Payroll Officer (Signature)

Authorized by (Contractor/Subcontractor)

(Signature)

(Title)

(IRS) Employer Identification Number

(Date)

EXHIBIT B: Certified Payroll Forms
CERTIFICATION FOR APPLICABLE FRINGE BENEFIT PAYMENTS

Project Name: _____

Classification/ Fringe Benefits Provided	Name, Address and Telephone Number of Plan/Fund/Program
1. _____ Health and Welfare	_____
_____	_____
_____	_____
_____	_____
_____	_____
2. _____ Health and Welfare	_____
_____	_____
_____	_____
_____	_____
_____	_____
3. _____ Health and Welfare	_____
_____	_____
_____	_____
_____	_____
_____	_____

OR: (Check if applicable)

_____ I certify that I do not make payments to approved fringe benefit plans, funds or programs.

_____	By _____
Contractor/Subcontractor	Signature
_____	_____
Date	Title

EXHIBIT B: Certified Payroll Forms

AUTHORIZATION FOR DEDUCTIONS

The undersigned authorized deductions, as noted, to be made from their wages. It is understood that these deductions: (a) are in the interest of the employee; (b) is not a condition of employment; (c) there is no direct or indirect financial benefit accruing to the employee; and; (d) it is not otherwise forbidden by law.

Employee's Name	Employee's Signature	Date	Deduction
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Signature of Authorized Representative of Employee

Authorized Representative's Name and Title

Date

Exhibit 'C'

**SAMPLE CONTRACT AGREEMENT/
ADDITIONAL INSURED CERTIFICATE**

Sample of Contract Agreement

Additional Insured Certificates

CONTRACTOR AGREEMENT

THIS AGREEMENT, entered into this ____ day of _____, 2014 by and between CITY OF ALAMEDA, a municipal corporation (hereinafter referred to as "City"), and _____, a (California corporation, partnership, sole proprietor, individual) whose address is _____, hereinafter called the Contractor, in reference to the following:

RECITALS:

A. City is a municipal corporation duly organized and validly existing under the laws of the State of California with the power to carry on its business as it is now being conducted under the statutes of the State of California and the Charter of the City.

B. The heating, ventilation and air conditioning direct digital controls at City Hall need to be removed and replaced. The City reached out to Contractor's on the City's bidders list, posted the plans and specifications on the City's webpage. Bids were opened on _____(date) and the firm providing the lowest responsive bid was selected.

B. City and Contractor desire to enter into an agreement for the removal and replacement of HVAC direct digital controls at the Alameda City Hall, 2263 Santa Clara Avenue, Alameda, CA, in accordance with Specifications, Special Provisions and Plans, adopted therefor No. P.W. 08-14-11, and on file in the office of the Public Works Department.

NOW, THEREFORE, it is mutually agreed by and between the undersigned parties as follows:

1. **TERM:**

The term of this Agreement shall commence on the ____ day of _____ 2014, and shall terminate on the ____ day of _____ 2014, unless terminated earlier as set forth herein.

2. **SERVICES TO BE PERFORMED:**

Contractor agrees to do all necessary work at its own cost and expense, to furnish all labor, tools, equipment, materials, except as otherwise specified, and to do all necessary work included in Exhibit A as requested. The Contractor acknowledges that the work plan included in Exhibit A is tentative and does not commit the City to perform all tasks included therein.

3. **COMPENSATION TO CONTRACTOR:**

Contractor shall be compensated for services performed pursuant to this Agreement in the amount and manner set forth in Contractor's bid, which is attached hereto as Exhibit "A" and incorporated herein by this reference. Payment will be made in the same manner that claims of a like character are paid by the City, with checks drawn on the treasury of said City, to be taken from CIP 91228.

Payment will be made by the City in the following manner: On the first day of each month, Contractor shall submit a written estimate of the total amount of work done the previous month. However, the City reserves the right to adjust budget within and between tasks. Pricing and accounting of charges are to be according to the bid packet pricing, unless mutually agreed to in writing.

Payment shall be made for 95% of the value of the work completed as determined by the City. The City shall retain 5% of the value of the work as partial security for the completion of the work by Contractor. Retained amounts shall be paid to Contractor within 60 days of acceptance by the City of the project. Payment shall not be construed as acceptance of defective work. No interest will be paid to Contractor on retained funds.

Compensation for bid is \$_____.

Prompt Payment Of Withheld Funds To Subcontractors: The City shall hold retainage from the prime contractor and shall make prompt and regular incremental acceptances of portions, as determined by the agency of the contract work and pay retainage to the prime contractor based on these acceptances. The prime contractor or subcontractor shall return all monies withheld in retention from all subcontractors within 10 days after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work by the agency. Any delay or postponement of payment may take place only for good cause and with the agency's prior written approval. Any violation of these provisions shall subject the violating prime contractor to the penalties, sanctions, and other remedies specified in Section 7108.5 of the California Business Professions Code. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise, available to the prime contractor or subcontractor in the event of a dispute involving late payment, or nonpayment by the contractor, or deficient subcontractor's performance, or noncompliance by a subcontractor. This clause applies to both DBE and non-DBE subcontractors.

4. **TIME IS OF THE ESSENCE:**

Contractor and City agree that time is of the essence regarding the performance of this Agreement.

5. **STANDARD OF CARE:**

Contractor agrees to perform all services hereunder in a manner commensurate with the prevailing standards of like professionals in the San Francisco Bay Area and agrees that all services shall be performed by qualified and experienced personnel who are not employed by the City nor have any contractual relationship with City.

6. **INDEPENDENT PARTIES:**

City and Contractor intend that the relationship between them created by this Agreement is that of employer-independent contractor. The manner and means of conducting the work are under the control of Contractor, except to the extent they are limited by statute, rule or regulation and the express terms of this Agreement. No civil service status or other right of employment will be acquired by virtue of Contractor's services. None of the benefits provided by City to its

employees, including but not limited to unemployment insurance, workers' compensation plans, vacation and sick leave are available from City to Contractor, its employees or agents. Deductions shall not be made for any state or federal taxes, FICA payments, PERS payments, or other purposes normally associated with an employer-employee relationship from any fees due Contractor. Payments of the above items, if required, are the responsibility of Contractor.

7. **IMMIGRATION REFORM AND CONTROL ACT (IRCA):**

Contractor assumes any and all responsibility for verifying the identity and employment authorization of all of its employees performing work hereunder, pursuant to all applicable IRCA or other federal, or state rules and regulations. Contractor shall indemnify and hold City harmless from and against any loss, damage, liability, costs or expenses arising from any noncompliance of this provision by Contractor.

8. **NON-DISCRIMINATION:**

Consistent with City's policy that harassment and discrimination are unacceptable employer/employee conduct, Contractor agrees that harassment or discrimination directed toward a job applicant, a City employee, or a citizen by Contractor or Contractor's employee on the basis of race, religious creed, color, national origin, ancestry, handicap, disability, marital status, pregnancy, sex, age, or sexual orientation will not be tolerated. Contractor agrees that any and all violations of this provision shall constitute a material breach of this Agreement.

9. **HOLD HARMLESS:**

Contractor shall indemnify, defend, and hold harmless City, its City Council, boards, commissions, officials, and employees ("Indemnitees") from and against any and all loss, damages, liability, claims, suits, costs and expenses whatsoever, including reasonable attorneys' fees ("Claims"), arising from or in any manner connected to Contractor's negligent act or omission, whether alleged or actual, regarding performance of services or work conducted or performed pursuant to this Agreement. If Claims are filed against Indemnitees which allege negligence on behalf of the Contractor, Contractor shall have no right of reimbursement against Indemnitees for the costs of defense even if negligence is not found on the part of Contractor. However, Contractor shall not be obligated to indemnify Indemnitees from Claims arising from the sole or active negligence or willful misconduct of Indemnitees.

10. **INSURANCE:**

On or before the commencement of the terms of this Agreement, Contractor shall furnish City with certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of insurance coverage in compliance with paragraphs 10A, B, C and D. Such certificates, which do not limit Contractor's indemnification, shall also contain substantially the following statement: "Should any of the above insurance covered by this certificate be canceled or coverage reduced before the expiration date thereof, the insurer affording coverage shall provide thirty (30) days' advance written notice to the City of Alameda by certified mail, "Attention: Risk Manager." It is agreed that Contractor shall maintain in force at all times during the performance of this Agreement all appropriate coverage of insurance required by this Agreement with an insurance company that is acceptable to City and licensed to do insurance business in the State of California. Endorsements naming the City as additional insured shall be submitted with the insurance certificates.

A. COVERAGE:

Contractor shall maintain the following insurance coverage:

(1) **Workers' Compensation:**

Statutory coverage as required by the State of California.

(2) **Liability:**

Commercial general liability coverage in the following minimum limits:

Bodily Injury: \$1,000,000 each occurrence
 \$2,000,000 aggregate - all other

Property Damage: \$1,000,000 each occurrence
 \$2,000,000 aggregate

If submitted, combined single limit policy with aggregate limits in the amounts of \$2,000,000 will be considered equivalent to the required minimum limits shown above.

(3) **Automotive:**

Comprehensive automobile liability coverage in the following minimum limits:

Bodily injury: \$1,000,000 each occurrence
Property Damage: \$1,000,000 each occurrence
 or
Combined Single Limit: \$2,000,000 each occurrence

B. SUBROGATION WAIVER:

Contractor agrees that in the event of loss due to any of the perils for which it has agreed to provide comprehensive general and automotive liability insurance, Contractor shall look solely to its insurance for recovery. Contractor hereby grants to City, on behalf of any insurer providing comprehensive general and automotive liability insurance to either Contractor or City with respect to the services of Contractor herein, a waiver of any right to subrogation which any such insurer of said Contractor may acquire against City by virtue of the payment of any loss under such insurance.

C. FAILURE TO SECURE:

If Contractor at any time during the term hereof should fail to secure or maintain the foregoing insurance, City shall be permitted to obtain such insurance in the Contractor's name or as an agent of the Contractor and shall be compensated by the Contractor for the costs of the insurance premiums at the maximum rate permitted by law and computed from the date written notice is received that the premiums have not been paid.

D. ADDITIONAL INSURED:

City, its City Council, boards and commissions, officers, and employees shall be named as an additional insured under all insurance coverages, except worker's compensation insurance.

The naming of an additional insured shall not affect any recovery to which such additional insured would be entitled under this policy if not named as such additional insured. An additional insured named herein shall not be held liable for any premium, deductible portion of any loss, or expense of any nature on this policy or any extension thereof. Any other insurance held by an additional insured shall not be required to contribute anything toward any loss or expense covered by the insurance provided by this policy.

E. **SUFFICIENCY OF INSURANCE:**

The insurance limits required by City are not represented as being sufficient to protect Contractor. Contractor is advised to consult Contractor's insurance broker to determine adequate coverage for Contractor.

Contractor shall furnish the following bonds from a bonding company acceptable to the City Attorney. Faithful Performance Bond and Labor and Material Bond are only required for work over \$25,000. Therefore, those estimates that are under \$25,000 will not need to budget for the bond premiums and those estimates over \$25,000 will need to be sure to budget for the bond premiums.

The insurance limits required by City are not represented as being sufficient to protect Contractor. Contractor is advised to consult Contractor's insurance broker to determine adequate coverage for Contractor.

11. **BONDS:**

Contractor shall furnish the following bonds from a bonding company acceptable to the City Attorney:

A. **Faithful Performance:**

A bond in the amount of 100% of the total contract price guaranteeing the faithful performance of this contract, and

B. **Labor and Materials:**

A bond for labor and materials in the amount of 100% of the total contract price.

12. **PROHIBITION AGAINST TRANSFERS:**

Contractor shall not assign, sublease, hypothecate, or transfer this Agreement, or any interest therein, directly or indirectly, by operation of law or otherwise, without prior written consent of City. Any attempt to do so without said consent shall be null and void, and any assignee, sublessee, hypothecate or transferee shall acquire no right or interest by reason of such attempted assignment, hypothecation or transfer. However, claims for money by Contractor from City under this Agreement may be assigned to a bank, trust company or other financial institution without prior written consent. Written notice of such assignment shall be promptly furnished to City by Contractor.

The sale, assignment, transfer or other disposition of any of the issued and outstanding capital stock of Contractor, or of the interest of any general partner or joint venturer or syndicate member or cotenant, if Contractor is a partnership or joint venture or syndicate or cotenancy, which shall result in changing the control of Contractor, shall be construed as an assignment of this Agreement. Control means fifty percent (50%) or more of the voting power of the corporation.

13. **SUBCONTRACTOR APPROVAL:**

Unless prior written consent from City is obtained, only those people and subcontractors whose names are listed in Contractor's bid shall be used in the performance of this Agreement.

Requests for additional subcontracting shall be submitted in writing, describing the scope of work to be subcontracted and the name of the proposed subcontractor. Such request shall set forth the total price or hourly rates used in preparing estimated costs for the subcontractor's services. Approval of the subcontractor may, at the option of City, be issued in the form of a Work Order.

In the event that Contractor employs subcontractors, such subcontractors shall be required to furnish proof of workers' compensation insurance and shall also be required to carry general and automobile liability insurance in reasonable conformity to the insurance carried by Contractor. In addition, any work or services subcontracted hereunder shall be subject to each provision of this Agreement.

14. **PERMITS AND LICENSES:**

Contractor, at its sole expense, shall obtain and maintain during the term of this Agreement, all appropriate permits, certificates and licenses, including a City Business License, that may be required in connection with the performance of services hereunder.

15. **REPORTS:**

Each and every report, draft, work product, map, record and other document reproduced, prepared or caused to be prepared by Contractor pursuant to or in connection with this Agreement shall be the exclusive property of City.

No report, information nor other data given to or prepared or assembled by Contractor pursuant to this Agreement shall be made available to any individual or organization by Contractor without prior approval by City.

Contractor shall, at such time and in such form as City may require, furnish reports concerning the status of services required under this Agreement.

16. **RECORDS:**

Contractor shall maintain complete and accurate records with respect to sales, costs, expenses, receipts and other such information required by City that relate to the performance of services under this Agreement.

Contractor shall maintain adequate records of services provided in sufficient detail to permit an evaluation of services. All such records shall be maintained in accordance with generally accepted accounting principles and shall be clearly identified and readily accessible. Contractor shall provide free access to such books and records to the representatives of City or its designees at all proper times, and gives City the right to examine and audit same, and to make transcripts therefrom as necessary, and to allow inspection of all work, data, documents, proceedings and activities related to this Agreement. Such records, together with supporting

documents, shall be kept separate from other documents and records and shall be maintained for a period of three (3) years after receipt of final payment.

If supplemental examination or audit of the records is necessary due to concerns raised by City's preliminary examination or audit of records, and the City's supplemental examination or audit of the records discloses a failure to adhere to appropriate internal financial controls, or other breach of contract or failure to act in good faith, then Contractor shall reimburse City for all reasonable costs and expenses associated with the supplemental examination or audit.

17. **NOTICES:**

All notices, demands, requests or approvals to be given under this Agreement shall be given in writing and conclusively shall be deemed served when delivered personally or on the second business day after the deposit thereof in the United States Mail, postage prepaid, registered or certified, addressed as hereinafter provided.

All notices, demands, requests, or approvals from Contractor to City shall be addressed to City at:

City of Alameda
Public Works Department
Maintenance Service Center
1616 Fortmann Way
Alameda, CA 94501
Attention: Jesse Barajas, Public Works Superintendent
Ph: (510) 747-7900 / Fax: (510) 521-8762

All notices, demands, requests, or approvals from City to Contractor shall be addressed to Contractor at:

Ph: () / Fax: ()

18. **LAWS TO BE OBSERVED.**

The Contractor shall keep himself fully informed of all existing and future state and federal laws and all municipal ordinances and regulations of the City of Alameda which in any manner affect those engaged or employed in the work, or the materials used in the work, or which in any way affect the conduct of the work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

19. **PREVAILING WAGES:**

a. The Contractor is aware of the requirements of California Labor Code sections 1720 et seq. and 1770 et seq., as well as California Code of Regulations, Title 8, section 16000 et seq. ("Prevailing Wage Laws"), which require the payment of prevailing wage rates and the

performance of other requirements on certain “public works” projects. Since this Project involves a “public work” project, as defined by the Prevailing Wage Laws, Contractor shall fully comply with such Prevailing Wage Laws. Contractor’s failure to comply with the Prevailing Wage Law may constitute a default under the contract for performance of the Work which would entitle the City to rescind the contract or exercise other remedies as provided by law or the contract.

b. The Contractor shall obtain a copy of the prevailing rates of per diem wages at the commencement of this Contract from the website of the Division of Labor Statistics and Research of the Department of Industrial Relations located at www.dir.ca.gov/dlsr/. In the alternative, the Contractor may view a copy of the prevailing rates of per diem wages at the City’s Public Works Department, Building 1, 950 W. Mall Square, Room 110, Alameda. The Contractor shall make copies of the prevailing rates of per diem wages for each craft, classification or type of worker needed to perform work on the Project available to interested parties upon request, and shall post copies at the Contractor’s principal place of business and at the Project site. The Contractor shall defend, indemnify and hold the City, its elected officials, officers, employees and agents free and harmless from any claims, liabilities, costs, penalties or interest arising out of any failure or alleged failure to comply with the Prevailing Wage Laws and/or the City’s Labor Compliance Program (hereinafter referred to as "LCP"), if any.

c. If this project is funded in whole or in part with Federal monies and subject to the provisions of the Davis-Bacon Act, the successful bidder shall pay not less than the wage rates determined by the Secretary of Labor. The Federal wage rates shall apply unless the State wage rates are higher. The Federal Wage Rates applicable to the contract are those current within ten (10) days of the bid due date.

d. The Contractor and all subcontractors shall pay and shall cause to be paid each worker engaged in work on the Project not less than the general prevailing rate of *per diem* wages determined by the Director, regardless of any contractual relationship which may be alleged to exist between the Contractor or any Subcontractor and such workers.

e. The Contractor and all subcontractors shall pay and shall cause to be paid to each worker needed to execute the work on the Project travel and subsistence payments, as such travel and subsistence payments are defined in the applicable collective bargaining Contracts filed with the Department of Industrial Relations in accordance with Labor Code § 1773.8.

f. If during the period any bid for work on this Project remains open, the Director of Industrial Relations determines that there has been a change in any prevailing rate of *per diem* wages in the locality in which this public work is to be performed, such change shall not alter the wage rates in the Notice calling for Bids or the contract subsequently awarded.

g. Pursuant to Labor Code § 1775, the Contractor shall as a penalty to the City, forfeit Fifty Dollars (\$50.00) for each calendar day, or portion thereof, for each worker paid less than the prevailing rate of *per diem* wages, determined by the Director, for such craft or classification in which such worker is employed for any public work done under the Contract by the Contractor or by any Subcontractor under it. The amount of the penalty shall be determined by the Labor Commission. In addition, the difference between such prevailing rate of *per diem* wage and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing rate of *per diem* wage shall be paid to each work by the Contractor.

h. Any worker employed to perform work on the Project, which work is not covered by any craft or classification listed in the general prevailing rate of *per diem* wages determined

by the Director, shall be paid not less than the minimum rate of wages specified therein for the craft or classification which most nearly corresponds to the work on the Project to be performed by them, and such minimum wage rate shall be retroactive to time of initial employment of such person in such craft or classification.

i. For those crafts or job classifications requiring special prevailing wage determinations, please contact the Division of Labor Statistics and Research, Prevailing Wage Unit, P.O. Box 420603, San Francisco, CA 94142-0603, (415) 703-4774 or check out the web site at www.dir.ca.gov.

20. **HOURS OF LABOR.**

a. As provided in Article 3 (commencing at § 1810), Chapter 1, Part 7, Division 2 of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by the Contractor or by any Subcontractor on any subcontract under this Contract, upon the work or upon any part of the work contemplated by this Contract, is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided. Notwithstanding the provision hereinabove set forth, work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week shall be permitted upon this public work provided that the employees' compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1-1/2) times the basic rate of pay.

b. The Contractor shall pay to the City a penalty of Twenty-five Dollars (\$25.00) for each worker employed in the execution of this Contract by the Contractor, or by any Subcontractor, for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one (1) calendar week, in violation of the provisions of Article 3 (commencing at § 1810), Chapter 1, Part 7, Division 2 of the Labor Code, unless compensation for the workers so employed by Contractor is not less than one and one-half (1-1/2) times the basic rate of pay for all hours worked in excess of eight (8) hours per day.

c. Holiday and overtime work, when permitted by law, shall be paid for at a rate of at least one and one-half (1½) times the above specified rate of *per diem* wages, unless otherwise specified. Holidays shall be defined in the Collective Bargaining Contract applicable to each particular craft, classification, or type of worker employed.

21. **CERTIFIED PAYROLL.**

a. Contractor's attention is directed to California Labor Code Section 1776, which requires Contractor and any subcontractors to keep an accurate payroll record and which imposes inspection requirements and penalties for non-compliance. Certified payrolls shall be prepared and submitted weekly to the Labor Compliance Officer, Gail Carlson, Public Works Department, 950 W. Mall Square, Room 110, Alameda, CA 94501 by the Contractor and each subcontractor. Contractor is responsible for the submission of copies of payrolls by all subcontractors. Each payroll submitted shall be accompanied by a "Statement of Compliance", signed by the Contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract, and shall certify the following:

b. That the payroll for each payroll period contains the name, social security number, and address of each employee, his or her correct classification, including applicable area and group code, hourly rates of wages paid, daily and weekly number of hours worked,

deductions made and actual wages paid, and that such information is correct and complete;

c. That such laborer or mechanic (including each helper, apprentice and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions; and

d. That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

e. If the Contractor or a subcontractor does not work during the payroll period, a Statement of Non-Working Days must be submitted for each day not worked.

f. In the event of noncompliance with the requirements of such section after 10 Days written notice specifying in what respects compliance is required, the CONTRACTOR shall forfeit as a penalty to the CITY, \$25.00 for each calendar Day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due.

22. **APPRENTICES.**

a. Attention is directed to the provisions in sections 1777.5 and 1777.6 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under him on contracts greater than \$30,000 or 20 working days. The Contractor and any subcontractor under him shall comply with the requirements of Sections 1777.5 and 1777.6 in the employment of apprentices.

b. Section 1777.5 requires the Contractor or subcontractor employing workers in any apprenticeable occupation to apply to the joint apprenticeship committee nearest the site of the public works project, and which administers the apprenticeship program in that trade, for a certificate of approval, if they have not previously applied and are covered by the local apprenticeship standards.

c. The Contractor is required to make contributions to funds established for the administration of apprenticeship programs if: (1) the Contractor employs registered apprentices or journeymen in any apprenticeable trade on such contracts and if other contractors on the public works site are making such contributions; or (2) if the Contractor is not a signatory to an apprenticeship fund and if the funds administrator is unable to accept Contractor' required contribution. The Contractor or subcontractor shall pay a like amount to the California Apprenticeship Council.

d. Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, ex-officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

23. **LABOR DISCRIMINATION.**

No discrimination shall be made in the employment of persons upon public works because of the race, color, sex, religion, age, national origin, sexual orientation, or physical disability of such persons and every Contractor for public works violating this section is subject to all the penalties imposed for a violation of the provisions of the Labor Code, and, in particular, Section 1735.

24. **REGISTRATION OF CONTRACTORS.**

Before submitting bids, contractors shall be licensed in accordance with the provisions of Chapter 9, Division 3, of the Business and Professional Code of the State of California.

25. **URBAN RUNOFF MANAGEMENT:**

The Contractor shall avoid creating excess dust when breaking asphalt or concrete and during excavation and grading. If water is used for dust control, contractor shall use as little as necessary. Contractor shall take all steps necessary to keep wash water out of the streets, gutters and storm drains.

The Contractor shall develop and implement erosion and sediment control to prevent pollution of storm drains. Such control includes but is not limited to:

A. Use storm drain inlet protection devices such as sand bag barriers, filter fabric fences, block and gravel filters. (Block storm drain inlets prior to the start of the rainy season (October 15), in site de-watering activities and saw-cutting activities; shovel or vacuum saw-cut slurry and remove from the site).

B. Cover exposed piles of soil or construction material with plastic sheeting. All construction materials must be stored in containers.

C. Sweep and remove all materials from paved surfaces that drain to streets, gutters and storm drains prior to rain as well as at the end of the each work day. At the completion of the project, the street shall be washed and the wash water shall be collected and disposed of offsite in an appropriate location.

D. After breaking old pavement, Contractor shall remove all debris to avoid contact with rainfall or runoff.

E. Contractor shall maintain a clean work area by removing trash, litter, and debris at the end of each workday. Contractor shall also clean up any leaks, drips, and other spills as they occur.

The objective is to ensure that the City and County of Alameda County-Wide Clean Water Program is adequately enforced. These controls should be implemented prior to the start of construction, up-graded as required, maintained during construction phases to provide adequate protection, and removed at the end of construction.

These recommendations are intended to be used in conjunction with the State's Best Management Practices Municipal and Construction Handbooks, local program guidance materials from municipalities, Section 7.1.01 of the Standard Specifications and any other appropriate documents on storm water quality controls for construction.

Failure to comply with this program will result in the issuance of noncompliance notices, citations, project stop orders or fines. The fine for noncompliance of the above program is two

hundred and fifty dollars (\$250.00) per occurrence per day. The State under the Federal Clean Water Act can also impose a fine on the contractor, pursuant to Cal. Water Code §13385.

26. **COMPLIANCE WITH MARSH CRUST ORDINANCE:**

Contractor shall perform all excavation work in compliance with the City's Marsh Crust Ordinance as set forth at Section 13-56 of the Municipal Code. Prior to performing any excavation work, Contractor shall verify with the Building Official whether the excavation work is subject to the Marsh Crust Ordinance. Contractor shall apply for and obtain permits from Building Services on projects deemed to be subject to the Marsh Crust Ordinance.

27. **COMPLIANCE WITH THE CITY'S INTEGRATED PEST MANAGEMENT POLICY:**

The Contractor shall follow the requirements of the City's Integrated Pest Management (IPM) Policy to ensure the City is in compliance with its Municipal Regional Stormwater NPDES Permit, Order No. R2-2009-0074, issued by the San Francisco Bay Regional Water Quality Control Board.

The Contractor shall follow the requirements of the City's Integrated Pest Management (IPM) Policy to ensure the City is in compliance with its Municipal Regional Stormwater NPDES Permit, Order No. R2-2009-0074, issued by the San Francisco Bay Regional Water Quality Control Board.

- Contractor shall use the most current IPM technologies available to ensure the long-term prevention or suppression of pest problems and to minimize negative impacts on the environment, non-target organisms, and human health for the control or management of pests in and around City buildings and facilities, parks and golf courses, urban landscape areas, rights-of-way, and other City properties.
- Contractor will consider the City IPM Policy's hierarchy of options or alternatives listed below, in the following order before recommending the use of or applying any pesticide on City property: (1)
 1. No controls (e.g. tolerating the pest infestation, use of resistant plant varieties or allowing normal life cycle of weeds);
 2. Physical or mechanical controls (e.g. hand labor, mowing, exclusion);
 3. Cultural controls (e.g. mulching, disking, alternative vegetation) and good housekeeping (e.g. cleaning desk area);
 4. Biological controls (e.g., natural enemies or predators); (5)
 5. Reduced-risk chemical controls (e.g., soaps or oils);
 6. Other chemical controls.
- Prior to applying chemical controls the contractor shall complete a checklist for the City's pre-approval that explains why a chemical control is necessary. For annual contracts that require regular application of chemical controls the contractor shall submit one checklist prior to the initiation of the project demonstrating that the hierarchy has been reviewed and no other options exist. (Attached as Exhibit ____). Additionally, the contractor shall provide documentation to the City's project manager of the implementation of the IPM techniques hierarchy described in the City's IPM Policy.

- ❑ Contractor shall avoid the use of the following pesticides that threaten water quality, human health and the environment:
 1. Acute Toxicity Category I chemicals as identified by the Environmental Protection Agency (EPA)
 2. Organophosphate pesticides (e.g., those containing Diazinon, chlorpyrifos or malathion)
 3. Pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin), carbamates (e.g., carbaryl), and fipronil
 4. Copper-based pesticides unless their use is judicious, other approaches and techniques have been considered, and the threat of impact to water quality is prevented.
- ❑ Contractor shall sign the Contractor Verification Form (attached as Exhibit __) indicating the intent to implement the City's IPM Policy, and return a signed copy to the City's project manager.
- ❑ Contractor shall provide to the City's project manager an annual Report of all pesticide usage in support of City operations including pesticide name, active ingredient(s), target pest(s), the total amounts used and the reasons for any increase in use of any pesticide.
- ❑ Contractor shall provide a copy of any current IPM certifications(s) to the City's project manager prior to initiation of the service work.

A copy of the City's IPM Policy may be obtained from the City's project manager and is also on file with the City Clerk. If this agreement pertains to the use of any items listed above, the Contractor will need to fill out and send in the Contractor Verification Form and Contractor Check List.

28. **TERMINATION:**

In the event Contractor fails or refuses to perform any of the provisions hereof at the time and in the manner required hereunder, Contractor shall be deemed in default in the performance of this Agreement. If such default is not cured within a period of two (2) days after receipt by Contractor from City of written notice of default, specifying the nature of such default and the steps necessary to cure such default, City may terminate the Agreement forthwith by giving to the Contractor written notice thereof.

City shall have the option, at its sole discretion and without cause, of terminating this Agreement by giving seven (7) days' prior written notice to Contractor as provided herein. Upon termination of this Agreement, each party shall pay to the other party that portion of compensation specified in this Agreement that is earned and unpaid prior to the effective date of termination.

29. **COMPLIANCES:**

Contractor shall comply with all laws, state or federal and all ordinances, rules and regulations enacted or issued by City.

30. **CONFLICT OF LAW:**

This Agreement shall be interpreted under, and enforced by the laws of the State of California excepting any choice of law rules which may direct the application of laws of another jurisdiction. The Agreement and obligations of the parties are subject to all valid laws, orders, rules, and regulations of the authorities having jurisdiction over this Agreement (or the successors of those authorities.) Any suits brought pursuant to this Agreement shall be filed with the courts of the County of Alameda, State of California.

31. **ADVERTISEMENT:**

Contractor shall not post, exhibit, display or allow to be posted, exhibited, displayed any signs, advertising, show bills, lithographs, posters or cards of any kind pertaining to the services performed under this Agreement unless prior written approval has been secured from City to do otherwise.

32. **WAIVER:**

A waiver by City of any breach of any term, covenant, or condition contained herein, shall not be deemed to be a waiver of any subsequent breach of the same or any other term, covenant, or condition contained herein, whether of the same or a different character.

33. **INTEGRATED CONTRACT:**

This Agreement represents the full and complete understanding of every kind or nature whatsoever between the parties hereto, and all preliminary negotiations and agreements of whatsoever kind or nature are merged herein. No verbal agreement or implied covenant shall be held to vary the provisions hereof. Any modification of this Agreement will be effective only by written execution signed by both City and Contractor.

34. **INSERTED PROVISIONS:**

Each provision and clause required by law to be inserted into the Agreement shall be deemed to be enacted herein, and the Agreement shall be read and enforced as though each were included herein. If through mistake or otherwise, any such provision is not inserted or is not correctly inserted, the Agreement shall be amended to make such insertion on application by either party.

35. **CAPTIONS:**

The captions in this Agreement are for convenience only, are not a part of the Agreement and in no way affect, limit or amplify the terms or provisions of this Agreement.

IN WITNESS WHEREOF, the parties have caused the Agreement to be executed on the day and year first above written.

CONTRACTOR
(Corporation)

CITY OF ALAMEDA
A Municipal Corporation

Name
Title

John A. Russo
City Manager

RECOMMENDED FOR APPROVAL

Name
Title

Robert G. Haun
Public Works Director

APPROVED AS TO FORM:
City Attorney

Andrico Penick
Assistant City Attorney

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 10 10 93

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - OWNERS, LESSEES or CONTRACTORS FORM B

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization:

City of Alameda
Public Works Department
Alameda Point, Building 1
950 West Mall Square, Room 110
Alameda, CA 94501-7558

SAMPLE

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of your ongoing operations performed for that insured.

REF:

The City of Alameda, its City Council, boards and commissions, officers & employees are additional insured for work done on their behalf by the named insured.

PRIMARY INSURANCE:

IT IS UNDERSTOOD AND AGREED THAT THIS INSURANCE IS PRIMARY AND ANY OTHER INSURANCE MAINTAINED BY THE ADDITIONAL INSURED SHALL BE EXCESS ONLY AND NOT CONTRIBUTING WITH THIS INSURANCE.

SEVERABILITY OF INTEREST:

IT IS AGREED THAT EXCEPT WITH RESPECT TO THE LIMIT OF INSURANCE, THIS COVERAGE SHALL APPLY AS IF EACH ADDITIONAL INSURED WERE THE ONLY INSURED AND SEPARATELY TO EACH INSURED AGAINST WHOM CLAIM IS MADE OR SUIT IS BROUGHT.

WAIVER OF SUBROGATION:

IT IS UNDERSTOOD AND AGREED THAT THE COMPANY WAIVES THE RIGHT OF SUBROGATION AGAINST THE ABOVE ADDITIONAL INSURED (S), BUT ONLY AS RESPECTS THE JOB OR PREMISES DESCRIBED IN THE CERTIFICATE ATTACHED HERETO.

NOTICE OF CANCELLATION:

IT IS UNDERSTOOD AND AGREED THAT IN THE EVENT OF CANCELLATION OF THE POLICY FOR ANY REASON OTHER THAN NON-PAYMENT OF PREMIUM, 30 DAYS WRITTEN NOTICE WILL BE SENT TO THE CERTIFICATE HOLDER BY MAIL. IN THE EVENT THE POLICY IS CANCELED FOR NON-PAYMENT OF PREMIUM, 10 DAYS WRITTEN NOTICE WILL BE SENT TO THE ABOVE.

Exhibit 'D

EMERGENCY FORM

EXHIBIT "D"

Emergency Form

During the course of the work and/or while the contractor has responsibility for the project, emergencies may arise where it is necessary to repair or replace safety devices, or install additional safety devices, or take preventative measures necessary for public safety. Such corrections as may be necessary are the contractor's responsibility and he, or his representative, will be called upon in such emergencies.

Please fill in the following information and submit it to the City Engineer/PW Supervisor.

CONTRACTOR'S NAME _____

CONTRACTOR'S PHONE NUMBER _____

PROJECT SUPERINTENDENT _____

CONTACT IN THE EVENT OF EMERGENCY: _____

Name: _____

Phone Number: _____

In cases where the contractor, or his representative, cannot be contacted or will not take the necessary actions, the City Public Works Department will be notified and the necessary repairs, corrections, or changes will be made. The contractor will be billed for such remedial action. Charges will include the cost of labor at applicable rates, the City's normal overhead factor, the rental of any equipment or safety devices placed during the emergency that are damaged or stolen, or otherwise not returned to the City, will be billed to the contractor.

Scheduled starting date _____

Scheduled completion date _____

Job Name Remove and Replace HVAC Direct Digital Controls at Alameda City Hall

EXHIBIT “E”

PERFORMANCE BOND FORM

Performance Bond Form

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name of Owner)

(Address of Owner)

hereinafter called OWNER, in the penal sum of _____ Dollars. (\$ _____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 2014, a copy of which is hereto attached and made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PERFORMANCE BOND FORM

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed on _____ counterparts, each one

of which shall be deemed an original, this the _____ day of _____, 2014.

ATTEST:

Principal
By: _____
Principal Secretary

(SEAL)

(Witness as to Principal) (Address)

(Address)

(Surety)

ATTEST:

Surety Secretary
(SEAL) By: _____

(Witness as to Surety) Attorney-in-fact

(Address) (Address)

NOTE: Date of BOND must not be prior to date of Contract.
If the CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

Exhibit 'F'

PAYMENT BOND FORM

PAYMENT BOND FORM

KNOW ALL MEN BY THESE PRESENTS: that

a _____, hereinafter called Principal, and

hereinafter called Surety, are held and firmly bound unto _____

hereinafter called OWNER, in the penal sum of _____ Dollars. (\$ _____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 2014, a copy of which is hereto attached and made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PAYMENT BOND FORM

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed on _____ counterparts, each one
(Number)
of which shall be deemed an original, this the _____ day of _____, 2014.

ATTEST: _____
Principal

By: _____
Principal Secretary
(SEAL)

(Witness as to Principal) (Address)

(Address)

(Surety)

ATTEST: _____
Surety Secretary
(SEAL)

By: _____
(Witness as to Surety) Attorney-in-fact

(Address) (Address)

NOTE: Date of BOND must not be prior to date of Contract.
If the CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

Exhibit 'G'

BIDDER'S BOND FORM

EXHIBIT 'G'

Bidder's Proposal Form

Contractor Name _____

BIDDER'S BOND

We, _____
as Principal, and as Surety are bound unto the _____,
hereafter referred to as "obligee", in the penal sum of ten percent (10%) of the total amount of the
bid of the Principal submitted to the Obligee for the work described below, for the payment of
which sum we bind ourselves, jointly, and severally,

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT:
WHEREAS, the Principal is submitted to the Obligee, for _____

(Copy here the exact description of

work, including locations as it appears on the proposal)

for which bids are to be opened per Section 1 Proposal and Contract Requirements, Paragraph E,
Presenting and Marking of Bid.

NOW, THEREFORE, if the Principal is awarded the contract and, within the time and
manner required under the specifications, after the prescribed forms are presented to Contractor
for signature, enters into a written contract, in the prescribed form, in accordance with the bid,
and files two bonds with Obligee, one to guarantee faithful performance of the contract and the
other to guarantee payment for labor and materials as provided by law, then this obligation shall
be null and void; otherwise, it shall remain in full force.

In the event suit is brought upon this bond by the Obligee and judgement is recovered,
the Surety shall pay all cost incurred by the Obligee in such suite, including a reasonable
attorney's fee to be fixed by the court.

The surety; for value received, hereby stipulates and agrees that the obligations of said
Surety and its Bond shall be in no way impaired or affected by any extension of the time within
which the OWNER may accept such BID; and said Surety does hereby waive notice of any such
extension.

Dated: _____, 2014.

Principal

Surety

By: _____

EXHIBIT "G"

CERTIFICATE OF ACKNOWLEDGMENT

State of California
County of Alameda

On this _____ day of _____ in the year 2014 before me
_____, a Notary Public, personally appeared _____

Attorney-in-fact

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (Seal)
Notary Public

Exhibit H

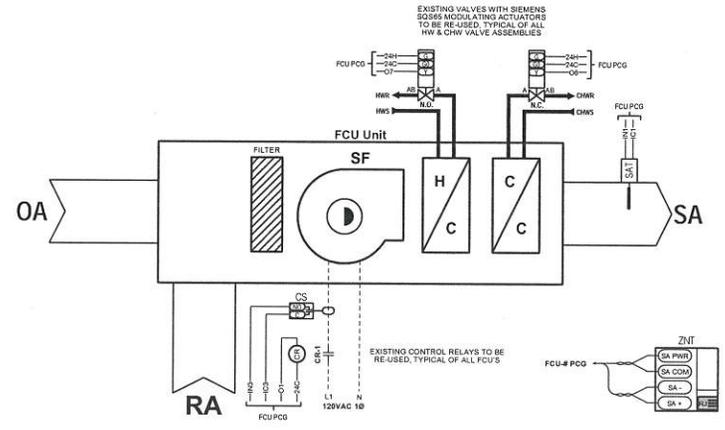
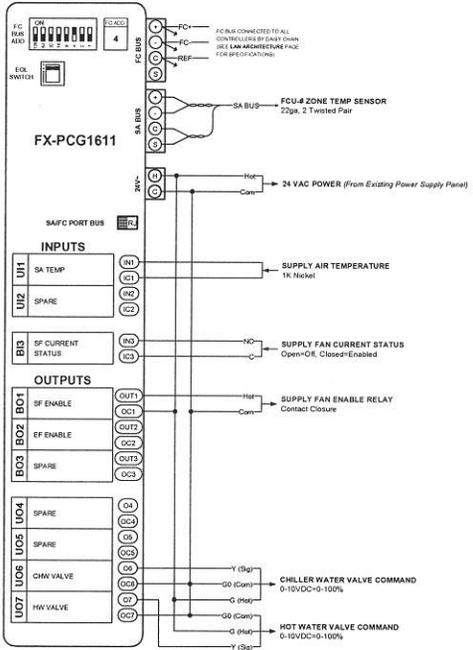
PROJECT PLANS for Alameda City Hall, HVAC Control Replacements

ALAMEDA CITY HALL HVAC CONTROLS REPLACEMENT

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8	MAIN CONTROL PANEL LAYOUT
9	NETWORK LAYOUT & ADDRESS SCHEDULE
10	SCOPE

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">Rev</td> <td style="width: 10%;">Date</td> <td style="width: 10%;">By</td> <td style="width: 10%;">Change</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	Rev	Date	By	Change													<p style="text-align: center;">TOTAL CONTROL CORPORATION <small>a division of ASB</small></p> <p style="text-align: center;">1040 Commercial St. Suite 106 San Jose, Ca 95112 Ph: (408)-441-1811 Fax: (408)-441-1810</p>	<p style="text-align: center;">INDEX</p>	<p style="text-align: center;">Project ALAMEDA CITY HALL HVAC CONTROLS REPLACEMENT</p> <p style="text-align: center;">Contractor: 2283 SANTA CLARA AVE., ALAMEDA, CA</p>
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1 FCU CONTROL
2 TYPICAL OF 27 FCU'S



FIELD COMPONENTS (TYP. OF 27 FCU'S)

TAG	QTY	PART NUMBER	DESCRIPTION	SUPPLIED BY
PCG	27	JC FX-PCG1611-0	Field Equipment Controller, BACnet MS/TP, 10 Point	RSD-TC
ZNT	27	JC NS-BTB7002-0	Network Zone Temp Sensor, with Override, LCD & Setpoint Adjust	RSD-TC
SAT	27	JC TE6311M-1	Dust Mount Temperature Sensor, 1K Nickel, 6" Length	RSD-TC
CS	27	VER H808	Current Operated Switch, Split-Zone, Adjustable Trip	RSD-TC

Contractor:

Project: ALAMEDA CITY HALL HVAC CONTROLS REPLACEMENT

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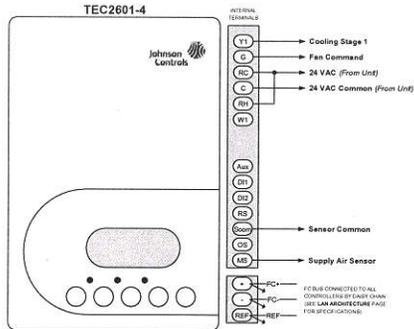
TC TOTAL CONTROL
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San Jose, Ca 95112
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Sheet Title: FCU CONTROL DETAIL (TYPICAL OF 27)

Job #: xxxxxx
Designed By: SXII
Drawing By: EW
Approved By: NS
Date: Aug 23, 2013
Sheet: 2 OF 10

1 **COMPUTER ROOM AC UNIT**
3 MONITOR ONLY

LOCATED ON WALL OF COMPUTER ROOM



CONTROL COMPONENTS

TAG	QTY	PART NUMBER	DESCRIPTION
TEC	1	TEC2601-4	Network AC Room Thermostat Controller, Single Stage, BAChet MS/TP
SAT	1	TE-6381M-1	10K Thermistor Duct Temp Sensor, 8" Length

Contractor:
**ALAMEDA CITY HALL
HVAC CONTROLS
REPLACEMENT**

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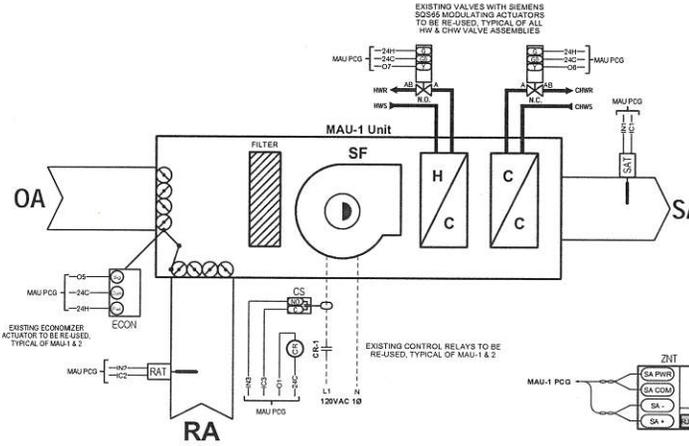
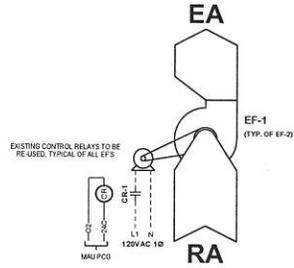
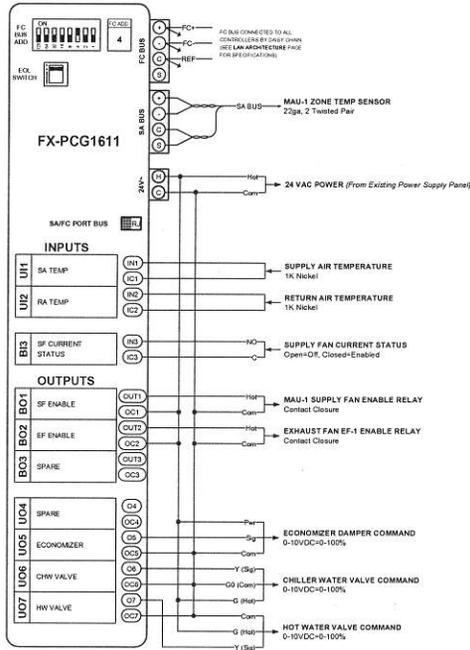
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COMPUTER ROOM AC CONTROL DETAILS

Revisions	Change
Rev	Date

Job #: xxxxxx
Designed By: SXII
Drawing By: EW
Approved By: NS
Date: Aug 23, 2013
Sheet: 3 OF 10

1 MAU-1 CONTROL
TYPICAL OF MAU-2



FIELD COMPONENTS (TYP. OF MAU-1 & 2)

TAG	QTY	PART NUMBER	DESCRIPTION	SUPPLIED BY
PCG	2	JC FX-PCG1611-0	Field Equipment Controller, BACnet MS/TP, 10 Point	RSD-TC
ZNT	2	JC NS-G1817030-0	Network Zone Temp Sensor, with Oximide, LCD & Setpoint Adjust	RSD-TC
SAT & RAT	4	JC YE6311M-1	Duct Mount Temperature Sensor, 1K Nickel, 8" Length	RSD-TC
CS	2	VER H608	Current Operated Switch, Split-Core, Adjustable Trip	RSD-TC

Contractor:
ALAMEDA CITY HALL HVAC CONTROLS REPLACEMENT
2283 SANTA CLARA AVE., ALAMEDA, CA

Project:
ALAMEDA CITY HALL HVAC CONTROLS REPLACEMENT

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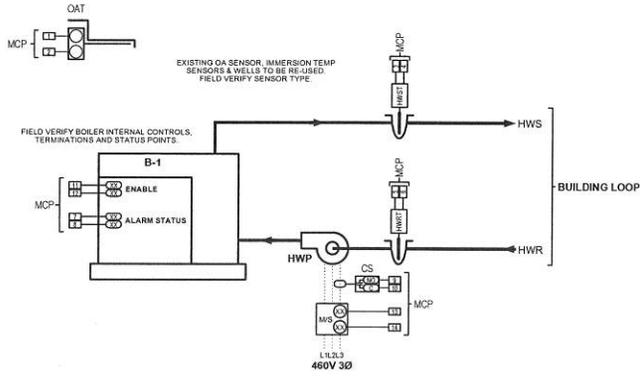
Sheet Title: **MAU-1 CONTROL DETAILS (TYPICAL OF MAU-2)**

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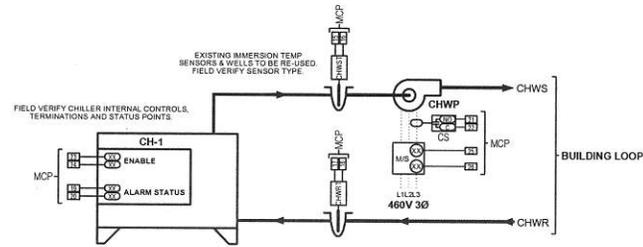
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Drawing By: EW
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Date: Aug 23, 2013
Sheet: 4 OF 10

1 **BOILER CONTROL**
5 TYPICAL OF 1



FIELD COMPONENTS			
TAG	QTY	PART NUMBER	DESCRIPTION
CS	1	VER H608	Current Operated Switch, Split-Core, Adjustable Trip

2 **CHILLER CONTROL**
5 TYPICAL OF 1 ONLY



FIELD COMPONENTS			
TAG	QTY	PART NUMBER	DESCRIPTION
CS	1	VER H608	Current Operated Switch, Split-Core, Adjustable Trip

Contractor:
**ALAMEDA CITY HALL
HVAC CONTROLS
REPLACEMENT**
2283 SANTA CLARA AVE., ALAMEDA, CA

Project:
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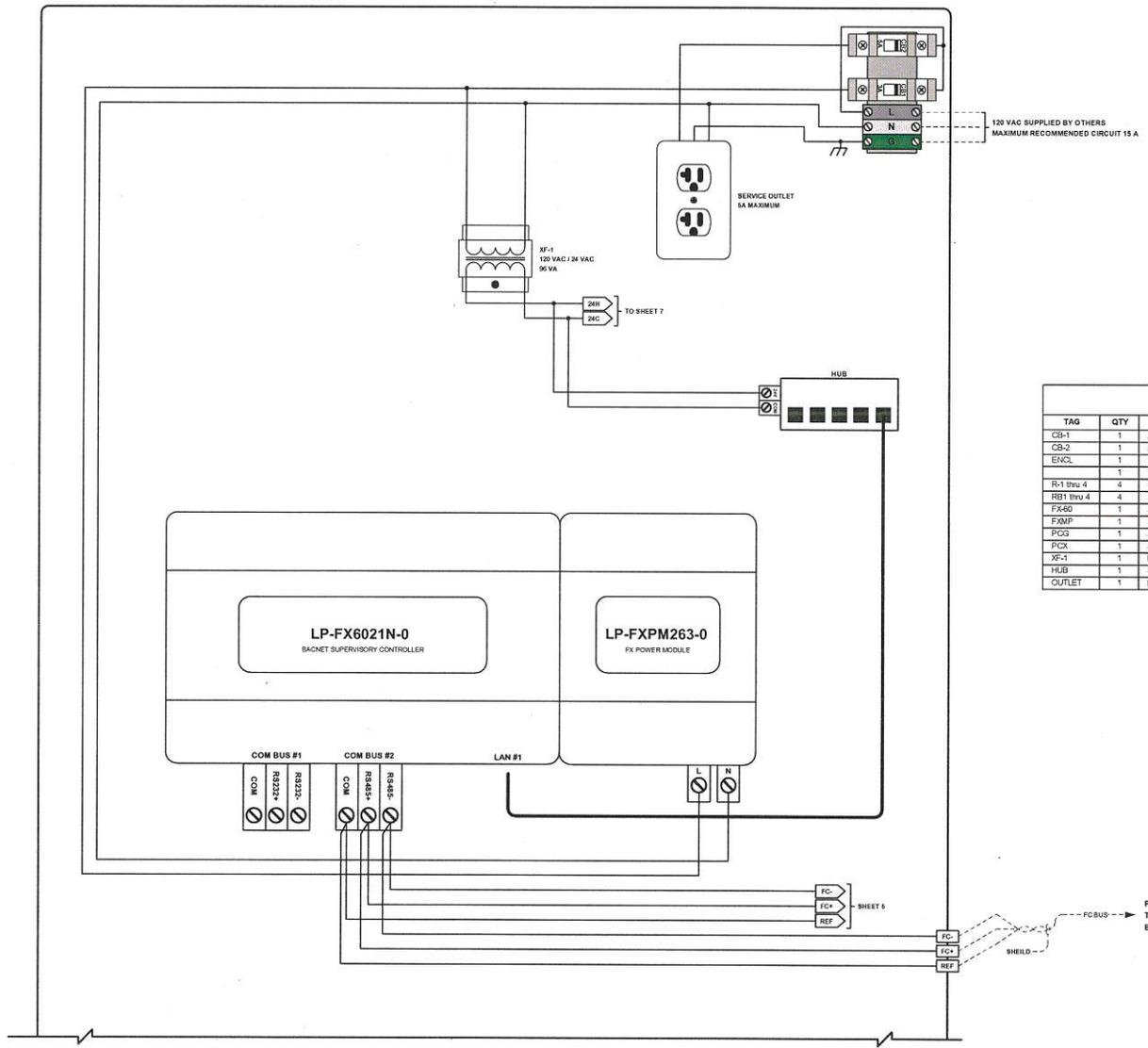
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Designed By: SXII
Drawing By: EW
Approved By: NS
Date: Aug 23, 2013
Sheet: 5 OF 10

REVISIONS

1
6 **MAIN CONTROL PANEL-PART 1**
FX-60 CONTROL WIRING



PANEL COMPONENTS

TAG	QTY	PART NUMBER	DESCRIPTION	SUPPLIED BY
CB-1	1	AB 1488A1C030	3 AMP 1 Pole UL 489 MINI CB	RSD-TC
CB-2	1	AB 1488A1C050	5 AMP 1 Pole UL 489 MINI CB	RSD-TC
ENCL	1	HAM E144530248	30" x 24" x 2" NEMA 4	RSD-TC
	1	HAM EP3024	30 X 24 Back Panel	RSD-TC
R-1 thru 4	4	SNDR RPM2B7	Relay 1 PL 24VAC LED Override	RSD-TC
RB1 thru 4	4	IEEC SH1B-05	1 Pole Relay Base	RSD-TC
FX-60	1	JC LP-FX6021N-0	Supervisory Controller, MSTP BACnet Com via RS-485	RSD-TC
FXMP	1	JC LP-FXPM263-0	Power Module, 90-263VAC Output, for DIN Rail Mounting	RSD-TC
PCG	1	JC FXPCG3231-0	14-Point Programmable Controller I/O Display, 8U, 2	RSD-TC
PCX	1	JC FXPCX4711-0	16-Point Extension I/O Module, 8 BI, 8 BO	RSD-TC
XF-1	1	LEC LE15022	120/209/240/480-24VAC, 96VA Transformer, Single Hub	RSD-TC
HUB	1	SKORP ESKS-1007	5-Port ETHERNET Switch	RSD-TC
OUTLET	1	PAN JBP1MD20W	White 120VAC Outlet	RSD-TC

Contractor:
**ALAMEDA CITY HALL
HVAC CONTROLS
REPLACEMENT**
2283 SANTA CLARA AVE., ALAMEDA, CA

Project:

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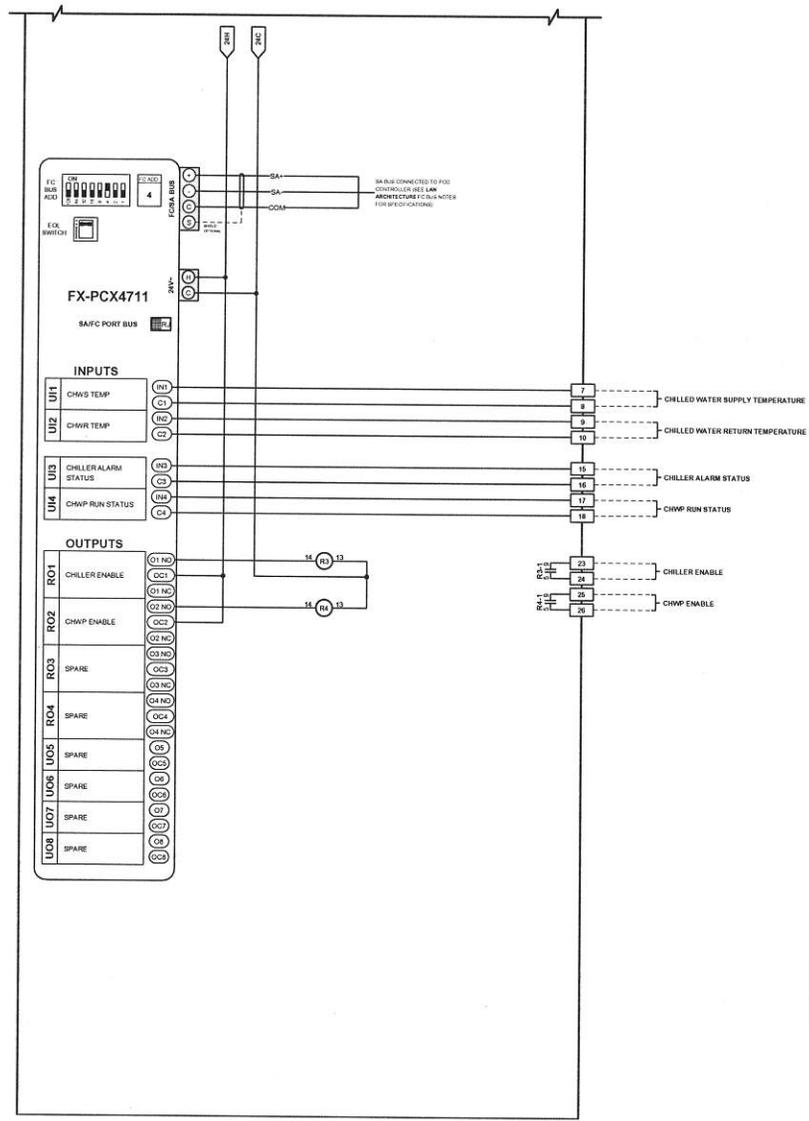
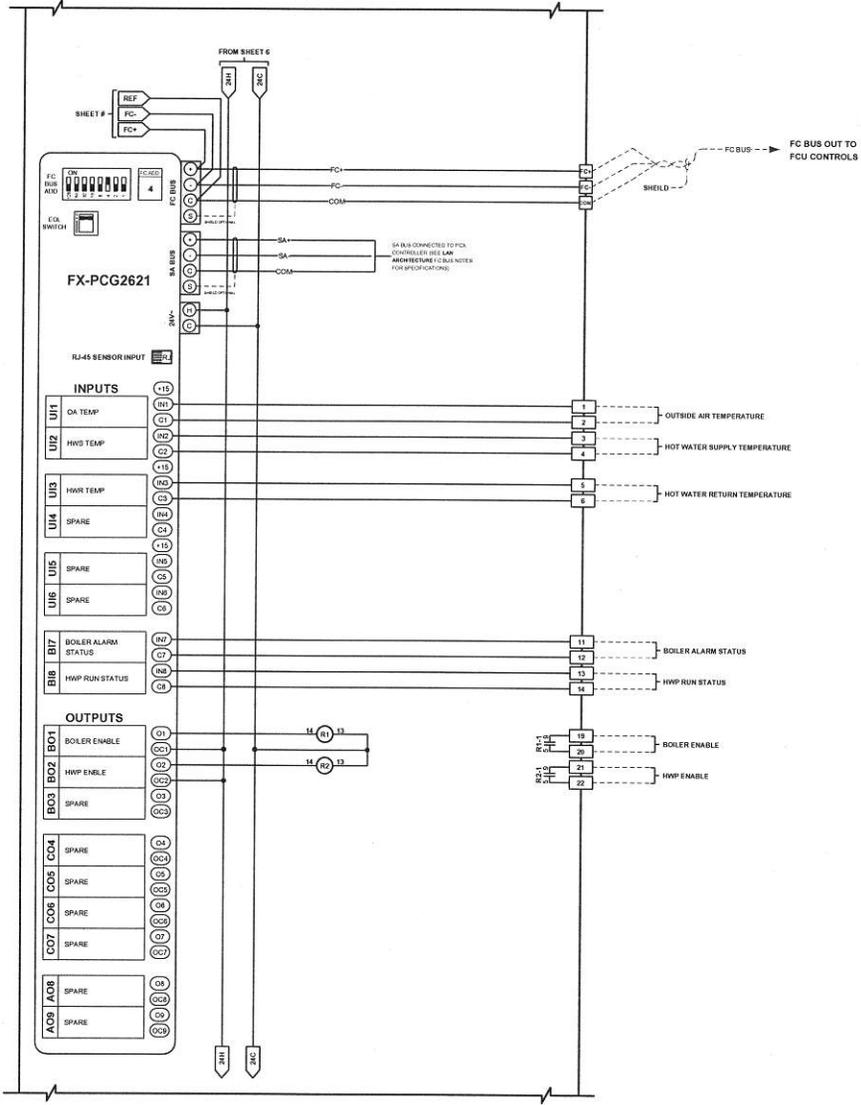
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Sheet Title: MAIN CONTROL PANEL FX60 WIRING DETAIL

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Job #: xxxxxx
Designed By: \$XII
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Date: Aug 23, 2013
Sheet: 6 OF 10

1 MAIN CONTROL PANEL-PART 2
7 CHW TEMPERATURE CO-1 & PCX-1 CONTROL WIRING



Contractor: **ALAMEDA CITY HALL HVAC CONTROLS REPLACEMENT**
2283 SANTA CLARA AVE., ALAMEDA, CA

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CONTROL SYSTEMS, INC.
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Sheet Title: MAIN CONTROL PANEL PCG-1 & PCX-1 WIRING DETAILS

Rev	Date	Change

Job #: xxxxxxx
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Drawing By: EW
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Date: AUG 23, 2013
Sheet: 7 of 10

Contractor Responsibilities

A. General

1. Installation of the building automation system shall be performed by the Controls Contractor. However, all installation shall be under the personal supervision of the Controls Contractor. The Controls Contractor shall certify all work as proper and complete. Under no circumstances shall the design, scheduling, coordination, programming, training, and warranty requirements for the project be delegated to a subcontractor.

B. Demolition

1. Remove controls which do not remain as part of the building automation system, all associated abandoned wiring and conduit, and all associated pneumatic tubing. The Owner will inform the Contractor of any equipment which is to be removed that will remain the property of the Owner. All other equipment which is removed will be disposed of by the Contractor.

C. Access to Site

1. Unless notified otherwise, entrance to building is restricted. No one will be permitted to enter the building unless their names have been cleared with the Owner or the Owner's Representative.

D. Code Compliance

1. All wiring, raceways, enclosures, junctions and splice boxes shall be installed in accordance with all applicable electrical codes and will comply with equipment manufacturer's recommendations.

E. Cleanup

1. At the completion of the work, all equipment pertinent to this contract shall be checked and thoroughly cleaned, and all other areas shall be cleaned around equipment provided under this contract.

Wiring, Conduit, and Cable

A. All wire will be copper and meet the minimum wire size and insulation class listed below:

Wire Class Wire Size Isolation Class

Power 12 Gauge 600 Volt

Class One 14 Gauge Std. 600 Volt

Class Two 16 Gauge Std. 300 Volt

Class Three 18 Gauge Std. 300 volt

Communications Per MR. Per MR.

B. Power and Class One wiring may be run in the same conduit. Class Two and Three wiring and communications wiring may be run in the same conduit.

C. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.

D. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum 1/2 inch galvanized EMT. Steel set screw fittings are acceptable for dry interior locations. Steel/water-tight compression fittings shall be used for exterior locations and interior locations subject to moisture. Provide conduit seal off fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.

E. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be used in exterior locations and interior locations subject to moisture.

F. Junction boxes shall be provided at all cable splices, equipment termination, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square with blank cover. Exterior and damp location JH-boxes shall be cast alloy FS boxes with threaded hubs and gasketed covers.

G. Where the space above the ceiling is a supply or return air plenum, the wiring shall be plenum rated. Plenum rated wiring can be run without conduit above suspended ceilings.

H. Fiber optic cable shall include the following sizes: 50/125, 62.5/125 or 100/140.

I. Only glass fiber is acceptable, no plastic.

J. Fiber optic cable shall only be installed and terminated by an experienced contractor. The BAS contractor shall submit to the Engineer the name of the intended contractor of the fiber optic cable with his submittal documents.

3.3 Hardware Installation

A. Installation Practices for Wiring

1. All controllers are to be mounted vertically and per the manufacturer's installation documentation.

2. The 120VAC power wiring to each Ethernet or Remote Site controller shall be a dedicated run, with a separate breaker. Each run will include a separate hot, neutral and ground wire. The ground wire will terminate at the breaker panel ground. The circuit will not feed any other circuit or device.

3. A true earth ground must be available in the building. Do not use a corroded or galvanized pipe, or structural steel.

4. Wires are to be attached to the building proper at regular intervals such that wiring does not droop. Wires are not to be affixed to or supported by pipes, conduit, etc.

5. Conduit in finished areas, will be concealed in ceiling cavity spaces, plenums, furred spaces and wall construction. Exception; metallic surface raceway may be used in finished areas on masonry walls. All surface raceway in finished areas must be color matched to the existing finish within the limitations of standard manufactured colors.

6. Conduit, in non-finished areas where possible, will be concealed in ceiling cavity spaces, plenums, furred spaces, and wall construction. Exposed conduit will run parallel to or at right angles to the building structure.

7. Wires are to be kept a minimum of three (3) inches from hot water, steam, or condensate piping.

8. Where sensor wires leave the conduit system, they are to be protected by a plastic insert.

9. Wires will not be allowed to run across telephone equipment areas.

B. Installation Practices for Field Devices

1. Well-mounted sensors will include thermal conducting compound within the well to insure good heat transfer to the sensor.

2. Actuators will be firmly mounted to give positive movement and linkage will be adjusted to give smooth continuous movement throughout 100 percent of the stroke.

3. Relay outputs will include transient suppression across all coils. Suppression devices shall limit transients to 150% of the rated coil voltage.

4. Water line mounted sensors shall be removable without shutting down the system in which they are installed.

5. For duct static pressure sensors, the high pressure port shall be connected to a metal static pressure probe inserted into the duct pointing upstream. The low pressure port shall be left open to the plenum area at the point that the high pressure port is tapped into the ductwork.

6. For building static pressure sensors, the high pressure port shall be inserted into the space via a metal tube. Pipe the low pressure port to the outside of the building.

C. Enclosures

1. For all I/O requiring field interface devices, these devices where practical will be mounted in a Field Interface Panel (FIP). The Contractor shall provide an enclosure which protects the device(s) from dust, moisture, condensation, integral wiring and moving parts.

2. FIPs shall contain power supplies for sensors, interface relays and controllers, and safety circuits.

3. The FIP enclosure shall be of steel construction with baked enamel finish, NEMA 1 rated with a hinged door and keyed lock. The enclosure will be sized for twenty percent spare mounting space. All locks will be keyed identically.

4. All wiring to and from the FIP will be to screw type terminals. Analog or communications wiring may use the FIP as a raceway without terminating. The use of wire nuts within the FIP is prohibited.

5. All outside mounted enclosures shall meet the NEMA-4 rating. The wiring within all enclosures shall be run in plastic track. Wiring within controllers shall be wrapped and secured.

D. Identification

1. Identify all control wires with labeling tape or sleeves using words, letters, or numbers that can be exactly cross-referenced with as-built drawings. Use building standard nomenclature and equipment identification names and alphanumeric characters.

2. All field enclosures, other than controllers, shall be identified with a bakelite nameplate. The lettering shall be in white against a black or blue background.

3. Junction box covers will be marked to indicate that they are a part of the BAS system.

4. All I/O field devices (except space sensors) that are not mounted within FIPs shall be identified with name plates.

5. All I/O field devices inside FIPs shall be labeled.

E. Control System Switch-over

1. Demolition of the existing control system will occur after the new temperature control system is in place including new sensors and new field interface devices.

2. Switch-over from the existing control system to the new system will be fully coordinated with the Owner. A representative of the Owner will be on site during switch-over.

3. The Contractor shall minimize control system downtime during switch-over. Sufficient installation mechanics will be on site so that the entire switch-over can be accomplished in a reasonable time frame.

F. Location

1. The location of sensors shall be coordinated with the chief building engineer.

2. Space humidity or temperature sensors will be mounted away from machinery generating heat, direct light and diffuser air streams.

3. Outdoor air sensors will be mounted on the north building face directly in the outside air. Install these sensors such that the effects of heat radiated from the building or sunlight is minimized.

4. Field enclosures shall be located immediately adjacent to the controller panel(s) to which it is being interfaced.

Commissioning and System Startup

A. Point to Point Check-out

1. Each I/O device (both field mounted as well as those located in FIPs) shall be inspected and verified for proper installation and functionality. A check-out sheet itemizing each device shall be filed out, dated and approved by the Project Manager for submission to the owner or owner's representative.

B. Controller and Workstation Check-out

1. A field check-out of all controllers and front end equipment (computers, printers, modems, etc.) shall be conducted to verify proper operation of both hardware and software. A check-out sheet itemizing each device and a description of the associated tests shall be prepared and submitted to the owner or owner's representative by the completion of the project.

C. System Acceptance Testing

1. All application software will be verified and compared against the sequence of operation. Control loops will be exercised by inducing a set point shift of at least 10% and observing whether the system successfully returns the process variable to set point. Record all test results and attach to the Test Results Sheet.

2. Test each alarm in the system and validate that the system generates the appropriate alarm message, that the message appears at all prescribed destinations (workstations or printers), and that any other related actions occur as defined (i.e. graphic panels are invoked, reports are generated, etc.). Submit a Test Results Sheet to the owner.

3. Perform an operational test of each unique graphic display and report to verify that the item exists, that the appearance and content are correct, and that any special features work as intended. Submit a Test Results Sheet to the owner.

4. Perform an operational test of each third party interface that has been included as part of the automation system. Verify that all points are properly polled, that alarms have been configured, and that any associated graphics and reports have been completed. If the interface involves a file transfer over Ethernet, test any logic that controls the transmission of the file, and verify the content of the specified information.

Required Control Features

A. Industry standard and application/project specific sequence of operation shall be established. Before switch over, become completely familiar with the existing sequence of operation and the set points. All existing sequences, points and set points shall be transferred.

B. Apply proportional (P), proportional plus integral (PI), proportional plus integral plus derivative (PID), or adaptive control loops to specified operating sequences which are appropriate to system operating requirements. Establish mode sequencing and conditioning statements as required to meet the intent of the sequence of operation. Review and modify the initial loop assignments and parameters as necessary to tune systems to satisfactory operation during and after initial start-up and testing.

C. Furnish the sequence of operation specified herein. Provide new control points, devices, additional control loops, relays, sensors, wiring, static pressure accumulators, and other devices as necessary to meet the intent of the sequence of operation. The intent of these specifications is that all control loops operated smoothly, on setpoint, without hunting or unnecessary cycling.

D. All control loop parameters, schedules, setpoints, ranges, alarm conditioning statements, and messages shall be readily adjustable at the BAS operator's terminal.

E. It shall be possible to override any temperature or pressure reset schedule and operate systems at a fixed temperature or pressure setpoint.

F. All sequences may be overridden manually or by a control sequence of higher authority, such as Fire Department override.

G. All HVAC system diagrams, operating schedules, control loop flow charts, equipment status, sensor inputs and control setpoints shall be displayed using two dimensional color graphics at the BAS monitor. Space temperatures, and room configurations in areas with partitions shall be graphically displayed on diagrammatic floor plans. When viewing HVAC control system graphics at the BAS monitor, it shall be possible with a single command to display the following:

1. Relevant instructions for acknowledging alarms and changing parameters, schedules, setpoints, ranges, alarm conditioning statements and alarm messages.

2. Sequence of operation for the system currently on display.

General

a. Coordinate all work with the chief building engineer. Do not program/reprogram unless approved by the management.

b. All other existing sequences and features not listed here shall remain unaltered and shall be transferred to the new BAS.

c. All set point changes shall be adjustable and shall be approved by the chief building engineer. Mechanical systems shall run in the presence of the chief building engineer for at least 2 weeks and until satisfactory operation is established before sequences and set points are finalized and accepted.

Contractor:

**ALAMEDA CITY HALL
HVAC CONTROLS
REPLACEMENT**

2285 SANTA CLARA AVE., ALAMEDA, CA

Project:

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TOTAL CONTROL
CONTROL SYSTEMS, A DIVISION OF AEC

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San Jose, Ca 95112
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Sheet: 10 of 10

Exhibit I

DIRECT DIGITAL CONTROL CUT SHEETS (Johnson Controls)

Facility Explorer

FX Supervisory Controllers

Description

FX Supervisory Controllers are Web-based supervisory-class controllers in the Facility Explorer product family. FX Supervisory Controllers manage networks of field controllers using open communication protocols, such as BACnet®, LONWORKS®, and N2 protocols. FX Supervisory Controllers support a full set of building automation features, such as scheduling, alarming, histories, data sharing, energy management, totalization, and customized control routines, which are specifically designed for commercial facilities.

Each FX Supervisory Controller includes a graphical system user interface and configuration tool that you can access with a Web browser. Remote access is easily achieved from an Internet, intranet, or dial-up connection. Multiple users can concurrently connect to the FX Supervisory Controller. You can manage security and presentation preferences through user profiles, logon IDs, and passwords.

FX Supervisory Controllers are a family of controllers similar in function and overall capabilities. The FX20, FX60, and FX70 are compact DIN rail mountable controllers with the capability for external input and output points.

In addition, the FX Supervisory Controllers' hardware and software design is modular, so you can add accessories, such as communications cards, input and output modules, and software options, if needed. This design allows you to select the controller most appropriate for the size of your facility and those options best needed to control it.

Refer to the *FX Supervisory Controller Product Bulletin (LIT-12011406)* for important product application information.

Repair Information

If the FX Supervisory Controller fails to operate within its specifications, replace the unit. For a replacement controller, contact the nearest Johnson Controls® representative.



FX Supervisory Controllers

Features

- Web-based user interface (UI)
- adoption of industry standard communication protocols
- embedded configuration tool
- modular design
- small, compact design
- FX Workbench

Selection Charts

FX Supervisory Controller Ordering Information

Product Code Number	Description
LP-FX2011N-1	FX20: Includes 128 MB RAM/64 MB Flash, 2 10/100 Mbps Ethernet ports, 1 non-isolated RS-485 port, 1 RS-232 port, 1 Niagara Direct Input/Output (NDIO) port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, and N2 driver.
LP-FX2021N-1	FX20 with BACnet MS/TP Protocol: Includes 128 MB RAM/64 MB Flash, 2 10/100 Mbps Ethernet ports, 1 non-isolated RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX6011N-1	FX60: Includes 128 MB RAM/128 MB Flash, 2 10/100 Mbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, and N2 driver.
LP-FX6021N-1	FX60 with BACnet MS/TP Protocol: Includes 128 MB RAM/128 MB Flash, 2 10/100 Mbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 NDIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX7011N-0	FX70: Includes 1 GB RAM/1 GB Flash, 1 RS-232 port, 1 RS-485 port, 2 1 Gbps Ethernet ports, 1 NRIO port, 2 communication card option slots, embedded Niagara driver, oBIX driver, N2 driver, FX Workbench, and Web User Interface.
LP-FX7021N-0	FX70 with BACnet MS/TP Protocol: Includes 1 GB RAM/1 GB Flash, 2 1 Gbps Ethernet ports, 1 RS-485 port, 1 RS-232 port, 1 NRIO port, 2 communication card option slots, embedded FX Workbench, Web User Interface, Niagara driver, oBIX driver, N2 driver, and BACnet MS/TP driver.
LP-FX20BDEM-1	Demo version of FX20: Includes all software modules and drivers. Intended for engineering and/or demonstration purposes only (not allowed for actual project installations). You must also purchase office support and renewal fees to activate this FX20. License expires yearly on October 31 and must be renewed yearly to continue operation.
LP-FX60BDEM-1	Demo version of FX60: Includes all software modules and drivers. Intended for engineering and/or demonstration purposes only (not allowed for actual project installations). Office support and renewal fee must also be purchased to activate this FX60. License expires yearly on October 31 and must be renewed yearly to continue operation.

FX Workbench Ordering Information (Part 1 of 2)

Product Code Number	Description
LP-FXWB-COPY	FX Supervisory Controller family software, delivered on DVD. Includes latest installation images for FX Server, FX Workbench, and FX Alarm Portal Client. Licenses not included—order licenses separately.
LP-FXWBDEM-0	Engineering/demo license for FX Workbench client software. Enables all features needed to engineer and demonstrate FX Supervisory Controllers and FX Server stations. Intended for installing contractors. Requires annual support fee. Expires yearly.
LP-FXWBE-0	End user license for FX Workbench client software. Enables those features needed to operate and reconfigure FX Supervisory Controllers and FX Server stations only via an online connection (cannot create new stations off line). Intended for end users (operators). Never expires.



FX Supervisory Controllers (Continued)

FX Workbench Ordering Information (Part 2 of 2)

Product Code Number	Description
LP-FXWBALM-0	FX Alarm Portal Client license. Enables only FX Alarm Portal and Alarm Console features. Intended for end users. Never expires.
LP-FXSWUPG-0	License file enabling a one-time software upgrade for one copy of FX Workbench or FX Alarm Portal Client. Software not included (order LP-FXWB-COPY to obtain latest copy of software).

Accessories

FX Supervisory Controller Hardware Accessories Ordering Information

Product Code Number	Description
LP-FXNDIO16-0	16 channel input/output module for the FX20/FX60 Supervisory Controllers: Includes 8 universal inputs, 4 relay outputs, and 4 0-10 V analog outputs, maximum of 4 per FX20/FX60 Supervisory Controller, or 2 if combined with NDIO34.
LP-FXNDIO34-0	34 channel input/output module for the FX20/FX60 Supervisory Controllers: Includes 16 universal inputs, 10 relay outputs, and 8 0-10 V analog outputs, maximum of 1 per FX20/FX60/FX70 Supervisory Controller. Also provides power to the FX20/FX60/FX70 Supervisory Controller using externally connected 24 VAC transformer or 24 VDC power supply.
LP-FXRIO16-0	Remote input/output module for the FX Supervisory Controllers. Includes 8 universal inputs, 4 relay outputs, and four 0-10 V analog outputs.
LP-FXLONFTT-1	LONWORKS communication card for the FX Supervisory Controllers: 78 kbps, FTT-10A, 2-position removable screw-terminal connector plug. Order LONWORKS driver separately.(LP-FXLON-0).
LP-FXRS485-0	Dual port RS-485 communication card for the FX Supervisory Controllers: electrically isolated, two 3-position removable screw-terminal connector plugs.
LP-FXWTC-0	Wireless TEC Option Card includes option card, mounting bracket, and direct-mount antenna.
TEC20-A-1	Replacement antenna for Wireless TEC Option Card.
TEC20-RA-1	Remote antenna for Wireless TEC Option Card when it is installed inside a metal cabinet or when remote antenna mounting is required by physical installation. Includes 0.53 m (1.75 ft) cable.
LP-FXRS232-0	Single port RS-232 communication card for the FX Supervisory Controller: 115,200 max baud rate, DB-9M connector.
LP-FXMDM-0	56 kbps, auto-dial/auto-answer modem for the FX Supervisory Controllers: RJ-11 connector, disables onboard RS-232 port, maximum of one per FX Supervisory Controller.
LP-FXPMUS-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, U.S. wall adapter.
LP-FXPMEU-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, European wall adapter.
LP-FXPMUK-0	Power module for FX Supervisory Controller: 90-240 VAC, 50/60 Hz, U.K. wall adapter.
LP-FXPM24-0	Power module for FX Supervisory Controller: 24 VAC/DC, DIN rail mountable.
LP-FXPM263-0	Power module for FX Supervisory Controller: 90-263 VAC/DC, 50/60 Hz DIN rail mountable.
LP-KITFX2BAT-0	NiMH replacement backup battery assembly for FX20 and FX60.
LP-KITFX7BAT-0	FX70 replacement backup battery assembly.
LP-KITFX7HW-0	Hardware Bag for FX70, containing screw terminal connector plugs (two 6-position, one 2-position, earth grounding wire).
LP-KITGPRSA-0	Replacement right-angle GSM/GPRS quad-band SMA coax-mounted stub antenna.
LP-KITSEDAT-0	Replacement adjustable-angle 2.4 GHz RP-SMA coax-mounted stub antenna.
LP-KITSED3T-0	3-terminal wiring plug for RS-485.
LP-KIT7MEM-0	1 GB DDR-2 333 MHz Small Outline Dual In-line Memory Module (SODIMM) memory module (standard replacement for FX70).
LP-FXGPRSW-0	GPRS Modem option card for FX20, FX60, FX70 with Wyleless SIM card.
LP-FXGPRSE-0	External mounting for GPRS modem antenna. Included is a 6.56 ft. (2m) SMA-type coax extension cable and steel bracket for wall or panel mounting.
LP-FXGPRSS-0	GPRS Modem SIM card replacement provisioned by Wyleless.
LP-FXSED-0	Sedona Framework option card with both wireless 6LoWPAN and wired RS-485 port, based on the Jennic JN5139 wireless microcontroller. Includes stub antenna.
LP-FXSEDEXT-0	External mounting for Sedona Framework antenna. Includes a 6.56 ft (2m) RP-SMA type, coax extension cable and mounting bracket.
LP-FXSRAM-0	Static RAM option card for battery-less FX supervisory controllers.
LP-FX70WIFI-0	Mini PCI 802.11 Wi-Fi adapter card for an FX70.

FX Supervisory Controller Software Accessories Ordering Information (Part 1 of 2)

Product Code Number	Description
LP-FX60EX256-0	License enabling 256 Mb memory expansion for one FX60.
LP-FXBACIPC-0	License enabling BACnet IP client (import) driver for one FX Supervisory Controller.
LP-FXBACIPS-0	License enabling BACnet IP server (export) driver for one FX Supervisory Controller.
LP-FXBACMS-0	License enabling BACnet MS/TP driver for one FX Supervisory Controller.
LP-FXLONIP-0	License enabling LONWORKS IP driver for one FX Supervisory Controller.
LP-FXLON-0	License enabling LONWORKS twisted pair driver license for one FX Supervisory Controller.
LP-FXMBUS-0	License enabling M-Bus driver for one FX Supervisory Controller.
LP-FXMDBRTU-0	License enabling MODBUS RTU client (import) driver for one FX Supervisory Controller.
LP-FXMDBRTUS-0	License enabling MODBUS RTU server (export) driver for one FX Supervisory Controller.



FX Supervisory Controllers (Continued)

FX Supervisory Controller Software Accessories Ordering Information (Part 2 of 2)

Product Code Number	Description
LP-FXFLEX-0	License enabling Flex serial Driver over RS-232 or RS-485.
LP-FXMDBTCP-0	License enabling MODBUS TCP client (import) driver for one FX Supervisory Controller.
LP-FXMDBTCP-0	License enabling MODBUS TCP server (export) driver for one FX Supervisory Controller.
LP-FXSNMP-0	License enabling Simple Network Management Protocol (SNMP) driver for one FX Supervisory Controller.
LP-FXCCN-0	License enabling Carrier® Communication/Comfort Network (CCN) driver for one FX Supervisory Controller
LP-FXMCQU-0	License enabling McQuay® OPM driver for one FX Supervisory Controller
LP-FXAINF-0	License enabling Andover™ Infinity driver for one FX Supervisory Controller
LP-FXSMS-0	License enabling Simple Messaging Service (SMS) driver for one FX Supervisory Controller.
LP-FX40UPG-0	License enabling one-time, new release software upgrade for one FX Supervisory Controller.
LP-FXAPHP-0	License enabling the American Auto-Matrix Public Host Protocol (PHP) driver for one FX Supervisory Controller.
LP-FXAPUP-0	License enabling the American Auto-Matrix Public Unitary Protocol (PUP) driver for one FX Supervisory Controller.
LP-FXAC-0	License enabling the Andover AC 256 driver for one FX Supervisory Controller.
LP-FXGLOB-0	License enabling the Global Cache driver for one FX Supervisory Controller. Enables control of IR controlled AV equipment via an RS-232 connection to a Global Cache FC module.
LP-FXHELV-0	License enabling the Helvar Lighting Control driver for one FX Supervisory Controller.
LP-FXHORT-0	License enabling the European Hortsmann meter driver for one FX Supervisory Controller.
LP-FXJOS-0	License enabling the Josam Grease Trap Sensor driver for one FX Supervisory Controller.
LP-FXLANG-0	License enabling the Lang Oven (over RS-232 or RS-485) driver for one FX Supervisory Controller.
LP-FXVDRT-0	License enabling the Veeder-Root driver for one FX Supervisory Controller.
LP-FXEIB-0	License enabling the EIB/Konnex IP Driver for one FX Supervisory Controller.
LP-FXSADR-0	License enabling Simple OpenADR driver for communication between FX Supervisory Controller and Akuacom DRAS. Limited to one client connection. Includes CRYPTO license for the SSL connection.
LP-FXSADR1-0	License enabling one additional connection to OpenADR compliant DRAS.

Technical Specifications

FX Supervisory Controller (Part 1 of 2)			
	FX20	FX60	FX70
Enclosure/ Mounting	Plastic/DIN Rail		
Dimension	6.313 x 4.820 x 2.438 in. (158.75 x 101.6 x 60.325 mm)		8.5 x 6 x 2.625 in. (216 x 152 x 68 mm)
Power Supply	DIN Rail Power modules		
Battery Backup	5-minute internal		5-minute internal, optional external
Processor	IBM® PowerPC® 405EP at 250 MHz	PowerPC 440EP at 524 MHz	PowerPC 440EPx at 652 MHz
RAM Memory	128 MB RAM	128 MB RAM (upgradeable to 256 MB)	1 GB RAM DDR2
Flash Memory	64 MB Flash	128 MB Flash	1 GB Flash
Environment	Operating Temperature: 0 to 50°C (32 to 122°F), Storage Temperature: 0 to 60°C (32 to 140°F), Relative Humidity: 5 to 95%, noncondensing		
Communication Ports			
Onboard	2 Ethernet 10/100 Mbps 1 RS-485 1 RS-232 2 option slots		Ethernet 1 Gbps 1 RS-485 (Isolated) 1 RS-232 2 option slots
Optional	Two options slots (any 2 of the following, except where noted): <ul style="list-style-type: none"> • Dual port RS-485 • LON FT/TP-10 • Modem (maximum of one and disables onboard RS-232) • RS-232 • Wireless TEC (maximum of one and disables onboard RS-232) • GPRS modem (maximum of one) 		
Network Drivers			
Embedded	N2, Niagara, oBIX, BACnet (on selected models)		
Optional	LONWORKS, BACnet MS/TP, BACnet IP Client, BACnet IP Server, MODBUS RTU Client, MODBUS RTU Server, MODBUS TCP Client, MODBUS TCP Server, SNMP, SMS, Flex Serial, Carrier CCN, McQuay OPM		
Direct I/O			
Onboard	None		

The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. © 2012 Johnson Controls, Inc. www.johnsoncontrols.com

FX Supervisory Controllers (Continued)

FX Supervisory Controller (Part 2 of 2)			
	FX20	FX60	FX70
Optional	Up to 66 (via NDIO modules)		Up to 256 via 16 Remote I/O Modules FXRIO16
Local (NDIO)	Up to 66 total I/O (via optional NDIO modules)		None
Remote I/O	Up to 64 I/O via 4 Remote I/O Modules (FXRIO16)		Up to 256 I/O via 16 Remote I/O Modules (FXRIO16)
Compliance	United States UL Listed, File E107041, CCN PAZX, under UL 916, Energy Management Equipment FCC compliant to CFR 47, part 15, subpart B, class A		
	Canada UL Listed, File E107041, CCN PAZX7, under CSA C22.2 No. 205, Signal Equipment Industry Canada compliant to ICES-003		
	Europe CE Mark– Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.		
	BACnet International: BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)		



Local Input Output Modules	
Product Codes	LP-FXNDIO34-0: 16 universal inputs, 10 relay outputs, 8 analog outputs LP-FXNDIO16-0: 8 universal inputs, 4 relay outputs, 4 analog outputs
Dimensions	NDIO34: 6.313 x 4.820 x 2.438 in. (16.04 x 12.24 x 6.19 cm) NDIO16: 3.2 x 4.828 x 2.437 in. (8.2 x 12.24 x 6.19 cm)
Universal Input Types Supported	10k ohm Type 3 thermistors. Thermistor Sensor Range: -23.3 to 115.5°C (10 to 240°F). Input accuracy is in the range of ± 1% of span. Characteristic curve is customizable. 0-10 V; accuracy is ± 2% of span, without user calibration; uses an external resistor for current input (four provided, mounted by installer on terminal connections) 4-20 mA current loop; accuracy is ±2% of span, without user calibration; self powered or board-powered sensors accepted Dry contact: V open circuit, 300- µA short-circuit current Pulsing dry contact at a rate of up to 20 Hz; 50% duty cycle
Digital Outputs	Form A relay contacts suitable for on/off control only; floating control not supported, Max voltage 30 volts AC or DC, 0.5 A max current rating
Analog Outputs	0-10 VDC, Minimum load supported per output is 2,500 ohms minimum or 4 mA drain maximum

Remote Input Output Modules	
Product Codes	LP-FXRIO16-0: 8 universal inputs, 4 relay outputs, 4 analog outputs
Dimensions	4 x 3.625 x 2.625 in. (10.16 x 9.2 x 6.7 cm)
Universal Input Types Supported	10k ohm Type 3 thermistors. Thermistor Sensor Range: -23.3 to 115.5°C (-10 to 240°F). Input accuracy is in the range of ±1% of span. Characteristic curve is customizable. 0-10 V; accuracy is ±2% of span, without user calibration; uses an external resistor for current input (four provided, mounted by installer on terminal connections) 4-20 mA current loop; accuracy is ±2% of span, without user calibration; self powered or board-powered sensors accepted Dry contact: V open circuit, 300- µA short-circuit current, Pulsing dry contact at a rate of up to 20 Hz; 50% duty cycle
Digital Outputs	Form A relay contacts suitable for on/off control only; floating control not supported, Max voltage 30 volts AC or DC, 0.5 A max current rating
Analog Outputs	0-10 VDC, Minimum load supported per output is 2,500 ohms minimum or 4 mA drain maximum

FX Workbench Requirements	
Processor	Intel® Pentium® 4, 1 GHz or higher
Operating System	Microsoft® Windows® 7, Microsoft Windows 2003 or Microsoft Windows Server® 2008 (If Microsoft IIS is disabled), Microsoft Virtual Server 2008, Microsoft Windows XP® Professional Operating System Microsoft Windows Vista™ Operating System. The Tunneling Service does not start automatically if installed on Microsoft Windows Vista operating system; however, you can manually start the Tunneling Service.
Web Browser	Microsoft Internet Explorer® Web browser Version 5.0 or later, Mozilla Firefox
Memory	512 MB minimum
Hard Disk	1 GB minimum, 5 GB recommended
Network Support	Ethernet 10/100 Mbps with RJ-45 connector

FX-PCG General Purpose Programmable Controllers

Description

The Facility Explorer General Purpose Programmable Controllers (FX-PCGs) can be applied to a wide variety of building equipment control applications ranging from simple fan coil or heat pump control to advanced central plant management.

The FX-PCG models include the 10-point FX-PCG16 and the 17-point FX-PCG26. FX-PCG models include a 32-bit microprocessor, intuitive design, and are available with an optional built-in Liquid Crystal Display (LCD) screen local User Interface (UI).

Refer to the *FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)* for important product application information.

Features

- Patented Proportional Adaptive Control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) technologies — provide continuous loop tuning
- user-friendly graphic theme and clear push-button identification — facilitate easy controller use

- writable flash memory — allows you to download standard or customized applications from the Facility Explorer Programmable Controller Programming and Commissioning Tool (FX-PCT) Software
- large product family — provides a wide range of point mix to meet application requirements and allows for the addition of one or more FX-PCX Expansion Input/Output Modules and/or network sensors to provide even more application capacity
- FX-Supervisory Controller Import Wizard — allows for easy controller integration
- local UI display option (integral display or stand-alone display) — provides enhanced local monitoring
- BACnet® Master-Slave/Token-Passing (MS/TP) communication — provides open system compatibility
- 32-bit microprocessor — ensures optimum performance and meets industry specifications
- wireless capability via FX-ZFR Series Wireless Field Bus System — enables wireless mesh connectivity between FX-PCGs, FX-WRZ Series Wireless Room Temperature Sensors, and FX-Supervisory Controllers, facilitating easy initial location and relocation
- universal and configurable inputs and outputs — support multiple signal options and increase controller application flexibility



FX-PCG26 Controller

Repair Information

If the FX-PCG fails to operate within its specifications, replace the unit. For a replacement FX-PCG, contact the nearest Johnson Controls® representative.

Selection Charts

FX-PCG Series Point Type Counts per Model

Point Types	Signals Accepted	FX-PCG16	FX-PCG26
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Current Mode, 4–20 mA ¹ Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	2	6
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	1	2
Analog Output (AO)	Analog Output, Voltage Mode, 0–10 VDC Analog Output, Current Mode, 4–20 mA	0	2
Binary Output (BO)	24 VAC Triac	3	3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	4	4

1. Analog Input, Current Mode is set by hardware for the FX-PCG26, and as software for the FX-PCG16.

FX-PCG General Purpose Programmable Controllers (Continued)

Ordering Information

Product Code Number	Description
FX-PCG1611-0	10-Point General Purpose Programmable Controller with 2 UI, 1 BI, 3 BO, and 4 CO
FX-PCG1621-0	10-Point General Purpose Programmable Controller with 2 UI, 1 BI, 3 BO, and 4 CO; Integral Display
FX-PCG2611-0	17-Point General Purpose Programmable Controller with 6 UI, 2 BI, 3 BO, 2 AO, and 4 CO
FX-PCG2621-0	17-Point General Purpose Programmable Controller with 6 UI, 2 BI, 3 BO, 2 AO and 4 CO; Integral Display

Accessories (Order Separately)

Product Code Number	Description
Y64T15-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65A13-0 ¹	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 8 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
Y65T31-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray, Bulk Pack
FX-BTCVT-1	Bluetooth® Commissioning Converter
FX-BTCVTCBL-700	Cable Replacement Set for the FX-BTCVT-1 or the NS-ATV7003-0; includes one 1.5 m (5 ft) retractable cable
FX-DIS1710-0	Local Controller Display for FX-PCG1611 and FX-PCG2611 models
FX-ZFR1810-0	Wireless Field Bus Coordinator, 10 mW Transmission Power; functions with FX Supervisory Controllers
FX-ZFR1811-0	Wireless Field Bus Router, 10 mW Transmission Power; functions with FX-PC Programmable Controllers and FX-WRZ Wireless Room Sensors

1. Additional Y6x Series Transformers are available from Johnson Controls. Refer to the *Series Y63, Y64, Y65, Y66, and Y69 Transformer Catalog Page (LIT-1922175)* for more information regarding transformers.

FX-PCG General Purpose Programmable Controllers (Continued)

Technical Specifications

FX-PCG Series		
Product Code Numbers	FX-PCG1611-0: 10-Point General Purpose Programmable Controller FX-PCG2611-0: 17-Point General Purpose Programmable Controller FX-PCG1621-0: 10-Point General Purpose Programmable Controller with Display and Push Button User Interface FX-PCG2621-0: 17-Point General Purpose Programmable Controller with Display and Push Button User Interface	
Supply Voltage	24 VAC Nominal, (20 VAC Minimum/30 VAC Maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)	
Power Consumption	14 VA Maximum for FX-PCG1611 and FX-PCG2611 (No Integral Display) 20 VA Maximum for FX-PCG1621 and FX-PCG2621 (With Integral Display) Note: Note: VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 84 VA (maximum).	
Ambient Conditions	Operating: 0 to 50°C (32 to 122°F); 10 to 90% RH Noncondensing Storage: -40 to 80°C (-40 to 176°F); 5 to 95% RH Noncondensing	
Controller Addressing	DIP Switch Set; Valid Controller Device Addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid controller addresses.)	
Communications Bus	BACnet® MS/TP, RS-485: 3-Wire FC Bus Between the Supervisory Controller and Programmable Controllers 4-Wire SA Bus Between Programmable Controller, Network Sensors, and other Sensor/Actuator Devices, Includes a lead to source 15 VDC supply power (from Programmable Controller) to bus devices.	
Processor	H8SX/166xR Renesas® Microcontroller	
Memory	1 MB Flash Memory and 512 KB Random Access Memory (RAM)	
Input and Output Capabilities	FX-PCG16 Models: 2 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 1 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (Selectable Internal or External Source Power) 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO FX-PCG26 Models: 6 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (Selectable Internal or External Source Power) 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA	
Analog Input/Analog Output Resolution and Accuracy	Analog Input: 16-bit Resolution Analog Output: 16-bit Resolution and ±200 mV in 0–10 VDC Applications	
Terminations	Input/Output: Fixed Screw Terminal Blocks FC Bus, SA Bus, and Supply Power: 3-Wire and 4-Wire Pluggable Screw Terminal Blocks FC Bus and SA Bus: RJ-12 6-Pin Modular Jacks	
Mounting	Horizontal on Single 35 mm DIN Rail Mount (preferred), or Screw Mount on Flat Surface with Three Integral Mounting Clips on Controller	
Housing	Enclosure material: ABS and Polycarbonate UL94 5VB; Self-extinguishing, Plenum-rated Protection Class: IP20 (IEC529)	
Dimensions (Height x Width x Depth)	FX-PCG16 Models: 150 x 164 x 53 mm (5-7/8 x 6-7/16 x 2-1/8 in.) Including Terminals and Mounting Clips FX-PCG26 Models: 150 x 190 x 53 mm (5-7/8 x 7-1/2 x 2-1/8 in.) Including Terminals and Mounting Clips Note: Mounting space for FX-PCG16 and FX-PCG26 Models requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.	
Weight	FX-PCG16 Models: 0.4 kg (0.9 lb) FX-PCG26 Models: 0.5 kg (1.1 lb)	
Compliance	United States	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant

M9106-xGx-2 Series Electric Non-spring Return Actuators

The M9106-xGx-2 Series direct-mount electric actuators operate on 24 VAC power and are available for use with on/off, floating, or proportional controllers. These non-spring return actuators are easily installed on a Variable Air Volume (VAV) box, a damper with a round shaft up to 1/2 inch (13 mm) in diameter, or a square shaft up to 3/8 inch (10 mm).

The M9106 models have 53 lb-in (6 N-m) running torque. They have a nominal 60-second travel time for 90° of rotation at 60 Hz (72 seconds at 50 Hz) with a load-independent rotation time.

The M9106-xGC-2 models are available with integral auxiliary switches to perform switching functions at any angle within the selected rotation range. GGx models feature 0 to 10 VDC position feedback, and the AGF models provide 10,000 ohm position feedback.



Figure 1: M9106-xGx-2 Non-spring Return Actuator

Features and Benefits	
<input type="checkbox"/> 35 dBA Rating	Meets audible requirements for open ceilings
<input type="checkbox"/> Synchronous Drive	Provides constant rotation time independent of load
<input type="checkbox"/> Direct Shaft Mount with Single-screw Coupler	Simplifies installation and provides 3-point shaft gripping
<input type="checkbox"/> Magnetic Clutch	Provides torque protection for the damper and actuator
<input type="checkbox"/> Field-selectable Rotation Time (IGx Models Only)	Replaces M9104, EDA-2040, and ATP-2040 actuators and provides optimum rotation time for the specific application
<input type="checkbox"/> Jumper-selectable Rotation Direction (GGx Models Only)	Simplifies installation
<input type="checkbox"/> Adjustable Rotation Stops	Allow application versatility with 30 to 90° Clockwise (CW) or Counterclockwise (CCW) rotation
<input type="checkbox"/> 1/2 in. NPT Threaded Conduit Opening	Meets electrical code requirements and allows the use of armored cable
<input type="checkbox"/> Manual Gear Release	Simplifies setup and field adjustments
<input type="checkbox"/> Output Position Feedback	Provides simple, closed-loop control with accurate position sensing

Application

IMPORTANT: This device is not designed or intended to be used in or near environments where explosive vapors or gases could be present, or environments where substances corrosive to the device's internal components could be present.

The M9106 actuators are used to position balancing, control, round, and zone dampers in typical Heating, Ventilating, and Air Conditioning (HVAC) applications. They are also used to position the blades in a VAV box.

The M9106 mounts directly on the duct surface, round damper, or small rectangular damper with an anti-rotation bracket and two sheet metal screws (included). Additional linkages or couplers are not required.

Refer to the damper or VAV box manufacturer's information to select the proper timing for the actuator. Refer to the appropriate application note for specific wiring diagrams and information.

Operation

IMPORTANT: The M9106-xGx-2 Series actuator is intended to control equipment under normal operating conditions. Where failure or malfunction of an M9106-xGx-2 actuator could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls), or systems (alarm or supervisory) intended to warn of, or protect against, failure or malfunction of an M9106-xGx-2 actuator must be incorporated into and maintained as part of the control system.

A controller provides a control signal to the actuator depending upon the desired movement of the damper blade. This signal causes the motor to rotate in the proper direction and the damper blade to open or close.

Note: To avoid excessive wear or drive time on the motor for the AGx models, use a controller and/or software that provides a time-out function to remove the signal at the end of rotation (stall). The GGx and IGx models have an auto shutoff to avoid excessive wear or drive time on the motor.

The actuator rotates at a nominal rate of 1.5° per second (90° in 60 seconds) at 60 Hz input. The actuator rotation is field adjustable from 30 to 90°. Determine the actual rotation time for actuators using less than 90° rotation, and use that value with the controller software. For example, 40 seconds is used for 60° rotation.

The IGA and IGC models offer adjustable rotation times of 1, 1.5, 2, 5.5 and 11 minutes (factory set for 1 minute). The 1-, 1.5-, and 2-minute settings are ideal for on/off and floating applications, and replace the M9104-xGx-2 1.5-minute models. The 5.5- and 11-minute settings are replacements for the 35 lb-in (4 N·m) EDA-2040 and the ATP-2040 models.

Dimensions

See Figure 2 for the actuator dimensions.

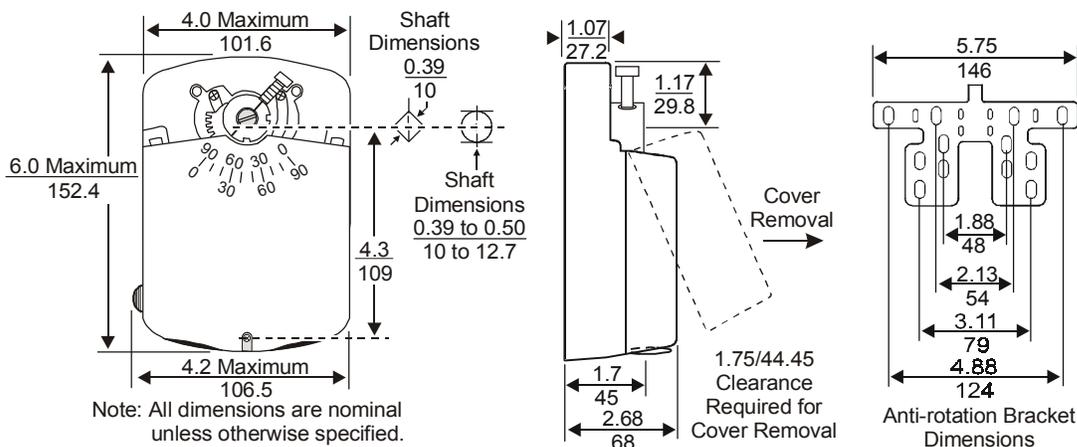


Figure 2: Actuator and Anti-rotation Bracket Dimensions, in. (mm)

Repairs and Replacement

Field repairs must not be made. For a replacement or an accessory, refer to the *Ordering Information* section.

Ordering Information

Contact the nearest Johnson Controls representative, and specify the desired product code number from Table 1 or Table 2.

Table 1: Actuators

M9106-xGx-2 Series Electric Actuator 53 lb·in (6 N·m)	M9106-AGA-2	M9106-AGC-2	M9106-AGF-2	M9106-GGA-2	M9106-GGC-2	M9106-IGA-2	M9106-IGC-2
On/Off Control						■	■
Floating Control	■	■	■			■	■
Proportional Control				■	■		
Feedback							
10,000 ohm Potentiometer			■				
0 to 10 VDC Feedback				■	■		
2 Auxiliary Switches		■			■		■
Adjustable Rotation Time						■	■

Table 2: Accessories

Product Code Number	Description
CBL-2000-1*	20 in. (0.5 m) Wiring Harness, Underwriter's Laboratories, Inc® (UL) accepted for plenum use, connects the M9106 and DPT-2015 to the VAV controller
CBL-2000-2	20 in. (0.5 m) plenum-rated Wiring Harness
CBL-2000-3	72 in. (1.8 m) plenum-rated Wiring Harness
DPT-2015-0*	0 to 1.5 in. W.C. (0 to 375 Pa) differential pressure transmitter
DMPR-KC003	Blade Pin Extension without Bracket supplied with Johnson Controls CD-1300 dampers and may be ordered separately for all direct mount applications
DMPR-KC010**	Adjustable Blade Position Indicator Switch Kit with total switching load limited to 2000 VA for the following applications: Pilot Duty: 24 VAC, 50 VA; 125/250/277 VAC, 125 VA; Motor Load: 125/250/277 VAC, 1/3 hp; Resistive Load: 125 VAC, 11 A; 250 VAC, 8 A; 277 VAC, 7 A (all maximum values)
DMPR-KR003	Sleeve Pin Kit for use with Johnson Controls round dampers with a 5/16 in. (8 mm) shaft; furnished with the damper and may be ordered separately
M9000-105	Pluggable 3-Terminal Block
M9000-106	Pluggable 4-Terminal Block
M9000-160	Replacement anti-rotation bracket for M9106 Series actuators
M9000-200	Commissioning Tool provides a control signal to drive on/off, floating, proportional, or resistive actuators.
M9000-512	Valve Linkage Kit for field mounting an M9106 actuator to a 1/2 in. 2-way VG1000 Series ball valve

* Use with an M9106-AGC-2 actuator to replace an ATP-2040 actuator and an EDA-2040-102 switch kit.

Note: An external relay (not provided) is needed for line voltage auxiliary switching.

** Use with an M9106 actuator to replace an EDA-2040 or ATP-2040 actuator and an EDA-2040-102 switch kit when line voltage switches are required and an external relay is not desired.

Technical Data

Product	M9106-xGx-2 Series Electric Non-spring Return Actuators	
Power Requirements	AGx:	20 to 30 VAC at 50/60 Hz; 2.5 VA supply, Class 2
	IGx:	20 to 30 VAC at 50/60 Hz; 2.8 VA supply, Class 2
	GGx:	20 to 30 VAC at 50/60 Hz; 3.2 VA supply, Class 2
Input Signal	AGx and IGx:	20 to 30 VAC at 50/60 Hz
	GGx:	0 to 10 VDC or 0 to 20 mA
Input Signal Adjustments	AGx and IGx:	CW and COM Terminals, CW rotation; CCW and COM Terminals, CCW rotation
	GGx (Voltage Input or Current Input):	
	Jumper Selectable:	0 (2) to 10 VDC or 0 (4) to 20 mA
	Factory Setting:	0 to 10 VDC, CW rotation with signal increase
		Action is jumper selectable Direct (CW) or Reverse (CCW) with signal increase.
Input Impedance	AGx:	200 ohms, nominal
	IGx:	160 ohms, nominal
	GGx:	Voltage Input, 150,000 ohms; Current Input, 500 ohms
Feedback Signal	AGF:	10,000 ohm potentiometer, 1 W
	GGx:	0 to 10 VDC or 2 to 10 VDC for 90° (10 VDC at 1 mA); Corresponds to input signal span selection
Auxiliary Switch Rating	xGC:	Two Single-Pole, Double-Throw (SPDT) switches rated at 24 VAC, 1.5 A inductive, 3.0 A resistive; 35 VA maximum per switch, Class 2
Mechanical Output (Running Torque)	1-, 1.5-, and 2-minute settings:	53 lb·in (6 N·m)
	5.5- and 11-minute settings:	35 lb·in (4 N·m)
Cycles	100,000 full cycles; 2,500,000 repositions rated at 53 lb·in (6 N·m)	
Audible Noise Rating	35 dBA maximum at 1 m	
Rotation Range	Adjustable from 30 to 90°, CW or CCW	
Rotation Time	IGx:	Adjustable with switch settings (Factory set for 1 minute.) 60, 90, 120, 330, or 660 seconds (1, 1.5, 2, 5.5, or 11 minutes) at 60 Hz; and 72, 108, 144, 396, or 792 seconds (1.2, 1.8, 2.4, 6.6, or 13.2 minutes) at 50 Hz All Other Models: Nominal 60 seconds at 60 Hz and 72 seconds at 50 Hz for 90°
Electrical Connection	1/4 in. spade terminals (To order optional pluggable terminal blocks, see Table 2.)	
Mechanical Connection	3/8 to 1/2 in. (10 to 12.7 mm) round shaft or 3/8 in. (10 mm) square shaft	
Enclosure	NEMA 2, IP32	
Ambient Operating Conditions	-4 to 125°F (-20 to 52°C); 90% RH maximum, non-condensing	
Ambient Storage Conditions	IGx:	-40 to 186°F (-40 to 86°C); 90% RH maximum, non-condensing
	All Other Models:	-40 to 176°F (-40 to 80°C); 90% RH maximum, non-condensing
Dimensions (H x W x D)	5.9 x 4.2 x 2.64 in. (150.1 x 106.5 x 67.0 mm)	
Shipping Weight	2.4 lb (1.08 kg)	
Agency Compliance	UL 873 Listed, File E27734, CCN XAPX CSA C22.2 No. 139 Certified, File LR85083, Class 3221 02 CE Mark, EMC Directive 89/336/EEC	

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

Printed in U.S.A.
www.johnsoncontrols.com

NS Series Network Sensors

Description

The NS Series Network Sensor offering includes NS Series Network Zone Sensors and NS Series Network Discharge Air Sensors. The NS Series Network Sensors are designed to function directly with Metasys® system Field Equipment Controllers (FECs), Input/Output Modules (IOMs), Variable Air Volume (VAV) Modular Assembly (VMA16) Controllers, and Facility Explorer FX-PC Series Programmable Controllers (FX-PCGs, FX-PCVs, and FX-PCXs).

The majority of NS Series Network Zone Sensors monitor room temperature; however, options are available to also monitor zone humidity, carbon dioxide (CO₂), local temperature setpoint adjustments, and other variables. This data is transmitted to a controller on the Sensor Actuator (SA) Bus.

The NS Series Network Zone Sensors include models with a temperature setpoint dial and Liquid Crystal Display (LCD) that allows occupants to view the zone temperature, Relative Humidity (RH), and view and adjust the zone temperature setpoint. Some temperature and humidity models include a push button to toggle between temperature and RH on the display. These models also have the capability to set the desired default display to either temperature or RH.

A fan mode push button is included to set the desired fan speed (AUTO-OFF-low-medium-high). An occupancy override function allows the user to signal the controller that the zone is occupied to override the scheduled mode. Some models have DIP switches to set a unique address for applications that require multiple sensors.

For communication wiring flexibility, the wires connecting the network zone sensor to a controller can be terminated using a modular jack or screw terminals.

Each network sensor includes an SA Bus access port to allow accessories to access the SA Bus. This plug allows accessories to service or commission the connected controller or gain access to any other controller on the same Field Controller (FC) Bus.

The NS Series Network Zone Sensor offering includes models that can be surface mounted, vertical wallbox mounted, or flush mounted to meet the requirements of the specific application.

The NS Series Network Discharge Air Sensors monitor the duct temperature, typically at the discharge of the VAV box, and transmit this data to a local controller on the SA Bus using the 10 ft (305 cm) wiring lead included with the unit. The 10 ft (305 cm) wiring lead consists of four 22 AWG (0.6 mm) trade size color-coded wires encased in a plenum-rated jacket. Each of the wires is stripped and tinned for easy connection to the SA Bus screw terminal block.

The NS Series Network Discharge Air Sensors are available with either a 4 or 8 in. (102 or 203 mm) temperature probe. All models include DIP switches for applications requiring multiple discharge air sensors, each with a unique DIP switch address.



NS Series Network Sensors

Features

- BACnet® Master-Slave/Token-Passing (MS/TP) protocol communication — provides compatibility with Metasys system field controllers and Facility Explorer programmable controllers in a proven communication network
- backlit Liquid Crystal Display (LCD) available on some models — provides real-time status of the environment with backlighting activated during user interaction
- simple temperature setpoint adjustment available on some models — enables you to change the setpoint with the turn of a dial
- temporary occupancy available on some models — provides a timed override command, which temporarily initiates an alternate mode
- field selectable default display setting on some models — allows you to toggle between temperature and RH on the display, and set the desired default for continuous viewing
- Fahrenheit/Celsius (F/C) button available on some models — toggles the display temperature between degrees Celsius and degrees Fahrenheit

Repair Information

If the NS Series Network Zone Sensor or the NS Series Network Discharge Air Sensor fails to operate within its specifications, replace the unit. For a replacement sensor, contact the nearest Johnson Controls® representative.

NS Series Network Sensors (Continued)

Selection Charts

Network Zone Sensor Ordering Information — Temperature Only Models

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB) or Surface-Mounted (SM)	Johnson Controls Logo	LCD Display	Temperature Adjustment: Setpoint (Set) or Warmer/Cooler Dial (W/C)	Occupancy Override	F/C Scale Toggle	Fan Control	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches	VAV Balancing Feature
NS-ATA7001-0	80 x 80	SM	Yes	Yes	Set	Yes	No	No	MJ	No	No
NS-ATA7002-0	80 x 80	SM	Yes	Yes	Set	Yes	No	No	ST	No	No
NS-ATA7003-0	80 x 80	SM	Yes	Yes	Set	Yes	No	No	ST	Yes	No
NS-ATB7001-0	80 x 80	SM	Yes	Yes	Set	Yes	Yes	No	MJ	No	No
NS-ATB7002-0	80 x 80	SM	Yes	Yes	Set	Yes	Yes	No	ST	No	No
NS-ATB7003-0	80 x 80	SM	Yes	Yes	Set	Yes	Yes	No	ST	Yes	No
NS-ATC7001-0	80 x 80	SM	Yes	Yes	Set	Yes	No	Yes	MJ	No	No
NS-ATC7002-0	80 x 80	SM	Yes	Yes	Set	Yes	No	Yes	ST	No	No
NS-ATD7001-0	80 x 80	SM	Yes	Yes	Set	Yes	Yes	Yes	MJ	No	No
NS-ATD7002-0	80 x 80	SM	Yes	Yes	Set	Yes	Yes	Yes	ST	No	No
NS-ATF7001-0	80 x 80	SM	Yes	Yes	W/C	Yes	Yes	No	MJ	No	No
NS-ATF7002-0	80 x 80	SM	Yes	Yes	W/C	Yes	Yes	No	ST	No	No
NS-ATN7001-0	80 x 80	SM	Yes	No	N/A	No	No	No	MJ	No	No
NS-ATN7001-2	80 x 80	SM	No	No	N/A	No	No	No	MJ	No	No
NS-ATN7003-0	80 x 80	SM	Yes	No	N/A	No	No	No	ST	Yes	No
NS-ATN7003-2	80 x 80	SM	No	No	N/A	No	No	No	ST	Yes	No
NS-ATP7001-0	80 x 80	SM	Yes	No	W/C	Yes	No	No	MJ	No	No
NS-ATP7001-2	80 x 80	SM	No	No	W/C	Yes	No	No	MJ	No	No
NS-ATP7002-0	80 x 80	SM	Yes	No	W/C	Yes	No	No	ST	No	No
NS-ATP7003-0	80 x 80	SM	Yes	No	W/C	Yes	No	No	ST	Yes	No
NS-ATP7003-2	80 x 80	SM	No	No	W/C	Yes	No	No	ST	Yes	No
NS-ATV7001-0	80 x 80	SM	Yes	Yes	Set	Yes	Yes	No ¹	MJ	No	Yes
NS-ATV7002-0	80 x 80	SM	Yes	Yes	Set	Yes	Yes	No ¹	ST	No	Yes
NS-BTB7001-0	120 x 80	WB, SM	Yes	Yes	Set	Yes	Yes	No	MJ	No	No
NS-BTB7001-2	120 x 80	WB, SM	No	Yes	Set	Yes	Yes	No	MJ	No	No
NS-BTB7002-0	120 x 80	WB, SM	Yes	Yes	Set	Yes	Yes	No	ST	No	No
NS-BTB7003-0	120 x 80	WB, SM	Yes	Yes	Set	Yes	Yes	No	ST	Yes	No
NS-BTF7001-0	120 x 80	WB, SM	Yes	Yes	W/C	Yes	Yes	No	MJ	No	No
NS-BTF7002-0	120 x 80	WB, SM	Yes	Yes	W/C	Yes	Yes	No	ST	No	No
NS-BTN7001-0	120 x 80	WB, SM	Yes	No	N/A	No	No	No	MJ	No	No
NS-BTN7001-2	120 x 80	WB, SM	No	No	N/A	No	No	No	MJ	No	No
NS-BTN7003-0	120 x 80	WB, SM	Yes	No	N/A	No	No	No	ST	Yes	No
NS-BTP7001-0	120 x 80	WB, SM	Yes	No	W/C	Yes	No	No	MJ	No	No
NS-BTP7001-2	120 x 80	WB, SM	No	No	W/C	Yes	No	No	MJ	No	No
NS-BTP7002-0	120 x 80	WB, SM	Yes	No	W/C	Yes	No	No	ST	No	No
NS-BTP7002-2	120 x 80	WB, SM	No	No	W/C	Yes	No	No	ST	No	No
NS-BTP7003-0	120 x 80	WB, SM	Yes	No	W/C	Yes	No	No	ST	Yes	No
NS-BTV7001-0	120 x 80	WB, SM	Yes	Yes	Set	Yes	Yes	No ¹	MJ	No	Yes
NS-BTV7002-0	120 x 80	WB, SM	Yes	Yes	Set	Yes	Yes	No ¹	ST	No	Yes

1. In the VAV balancing models, the fan control button is replaced by a light bulb button used in the VAV balancing process.

NS Series Network Sensors (Continued)

Network Zone Sensor Ordering Information — Temperature and Humidity Models without RH Display

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB) or Surface-Mounted (SM)	LCD Display, RH Display	Humidity Element Accuracy	Temperature Adjustment: Setpoint (Set) or Warmer/Cooler Dial (W/C)	Occupancy Override	F/C Scale Toggle	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches
NS-AHA7001-0	80 x 80	SM	Yes, No	3%	Set	Yes	No	MJ	No
NS-AHA7002-0	80 x 80	SM	Yes, No	3%	Set	Yes	No	ST	No
NS-AHB7001-0	80 x 80	SM	Yes, No	3%	Set	Yes	Yes	MJ	No
NS-AHB7002-0	80 x 80	SM	Yes, No	3%	Set	Yes	Yes	ST	No
NS-AHB7003-0	80 x 80	SM	Yes, No	3%	Set	Yes	Yes	ST	Yes
NS-AHN7001-0	80 x 80	SM	None	3%	N/A	No	No	MJ	No
NS-AHN7001-2	80 x 80	SM	None	3%	N/A	No	No	ST	No
NS-AHP7001-0	80 x 80	SM	None	3%	W/C	Yes	No	MJ	No
NS-APA7001-0	80 x 80	SM	Yes, No	2%	Set	Yes	No	MJ	No
NS-APA7002-0	80 x 80	SM	Yes, No	2%	Set	Yes	No	ST	No
NS-APB7001-0	80 x 80	SM	Yes, No	2%	Set	Yes	Yes	MJ	No
NS-APB7002-0	80 x 80	SM	Yes, No	2%	Set	Yes	Yes	ST	No
NS-APB7003-0	80 x 80	SM	Yes, No	2%	Set	Yes	Yes	ST	Yes
NS-BHB7001-0	120 x 80	WB, SM	Yes, No	3%	Set	Yes	Yes	MJ	No
NS-BHB7002-0	120 x 80	WB, SM	Yes, No	3%	Set	Yes	Yes	ST	No
NS-BHB7003-0	120 x 80	WB, SM	Yes, No	3%	Set	Yes	Yes	ST	Yes
NS-BHN7001-0	120 x 80	WB, SM	None	3%	N/A	No	No	MJ	No
NS-BHP7001-0	120 x 80	WB, SM	None	3%	W/C	Yes	No	MJ	No
NS-BPB7001-0	120 x 80	WB, SM	Yes, No	2%	Set	Yes	Yes	MJ	No
NS-BPB7002-0	120 x 80	WB, SM	Yes, No	2%	Set	Yes	Yes	ST	No
NS-BPB7003-0	120 x 80	WB, SM	Yes, No	2%	Set	Yes	Yes	ST	Yes

Network Zone Sensor Ordering Information — Temperature and Humidity Models with Temperature or RH Display (Field Selectable Default Display)

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB) or Surface-Mounted (SM)	LCD Display, RH Display	Humidity Element Accuracy	Temperature Adjustment: Setpoint (Set) or Warmer/Cooler Dial (W/C)	Occupancy Override	F/C Scale Toggle	Screw Terminals (ST) or Modular Jack (MJ)	Address Switches
NS-AHR7101-0	80 x 80	SM	Yes, Yes	3%	Set	Yes	Yes	MJ	No
NS-AHR7102-0	80 x 80	SM	Yes, Yes	3%	Set	Yes	Yes	ST	No
NS-AHR7103-0	80 x 80	SM	Yes, Yes	3%	Set	Yes	Yes	ST	Yes
NS-APR7101-0	80 x 80	SM	Yes, Yes	2%	Set	Yes	Yes	MJ	No
NS-APR7102-0	80 x 80	SM	Yes, Yes	2%	Set	Yes	Yes	ST	No
NS-BHR7101-0	120 x 80	WB, SM	Yes, Yes	3%	Set	Yes	Yes	MJ	No
NS-BHR7103-0	120 x 80	WB, SM	Yes, Yes	3%	Set	Yes	Yes	ST	Yes

Network Zone Sensor Ordering Information — CO₂ Model

Product Code Number	Size (mm), Height x Width	Vertical Wallbox-Mounted (WB), or Surface-Mounted (SM)	LCD Display	CO ₂ Measurement Range	Screw Terminals (ST), or Modular Jack (MJ)	Sensor Addressing
NS-BCN7004-0	120 x 80	WB, SM	No	0 to 2,000 ppm	ST, MJ	DIP Switch (212 to 219)

Network Zone Sensor Ordering Information — Flush-Mount Temperature Only Model

Product Code Number	Faceplate Dimensions, Height x Width	Mounting	LCD Display	Temperature Measurement Range	Terminations	Sensor Addressing
NS-FTN7003-2	4-1/2 in. x 2-3/4 in. (114 mm x 70 mm)	Flush-Mount	No	32.0°F/0.0°C to 104.0°F/40.0°C	Screw Terminal Block	DIP Switch (200 to 203)

NS Series Network Sensors (Continued)

Network Discharge Air Sensor Ordering Information

Product Code Number	Dimensions, Height x Width x Depth	Temperature Probe Length	10 ft (305 cm) Wiring Lead Included	Terminations	Sensor Addressing
NS-DTN7043-0	3 in. x 3 in. x 2 in. (76 mm x 76 mm x 51 mm)	4 in. (102 mm)	Yes	Screw Terminal Block	DIP Switch (204 to 211)
NS-DTN7083-0	3 in. x 3 in. x 2 in. (76 mm x 76 mm x 51 mm)	8 in. (203 mm)	Yes	Screw Terminal Block	DIP Switch (204 to 211)

Technical Specifications

NS Series Network Zone Sensors — Temperature Only Models and Temperature and Humidity Models		
Supply Voltage	9.8 to 16.5 VDC; 15 VDC Nominal (From SA Bus)	
Current Consumption	Temperature Only Models with LCD Display: 21 mA Maximum (Non-transmitting)	
	Temperature Only Models without LCD Display: 13 mA Maximum (Non-transmitting)	
	Temperature and Humidity Models with LCD Display: 25 mA Maximum (Non-transmitting)	
	Temperature and Humidity Models without LCD Display: 17 mA Maximum (Non-transmitting)	
Terminations	Modular Jack or Screw Terminal Block	
Sensor Addressing	NS-AHx7003-0, NS-APB7003-0, NS-ATx7003-0, NS-BHx7003-0, NS-BPB7003-0, NS-BTB7003-0, NS-BTN7003-0, and NS-BTP7003-0 Models: DIP Switch Set from 200 to 203; Factory Set at 203 All Other Models: Fixed Address of 199	
Wire Size	Modular Jack Models: 24 or 26 AWG (0.5 or 0.4 mm Diameter) Recommended; Three Twisted Pair (Six Conductors)	
	Screw Terminal Block Models: 18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended	
Communication Rate	Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps	
Mounting	Surface-Mounted: 80 x 80 mm	
	Surface-Mounted or Vertical Wallbox-Mounted: 120 x 80 mm	
Temperature Measurement Range	32.0°F/0.0°C to 104.0°F/40.0°C	
Humidity Measurement Range	Full Range: 0 to 100% RH	
	Calibrated Range: 10 to 90% RH	
Temperature Sensor Type	Local Platinum Resistance Temperature Detector (RTD)	
Humidity Sensor Type	Thin Film Capacitive Sensor	
Temperature Resolution (Models with LCD)	±0.5F°/±0.5C°	
Temperature Sensor Accuracy	±1.0F°/±0.6C°	
Humidity Element Accuracy	NS-APx700x-0 and NS-BPB700x-0 Models: ±2% RH for 20 to 80% RH; ±4% RH for 10 to 20% and 80 to 90% RH	
	NS-AHx700x-0 and NS-BHx700x-0 Models: ±3% RH for 20 to 80% RH; ±6% RH for 10 to 20% and 80 to 90% RH	
Time Constant	10 Minutes Nominal at 10 fpm Airflow	
Default Temperature Setpoint Adjustment Range	With LCD Display: 50.0°F/10.0°C to 86.0°F/30.0°C in 0.5° Increments	
	Without LCD Display: ±5.0F°/±3.0C°	
Ambient Conditions	Operating: 32 to 104°F (0 to 40°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point	
	Storage with LCD Display: -4 to 140°F (-20 to 60°C); 5 to 95% RH, Noncondensing	
	Storage without LCD Display: -40 to 158°F (-40 to 70°C); 5 to 95% RH, Noncondensing	
Compliance	BACnet International	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS) Note: Excludes the NS-ATV700x-0 and NS-BTV700x-0 models.
	United States	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment; FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada, ICES-003
	Europe	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Accessory (Order Separately)	NS-WALLPLATE-0: Adapts an 80 x 80 mm NS Series Network Zone Sensor to a Standard 80 x 120 mm Wallbox	
Shipping Weight	NS-Axx7xxx-0 Models: 0.20 lb (0.09 kg)	
	NS-Bxx7xxx-0 Models: 0.25 lb (0.11 kg)	

NS Series Network Sensors (Continued)

NS Series Network Zone Sensor — CO₂ Model		
Supply Voltage	Non-isolated: 20 to 30 VAC (18 to 30 VDC), Class 2 or Safety Extra-Low Voltage (SELV)	
	Isolated: 9.8 to 16.5 VDC; 15 VDC Nominal (From SA Bus)	
Current Consumption	Non-isolated: 22 mA Average at 24 VAC; 28 mA Average at 24 VDC	
	Isolated: 5 mA Maximum, Non-transmitting (From SA Bus)	
Power Consumption	Non-isolated: Less Than 0.7 W Average	
Terminations	Non-isolated Supply: Screw Terminal Block	
	SA Bus: Modular Jack or Screw Terminal Block	
Sensor Addressing	DIP Switch Set from 212 to 219; Factory Set at 212	
Wire Size	Modular Jack: 24 or 26 AWG (0.5 or 0.4 mm Diameter) Recommended; Three Twisted Pair (Six Conductors)	
	Screw Terminal Block: 18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended	
Communication Rate	Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps	
CO₂ Measurement Range	0 to 2,000 ppm	
CO₂ Sensing Accuracy	Plus or Minus the Sum of 50 ppm and 3.0% of the CO ₂ Reading at 77°F (25°C) and 978 hPa or an Altitude of 1,000 ft/300 m	
	Note: All accuracy specifications reflect the testing of the device using high-grade certified gases. This device is intended for an altitude range of 0 ft/0 m to 2,000 ft/600 m above sea level without compensation.	
	Temperature Dependence of Output: -0.35% of the CO ₂ Reading per 1.8F°/1C° Typical	
	Pressure Dependence of Output: +0.15% of the CO ₂ Reading per 1 hPa Typical	
CO₂ Sensing Resolution	1 ppm	
CO₂ Sensing Response Time	1 Minute (0 to 90%)	
CO₂ Sensing Warm-Up Time	Less Than 1 Minute; Less Than 10 Minutes for Full Accuracy	
CO₂ Sensing Long-Term Stability	Less Than ±100 ppm Over 5 Years	
Mounting	Surface-Mounted or Vertical Wallbox-Mounted: 120 x 80 mm	
Ambient Conditions	Operating: 32 to 104°F (0 to 40°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point; 700 to 1,200 hPa	
	Storage: -40 to 158°F (-40 to 70°C); 0 to 95% RH, Noncondensing	
Compliance	BACnet International	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS)
	United States	UL Listed, File E107041 CCN PAZX, Under UL 916, Energy Management Equipment; FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada, ICES-003
	Europe	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Supply Voltage	0.35 lb (0.16 kg)	

NS Series Network Sensors (Continued)

NS Series Network Zone Sensor — Flush-Mount Temperature Only Model		
Supply Voltage	9.8 to 16.5 VDC; 15 VDC Nominal (From SA Bus)	
Current Consumption	12 mA Maximum (Non-transmitting) per Flush-Mount Network Sensor	
Terminations	Screw Terminal Block Note: Wire leads are field supplied and are not tinned.	
Sensor Addressing	DIP Switch Set from 200 to 203; Factory Set at 203	
Wire Size	18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended; 10 ft (304.8 cm) Wiring Lead Included with the Unit	
Communication Rate	Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps	
Temperature Measurement Range	32.0°F/0.0°C to 104.0°F/40.0°C	
Temperature Sensor Type	Local Platinum Resistance Temperature Detector (RTD)	
Temperature Sensor Accuracy	±1.0F°/±0.6C°	
Ambient Conditions	Operating: 32 to 104°F (0 to 40°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point Storage: -40 to 158°F (-40 to 70°C); 5 to 95% RH, Noncondensing	
	BACnet International	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS)
	United States	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment; FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada, ICES-003
	Europe	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight	0.25 lb (0.11 kg)	

NS Series Network Discharge Air Sensors		
Supply Voltage	9.8 to 16.5 VDC; 15 VDC Nominal	
Current Consumption	12 mA Maximum (Non-transmitting) per Discharge Air Sensor	
Terminations	Four Color-Coded Wiring Leads, Stripped and Tinned; Factory-Installed at the Discharge Air Sensor Screw Terminal Block	
Sensor Addressing	DIP Switch Set from 204 to 211; Factory Set at 204	
Wire Size	18 to 22 AWG (1.0 to 0.6 mm Diameter); 22 AWG (0.6 mm Diameter) Recommended; 10 ft (305 cm) Wiring Lead Included with the Unit	
Communication Rate	Auto-Detect: 9.6k, 19.2k, 38.4k, or 76.8k bps	
Mounting	Duct-Mounted: 4 or 8 in. (102 or 203 mm) Temperature Probe Length	
Temperature Measurement Range	14°F/-10°C to 140°F/60°C	
Temperature Sensor Type	Local Platinum Resistance Temperature Detector (RTD)	
Temperature Sensor Accuracy	±1.0F°/±0.6C°	
Ambient Conditions	Operating: 14 to 140°F (-10 to 60°C); 10 to 90% RH, Noncondensing; 85°F (29°C) Maximum Dew Point Storage: -40 to 158°F (-40 to 70°C); 5 to 95% RH, Noncondensing	
	BACnet International	BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Smart Sensor (B-SS)
	United States	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment; FCC Compliant to CFR 47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada, ICES-003
	Europe	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant
Shipping Weight	NS-DTN7043-0: 1.15 lb (0.52 kg)	
	NS-DTN7083-0: 1.17 lb (0.53 kg)	

FX-PCV Programmable VAV Box Controllers

Description

FX-PCVs are designed specifically for Variable Air Volume (VAV) Box control applications. The FX-PCV controllers have a pressure sensor and actuator in a pre-wired unit. The FX-PCV controllers connect easily to the NS Series Network Sensors for zone and discharge air temperature sensing.

The FX-PCV controllers can be configured for both single-duct and dual-duct VAV box control applications. The FX-PCV controllers require an additional damper actuator and Differential Pressure Transducer (DPT) sensor for dual duct or supply/exhaust applications.

Refer to the *FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)* for important product application information.

Features

- BACnet® Master-Slave/Token-Passing (MS/TP) protocol communication — provides open system compatibility

- writable flash memory — allows standard or customized applications to be downloaded from the Facility Explorer Programmable Controller Tool (FX-PCT)
- integrated pressure sensor and actuator — reduces installation time
- wireless capability via FX-ZFR Series Wireless Field Bus System — enables wireless mesh connectivity between FX-PCVs to FX-WRZ Series Wireless Room Temperature Sensors, and to FX Supervisory Controllers, facilitating easy initial location and relocation
- fast response actuator — reduces commissioning time by driving the damper from fully open to fully closed (90°) in 60 seconds
- point capacity that can be expanded by adding FX-PCX Expansion Input/Output Modules to the Sensor Actuator (SA) bus — provides further application flexibility
- patented Proportional Adaptive control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) technologies — provide continuous loop tuning



FX-PCV Controller

Repair Information

If the FX-PCV controller fails to operate within its specifications, replace the unit. For a replacement FX-PCV controller, contact the nearest Johnson Controls® representative.

Selection Charts

FX-PCV Series Point Type Counts per Model

Point Types	Signals Accepted	FX-PCV1610	FX-PCV1620
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	1	1
Binary Output (BO)	24 VAC Triac	0	3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	0	2
Integrated Actuator	Internal	1	1
Integrated Flow Sensor	Internal	1	1
Zone Sensor Input	On SA Bus	Up to 4 NS Series Network Zone Sensors Up to 9 FX-WRZ Wireless Zone Sensors	
Discharge Air Sensor Input	On SA Bus	Up to 5 NS Series Network Discharge Air Sensors	

Ordering Information

Product Code Number	Description
FX-PCV1610-0	Programmable VAV Box Controller with Integrated Actuator and Pressure Sensors (Cooling only)
FX-PCV1620-0	Programmable VAV Box Controller with Integrated Actuator and Pressure Sensor (with Reheat and Fan Control)

FX-PCV Programmable VAV Box Controllers (Continued)

Accessories (Order Separately)

Product Code Number	Description
Y64T15-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65A13-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 8 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
Y65T31-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK1002-0	2-Position Screw Terminal that Plugs onto PCV Output Point Spade Lugs
AP-TBK1003-0	3-Position Screw Terminal that Plugs onto PCV Output Point Spade Lugs
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray, Bulk Pack
FX-BTCVT-1	Bluetooth® Commissioning Converter
FX-BTCVTCBL-700	Cable Replacement Set for the FX-BTCVT-1 or the FX-ATV7003-0; includes one 1.5 m (5 ft) retractable cable.
FX-ZFR1810-0	Wireless Field Bus Coordinator, 10 mW Transmission Power; functions with FX Supervisory Controllers.
FX-ZFR1811-0	Wireless Field Bus Router, 10 mW Transmission Power; functions with FX-PC Programmable Controllers and FX-WRZ Wireless Room Sensors.
FX-ZFRCBL-0	Wire Harness which allows an FX-PCV to be connected to an SA Bus device (FX-BTCVT, FX-DIS Display, NS Sensor) when its SA Bus RJ-12 jack is occupied by an FX-ZFR1811 router.

1. Additional Y6x Series Transformers are available from Johnson Controls. Refer to the *Series Y63, Y64, Y65, Y66, and Y69 Transformer Catalog Page (LIT-1922175)* for more information regarding transformers.

Technical Specifications

FX-PCV Series (Part 1 of 2)	
Product Code Numbers	FX-PCV1610-0: Programmable VAV Box Controller, Cooling Only FX-PCV1620-0: Programmable VAV Box Controller, Cooling with Reheat and Fan Control
Supply Voltage	24 VAC Nominal (20 VAC Minimum/30 VAC Maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	10 VA Typical, 14 VA Maximum Note: VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	Operating: 0 to 50°C (32 to 122°F) Storage: -40 to 70°C (-40 to 158°F)
Terminations	Inputs/Outputs: 6.3 mm (1/4 in.) Spade Lugs FC Bus, SA Bus, and Supply Power: 4-Wire and 3-Wire Pluggable Screw Terminal Blocks Sensor Port: RJ-12 6-Pin Modular Jacks
Controller Addressing	DIP Switch Set; Valid FX-PC Controller Device Addresses 4–127 (Device addresses 0–3 and 125–255 are reserved and not valid FX-PC controller addresses.)
Communications Bus	BACnet MS/TP, RS-485: 3-Wire FC Bus Between the FX Supervisory Controller and the FX-PC Programmable Controllers 4-wire SA Bus between the FX-PCV Controller, Network Sensors, and other Sensor/Actuator devices, includes a terminal to source 15 VDC supply power from FX-PCV to SA Bus devices.
Analog Input/Analog Output Resolution and Accuracy	Analog Input: 15-bit Resolution Analog Output: 16-bit Resolution and ±200 mV in 0–10 VDC Applications
Air Pressure Differential Sensor	Setra Transducer, Differential Pressure to Electrical, 0 to 38.1 mm (0 to 1.5 in.) W.C., 0.5 to 4.5 VDC, 5 VDC Supply, Aluminum Plated Performance Characteristics: Combined Repeatability and Hysteresis Error: ±0.05% of Full Span Maximum Non-linearity Errors (Best Fit Method): ±1.0% of Full Span Maximum Response Time (to within 63% of Full Scale Pressure with Step Change on Input): 15 ms Temperature Error from 15.6 to 48.9°C (60 to 120°F) Null: ±0.06% of Full Span per °F Maximum Span: ±1.5% of Full Span Maximum Stability, Null: ±0.5% of Full Scale Maximum, 1 Year Minimum Stability, Span: ±2.0% of Full Scale Maximum, 1 Year Minimum
Mounting	Mounts to Damper Shaft Using Single Set Screw, and to Duct with Single Mounting Screw
Actuator Rating	4 N·m (35 lb-in.) Minimum Shaft Length = 44 mm (1-3/4 in.)
Dimensions	(Height x Width x Depth): 182 x 182 x 64 mm (7-3/16 x 7-3/16 x 2-1/2 in.) Center of Output Hub to Center of Anti-rotation Slot: 160 mm (6-5/16 in.)
Weight	0.86 kg (1.9 lb)

FX-PCV Programmable VAV Box Controllers (Continued)

FX-PCV Series (Part 2 of 2)		
Compliance	United States	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada	UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant

FX-PCX Expansion Input/Output Modules

Description

FX-PCX Expansion Input/Output Modules can serve in one of two capacities depending on where they are installed in the Facility Explorer (FX) system. When installed on the SA bus of an FX-PCG or FX-PCV controller, the FX-PCXs expand the point count of these controllers. When installed on the FC Bus as point multiplexors, FX-PCXs allow an FX Supervisory Controller to monitor and control points directly.

Refer to the *FX-PC Series Programmable Controllers and Related Products Product Bulletin (LIT-12011657)* for important product application information.

Features

- large product family provides a wide range of input/output point combinations to best fit the applications
- ability to reside on the FC Bus or SA Bus provides application flexibility
- pluggable communications bus, inputs/outputs, and power terminals expedites installation BACnet MS/TP communication provides open system compatibility
- 32-bit microprocessor ensures optimum performance and meets industry specifications
- wireless capabilities via FX-ZFR Series Wireless Field Bus System enable wireless mesh connectivity between FX-PCGs/FX-PCXs to FX-WRZ Series Wireless Sensors, and to FX Supervisory Controllers, to facilitate easy initial location and relocation
- universal and configurable inputs and outputs support multiple signal options and increase controller application flexibility



Expansion I/O Module

Repair Information

If the Expansion Input/Output Module fails to operate within its specifications, replace the unit. For a replacement Expansion Input/Output (I/O) Module, contact the nearest Johnson Controls® representative.

Selection Chart.

FX-PCX Series Point Type Counts per Model

Point Types	Signals Accepted	FX-PCX 17xx	FX-PCX 2711	FX-PCX 2721	FX-PCX 3711	FX-PCX 3721	FX-PCX 3731	FX-PCX 4711
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Current Mode, 4–20 mA Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode		2	8	4			6
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	4				16	8	2
Analog Output (AO)	Analog Output, Voltage Mode, 0–10 VDC Analog Output, Current Mode, 4–20 mA			2				2
Binary Output (BO)	24 VAC Triac						8 ¹	3
Universal Output (UO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 V AC/DC FET Analog Output, Current Mode, 4–20 mA		2		4			
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac							4
Relay Output	120/240 VAC		2		4			

1. If the EXT jumper is active on models with Binary Outputs, an external low-voltage power source is required



FX-PCX Expansion Input/Output Modules (Continued)

Ordering Information

Code Number	Description
FX-PCX1711-0	4-Point Expansion I/O Module with 4 BI
FX-PCX2711-0	6-Point Expansion I/O Module with 2 UI, 2 UO, 2 BO
FX-PCX2721-0	10-Point Expansion I/O Module with 8 UI, 2 AO
FX-PCX3711-0	12-Point Expansion I/O Module with 4 UI, 4 UO, 4 BO
FX-PCX3721-0	16-Point Expansion I/O Module with 16 BI
FX-PCX3731-0	16-Point Expansion I/O Module with 8 BI, 8 BO
FX-PCX4711-0	17-Point Expansion I/O Module with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO

Accessories (Order Separately)

Code Number	Description
Y64T15-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65A13-0 ¹	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 8 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
Y65T31-0 ¹	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray, Bulk Pack
FX-BTCVT-1	Bluetooth® Commissioning Converter
FX-BTCVTCBL-700	Cable Replacement Set for the FX-BTCVT-1 or the FX-ATV7003-0; Includes one 1.5 m (5 ft) Retractable Cable

1. Additional Y6x Series Transformers are available from Johnson Controls. Refer to the *Series Y63, Y64, Y65, Y66, and Y69 Transformer Catalog Page (LIT-1922175)* for more information regarding transformers.

Technical Specifications

FX-PCX (Part 1 of 2)	
Product Code Numbers	FX-PCX1711-0: 4-Point Expansion Input/Output Module FX-PCX2711-0: 6-Point Expansion Input/Output Module FX-PCX2721-0: 10-Point Expansion Input/Output Module FX-PCX3711-0: 12-Point Expansion Input/Output Module FX-PCX3721-0: 16-Point Expansion Input/Output Module FX-PCX3731-0: 16-Point Expansion Input/Output Module FX-PCX4711-0: 17-Point Expansion Input/Output Module
Supply Voltage	24 VAC Nominal, (20 VAC Minimum/30 VAC Maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) Europe
Power Consumption	14 VA Maximum Note: VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 84 VA (maximum).
Ambient Conditions	Operating: 0–50°C (32–122°F); 10–90% RH Noncondensing Storage: -40–80°C (-40–176°F); 5–95% RH Noncondensing
Addressing	DIP Switch Set; FX-PCX Controller Device Addresses are 4–127 (Device addresses 0–3 and 128–255 are reserved and are not valid FX-PCX addresses.)
Communications Bus	BACnet MS/TP, RS-485: 3-Wire FC Bus Between the Supervisory Controller and Programmable Controllers. 4-wire SA Bus Between Programmable Controller, Expansion I/O Modules, Network Sensors, and other Sensor/Actuator devices, includes a lead source 15 VDC supply power (from programmable controller) to SA bus devices.
Processor	H8SX/166xR Renesas® 32-bit Microcontroller
Memory	FX-PCX17, FX-PCX27, and FX-PCX37 Models: 640 KB Flash Memory and 128 KB Random Access Memory (RAM) FX-PCX47 Models: 1 MB Flash Memory and 512 KB RAM

FX-PCX Expansion Input/Output Modules (Continued)

FX-PCX (Part 2 of 2)	
Input and Output Capabilities	FX-PCX1711: 4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
	FX-PCX2711: 2 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Universal Outputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 2 - Relay Outputs (Single-Pole, Double-Throw) Rate as: 240 VAC Maximum Voltage 1/3 hp 125 VAC, 1/2 hp 250 VAC 400 VA Pilot Duty at 240 VAC 200 VA Pilot Duty at 120 VAC 3 A Noninductive 24–240 VAC
	FX-PCX2721: 8 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact
	FX-PCX3711: 4 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 4 - Universal Outputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 4 - Relay Outputs (Single-Pole, Double-Throw) Rate as: 240 VAC Maximum Voltage 1/3 hp 125 VAC, 1/2 hp 250 VAC 400 VA Pilot Duty at 240 VAC 200 VA Pilot Duty at 120 VAC 3 A Noninductive 24–240 VAC
	FX-PCX3721: 16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
	FX-PCX3731: 8 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 8 - Binary Outputs: Defined as 24 VAC Triac (Require external low-voltage power source.)
	FX-PCX4711: 6 - Universal Inputs: Defined as 0–VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (Selectable Internal or External Source Power) 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA
Analog Input/Analog Output Resolution and Accuracy	Analog Input: 16-bit Resolution Analog Output: 16-bit Resolution and ± 200 mV in 0–10 VDC Applications
Terminations	Input/Output: Fixed Screw Terminal Blocks SA/FC Bus and Supply Power: 4-Wire and 3-Wire Pluggable Screw Terminal Blocks SA/FC Bus Port: RJ-12 6-Pin Modular Jacks
Mounting	Horizontal on Single 35 mm DIN Rail Mount (preferred), or Screw Mount on Flat Surface with Three Integral Mounting Clips on Controller
Housing	Enclosure material: ABS and Polycarbonate UL94 5VB; Self-extinguishing, Plenum-rated Protection Class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	FX-PCX17 and FX-PCX27 Models: 150 x 120 x 53 mm (5-7/8 x 4-3/4 x 2-1/8 in.) Including Terminals and Mounting Clips FX-PCX37 and FX-PCX47 Models: 150 x 190 x 53 mm (5-7/8 x 7-1/2 x 2-1/8 in.) Including Terminals and Mounting Clips Note: For all models, mounting space requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy removal, ventilation, and wire terminations.
Weight	0.5 kg (1.1 lb)
Compliance	United States UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
	Australia and New Zealand C-Tick Mark, Australia/NZ Emissions Compliant
	BACnet International BACnet Testing Laboratories (BTL) 135-2004 Listed BACnet Application Specific Controller (B-ASC) (FX-PCX2721, FX-PCX3721, and FX-PCX3731 models pending.)