NOTICE TO BIDDERS

CITY OF BEVERLY HILLS

CONTRACT DOCUMENTS

FOR

UPGRADES TO THE HVAC CONTROLS SYSTEM PROJECT

BID NO. 17-51

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I. NOTICE INVITING BIDS

FOR

UPGRADES TO THE HVAC CONTROLS SYSTEM PROJECT

Bid number: 17-51

NOTICE IS HEREBY GIVEN that the City of Beverly Hills, California ("City") invites sealed bids for the Project. The City will receive such bids at City Hall, 455 North Rexford Drive, Room 290, Beverly Hills, California 90210 up to **2:00 p.m. on December 14, 2017**, at which time they will be publicly opened and read aloud.

All bids must be made on the form furnished by the City. Each bid must be submitted in a sealed package addressed to the City Clerk with the Project name and bid number typed or clearly printed on the lower left corner of the package. Bids must remain valid and shall not be subject to withdrawal for ninety (90) Days after the bid opening date.

INCORPORATION OF STANDARD SPECIFICATIONS

The 2012 edition of "Standard Specifications for Public Works Construction" and the 2013 and 2014 Supplements (collectively "Standard Specifications") are incorporated into these Contract Documents by this reference, as amended by the provisions of these Contract Documents. The Work described herein shall be done in accordance with the provisions of the Standard Specifications insofar as the same may apply, and in accordance with these Contract Documents.

SCOPE OF WORK

The project is to upgrade the existing HVAC controls that are currently serving a large portion of City facilities. The upgrade of these systems will consist of replacing the XL500 line controllers with a combination Honeywell WEBS IP based controllers; IP Based IO Controllers and Lonworks controllers were required to remove the legacy style controllers. The upgrade will remove the use of the XP based operating system and migrate to a HTML-5 Based operating system. The existing Legacy controllers are monitoring and controlling very critical applications within the City. They also contain various energy conservation measures and programming in which the City has invested in over the last 12 years. The engineering solution is to migrate these panels without losing any investments in engineering and commissioning.

OBTAINING BID DOCUMENTS

A copy of the Contract Documents may be obtained by mail or in person from the Public Works Department, 345 Foothill Road, Beverly Hills, CA 90210, telephone number 310-288-2866. The Contract Documents, including the plans and specifications may also be viewed on, and downloaded from the City's website: www.beverlyhills.org:shortcuts: bid information: bid number 17-51.

PREQUALIFICATION

The City can only accept Proposals from Bidders who have been prequalified for this Project. Any Proposal received from a Bidder who has not been prequalified for this Project will be returned unopened to the Bidder.

MANDATORY PRE-BID MEETING AND SITE VISIT

A mandatory pre-bid meeting will be held on December 6, 2017 at 10:00 a.m. at Public Works Facility, located 345 Foothill Road, Beverly Hills, CA 90210. Every Bidder is required to attend the pre-bid meeting and site visit. Failure of a Bidder to attend will render that Bidder's Proposal non-responsive. No allowances for cost adjustments will be made if Bidders fail to adequately examine the premises before submitting a Proposal.

REQUESTS FOR CLARIFICATION

If you discover any error, omission, ambiguity or conflict in the Plans or Specifications and wish to have a clarification, please fax or email your request for clarification to the Project Administrator such that it is received by

him or her no later than four (4) working days before Bid opening. Requests for clarification received after this date will be disregarded. Please indicate the Project and bid number in your request for clarification.

REGISTRATION WITH THE DEPARTMENT OF INDUSTRIAL RELATIONS

The Bidder's attention is directed to Labor Code Section 1725.5, which provides that a contractor or subcontractor shall not be qualified to bid on, be listed in a Bid proposal, subject to the requirements of Public Contract Code Section 4104, or engage in the performance of any contract that is subject to Labor Code Section 1720 *et seq*., unless currently registered and qualified to perform a public work pursuant to Labor Code Section 1725.5. This requirement applies to any bid proposal submitted on or after March 1, 2015, and any contract for public work entered into on or after April 1, 2015.

PREVAILING WAGES

In accordance with Labor Code Section 1770 *et seq*., this Project is a "public work," and thus, the Contractor and any Subcontractors must pay wages in accordance with the determination of the Director of the Department of Industrial Relations ("DIR") regarding the prevailing rate of per diem wages. Copies of those rates are on file with the Director of Public Works, and are available to any interested party upon request. Contractor shall post a copy of the DIR's determination of the prevailing rate of per diem wages at each job site.

BONDS

Each Bid must be accompanied by a cash deposit, cashier's check, certified check or Bidder's Bond issued by a Surety insurer, each of which must be made payable to the City, in an amount not less than ten percent (10%) of the total Bid submitted. Personal or company checks are not acceptable. Upon award of Contract, Contractor shall provide faithful performance and payment Bonds, each in a sum equal to the Contract Price. Bonds must be issued by a California admitted Surety insurer and submitted using the required forms, which are in the Contract Documents. Failure to enter into a valid contract, including the submission of all required Bonds and insurance coverages, with the City within fifteen (15) Days after the date of the delivery of the contract forms to the Bidder, shall constitute a material breach and subject the Bid security to forfeiture to the extent provided by law.

LICENSES

The Bidder shall possess a valid Class C-20 Contractor's license issued by California State Contractors License Board at the time of the Bid submission. The successful Contractor must also possess a current City business license.

RETENTION SUBSTITUTION

Five percent (5%) of any progress payment will be withheld as retention. In accordance with Public Contract Code Section 22300, and at the request and expense of the Contractor, securities equivalent to the amount withheld may be deposited with City or with a State or federally chartered bank as escrow agent, which shall then pay such moneys to the Contractor. Upon satisfactory completion of the Contract, the securities shall be returned to the Contractor. Alternatively, Contractor may request that the City make payments of earned retentions directly to an escrow agent at Contractor's expense. No such substitutions shall be accepted until all related documents are approved by the City Attorney.

LIQUIDATED DAMAGES

All Work shall be completed within 60 calendar days following the date specified in the written Notice to Proceed from the City. There will be a $500.00 assessment for each calendar day that Work remains incomplete beyond the time specified for the completion of the Work in the Contract Documents.

BIDDING PROCESS

The City reserves the right to reject any Bid or all Bids and to waive any irregularities or informalities in any Bid or in the bidding and to make awards in all or part in the best interest of the City.

II. INSTRUCTIONS TO BIDDERS

FORM OF PROPOSAL: Proposals shall be made on the Proposal forms found herein. Bidders shall include all forms and fill in all blank spaces, including inserting "N/A" (for non applicable) where necessary. The Proposal shall be enclosed in a sealed envelope bearing the name of the Bidder and the name of the Project as described in the Notice Inviting Bids.

DELIVERY OF PROPOSALS: The Proposal shall be delivered by the time and to the place stipulated in the Notice Inviting Bids. The time of delivery shall be definitively determined by the time-stamping clock located at the City Clerk's office. It is the Bidder's sole responsibility to see that this Proposal is received in proper time, and Bidders assume all risks arising out of the means of delivery. Any Proposal received after the scheduled closing time for receipt of Proposals may be returned to the Bidder unopened. Bidders or their authorized agents are invited to be present for Bid opening.

MODIFICATIONS AND ALTERNATIVE PROPOSALS: Unauthorized conditions, limitations or provisos attached to a Proposal will render it non-responsive and may be cause for rejection. The complete Proposal form must be without interlineations, alterations or erasures. No oral, telegraphic or telephonic Proposals or modifications will be considered.

WITHDRAWAL OF PROPOSAL: The Proposal may be withdrawn upon request by the Bidder without prejudice, provided that the request is in writing, has been executed by the Bidder or his or her duly authorized representative, and is filed with the Project Administrator before the date and time fixed for opening of Bids. No Proposal may be withdrawn during the period of ninety (90) Days after the opening of Proposals.

BIDDER'S SECURITY: In accordance with Public Contract Code Section 20170 *et seq*., each Proposal shall be accompanied by cash, a certified or cashier's check payable to the City, or a satisfactory Bid Bond in favor of the City executed by the Bidder as principal and an admitted surety insurer as Surety, in an amount not less than ten percent (10%) of the amount set forth in the Bid. The cash, check or Bid Bond shall be given as a guarantee that the Bidder will execute the Contract if it is awarded to him or her in conformity with the Contract Documents and all Addenda issued before Bid opening, and shall provide the evidence of insurance and furnish the necessary Bonds as specified in the Contract Documents and all Addenda issued before Bid opening, within fifteen (15) Days after written notice of the award. In case of the Bidder's refusal or failure to do so, the cash, check, or Bond, as the case may be, shall be forfeited to the City pursuant to Public Contract Code Section 20172, except as provided in Public Contract Code Section 20174. Under Section 20174, if the lowest responsible Bidder fails or refuses to execute the Contract, the City may award the Contract to the next lowest responsible Bidder; if the City does so, the amount of the lowest Bidder's security shall be applied by the City to the difference between the lowest Bid and next lowest Bid, and the surplus, if any, shall be returned to the lowest Bidder or to his or her Surety. No Bidder's Bond will be accepted unless it conforms substantially to the form provided in these Contract Documents.

ADDENDA: The Project Administrator may, from time to time, issue Addenda to the Contract Documents. Parties that have obtained the Contract Documents shall be notified of and furnished with copies of such Addenda, either by certified mail, personal delivery, or facsimile during the period of advertising at no additional cost. The City may determine, in its sole discretion, whether an Addendum requires the postponement of the date set for opening Bids. The announcement of the new date, if any, shall be made within the Addenda. **Please Note:** Bidders are primarily and ultimately responsible for ensuring that they have received any and all Addenda. To this end, each Bidder should contact the City to verify that he or she has received all Addenda issued, if any. Bidders must acknowledge receipt of all Addenda, if any, in its Proposal. Failure to acknowledge receipt of all Addenda may cause a Proposal to be deemed incomplete and non-responsive.

DISCREPANCIES IN PROPOSALS: The Bidder shall set forth as to each item of Work, in clearly legible figures, a unit or line item Bid amount for the item in the respective spaces provided for this purpose.

In case of discrepancy between the unit price and the total set forth for the item, the unit price shall prevail. However, if the amount set forth as a unit price is ambiguous, unintelligible or uncertain for any cause, or is

omitted, or if the unit price is the same amount as the entry in the “Total” column, then the amount set forth in the “Total” column for the item shall prevail in accordance with the following:

(1) As to lump sum items, the amount set forth in the “Total” column shall be the unit price.

(2) As to unit price items, the amount set forth in the “Total” column shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price.

In case of discrepancy between words and figures, the words shall prevail.

BIDDER’S EXAMINATION OF SITE AND CONTRACT DOCUMENTS: Each Bidder must carefully examine the site of the Project, the entirety of the Contract Documents and all Addenda issued. Upon submission of a Proposal, it will be assumed that the Bidder has thoroughly investigated the Work and is satisfied as to the conditions to be encountered and the character, quality, and quantities of Work to be performed and materials to be furnished. Upon Proposal submission, it shall be further assumed that the Bidder is familiar with and agrees to the requirements of the Contract Documents and all Addenda issued. The submission of a Proposal shall be considered conclusive evidence that the Bidder has made such an examination and consents thereto. No information derived from an inspection of records or investigation will in any way relieve the Contractor from his or her obligations under the Contract Documents or any Addenda issued nor entitle the Contractor to any additional compensation. By submitting his or her Proposal, the Contractor agrees not to make any claim against the City based upon ignorance or misunderstanding of any condition of the Work site or of the requirements set forth in the Contract Documents or Addenda.

DISQUALIFICATION OF BIDDERS: No Person shall be allowed to make, file or be interested in more than one Bid for the same project, unless alternate Bids are specifically called for. A Person that has submitted a sub-proposal to a Bidder, or that has quoted prices of materials to a Bidder, is not hereby disqualified from submitting a sub-proposal or quoting prices to other Bidders or making a prime Proposal. If there is a reason to believe that collusion exists among the Bidders, all affected Bids will be rejected.

RETURN OF BID SECURITY: The successful Bidder’s Proposal security shall be held until the Contract is executed. Bid security shall be returned to the unsuccessful Bidders within a reasonable time, which in any case shall not exceed sixty (60) Days after the successful Bidder has signed the Contract.

AWARD OF CONTRACT: The City reserves the right to reject any or all Proposals or any parts thereof or to waive any irregularities or informalities in any Proposal or in the bidding. The award of the Contract, if made, will be to the lowest responsible Bidder within ninety (90) Days after the opening of the Proposals, except that the award may be made after that period if the successful Bidder has not given the City written notice of the withdrawal of his or her Bid.

ADDITIVE OR DEDUCTIVE BIDS: If additive or deductive Bids are required, the lowest Bid shall be the Proposal with the lowest base bid, plus all of the alternate Bids, minus all of the deductive Bids, as listed in the Proposal forms. This determination method shall be used regardless of whether additive or deductive items are included in the project, which shall be at the City’s discretion.

LISTING SUBCONTRACTORS: Each Bidder shall submit a list of the proposed Subcontractors on this Project, as required by the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100, *et seq*.). A form for this purpose is furnished with the Proposal.

EXECUTION OF CONTRACT: The Bidder to whom award of the Project is made shall execute a written contract with the City in the form included in these Contract Documents within fifteen (15) Days from the date of mailing of written notice of the award. This Bidder shall also secure all insurance and Bonds as herein specified, and provide copies therefor to the City, within fifteen (15) Days from the date of mailing of written notice of the award. Failure or refusal to enter into the Contract or to conform to any of the stipulated requirements shall be just cause for the annulment of the award and forfeiture of the Bidder’s security. In the event the Bidder to whom an award is made fails or refuses to execute the Contract within that time, the City may declare the Bidder’s security

forfeited, and the City Council may award the Work to the next lowest responsible Bidder, or may call for new Bids. Where the City Council awards the Work to the next lowest responsible Bidder, pursuant to Public Contract Code Section 20174, the amount of the lowest Bidder's security shall be applied to the difference between the lowest and next lowest Bid and the surplus, if any, shall be returned to the lowest Bidder or to his or her Surety. If the second lowest responsible Bidder fails or refuses to execute the Contract, the City Council may award the Contract to the third lowest responsible Bidder pursuant to Public Contract Code Section 20174.

SIGNATURES: The Bidder or his, her or its authorized representative shall execute all documents requiring signatures, including but not limited to various forms in the Proposal, various forms in the Contract, and Bonds. Bidders shall provide evidence satisfactory to the City, such as an authenticated resolution of its Board of Directors or a Power of Attorney, indicating the capacity of the person signing the Proposal to bind the Bidder to each Proposal and to any Contract arising therefrom.

INSURANCE AND BONDS: The Contractor shall not begin Work under the Contract until it has given the City evidence of all required insurance coverage, including all additional insured endorsements. The Contractor also shall not begin Work under the Contract until it has furnished to the City two Bonds: one guaranteeing the Contractor's faithful performance of the Contract, and other securing the payment of claims for labor and material. Each of these Bonds shall be executed in a sum equal to the Contract amount.

INDEMNITY: The indemnity shall be as written in Section 7.B of the Specifications.

INTERPRETATION OF CONTRACT DOCUMENTS: If any Bidder is in doubt as to the intended meaning of any part of the Contract Documents, or finds discrepancies in or omissions from the Contract Documents, he or she may submit to the Project Administrator a written request for an interpretation or correction not later than five (5) working days before Bid opening. The Person submitting the request will be responsible for its prompt delivery, and no requests will be accepted or considered after that time. Any interpretation or correction of the Contract Documents will be made only by an Addendum duly issued and mailed, with a copy of such Addendum faxed or emailed, to each Person receiving a set of the Contract Documents. No oral interpretation of any provision in the Contract Documents shall be binding.

TAXES: Except as may be otherwise specifically provided herein, all sales and/or use taxes assessed by federal, State or local authorities on materials used or furnished by the Contractor in performing the Work hereunder shall be paid by the Contractor. Contractor shall calculate payment for all sales, unemployment, pension and other taxes imposed by federal, State, and local law and shall include these payments in the total Proposal.

CHECKLIST FOR BIDDERS

The following information is required of all Bidders at the time of the Bid:

____ Completed and Signed Proposal

____ Completed and Signed Bid Form

____ Completed, Signed Information Required of Bidders Form

____ Completed Designation of Subcontractors Form

____ Completed, Signed and Notarized Bid Bond or Other Security

____ Signed Non-Collusion Declaration

____ Completed and Signed Acknowledgement of Addenda

____ Copy of Honeywell Certification

Failure of the Bidder to provide all required information in a complete and accurate manner may be considered non-responsive.

PROPOSAL

CITY OF BEVERLY HILLS

UPGRADES TO THE HVAC CONTROLS SYSTEM PROJECT

TO THE HONORABLE MAYOR AND CITY COUNCIL OF THE CITY OF BEVERLY HILLS:

The undersigned, as Bidder, declares that: (1) this Proposal is made without collusion with any other Person and that the only Persons or parties interested as principals are those named herein; (2) Bidder has carefully examined the Contract Documents and all Addenda as well as the site of the proposed Work; and (3) Bidder has investigated and is satisfied as to the conditions to be encountered, the character, quality and quantities of Work to be performed and materials to be furnished. Furthermore, the undersigned agrees that submission of this Proposal shall be conclusive evidence that such examination and investigation have been made and agrees, in the event this Contract be awarded to Bidder, to enter into the Contract with the City of Beverly Hills to perform the proposed Project in accordance with the Contract Documents and all Addenda in the time and manner therein prescribed, and to furnish or provide all materials, labor, tools, equipment, apparatus and other means necessary so to do, except as may otherwise be furnished or provided under the terms of the Contract Documents and Addenda, for the following stated unit prices or lump-sum price as submitted on the Bid herein..

Accompanying this Proposal is cash, a cashier's check, a certified check or a Bidder's Bond in an amount equal to at least ten percent (10%) of the total aggregate Bid price hereof based on the quantities shown and the unit prices quoted. The undersigned Bidder further agrees that should he or she be awarded the Contract on the basis hereof and thereafter fails or refuses to enter into the Contract and provide the required evidence of insurance and Bonds within fifteen (15) Days after written notice of the award, the cash, check or Bid Bond shall be forfeited to the City in accordance with Public Contract Code Section 20172, except as otherwise provided in Public Contract Code Section 20174.

The undersigned also certifies to be properly licensed by the State as a contractor to perform this type of Work. The undersigned possesses California Contractor's License Number _____, Class _____, which expires on _____.

Bidder's name: _____

Signature: _____ Date: _____

BID FORM

CITY OF BEVERLY HILLS

NOTE: Any Alteration or Addition to the Bid Form May Invalidate the Bid

The undersigned, having carefully examined the site conditions and the Contract Documents for

UPGRADES TO THE HVAC CONTROLS SYSTEM PROJECT

HEREBY PROPOSES AND AGREES to commence the Work per the Agreement; to furnish all labor, materials, equipment, transportation, service, sales taxes, and other costs necessary to complete the Work as specified herein from the date of Notice To Proceed, in strict conformity with the Contract Documents, at prices indicated below.

1.0 TOTAL LUMP SUM BASE BID:
Bidder agrees to provide and install all base bid work as shown on the Drawings and described in the Contract Documents including licenses, permits, fees, taxes, overhead, bond and insurance for the total lump sum of:

$ _____
Dollars (in words- printed)

$ _____
Dollars (in figures)

NOTE: In the case of any discrepancy between words and figures, the words shall prevail.

2.0 ALTERNATE BIDS - Bidder agrees to provide an add/deduct for any or all of the Alternate Bid items listed herein as part of the overall Work. These Alternates are listed in the scope of work the respective specification sections. The Contractor shall guarantee the bid price(s) for the Alternates for 90 days.

2.1 ALTERNATE BID 1: Provide a cost to replace the VAV controllers to new FT-10 Stryker Controllers with new wall modules, actuators and sensors at the Public Works Facility.

$ _____
Dollars (in words- printed)

$ _____
Dollars (in figures)

5.0 TIME OF PERFORMANCE – Contractor proposes to complete the Work, including the accepted Alternatives, within 60 calendar days as specified in the Contract Documents, commencing from the Date of Notice To Proceed.

6.0 COMPENSATION FOR DELAY (PER DIEM)

Bidder shall determine and provide in the space below the amount of per diem compensation (costs to include any and all of Contractor's overhead, profit and General Conditions as directly related to this project) for any Compensable Delay at any time during the performance of the Work:

$ _____

Per Diem Per Day (in words) Per Diem Per Day (in figures)

Per Diem compensation multiplied by Twenty (20) days =

$ _____

Per Diem (in words) Per Diem (in figures)

7.0 TOTAL PROJECT BID

To determine the low Bidder, the City will calculate the sum of the Base Bid listed in paragraph 1.0, plus the amount of per diem for Compensable Delay listed in paragraph 5.0 multiplied by twenty (20) days. The Contract will then be awarded to the lowest responsive and responsible Bidder.

The Contract Amount may or may not include any or all or the alternatives, at the sole discretion of the City.

The use of the multiplier of twenty (20) days is not intended as an estimate of the number of days of Compensable Delay anticipated by the City. The City will pay the per diem compensation only for the actual number of days of Compensable Delay, as defined in the General Conditions. The actual number of days of Compensable Delay may be lesser or greater than the "multiplier" shown above.

Signature: _____ Title: _____ Date: _____

INFORMATION REQUIRED OF BIDDER

Fill out all of the following information. Attach additional sheets if necessary.

(1) Bidder's name: _____

(2) If the Bidder's name is a fictitious name, who or what is the full name of the registered owner? If the Bidder's name is not a fictitious name, write "N/A" in the response to this question. If you are doing business under a fictitious name, provide a copy of the filed valid Fictitious Business Name Statement.

_____

(3) Business address: _____

(4) Telephone: _____ Facsimile: _____

(5) Type of firm - Individual, Partnership, LLC or Corporation: _____

(6) Corporation organized under the laws of the state of: _____

(7) California State Contractor's License Number and Class: _____

(8) Original Date Issued: _____ Expiration Date: _____

(9) List the name and title of the person(s) who inspected the site of the proposed Work for your firm:

_____

(10) List the name and title of the person(s) who attended the mandatory pre-bid meeting for this Project, including the mandatory site visit, for your firm, if any:

_____

Upon request of the City, the Bidder shall furnish additional information.

The Bidder certifies under penalty of perjury under the laws of the State that the information provided above is true and correct.

Company

Signature: _____

Title: _____

Date: _____

Signature: _____

Title: _____

Date: _____

DESIGNATION OF SUBCONTRACTORS
[Public Contract Code 4104]

List all Subcontractors doing Work in an amount in excess of 0.5% of the Contractor's total Bid or, in the case of Bids or offers for the construction of Streets or highways (including bridges), in excess of 0.5% of the Contractor's total Bid or $10,000, whichever is greater. If all Subcontractors do not fit on this page, attach another page listing all information for all other Subcontractors.

Name under which Subcontractor is Licensed	California Contractor's License Number(s) & Class(es)	Address & Phone Number	Type of Work/Trade (e.g., Electrical)

Bond No.

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS that:

WHEREAS the City of Beverly Hills ("City"), has issued an invitation for Bids for the Work described as follows:

UPGRADES TO THE HVAC CONTROLS SYSTEM PROJECT
(Project name)

WHEREAS_____

_____
(Name and address of Bidder)

("Principal"), desires to submit a Bid to City for the Work.

WHEREAS, Bidders are required under the provisions of the California Public Contract Code to furnish a form of Bidder's security with their Bid.

NOW, THEREFORE, we, the undersigned Principal, and _____

_____
(Name and address of Surety)

("Surety") a duly admitted surety insurer under the laws of the State of California, as Surety, are held and firmly bound unto the City in the penal sum of _____

_____

Dollars ($_____), being not less than ten percent (10%) of the total Bid price, in lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the hereby bounded Principal is awarded a contract for the Work by the City and, within the time and in the manner required by the bidding specifications, enters into the written form of contract included with bidding specifications, furnishes the required Bonds, one to guarantee faithful performance and the other to guarantee payment for labor and materials, and furnishes the required insurance coverage, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

In case suit is brought upon this Bond, Surety further agrees to pay all court costs incurred by the City in the suit and reasonable attorneys' fees in an amount fixed by the court. Surety hereby waives the provisions of California Civil Code Section 2845.

IN WITNESS WHEREOF, this instrument has been duly executed by Principal and Surety, on the date set forth below, the name of each corporate party being hereto affixed and these presents duly signed by its undersigned representative(s) pursuant to authority of its governing body.

Dated: _____

"Principal"	"Surety"
_____	_____
_____	_____
By:_____	By:_____
Its	Its
By:_____	By:_____
Its	Its
(Seal)	*(Seal)*

Note: This Bond must be dated, all signatures must be notarized, and evidence of the authority of any person signing as attorney-in-fact must be attached.

NONCOLLUSION DECLARATION
TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID
[Public Contract Code 7106]

The undersigned declares:

I am the _____ of _____, the party making the foregoing Bid.

The Bid is not made in the interest of, or on behalf of, any undisclosed Person, partnership, company, association, organization, or corporation. The Bid is genuine and not collusive or sham. The Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham Bid. The Bidder has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham Bid, or to refrain from bidding. The Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the Bid price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the Bid price, or of that of any other Bidder. All statements contained in the Bid are true. The Bidder has not, directly or indirectly, submitted his or her Bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, Bid depository, or to any member or agent thereof, to effectuate a collusive or sham Bid, and has not paid, and will not pay, any Person or entity for such purpose.

Any person executing this declaration on behalf of a Bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the Bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____, at

_____ , _____ ."

Signature _____	Signature _____
Printed Name:_____	Printed Name:_____
Date: _____	Date: _____

ACKNOWLEDGMENT OF ADDENDA

Bidder's Name: _____

The Bidder shall signify receipt of all Addenda here, if any:

Addendum Number	Date Received	Signature

If there are more Addenda than there is room in the chart above, attach another page acknowledging receipt of the Addenda.

III. SPECIFICATIONS

1. TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

A. STANDARD SPECIFICATIONS

The Work described herein shall be done in accordance with the provisions of the Standard Specifications (defined in the Notice Inviting Bids) insofar as the same may apply, and in accordance with these Contract Documents.

B. TERMS AND DEFINITIONS

Whenever in the Standard Specifications or in the Contract Documents the following terms are used, they shall be understood to mean the following:

(1) City - The City of Beverly Hills.

(2) City Council - The City Council of the City of Beverly Hills.

(3) Project Administrator- The City Director of Public Works, acting either directly or through properly authorized agents. Such agents shall act within the scope of the particular duties entrusted to them.

(4) Inspector - An authorized representative of the City, assigned by the City to make inspections of Work performed by or material supplied by the Contractor.

(5) Laboratory - A laboratory authorized by the City to test materials and Work involved in the Contract.

(6) Special Provisions - All Contract Documents.

(7) Project - See Scope of Work in the Notice Inviting Bids.

2. SCOPE AND CONTROL OF THE WORK

Section 2-3.2 ("Self Performance") of the Standard Specifications is hereby deleted and replaced with the following: "The Contractor shall not be required to perform, with its own organization, Contract work amounting to at least fifty percent (50%) of the Contract Price."

Otherwise, the provisions below shall supplement but not replace those provisions in Section 2 of the Standard Specifications.

A. ASSIGNMENT

Any purported assignment without written consent of the City shall be null, void, and of no effect, and Contractor shall hold harmless, defend and indemnify the City and its officers, officials, employees, agents and representatives with respect to any claim, demand or action arising from or relating to any unauthorized assignment.

If the City opts to consent to assignment, the City's consent shall be contingent upon: 1) a letter from the Surety company agreeing to the assignment and assigning all of the Bonds to the assignee without any reduction, or the assignee supplying all new Bonds in the amounts originally required under the Contract Documents; and 2) the assignee supplying all of the required insurance in the amounts required in the Contract Documents. Until the Surety assigns all of the Bonds or the assignee supplies all of the new Bonds, and until the assignee supplies all

of the required insurance, an assignment otherwise consented to in writing by the City shall not be effective. Even if the City consents to assignment, no assignment shall relieve the Contractor of liability under the Contract.

B. BONDS

All Bonds must be submitted using the required forms, which are in the Contract Documents, or on any other form approved by the City Attorney.

C. PRECEDENCE OF THE CONTRACT DOCUMENTS

WITH REGARD TO SECTION 2-5.2 IN THE STANDARD SPECIFICATIONS, THE GENERAL PROVISIONS SHALL CONTROL OVER THE SPECIAL PROVISIONS, AND THE NOTICE INVITING BIDS AND INSTRUCTIONS TO BIDDERS (IN THAT ORDER) SHALL CONTROL OVER THE BID, SUCH THAT THE ORDER OF PRECEDENCE SHALL BE AS FOLLOWS:

1. Permits issued by regulatory agencies with jurisdiction.
2. Change Orders and Supplemental Agreements; whichever occurs last.
3. Contract/ Agreement.
4. Addenda.
5. Notice Inviting Bids.
6. Instructions to Bidders.
7. Bid/ Proposal.
8. General Provisions.
9. Special Provisions.
10. Plans.
11. Standard Plans.
12. Standard Specifications.
13. Reference Specifications.

D. SUBSURFACE DATA

If the City or its consultants have made investigations of subsurface conditions in areas where the Work is to be performed, such investigations shall be deemed made only for the purpose of study and design. If a geotechnical or other report has been prepared for the Project, the Contractor may inspect the records pertaining to such investigations subject to and upon the conditions hereinafter set forth. The inspection of the records shall be made in the Office of the Project Administrator. It is the Contractor's sole responsibility to determine whether such investigations exist and the City makes no affirmative or negative representation concerning the existence of such investigations.

The records of any such investigations are made available solely for the convenience of the Contractor. It is expressly understood and agreed that the City, the Project Administrator, their agents, consultants or employees assume no responsibility whatsoever with respect to the sufficiency or accuracy of any investigations, the records thereof, and the interpretations set forth therein. No warranty or guarantee is expressed or implied that the conditions indicated by any such investigations or records are representative of those existing in the Project area. The Contractor agrees to make such independent investigations and examination as necessary to be satisfied of the conditions to be encountered in the performance of the Work.

The Contractor represents that he or she has studied the Plans, Specifications and other Contract Documents, and all surveys and investigation reports of subsurface and latent physical conditions, has made such additional surveys and investigations as necessary for the performance of the Work at the Contract Price in accordance with the requirements of the Contract Documents, and that he or she has correlated the results of all such data with the requirements of the Contract Documents. No claim of any kind shall be made or allowed for any error, omission or claimed error or omission in whole or in part, of any geotechnical exploration or any other report or data furnished or not furnished by the City.

E. SURVEYING

Contractor shall verify all dimensions on the drawings and shall report to the City any discrepancies before proceeding with related Work. Contractor shall perform all survey and layout Work per the benchmark information on the Project Plans. All surveying Work must conform to the Professional Land Surveyors' Act, California Business and Professions Code Section 8700 *et seq*. All final Project surveying notes are to be provided to the City before final payment to the Contractor.

Construction stakes shall be set and stationed by the Contractor at the Contractor's expense. Surveying costs shall be included in the price of items bid. No separate payment will be made. Re-staking and replacement of construction survey markers damaged as a result of the Work, vandalism, or accident shall be at the Contractor's expense.

F. INSPECTIONS

Contractor shall arrange for all off-site inspection of the Work required by any ordinance or governing authorities. The Contractor shall also arrange for other inspections, including tests in connection therewith, as may be assigned or required.

3. CHANGES IN WORK

The provisions below shall supplement but not replace those provisions in Section 3 of the Standard Specifications.

A. INCREASES, ALTERATION AND DECREASES OF THE WORK TO BE DONE

The City reserves the right to increase or decrease the quantity of any item or portion of the Work described in the Contract Documents or the Proposal form or to alter or omit portions of the Work so described, as may be deemed necessary or expedient by the Project Administrator, without in any way making the Contract void. Such increases, alterations or decreases of Work shall be considered and treated as though originally contracted for, and shall be subject to all the terms, conditions and provisions of the original Contract. The Contractor shall not claim or bring suit for damages, whether for loss of profits or otherwise, on account of any decrease, alteration or omission of any kind of Work to be done.

B. EXTRA WORK

Section 3-3.2.3 ("Markup") of the Standard Specifications is hereby deleted and replaced with the following:

The term "Net Cost of Extra Work" shall mean the <u>actual</u> costs necessarily incurred by Contractor and all subcontractors that actually perform the Extra Work caused by the change(s) in the Work, and consists of costs of labor, materials and equipment rental <u>only</u>. Overhead and profit allowed under this Article, shall be deemed to include all costs and expenses which the Contractor or any of its subcontractors may incur in the performance of a change in the Work and which are not otherwise specifically recoverable by them pursuant to this Article 7. The "Net Cost of Extra Work" shall be limited to the following to the extent so incurred:

1. **Labor** - The costs of labor will be the actual straight-time cost for wages prevailing locally for each craft or type of worker at the time the Extra Work is done at the Project Site, plus employer payments collectively referred to as "Fringe Benefits and Payroll Taxes," of payroll, taxes and insurance, health and welfare pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State or local laws, as well as assessments or benefits required by lawful collective bargaining agreements. The use of a labor classification which would increase the Net Cost of Extra Work will not be permitted unless the Contractor establishes the necessity for such additional costs. Labor costs for equipment operators and helpers shall be reported only when such costs are not included in the invoice for equipment rental. Wages or salaries and Fringe Benefits and Payroll Taxes of necessary supervisory and administrative personnel directly employed at the Project Site for the supervision of the Extra Work are included, but only (1) if the Extra Work requires an extension of Contract Time

or requires direct supervision of approved overtime Work and (2) to the extent such personnel are solely engaged in supervising such Extra Work during periods of overtime or extension of the Contract Time.

2. **Material** - The cost of materials reported shall be at invoice or lowest current price at which such materials are locally available and delivered to the jobsite in the quantities involved, plus sales tax, freight and delivery. The City reserves the right to approve materials and sources of supply, or to supply materials to the Contractor, if necessary, for the progress of the work. No mark-up shall be applied to any material provided by the City. Material re-stocking charges shall be limited to 5% of the amount of material.

3. **Tool and Equipment Rental** - No payment will be made for the use of tools which have a replacement value of $500 or less. Regardless of ownership, the rates to be used in determining equipment rental cost shall not exceed listing rates prevailing locally at equipment rental agencies, or distributors, at the time the work is performed. The rental rates paid shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals. If equipment is used intermittently, when not in use, it shall be returned to its rental source unless the Contractor elects to keep it at the work site at no expense to the City. The reported rental time for equipment already at the jobsite shall be the duration of its use on the Extra Work, commencing at the time it is first put into actual operation on the Extra Work, plus the time required to move it from its previous site and back, or to a closer site.

4. **Invoices** - Vendors' invoices for material, equipment rental, and other expenditures, shall be submitted with the request for payment. If the request for payment is not substantiated by invoices or other documentation, the City's Representative may establish the cost of the item involved at the lowest price which was current at the time of such submittal.

Net Cost of Extra Work shall NOT include any of the following, which are construed to be included in the Contractor's overhead and profit figures:

1. Wages or salaries and Fringe Benefits and Payroll Taxes of Contractor's and all subcontractors' employees or personnel not directly employed at the Project site for the supervision or performance of Extra Work.

2. Overhead, administrative, or general expenses of any kind including data processing, engineering, estimating and etc. costs incurred in connection with Extra Work.

3. Loss of efficiency or productivity.

4. Capital expenses, including interest on capital employed in connection with Extra Work.

5. Legal costs.

6. Federal, state, or local income and franchise taxes.

C. CONTRACTOR FEE OR MARK-UP

The term "Contractor Fee" or "Mark-up" shall mean the full amount of compensation for all costs and expenses including overhead, profit, bond and insurance not included in the Net Cost of Extra Work. The Contractor Fee, or Mark-up, shall be computed as follows:

1. If the Net Cost of Extra Work is less than or equal to $25,000, the Contractor Fee, or Mark-up, shall be computed as follows:

a. For Extra Work performed directly by the Contractors forces the added cost for all expenses, overhead, profit, bond and insurance shall not exceed fifteen percent (15%) of the Net Cost of the Extra Work.

b. For Extra Work performed by a First Tier subcontractor, the cost for combined expenses, overhead, profit, bond and insurance of both the Contractor and subcontractor shall not exceed twenty percent (20%) of the Net Cost of the subcontractor's Extra Work.

c. For Extra Work performed by any Sub-subcontractor, the cost of combined expenses, overhead, profit, bond and insurance of the Contractor, the subcontractor and the lowest Tier of subcontractor shall not exceed twenty-five percent (25%) of the Net Cost of the lowest Tier subcontractor's Extra Work.

2. If the Net Cost of Extra Work is greater than $25,000 and less than or equal to $100,000, the Contractor Fee or Mark-up shall be computed as follows:

a. For Extra Work performed directly by the Contractor's forces the added cost for all expenses, overhead, profit, bond and insurance shall not exceed twelve percent (12%) of the Net Cost of the Extra Work.

b. For Extra Work performed by a 1st Tier subcontractor, the cost for combined expenses, overhead, profit, bond and insurance of both the Contractor and subcontractor shall not exceed seventeen percent (17%) of the Net Cost of the subcontractor's Extra Work.

c. For Extra Work performed by any Sub-subcontractor, the cost of combined expenses, overhead, profit, bond and insurance of the Contractor, the subcontractor and the lowest tier of subcontractor shall not exceed twenty-two percent (22%) of the Net Cost of the lowest Tier subcontractor's Extra Work.

3. If the Net Cost of Extra Work is greater than $100,000, the Contractor Fee or Mark-up shall be computed as follows:

a. For Extra Work performed directly by the Contractor's forces the added cost for all expenses, overhead, profit, bond and insurance shall not exceed ten percent (10%) of the Net Cost of the Extra Work.

b. For Extra Work performed by a 1st Tier subcontractor, the cost for combined expenses, overhead, profit, bond and insurance of both the Contractor and subcontractor shall not exceed fifteen percent (15%) of the Net Cost of the subcontractor's Extra Work.

c. For Extra Work performed by any Sub-subcontractor, the cost of combined expenses, overhead, profit, bond and insurance of the Contractor, the subcontractor and the lowest tier of subcontractor shall not exceed twenty percent (20%) of the Net Cost of the lowest tier subcontractor's Extra Work.

4. The Table of Contractor Fees/Mark-ups below is provided as a guide for the convenience of the Contract:

NET COST OF EXTRA WORK									
TIER	$0 – 25,000			$25,000 – 100,000			OVER $100,000		
	GC ONLY	GC w/ SUB	GC, SUB, SUB SUB	GC ONLY	GC w/ SUB	GC, SUB, SUB SUB	GC ONLY	GC w/ SUB	GC, SUB, SUB SUB
General Contractor	15	5	5	12	5	5	10	5	5
Subcontractor		15	5		12	5		10	5
Sub-subcontractor			15			12			10
Totals	**15%**	**20%**	**25%**	**12%**	**17%**	**22%**	**10%**	**15%**	**20%**

4. CONTROL OF MATERIALS

The provision below shall supplement but not replace those provisions in Section 4 of the Standard Specifications.

A. TRADE NAMES OR EQUALS

If Contractor requests to substitute an equivalent item for a brand or trade name item, the burden of proof as to the comparative quality and suitability of alternative equipment or articles or materials shall be upon the Contractor, and Contractor shall furnish, at Contractor's own expense, all information necessary or related thereto as required by the Project Administrator. All requests for substitution shall be submitted, together with all documentation necessary for the Director to determine equality.

5. UTILITIES

The provisions below shall supplement but not replace those provisions in Section 5 of the Standard Specifications.

A. LOCATION

The methods used and costs involved to locate existing elements, points of connection and all construction methods are Contractor's sole responsibility. Accuracy of information furnished, as to existing conditions, is not guaranteed by the City. Contractor, at his or her sole expense, must make all investigations necessary to determine locations of existing elements, which may include, without limitation, contacting U.S.A. Alert and other private underground locating firm(s), utilizing specialized locating equipment, hand trenching, or both. For every Dig Alert Identification Number issued by U.S.A. during the course of the project, Contractor must submit to the City the "Underground Service Alert Identification Number Form" attached hereto and incorporated herein by this reference.

B. PROTECTION

If Utilities become damaged or broken due to the Contractor's Work, it will be Contractor's responsibility to repair the Utility at no cost to the Utility or the City of Beverly Hills.

C. NOTIFICATION

The Contractor shall notify the Project Administrator and the owners of all Utilities and substructures not less than forty-eight (48) hours before starting construction.

D. ENTRY BY UTILITY OWNERS

The right is reserved to the owners of public Utilities or franchises to enter upon the Project site for the purpose of making repairs or changes in their property that may be necessary as a result of the Work as well as any other reason authorized by the City. When the Contract Documents provide for the Utility owners to alter, relocate or reconstruct a Utility, or when the Contract Documents are silent in this regard and it is determined by the Project Administrator that the Utility owners must alter, relocate or reconstruct a Utility, the Contractor shall schedule and allow adequate time for those alterations, relocations or reconstructions by the respective Utility owners.

E. RELOCATION

The Contractor shall cooperate fully with all Utility forces of the City or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities that interfere with the progress of the Work. The Contractor shall schedule the Work so as to minimize interference with the relocation, altering, or other rearranging of facilities.

F. COOPERATION

The Contractor's attention is directed to the fact that work may be conducted at or adjacent to the site by other contractors during the performance of the Work under this Contract. The Contractor shall conduct its operations so as to cause a minimum of interference with the work of such other contractors, and shall cooperate fully with such contractors to provide continued safe access to their respective portions of the site, as required to perform work under their respective contracts. Compensation for compliance shall be included in the various items of Work, and no additional compensation shall be allowed therefor.

6. PROSECUTION, PROGRESS AND ACCEPTANCE OF THE WORK

The provisions below shall supplement but not replace those provisions in Section 6 of the Standard Specifications.

A. CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK

1. Construction Schedule

In addition to the construction schedule required pursuant to Section 6-1.1 of the Standard Specifications after notification of the award of the Contract and before any start of the Project, as well as the revised construction schedule in advance of beginning revised operations, Contractor shall submit an updated construction schedule with its monthly invoice every month. Progress payments shall be contingent upon the receipt of monthly updated construction schedules.

2. Pre-Construction Conference

Approximately ten (10) days before the commencement of Work at the site, a pre-construction conference will be held at the City and shall be attended by the Contractor's Project manager, its on-site field superintendent, and any Subcontractors that Contractor deems appropriate. Attendance by Contractor and any Subcontractors designated is mandatory.

Unless previously submitted to the Project Administrator, the Contractor shall bring to the pre-construction conference copies of each of the following:

1) Construction Schedule.
2) Procurement schedule of major equipment and materials and items requiring long lead time.
3) Shop drawing/ sample submittal schedule.
4) Preliminary schedule of values (lump sum price breakdown) for progress payment purposes.
5) Written designation of the on-site field superintendent and the Project manager. Both daytime and emergency telephone numbers shall be included in the written designation.

The purpose of the conference is to designate responsible personnel and establish a working relationship. The parties will discuss matters requiring coordination and establish procedures for handling such matters. The complete agenda will be furnished to the Contractor before the meeting date. The Contractor shall be prepared to discuss all of the items listed below.

1) Contractor's construction schedule.
2) Notification of local residents before starting any Work and keeping them informed throughout the Project.
3) Procedures for transmittal, review, and distribution of Contractor's submittals.
4) Processing applications for payment.
5) Maintaining record documents.
6) Critical Work sequencing.

7) Maintaining sewage service during construction, including proposed by-passes.
8) NPDES requirements, if any.
9) Field decisions and Change Orders.
10) Use of Project site, office and storage areas, security, housekeeping, and City's needs.
11) Major equipment deliveries and priorities.
12) Traffic control.
13) Any other item that the City representative states is relevant to the meeting.

3. Weekly Progress Meetings

Progress meetings will be held each week during the course of the Project. The meeting location, day of the week and time of day will be mutually agreed to by the City and the Contractor. The Contractor shall provide a two-week "look ahead" schedule for each meeting. The construction manager will preside at these meetings and will prepare the meeting agenda, meeting minutes and will distribute minutes to all persons in attendance. As the Work progresses, if it is determined by mutual agreement of the attendees, that weekly meetings are not necessary, the weekly progress meetings may be changed to bi-weekly progress meetings.

B. PROSECUTION OF THE WORK

If the Project Administrator determines that the Contractor is failing to prosecute the Work to the proper extent, the Project Administrator may issue an order in any form or manner. If the order is in writing, the Project Administrator has the option of listing the steps required to remedy the situation and reasonable deadlines therefor. The Project Administrator may also provide that if such steps are not taken within such listed deadlines, then a penalty of Five Hundred dollars ($500) per day may be assessed for each day of delay. This option is available in addition to all other options in the Standard Specifications or as otherwise legally available.

C. TERMINATION OF THE CONTRACT FOR CONVENIENCE

In addition to the reasons for termination listed in Section 6-5 of the Standard Specifications, which allow termination upon any written notice, the City may cancel the Contract for any other reason or for no reason upon thirty (30) days' written notice. The rest of the procedure outlined in Section 6-5 shall apply to such situation, including the Contractor's required immediate notification of Subcontractors and suppliers and the payment. In no event (including termination for impossibility or impracticability, due to conditions or events beyond the control of the City, for any other reason or for no reason) shall the total amount of money to Contractor exceed the amount which would have been paid to Contractor for the full performance of the services described in the Contract.

D. DELAYS AND EXTENSIONS OF TIME

1. Changed Conditions Caused by Acts of God

The Contractor shall not be responsible for the cost of repairing or restoring damage to the Work if the damages have been determined to have been proximately caused by an Act of God and are in excess of five percent (5%) of the Contract amount, provided that the Work damaged was built in accordance with accepted and applicable building standards and the Contract Documents. Per Section 7105(b)(2) of the Public Contract Code, "Acts of God" shall include only earthquakes in excess of a magnitude of 3.5 on the Richter Scale and tidal waves. The Contractor shall notify the City promptly in writing of each such excusable delay, its cause and its expected delay, and shall upon request update such notice. This Section shall not abridge or affect, and shall be read in congruence with, Section 6-6 of the Standard Specifications.

2. Delays

No extension of time will be granted for delay caused by shortage of materials unless the Contractor furnishes to the Project Administrator documentary proof that he or she has diligently made reasonable and timely efforts to obtain such materials from all known sources. No time extension will be granted for delays which do not affect the critical path of the construction schedule provided at the Pre-Construction Conference.

Unless otherwise agreed in writing, an adjustment to the Contract time by reason of a Change Order shall be agreed to at the time the Change Order is issued and accepted by the Contractor. If the Change Order does not reserve the right of the parties, or either of them, to seek an adjustment to the Contract time, then the parties forever relinquish and waive such right and there shall be no further adjustments to the Contract time.

3. Extensions of Time

In the event it is deemed appropriate by the City to extend the time for completion of the Work, any such extension shall not release any guarantee for the Work required by the Contract Documents, nor shall any such extension of time relieve or release the sureties on the Bonds executed. In executing such Bonds, the sureties shall be deemed to have expressly agreed to any such extensions of time. The amount of time allowed by an extension of time shall be limited to the period of the delay giving rise to the same as determined by the City. Notwithstanding any dispute which may arise in connection with a claim for adjustment of the Contract time, the Contractor shall promptly proceed with the Work.

4. Payment for Delays

Notwithstanding any other terms and conditions of the Contract Documents, the City shall have no obligation whatsoever to increase the Contract Price or extend the time for delays.

Unless compensation and/or mark up is agreed upon by the City, the Contractor agrees that no payment of compensation of any kind shall be made to the Contractor for damages or increased overhead costs caused by any delays in the progress of the Contract, whether such delays are avoidable or unavoidable or caused by any act or omission of the City or its agents. Any accepted delay claim shall be fully compensated for by an extension of time to complete the performance of the Work.

This Section shall not apply to compensable delays caused solely by the City. If a compensable delay is caused solely by the City, the Contractor shall be entitled to a Change Order that 1) extends the time for completion of the Contract by the amount of delay caused by the City, 2) compensates the Contractor for the actual costs caused by the delay and 3) pays the Contractor a mark-up for any additional work as set forth in Section 3 of the Standard Specifications and Section 3 of these General Provisions.

E. TIME OF COMPLETION

The Contractor shall complete all Work under the Contract within Sixty (60) calendar days from the date of the Notice to Proceed. The Contractor shall not be allowed to begin any construction activity at the site before the issuance of the Notice to Proceed. Between the period of the Notice of Award and Notice to Proceed, the Contractor shall process Shop Drawings and begin procuring equipment and materials.

F. COMPLETION, ACCEPTANCE AND WARRANTY

1. Acceptance

The Project will not be considered complete and ready for City Council acceptance until all required Work is completed and all of the following items have been received by the Project Administrator:

(1) "Notice of Completion" indicating approval by City departments and divisions;

(2) All written guarantees and approvals from governing agencies as specified herein;

(3) All "as-builts";

(4) Duplicate copies of all operating instructions and manufacturer's operating catalogs and data, together with such field instructions as necessary to fully instruct City personnel in correct

operation and maintenance procedures for all equipment installed listed under the electrical, air conditioning, heating, ventilating and other trades. This data and instructions shall be furnished for all equipment requiring periodic adjustments, maintenance or other operation procedures.

2. Warranty

For the purposes of the calculation of the start of the warranty period, the Work herein contracted for shall be deemed to be completed upon the date of the City's acceptance of the entire Project, which is when the City Council directs staff to file a Notice of Completion. If that direction is contingent on the completion of any items remaining on a punchlist, the Work herein contracted for shall be deemed to be completed upon the date of the Project Administrator's acceptance of the final item(s) on that punchlist.

Contractor shall repair or replace defective materials and workmanship as required in Section 6-8.3 of the Standard Specification at Contractor's own expense. Additionally, Contractor agrees to defend, indemnify and hold the City harmless from claims of any kind arising from damage, injury or death due to such defects.

The parties agree that no certificate given shall be conclusive evidence of the faithful performance of the Contract, either in whole or in part, and that no payment shall be construed to be in acceptance of any defective Work or improper materials. Further, the certificate or final payment shall not terminate the Contractor's obligations under the warranty herein. The Contractor agrees that payment of the amount due under the Contract and the adjustments and payments due for any Work done in accordance with any alterations of the same, shall release the City, the City Council and its officers and employees from any and all claims or liability on account of Work performed under the Contract or any alteration thereof.

G. LIQUIDATED DAMAGES

For the purposes of the calculation of the start of the liquidated damages, the Work herein contracted for shall be deemed to be completed when the same has been actually completed in accordance with the Plans and Specifications therefor and to the satisfaction of the Project Administrator. The Project must be certified by the Project Administrator in accordance with Section 6-8.1 of the Standard Specifications.

Liquidated damages shall be as set forth in Section 6-9 of the Standard Specifications, except that the sum of Two Hundred and Fifty dollars ($250) per calendar day is amended to Five Hundred dollars ($500) per calendar day. Nothing in this Section shall prohibit the Project Administrator or City Council from granting to the Contractor an extension of time and waiving the liquidated damages.

7. RESPONSIBILITIES OF THE CONTRACTOR

Section 7-12 ("Advertising") of the Standard Specifications is hereby deleted and replaced with the following:

> The names, addresses and specialties of Contractor, Subcontractors, architects or engineers may not be displayed on any signage within the public right-of-way. This signage prohibition includes advertising banners hung from truck beds or other equipment.

Otherwise, the provisions below shall supplement but not replace those provisions in Section 7 of the Standard Specifications.

A. LABOR

1. Public Work

Contractor acknowledges that the Project is a "public work" as defined in Division 2, Part 7, Chapter 1 (commencing with Section 1720) of the California Labor Code ("Chapter 1"), and that this Project is subject to (a) Chapter 1, including without limitation Labor Code Section 1771 and (b) the rules and regulations established by the Director of Industrial Relations ("DIR") implementing such statutes. Contractor shall perform all Work on the

Project as a public work. Contractor shall comply with and be bound by all the terms, rules and regulations described in (a) and (b) as though set forth in full herein.

2. Copies of Wage Rates

Pursuant to Labor Code Section 1773.2, copies of the prevailing rate of per diem wages for each craft, classification, or type of worker needed to perform the Project are on file at City Hall and will be made available to any interested party on request. By initiating any Work on this Project, Contractor acknowledges receipt of a copy of the DIR determination of such prevailing rate of per diem wages, and Contractor shall post such rates at each job site covered by these Contract Documents.

3. Failure to Pay Prevailing Rates

Contractor shall comply with and be bound by the provisions of Labor Code Sections 1774 and 1775 concerning the payment of prevailing rates of wages to workers and the penalties for failure to pay prevailing wages. The Contractor shall, as a penalty to the City, forfeit two hundred dollars ($200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the DIR for the work or craft in which the worker is employed for any public work done pursuant to these Contract Documents by Contractor or by any Subcontractor.

4. Payroll Records

Contractor shall comply with and be bound by the provisions of Labor Code Section 1776, which requires Contractor and each Subcontractor to (1) keep accurate payroll records and verify such records in writing under penalty of perjury, as specified in Section 1776, (2) certify and make such payroll records available for inspection as provided by Section 1776, and (3) inform the City of the location of the records.

5. Apprentices

Contractor shall comply with and be bound by the provisions of Labor Code Sections 1777.5, 1777.6 and 1777.7 and California Administrative Code Title 8, Section 200 *et seq*. concerning the employment of apprentices on public works projects. Contractor shall be responsible for compliance with these Sections for all apprenticeable occupations. Before commencing Work on this Project, Contractor shall provide City with a copy of the information submitted to any applicable apprenticeship program. Within sixty (60) Days after concluding Work, Contractor and each of its Subcontractors shall submit to the City a verified statement of the journeyman and apprentice hours performed under this Contract.

6. Debarment or Suspension

Contractor and Subcontractors shall not be debarred or suspended throughout the duration of this Contract pursuant to Labor Code Section 1777.1 or 1777.7. If Contractor or any Subcontractor becomes debarred or suspended throughout the duration of the Project, Contractor shall immediately notify City.

7. Hours

Contractor acknowledges that eight (8) hours labor constitutes a legal day's work. Contractor shall comply with and be bound by Labor Code Section 1810. Contractor shall comply with and be bound by the provisions of Labor Code Section 1813 concerning penalties for workers who work excess hours. The Contractor shall, as a penalty to the City, forfeit twenty-five dollars ($25) for each worker employed in the performance of this Project 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 one (1) calendar day and forty (40) hours in any one calendar week in violation of the provisions of Division 2, Part 7, Chapter 1, Article 3 of the Labor Code. Pursuant to Labor Code Section 1815, 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 public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than 11/2 times the basic rate of pay.

8. Subcontractors

For every Subcontractor who will perform Work on the Project, Contractor shall be responsible for such Subcontractor's compliance with Chapter 1 and Labor Code Sections 1860 and 3700, and Contractor shall include in the written contract between it and each Subcontractor a copy of the provisions in this Section 7.A of the General Provisions and a requirement that each Subcontractor shall comply with those provisions. Contractor shall be required to take all actions necessary to enforce such contractual provisions and ensure Subcontractor's compliance, including without limitation, conducting a periodic review of the certified payroll records of the Subcontractor and upon becoming aware of the failure of the Subcontractor to pay his or her workers the specified prevailing rate of wages. Contractor shall diligently take corrective action to halt or rectify any failure.

9. Prevailing Wage Indemnity

To the maximum extent permitted by law, Contractor shall indemnify, hold harmless and defend (at Contractor's expense with counsel reasonably acceptable to the City) the City, its officials, officers, employees, agents and independent contractors serving in the role of City officials, and volunteers from and against any demand or claim for damages, compensation, fines, penalties or other amounts arising out of or incidental to any acts or omissions listed in Section 7.A of the General Provisions by any Person (including Contractor, its Subcontractors, and each of their officials, officers, employees and agents) in connection with any Work undertaken or in connection with the Contract Documents, including without limitation the payment of all consequential damages, attorneys' fees, and other related costs and expenses. All duties of Contractor under this Section 7.A.9 shall survive termination of the Contract.

10. Registration with the Department of Industrial Relations

The Bidder's attention is directed to Labor Code Section 1725.5, which provides that a contractor or subcontractor shall not be qualified to bid on, be listed in a Bid proposal, subject to the requirements of Public Contract Code Section 4104, or engage in the performance of any contract that is subject to Labor Code Section 1720 *et seq*., unless currently registered and qualified to perform a public work pursuant to Labor Code Section 1725.5. This requirement applies to any bid proposal submitted on or after March 1, 2015, and any contract for public work entered into on or after April 1, 2015.

B. INDEMNIFICATION

The following indemnity provisions shall supersede the indemnity in Section 7-3 of the Standard Specifications.

1. Contractor's Duty.

To the maximum extent permitted by law, Contractor hereby agrees, at its sole cost and expense, to defend with competent defense counsel approved by the City Attorney, protect, indemnify, and hold harmless the City, its elected and appointed officials, officers, employees, volunteers, attorneys, agents (including those City agents serving as independent contractors in the role of City representative), successors, and assigns (collectively "Indemnitees") from and against any and all claims (including, without limitation, claims for bodily injury, death or damage to property), demands, charges, obligations, damages, causes of action, proceedings, suits, losses, stop payment notices, judgments, fines, liens, penalties, liabilities, costs and expenses of every kind and nature whatsoever, in any manner arising out of, incident to, related to, in connection with or resulting from any act, failure to act, error or omission of Contractor or any of its officers, agents, attorneys, servants, employees, Subcontractors, material suppliers or any of their officers, agents, servants or employees, arising out of, incident to, related to, in connection with or resulting from any term, provision, image, plan, covenant, or condition in the Contract Documents, including without limitation, the payment of all consequential damages, attorneys' fees, experts' fees, and other related costs and expenses (individually, a "Claim," or collectively, "Claims"). Contractor shall promptly pay and satisfy any judgment, award or decree that may be rendered against Indemnitees in any such Claim. Contractor shall reimburse Indemnitees for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided. Contractor's obligation to indemnify shall not be restricted to insurance proceeds, if any, received by Contractor or Indemnitees. This indemnity shall

apply to all Claims regardless of whether any insurance policies are applicable or whether the Claim was caused in part or contributed to by an Indemnitees.

2. Civil Code Exception

Nothing in this Section 7.B shall be construed to encompass Indemnitees' sole negligence or willful misconduct to the limited extent that the underlying Contract is subject to Civil Code Section 2782(a) or the City's active negligence to the limited extent that the underlying Contract Documents are subject to Civil Code Section 2782(b), provided such sole negligence, willful misconduct or active negligence is determined by agreement between the parties or by the findings of a court of competent jurisdiction.

3. Nonwaiver of Rights

Indemnitees do not and shall not waive any rights that they may possess against Contractor because the acceptance by City, or the deposit with City, of any insurance policy or certificate required pursuant to these Contract Documents. This indemnity provision is effective regardless of any prior, concurrent, or subsequent active or passive negligence by Indemnitees and shall operate to fully indemnify Indemnitees against any such negligence.

4. Waiver of Right of Subrogation.

Contractor, on behalf of itself and all parties claiming under or through it, hereby waives all rights of subrogation and contribution against the Indemnitees, while acting within the scope of their duties, from all Claims arising out of or incident to the activities or operations performed by or on behalf of the Contractor regardless of any prior, concurrent or subsequent active or passive negligence by Indemnitees.

5. Survival.

The provisions of this Section 7.B shall survive the term and termination of the Contract, are intended to be as broad and inclusive as is permitted by the law of the State, and are in addition to any other rights or remedies that Indemnitees may have under the law. Payment is not required as a condition precedent to an Indemnitee's right to recover under this indemnity provision, and an entry of judgment against a Contractor shall be conclusive in favor of the Indemnitee's right to recover under this indemnity provision.

C. INSURANCE

Upon award of Contract, Contractor will be obligated to file Certificates of Insurance evidencing coverage as specified in the Contract Documents and in a form acceptable to City.

1. <u>Commencement of Work</u>

The Contractor shall not commence Work under this Contract until all insurance required under this section has been obtained by the Contractor and approved by the City; nor shall the Contractor allow any Subcontractor to commence Work until all similar insurance required of the Subcontractor has been so obtained and accepted.

2. <u>Liability Insurance</u>

Contractor shall procure and maintain for the duration of the contract, insurance against claims for injuries to persons or damage to property which may arise from or in connection with the performance of the work by the contractor, his agents, representatives, employees or subcontractors, pursuant to contractor's bid or any subsequent contract. Insurance shall be of the type, in the amounts and subject to the provisions described below.

Commercial general liability coverage at least as broad as Insurance Services Office Commercial General Liability occurrence coverage ("occurrence" form CGO001, Ed. 11/88) with a limit of not less than $2,000,000 per

occurrence. If the insurance includes a general aggregate limit, that limit shall apply separately to this contract or it shall be at least twice the required per occurrence limit.

Business automobile liability insurance at least as broad as Insurance Services office form CA 0001 (Ed. 12/90) covering Automobile Liability, code I "any auto" and endorsement CA 0029 (Ed. 12/88) with a limit not less than $1,000,000 per accident.

Workers Compensation Insurance as required by the State of California and employer's liability insurance with a limit not less than $1,000,000 per accident.

3. Evidence of Coverage

(a) Prior to commencement of work under this Contract, or within 14 days of notification of award of Contract, whichever is shorter, Contractor shall file certificates of insurance with original endorsements evidencing coverage in compliance with this contract and in a form acceptable to City. The certificate shall be on the City's standard proof of insurance form or on another form approved in writing by City's Risk Manager. Endorsement must be executed on the City's appropriate standard form titled, "Additional Insured Endorsement," copies of which are provided in the Contract Documents.

(b) Contractor shall provide to City, on request, a complete copy, including all endorsements and riders, of any insurance policy.

(c) During the term of this Contract, Contractor shall maintain current valid proof of insurance coverage, with City at all times. Proof of renewals shall be filed prior to expiration of any required coverage and shall be provided on the City's standard proof of insurance form.

(d) Failure to submit any required evidences of insurance within the required time period shall be cause for termination for default, and shall be cause for forfeiture of this bidder's bid security, if applicable.

(e) In the event Contractor does not maintain current, valid evidence of insurance on file with City, City may, at its option, withhold payment of any moneys owed to Contractor, or which it subsequently owes to Contractor, until proper proof is filed.

4. Rating

All insurance coverages shall be provided by insurers with a rating of B+ or better in the most recent edition of Best's Key Rating Guide, Property-Casualty Edition.

5. Notice

Each insurance policy shall be endorsed to state that coverage shall not be suspended, voided or canceled and shall not be reduced in coverage or limits except after 30 days prior written notice provided to the City. Upon prior request of the carrier, the notice period may be reduced to 10 days in the event of non-payment of premium.

6. Additional Insureds

All liability coverages shall name the City, its City Council and every officer, agent and employee of City as additional insureds with respect to work under this bid or any subsequent contract.

7. Primary Coverage

Contractor's insurance and any insurance provided in compliance with these specifications shall be primary with respect to any insurance or self-insurance programs covering the City, its City Council and any officer, agent or employee of City.

8. Waiver of Rights of Subrogation

Where available, the insurer shall agree to waive all rights of subrogation against the City, its City Council and every officer, agent and employee of City.

9. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions shall be declared to be subject to the approval by City. At the option of the City, either the insurer shall reduce or eliminate the deductibles or self-insured retentions as respects the City, or the Contractor shall procure a bond guaranteeing payment of losses and expenses.

10. Replacement Coverage

In the event that Contractor does not provide continuous insurance coverage, the City shall have the right, but not the obligation, to obtain the required insurance coverage at Contractor's cost, and the City may deduct all such costs from moneys the City owes to the Contractor or from moneys which it subsequently owes to the Contractor.

11. Subcontractors

Contractor shall ensure all Subcontractors and their employees are listed as additional insureds on all of Contractor's insurance policies required by this Contract.

12. No Limitation on Indemnity

The insurance provisions shall not be construed to limit the Contractor's indemnity obligations contained in these Contract Documents.

In addition, the Contractor shall guarantee and warranty all Work against defective workmanship and materials furnished by the Contractor for a period of one (1) year from the date the Work was completed and accepted by the City.

D. PERMITS

Contractor will be required to obtain all necessary permits from the City, which may include obtaining a no fee encroachment permit for Work within the public right-of-way, as well as all other permits from all other agencies. Should this Project require construction of trenches or excavations which are five (5) feet or deeper and into which a person is required to descend, the Contractor shall obtain a Cal/OSHA permit and furnish the City with a copy before Work can commence on this Project. Contractor shall bear all cost for fees for all agencies except for the City.

E. WORKSITE MAINTENANCE

1. Site Cleanliness

Clean-up shall be done as Work progresses at the end of each day and thoroughly before weekends. If the job site is not cleaned to the satisfaction of the Project Administrator, the cleaning will be done or contracted by the City and shall be back-charged to the Contractor and deducted from the Contract amount.

2. Rubbish Removal

One rubbish removal company is allowed to operate within the City. Information can be obtained from the City's Commercial Services Division (310) 288-2806. This Division shall also be contacted for roll-off containers.

3. Jobsite Run-off Control Measures

The Contractor agrees to provide for City review and approval and implement an approved Storm Water Pollution Prevention Plan (SWPPP) to prevent the run-off of construction materials into the City's storm water system.

8. FACILITIES FOR CITY PERSONNEL

The provisions of Section 8 of the Standard Specifications shall apply except as modified herein. No field offices for City personnel shall be required; however, City personnel shall have the right to enter upon the Project at all times and shall be admitted to the offices of the Contractor to use the telephone, desk and sanitary facilities provided by the Contractor for his or her own personnel.

9. MEASUREMENT AND PAYMENT

The provisions below shall supplement but not replace those provisions in Section 9 of the Standard Specifications.

A. GENERAL PAYMENT

In accordance with Public Contract Code Section 7107, if no claims have been filed and are still pending, the amount deducted from the final estimate and retained by the City will be paid to the Contractor except such amounts as are required by law to be withheld by properly executed and filed notices to stop payment, or as may be withheld for any other lawful purposes.

B. PARTIAL AND FINAL PAYMENT

1. Monthly Closure Date and Invoice Date

In accordance with Section 9-3.2 of the Standard Specifications, the monthly closure date shall be the last calendar day of each month. A measurement of Work performed and a progress estimate of the value thereof based on the Contract and of the monthly payment shall be prepared by the Contractor and submitted to the Project Administrator before the tenth day of the following month for verification and payment consideration.

2. Payments

City shall make payments within thirty (30) Days after receipt of Contractor's undisputed and properly submitted payment request, including an updated construction schedule pursuant to Section 6.A.1 of the General Provisions. City shall return to Contractor any payment request determined not to be a proper payment request as soon as practicable, but not later than seven (7) Days after receipt, and shall explain in writing the reasons why the payment request is not proper.

3. Retention

The City shall withhold not less than five percent (5%) of the Contract Price until final completion and acceptance of the Project.

4. Final Invoice and Payment

Final Payment, constituting the entire unpaid balance of the Contract amount, shall be made by the City to the Contractor when (1) the Contract has been fully performed by the Contractor except for the Contractor's responsibility to correct nonconforming Work as agreed to between the City and the Contractor; and (2) a final Certificate for Payment has been submitted by the Contractor and approved by the City; and (3) the work has been accepted by the City Council of the City of Beverly Hills; and (4) a Notice of Completion has been filed. Final payment shall be made by the City not more than forty (40) days after completion of the above, but only to the extent that no stop notices or other requirements to withhold funds are then in effect.

5. Substitute Security.

In accordance with Public Contract Code Section 22300, the Contractor may request that it be permitted to substitute securities in lieu of having retention withheld by the City from progress payments when such payments become due or, in the alternative, Contractor may request that the City make payments of earned retentions directly to an agreed upon designated escrow agent at Contractor's expense. If the Contractor selects either one of these alternatives, the following shall control:

a) Substitution of Securities for Performance Retention

At some reasonable time before any progress payment would otherwise be due and payable to Contractor in the performance of Work under these Contract Documents, the Contractor may submit a request to the City in writing to permit the substitution of retentions with securities equivalent to the amount estimated by the City ("estimated amount of retention") to be withheld. Contractor shall deposit such securities with the City or may, in the alternative, deposit such securities in escrow with a State or federally chartered bank in California, as the escrow agent, and at the Contractor's expense. Such securities will be the equivalent or greater in value of the estimated amount of retention. If the Contract is modified by written Modifications or Change Orders or Contractor otherwise becomes entitled to receive an amount more than the Contract amount at the time the securities are deposited, the Contractor shall, at the request of the City, deposit with the City or escrow agent, whichever is applicable, additional securities within a reasonable time so that the amount of securities on deposit with the City or escrow agent is equivalent or greater in value than the amount of retention the City would otherwise be entitled to withhold from progress payments due or to become due to the Contractor as the Work progresses. The City shall withhold any retention amount that exceeds the security amount until the additional securities are deposited and, if the deposit is with an escrow agent, the City has confirmation from that escrow agent of the new total value of securities. Upon satisfactory completion of the Contract, which shall mean, among other things, that the City is not otherwise entitled to retain proceeds from progress payments as elsewhere provided in the Contract or under applicable law, the securities shall be returned to the Contractor. The City shall, within its sole discretion, determine whether the amount of the securities on deposit with the City or escrow agent is equal to or greater than the amount of estimated retention of progress payments which could otherwise be held by the City if the Contractor had not elected to substitute same with securities.

b) Deposit of Retention Proceeds with an Escrow Agent

As an alternative to the substitution of securities, as provided above, or the City otherwise retaining and holding retention proceeds from progress payments, the Contractor may request the City to make payments of retentions earned directly to an escrow agent with the same qualifications as required in paragraph (1) above and at the expense of the Contractor. At its sole expense, the Contractor may direct the investment of such retention payments into only such securities as mentioned in paragraph (3) below and shall be entitled to interest earned on such investments on the same terms provided for securities deposited by Contractor. Upon satisfactory completion of the Contract, which shall mean when the City would not otherwise be entitled to withhold retention proceeds from progress payments had the Contractor not elected to have such proceeds deposited into escrow, Contractor shall be allowed to receive from the escrow agent all securities, interest and payments deposited into escrow pursuant to the terms of this Section. The Contractor shall pay to each Subcontractor, not later than ten (10) Days of receipt of payment, the respective amount of interest earned, net of costs attributed to retention withheld from each Subcontractor, on the amount withheld to insure performance of the Contractor.

c) Subcontractor Entitlement to Interest

Any Contractor who elects to receive interest on moneys withheld in retention by the City shall, at the request of any Subcontractor performing more than five percent (5%) of the Contractor's total Bid, make that option available to the Subcontractor regarding any moneys withheld in retention by the Contractor from the Subcontractor. If the Contractor elects to receive interest on any moneys withheld in retention by the City, then the Subcontractor shall receive the identical rate of interest received by the Contractor on any retention moneys withheld from Subcontractor by the Contractor, less any actual pro rata costs associated with administering and calculating that interest. In the event that the interest rate is a fluctuating rate, the rate for the Subcontractor shall be determined by calculating the interest rate paid during the time that retentions were withheld from the Subcontractor. If the

Contractor elects to substitute securities in lieu of retention, then, by mutual consent of the Contractor and Subcontractor, the Subcontractor may substitute securities in exchange for the release of moneys held in retention by the Contractor. The Contractor shall pay each Subcontractor, not later than ten (10) Days after receipt of escrow moneys, the amount owed to each Subcontractor from the moneys plus the respective amount of interest earned, net of costs attributed to the retention held from each Subcontractor, on the amount of retention withheld to insure performance of the Subcontractor.

d) Securities Eligible for Investment

Securities eligible for investment shall include those listed in California Government Code Section 16430, bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed upon between the Contractor and the City. The Contractor shall be the beneficial owner of any securities substituted for any monies withheld and shall receive any interest thereon.

e) Escrow Agreement for Security Deposits in Lieu of Retention

The escrow agreement that shall be used for the deposit of securities in lieu of retention shall substantially conform to the form prescribed in California Public Contract Code Section 22300(f).

f) Inconsistencies with Prevailing Statutory Requirements

If there is any inconsistency between or differences in Public Contract Code Section 22300 and the terms of this provision, or any future amendments thereto, Section 22300 shall control.

C. AUDIT

The City or its representative shall have the option of inspecting and/or auditing all records and other written materials used by Contractor in preparing its billings to the City as a condition precedent to any payment to Contractor or in response to a construction claim or a Public Records Act request. Contractor will promptly furnish documents requested by the City at no cost. Additionally, Contractor shall be subject to State Auditor examination and audit at the request of the City or as part of any audit of the City, for a period of three (3) years after final payment under the Contract.

10. ADDITIONAL TERMS

A. REQUIRED LICENSES

The Contractor shall possess a valid Class B Contractor's license issued by California State Contractors License Board. The Contractor shall also be required to possess a City business license. In accordance with Section 7028.15 of the Business and Professions Code, all Contractors shall be licensed in accordance with the laws of the State of California and any Contractor or Subcontractor not so licensed is subject to the penalties imposed by such laws.

B. DEBARRED OR SUSPENDED SUBCONTRACTORS

Contractor shall not perform Work with any Subcontractor that has been debarred or suspended pursuant to California Labor Code Section 1777.1 or 1777.7.

C. NONDISCRIMINATORY EMPLOYMENT

Contractor shall not unlawfully discriminate against any individual based on race, color, religion, nationality, gender, sex, sexual orientation, age or condition of disability. Contractor understands and agrees that it is bound by and shall comply with the nondiscrimination mandates of all statutes and local ordinances and regulations.

D. NOTICE TO PROCEED

Upon award of this Contract and signing the Contract Documents, the City shall issue the Contractor a Notice to Proceed. The City will not authorize any Work to be done under these Contract Documents before the Contract has been fully executed. Any Work that is done by the Contractor in advance of such time shall be considered as being done at Contractor's own risk and responsibility, and as a consequence will be subject to rejection.

E. CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the final acceptance of the Work by the City as defined in Section 6.F.1 of the General Provisions, by written action of the Project Administrator, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part of the Work by the action of the elements or any other cause. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the Work occasioned by any cause before its completion and acceptance and shall bear the expense thereof, except for such injuries or damages arising from the sole negligence of willful misconduct of the City, its officers, agents or employees. In the case of suspension of Work from any cause whatever, the Contractor shall be responsible for all materials and the protection of Work already completed, shall properly store and protect them if necessary, and shall provide suitable drainage and erect temporary structures where necessary.

F. PROCEDURE IN CASE OF DAMAGE TO PUBLIC PROPERTY

Any portions of curb, gutter, sidewalk or any other City improvement damaged by the Contractor during the course of construction shall be replaced by the Contractor at Contractor's own cost.

G. SOILS ENGINEERING AND TESTING

A soils engineer may be retained by the City to perform soils tests during the Contractor's entire operation to ascertain a minimum ninety-five percent (95%) compaction. The City shall be responsible for the cost of soils tests.

H. BARRICADING, PROTECTION AND TRAFFIC CONTROL

Due to the Project's location, the Contractor shall be required to secure and render safe the entire construction area at the end of each working day. Work areas must be well barricaded and flagged. No open excavations will be allowed on the weekends.

Contractor shall be responsible for and shall provide and maintain all required guards, railings, lights and warning signs and shall take all precautions to avoid injury or damage to any person or property and shall protect and indemnify the City against any claim or liability arising from or based on the lack of proper safeguards or negligence whether by him- or herself or his or her agents, employees or Subcontractors.

Payment for barricading, protection and traffic control shall be included in the price bid and shall include all labor and material necessary to adequately perform the Work involved to the satisfaction of the Project Administrator.

I. ACCESS TO PRIVATE PROPERTY

The Contractor shall be responsible for all fees and costs associated with securing permission to access private property for any portion of the Project.

J. WORKING DAYS AND HOURS

Contractor shall do all Work between the hours of 8:00 a.m. to 6:00 p.m., Monday through Friday. No Work will be allowed on Federal or City holidays.

In addition, no Work will be allowed on any special election day which may be declared. Should a special election

day be declared, a time extension of one (1) working day will be granted for each such day.

Whenever the Contractor is permitted or directed to perform night Work or to vary the period during which Work is performed during the day, Contractor shall give twelve (12) hours notice to the Inspector so that inspection may be provided. Also, a charge may be made to the Contractor for approved overtime or weekend inspections requested by the Contractor.

K. CLAIM DISPUTE RESOLUTION

In the event of any dispute or controversy with the City over any matter whatsoever, Contractor shall not cause any delay or cessation in or of Work, but shall proceed with the performance of the Work in dispute. Contractor shall retain any and all rights provided that pertain to the resolution of disputes and protests between the parties. The Disputed Work will be categorized as an "unresolved dispute" and payment, if any, shall be as later determined by mutual agreement or a court of law. Contractor shall keep accurate, detailed records of all Disputed Work, claims and other disputed matters.

All claims arising out of or related to the Contract Documents or this Project, and the consideration and payment of such claims, are subject to the provisions of the Division 3.6 (commencing with Government Code Section 810) of Title 1 of the Government Code (the "Government Claims Act") with regard to filing claims and to Article 1.5 (commencing with Section 20104) of Division 2, Part 3 of the Public Contract Code regarding the resolution of public works claims of $375,000 or less. This Contract hereby incorporates those provisions as through fully set forth herein. Thus, Contractor or any Subcontractor must file a claim in accordance with the Government Claims Act as a prerequisite to filing a construction claim in compliance with Article 1.5, and must then adhere to Article 1.5.

L. THIRD PARTY CLAIMS

City shall have full authority to compromise or otherwise settle any claim relating to the Project at any time. City shall timely notify Contractor of the receipt of any third-party claim relating to the Project. City shall be entitled to recover its reasonable costs incurred in providing this notice.

M. COMPLIANCE WITH LAWS

Contractor shall comply with all applicable federal, State and local laws, ordinances, codes and regulations in force at the time Contractor performs pursuant to the Contract Documents.

N. CONTRACTOR'S REPRESENTATIONS

By signing the Contract, Contractor represents, covenants and agrees that: a) Contractor is licensed, qualified, and capable of furnishing the labor, materials, and expertise necessary to perform the services in accordance with the terms and conditions set forth in the Contract Documents; b) there are no obligations, commitments, or impediments of any kind that will limit or prevent its full performance under the Contract Documents; c) there is no litigation pending against Contractor, and Contractor is not the subject of any criminal investigation or proceeding; and d) to Contractor's actual knowledge, neither Contractor nor its personnel have been convicted of a felony.

O. CONFLICTS OF INTEREST

Contractor agrees not to accept any employment or representation during the term of the Contract or within twelve (12) months after acceptance as defined in Section 6.F.1 of the General Provisions that is or may likely make Contractor "financially interested," as provided in Government Code Section 1090 and 87100, in any decisions made by City on any matter in connection with which Contractor has been retained pursuant to the Contract Documents.

P. APPLICABLE LAW

The validity, interpretation, and performance of these Contract Documents shall be controlled by and construed under the laws of the State of California, excluding California's choice of law rules. Venue for any such action relating to the Contract shall be in the Los Angeles County Superior Court.

Q. TIME

Time is of the essence in these Contract Documents.

R. INDEPENDENT CONTRACTOR

Contractor and Subcontractors shall at all times remain, as to the City, wholly independent contractors. Neither the City nor any of its officials, officers, employees or agents shall have control over the conduct of Contractor, Subcontractors, or any of their officers, employees, or agents, except as herein set forth, and Contractor and Subcontractors are free to dispose of all portions of their time and activities which they are not obligated to devote to the City in such a manner and to such Persons that the Contractor or Subcontractors wish except as expressly provided in these Contract Documents. Contractor and Subcontractors shall have no power to incur any debt, obligation, or liability on behalf of the City, bind the City in any manner, or otherwise act on behalf of the City as agents. Contractor and Subcontractors shall not, at any time or in any manner, represent that they or any of their agents, servants or employees, are in any manner agents, servants or employees of City. Contractor and Subcontractors agree to pay all required taxes on amounts paid to them under the Contract, and to indemnify and hold the City harmless from any and all taxes, assessments, penalties, and interest asserted against the City by reason of the independent contractor relationship created by the Contract Documents. Contractor shall include this provision in all contracts with all Subcontractors.

S. CONSTRUCTION

In the event of any asserted ambiguity in, or dispute regarding the interpretation of any matter herein, the interpretation of these Contract Documents shall not be resolved by any rules of interpretation providing for interpretation against the party who causes the uncertainty to exist or against the party who drafted the Contract Documents or who drafted that portion of the Contract Documents.

T. NON-WAIVER OF TERMS, RIGHTS AND REMEDIES

Waiver by either party of any one or more of the conditions of performance under these Contract Documents shall not be a waiver of any other condition of performance under these Contract Documents. In no event shall the making by the City of any payment to Contractor constitute or be construed as a waiver by the City of any breach of covenant, or any default which may then exist on the part of Contractor, and the making of any such payment by the City shall in no way impair or prejudice any right or remedy available to the City with regard to such breach or default.

U. TERM

The Contract is effective as of the Effective Date listed, and shall remain in full force and effect until Contractor has fully rendered the services required by the Contract Documents or the Contract has been otherwise terminated by the City. However, some provisions may survive the term listed within this Section, as stated in those provisions.

V. NOTICE

Except as otherwise required by law, any notice or other communication authorized or required by these Contract Documents shall be in writing and shall be deemed received on (a) the day of delivery if delivered by hand or overnight courier service during the City's regular business hours or (b) on the third business day following deposit in the United States mail, postage prepaid, to the addresses listed on Contractor's Bid and

City Hall, or at such other address as one party may notify the other.

W. SEVERABILITY

If any term or portion of these Contract Documents is held to be invalid, illegal, or otherwise unenforceable by a court of competent jurisdiction, the remaining provisions of these Contract Documents shall continue in full force and effect.

CHECKLIST FOR EXECUTION OF CONSTRUCTION CONTRACT

TO BE SUBMITTED BY SUCCESSFUL BIDDER:

____ Two executed copies of the Contract

____ Payment Bond in amount of the Contract

____ Performance Bond in amount of the Contract

____ Workers' Compensation Certificate

____ Liability insurance certificate naming the City as a co-insured

____ Automobile insurance certificate naming the City as a co-insured

____ General aggregate insurance certificate naming the City as a co-insured

____ Copy of City business license

____ Additional insured endorsement – comprehensive general liability

____ Additional insured endorsement – automobile liability

____ Additional insured endorsement -- excess liability

IV. CONTRACT

CONTRACT

CITY OF BEVERLY HILLS

CONTRACT FOR

UPGRADES TO THE HVAC CONTROLS SYSTEM PROJECT

THIS CONTRACT ("Contract") is made and entered this _____ day of _____, 20___ ("Effective Date"), by and between the CITY OF BEVERLY HILLS, a California municipal corporation ("City") and _____ ("Contractor"). Contractor's license number is _____.

In consideration of the mutual covenants hereinafter set forth, the parties hereto agree as follows:

1. Contract Documents. The Contract Documents consist of this Contract, the Notice Inviting Bids, Instructions to Bidders, Bid (including documentation accompanying the Bid and any post-Bid documentation submitted before the Notice of Award), the Bonds, permits from regulatory agencies with jurisdiction, General Provisions, Special Provisions, Plans, Standard Plans, Standard Specifications, Reference Specifications, Addenda, Change Orders, and Supplemental Agreements. The Contract Documents are attached hereto and incorporated herein by reference. In the event of any conflict between the terms of this Contract and any incorporated documents, the terms of this Contract shall control.

2. Scope of Services. Contractor shall perform the Work in a good and workmanlike manner for the project identified as Upgrades to the HVAC Controls System Project ("Project"), as described in this Contract and in the Contract Documents.

3. Compensation. In consideration of the services rendered hereunder, City shall pay Contractor a not to exceed amount of _____ dollars ($_____) in accordance with the prices as submitted in Contractor's Proposal, attached hereto and incorporated herein by this reference.

4. Incorporation by Reference. All of the following documents are attached hereto and incorporated herein by this reference: Workers' Compensation Certificate of Insurance; Additional Insured Endorsement (Comprehensive General Liability); Additional Insured Endorsement (Automobile Liability); and Additional Insured Endorsement (Excess Liability).

5. Antitrust Claims. In entering into this Contract, Contractor offers and agrees to assign to the City all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the California Business and Professions Code) arising from purchases of goods, services, or materials pursuant to the Contract. This assignment shall be made and become effective at the time the City tenders final payment to Contractor without further acknowledgment by the parties.

6. Prevailing Wages. City and Contractor acknowledge that this Project is a public work to which prevailing wages apply. The provisions of Section 7.A of the General Provisions shall apply and are mandatory for this Project.

7. Workers' Compensation. California Labor Code Sections 1860 and 3700 provide that every contractor will be required to secure the payment of compensation to its employees. In accordance with the provisions of California Labor Code Section 1861, by signing this Contract, the Contractor certifies as follows:

> "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to under take 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."

8. Titles. The titles used in this Contract are for convenience only and shall in no way define, limit

or describe the scope or intent of this Contract or any part of it.

9. Authority. Any person executing this Contract on behalf of Contractor warrants and represents that he or she has the authority to execute this Contract on behalf of Contractor and has the authority to bind Contractor to the performance of its obligations hereunder.

10. Entire Agreement. This Contract, including any other documents incorporated herein by specific reference, represents the entire and integrated agreement between City and Contractor. This Contract supersedes all prior oral or written negotiations, representations or agreements. This Contract may not be modified or amended, nor any provision or breach waived, except in a writing signed by both parties which expressly refers to this Contract.

11. Counterparts. This Contract may be executed in counterpart originals, duplicate originals, or both, each of which is deemed to be an original for all purposes.

IN WITNESS WHEREOF, the parties hereto have executed the Contract the day and year first above written.

CITY OF BEVERLY HILLS

By: _____

Lili Bosse, Mayor

ATTEST:

By: _____
BYRON POPE, City Clerk

Dated: _____

_____
("CONTRACTOR")

By: _____

Printed Name: _____

Title: _____

By: _____

Printed Name: _____

Title: _____

APPROVED AS TO FORM:

By: _____
LAURENCE S. WIENER
City Attorney

APPROVED AS TO CONTENT:

By: _____
MAHDI ALUZRI
City Manager

By: _____
SHANA EPSTEIN
Director of Public Works

By: _____

Sharon L'Heureux Dressel
Risk Manager

V. BONDS

Bond No. _____

PAYMENT BOND
(LABOR AND MATERIALS)

KNOW ALL PERSONS BY THESE PRESENTS that:

WHEREAS the City of Beverly Hills ("City"), State of California, has awarded to _____

_____

_____("Principal")

(Name and address of Contractor)

a contract (the "Contract") for the Work described as follows**:**

UPGRADES TO THE HVAC CONTROLS SYSTEM PROJECT
(Project name)

WHEREAS, under the terms of the Contract, the Principal is required before entering upon the performance of the work, to file a good and sufficient payment bond with the City to secure the claims to which reference is made in Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the Civil Code.

NOW, THEREFORE, we, the undersigned Principal, and _____

_____

_____

(Name and address of Surety)

("Surety") a duly admitted surety insurer under the laws of the State of California, as Surety, are held and firmly bound unto the City and all contractors, subcontractors, laborers, material suppliers, and other persons employed in the performance of the agreement and referred to in Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the Civil Code in the penal sum of _____

_____

Dollars ($_____), for materials furnished or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to this work or labor, that the surety will pay the same in an amount not exceeding the amount hereinabove set forth, and also in case suit is brought upon this bond, will pay, in addition to the face amount thereof, costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by City in successfully enforcing this obligation, to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this Bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this Bond.

Should the condition of this Bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force and effect.

The Surety hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract or the specifications accompanying the same shall in any manner affect its obligations on this Bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all

purposes be deemed an original hereof, have been duly executed by Principal and Surety, on the date set forth below, the name of each corporate party being hereto affixed and these presents duly signed by its undersigned representative(s) pursuant to authority of its governing body.

Dated: _____

"Principal"	"Surety"
_____	_____
_____	_____
By: _____ Its	By: _____ Its
By: _____ Its	By: _____ Its
(Seal)	*(Seal)*

APPROVED AS TO FORM:

By: _____
Laurence S. Wiener, City Attorney

Note: This Bond must be executed in duplicate and dated, all signatures must be notarized, and evidence of the authority of any person signing as attorney-in-fact must be attached. IF CONTRACTOR IS A PARTNERSHIP, ALL PARTNERS MUST EXECUTE BOND. DATE OF BOND MUST NOT BE PRIOR TO DATE OF CONTRACT. 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.

Bond No. _____

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS that:

WHEREAS the City of Beverly Hills ("City"), has awarded to _____

_____

_____ ("Principal")

(Name and address of Contractor)

a contract (the "Contract") for the Work described as follows**:**

UPGRADES TO THE HVAC CONTROLS SYSTEM PROJECT

(Project name)

WHEREAS, Principal is required under the terms of the Contract to furnish a Bond for the faithful performance of the Contract.

NOW, THEREFORE, we, the undersigned Principal, and _____

_____

_____,

(Name and address of Surety)

("Surety") a duly admitted surety insurer under the laws of the State of California, as Surety, are held and firmly bound unto the City in the penal sum of _____

_____

Dollars ($_____), this amount being not less than the total Contract Price, in lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, successors executors and administrators, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the hereby bounded Principal, his, her or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the Contract and any alteration thereof made as therein provided, on the Principal's part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the City, its officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by City in successfully enforcing such obligation, all to be taxed as costs and included in any judgment rendered.

The Surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or of the Work to be performed thereunder or the specifications accompanying the same shall in anywise affect its obligations under 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. Surety hereby waives the provisions of California Civil Code 2845 and 2849. The City is the principal beneficiary of this Bond and has all rights of a party hereto.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original hereof, have been duly executed by Principal and Surety, on the date

set forth below, the name of each corporate party being hereto affixed and these presents duly signed by its undersigned representative(s) pursuant to authority of its governing body.

Dated: _____

"Principal"	"Surety"
_____	_____
_____	_____
By: _____	By: _____
Its	Its
By: _____	By: _____
Its	Its
(Seal)	*(Seal)*

APPROVED AS TO FORM:

By: _____
Laurence S. Wiener, City Attorney

Note: This Bond must be executed in duplicate and dated, all signatures must be notarized, and evidence of the authority of any person signing as attorney-in-fact must be attached. IF CONTRACTOR IS A PARTNERSHIP, ALL PARTNERS MUST EXECUTE BOND. DATE OF BOND MUST NOT BE PRIOR TO DATE OF CONTRACT. 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.

VI. INSURANCE

WORKERS' COMPENSATION
CERTIFICATE OF INSURANCE

WHEREAS, the City of Beverly Hills ("City") has required certain insurance to be provided by:

_____

NOW THEREFORE, the undersigned insurance company does hereby certify that it has issued the policy or policies described below to the following named insureds and that the same are in force at this time:

1. This certificate is issued to:

   City of Beverly Hills
   City Hall
   455 North Rexford Drive, Suite 190
   Beverly Hills, California 90210

2. The insureds under such policy or policies are:

   _____

3. Workers' Compensation Policy or Policies in a form approved by the Insurance Commissioner of California covering all operations of the named insureds as follows:

Policy Number	Effective Date	Expiration Date
_____	_____	_____
_____	_____	_____
_____	_____	_____

_____

_____

_____

By: _____
Its Authorized Representative

ADDITIONAL INSURED ENDORSEMENT
COMPREHENSIVE GENERAL LIABILITY

_____

Name and address of named insured ("Named Insured"):

_____

Name and address of Insurance Company ("Company"):

_____

General description of agreement(s), permit(s), license(s), and/or activity(ies) insured:

Notwithstanding any inconsistent statement in the policy to which this endorsement is attached (the "Policy") or in any endorsement now or hereafter attached thereto, it is agreed as follows:

1. The City of Beverly Hills ("City"), its elected officials, officers, attorneys, agents, employees, and volunteers are additional insureds (the above named additional insureds are hereafter referred to as the "Additional Insureds") under the Policy in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured. The Additional Insureds have no liability for the payment of any premiums or assessments under the Policy.

2. The insurance coverages afforded the Additional Insureds under the Policy shall be primary insurance, and no other insurance maintained by the Additional Insureds shall be called upon to contribute with the insurance coverages provided by the Policy.

3. Each insurance coverage under the Policy shall apply separately to each Additional Insured against whom claim is made or suit is brought except with respect to the limits of the Company's liability.

4. Nothing in this contract of insurance shall be construed to preclude coverage of a claim by one insured under the policy against another insured under the policy. All such claims shall be covered as third-party claims, i.e., in the same manner as if separate policies had been issued to each insured. Nothing contained in this provision shall operate to increase or replicate the Company's limits of liability as provided under the policy.

5. The insurance afforded by the Policy for contractual liability insurance (subject to the terms, conditions and exclusions applicable to such insurance) includes liability assumed by the Named Insured under the indemnification and/or hold harmless provision(s) contained in or executed in conjunction with the written agreement(s) or permit(s) designated above, between the Named Insured and the Additional Insureds.

6. The policy to which this endorsement is attached shall not be subject to cancellation, change in coverage, reduction of limits (except as the result of the payment of claims), or non-renewal except after written notice to City, by certified mail, return receipt requested, not less than thirty (30) Days before the effective date thereof. In the event of Company's failure to comply with this notice provision, the policy as initially drafted will continue in full force and effect until compliance with this notice requirement.

7. Company hereby waives all rights of subrogation and contribution against the Additional Insureds, while acting within the scope of their duties, from all claims, losses and liabilities arising out of or incident to the perils insured against in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured regardless of any prior, concurrent, or subsequent active or passive negligence by the Additional Insureds.

8. It is hereby agreed that the laws of the State of California shall apply to and govern the validity, construction, interpretation, and enforcement of this contract of insurance.

9. This endorsement and all notices given hereunder shall be sent to City at:

City Manager
City of Beverly Hills
City Hall
455 North Rexford Drive, Suite 190
Beverly Hills, California 90210

10. Except as stated above and not in conflict with this endorsement, nothing contained herein shall be held to waive, alter or extend any of the limits, agreements, or exclusions of the policy to which this endorsement is attached.

TYPE OF COVERAGES TO WHICH THIS ENDORSEMENT ATTACHES	POLICY PERIOD FROM/TO	LIMITS OF LIABILITY

11. Scheduled items or locations are to be identified on an attached sheet. The following inclusions relate to the above coverages. Includes:

- □ Contractual Liability
- □ Owners/Landlords/Tenants
- □ Manufacturers/Contractors
- □ Products/Completed Operations
- □ Broad Form Property Damage
- □ Extended Bodily Injury
- □ Broad Form Comprehensive General Liability Endorsement
- □ Explosion Hazard
- □ Collapse Hazard
- □ Underground Property Damage
- □ Pollution Liability
- □ Liquor Liability
- □ _____
- □ _____
- □ _____

12. A □ deductible or □ self-insured retention *(check one)* of $_____ applies to all coverage(s) except: _____ *if none, so state)*. The deductible is applicable □ per claim or □ per occurrence *(check one)*.

13. This is an □ occurrence or □ claims made policy *(check one)*.

14. This endorsement is effective on _____ at 12:01 a.m. and forms a part of Policy Number _____.

I, _____ *(print name)*, hereby declare under penalty of perjury under the laws of the State of California, that I have the authority to bind the Company to this endorsement and that by my execution hereof, I do so bind the Company.

Executed _____, 20____

_____
Signature of Authorized Representative

(Original signature only; no facsimile signature or initialed signature accepted)

Telephone No.: (_____) _____

ADDITIONAL INSURED ENDORSEMENT
AUTOMOBILE LIABILITY

Name and address of named insured ("Named Insured"): _____

_____

Name and address of Insurance Company ("Company"): _____

_____

General description of agreement(s), permit(s), license(s), and/or activity(ies) insured:

Notwithstanding any inconsistent statement in the policy to which this endorsement is attached (the "Policy") or in any endorsement now or hereafter attached thereto, it is agreed as follows:

1. The City of Beverly Hills ("City"), its elected officials, officers, attorneys, agents, employees, and volunteers are additional insureds (the above named additional insureds are hereafter referred to as the "Additional Insureds") under the Policy in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured. The Additional Insureds have no liability for the payment of any premiums or assessments under the Policy.

2. The insurance coverages afforded the Additional Insureds under the Policy shall be primary insurance, and no other insurance maintained by the Additional Insureds shall be called upon to contribute with the insurance coverages provided by the Policy.

3. Each insurance coverage under the Policy shall apply separately to each Additional Insured against whom claim is made or suit is brought except with respect to the limits of the Company's liability.

4. Nothing in this contract of insurance shall be construed to preclude coverage of a claim by one insured under the policy against another insured under the policy. All such claims shall be covered as third-party claims, i.e., in the same manner as if separate policies had been issued to each insured. Nothing contained in this provision shall operate to increase or replicate the Company's limits of liability as provided under the policy.

5. The insurance afforded by the Policy for contractual liability insurance (subject to the terms, conditions and exclusions applicable to such insurance) includes liability assumed by the Named Insured under the indemnification and/or hold harmless provision(s) contained or executed in conjunction with the written agreement(s) or permit(s) designated above, between the Named Insured and the Additional Insureds.

6. The policy to which this endorsement is attached shall not be subject to cancellation, change in coverage, reduction of limits (except as the result of the payment of claims), or non-renewal except after written notice to City, by certified mail, return receipt requested, not less than thirty (30) Days before the effective date thereto. In the event of Company's failure to comply with this notice provision, the policy as initially drafted will continue in full force and effect until compliance with this notice requirement.

7. Company hereby waives all rights of subrogation and contribution against the Additional Insureds, while acting within the scope of their duties, from all claims, losses and liabilities arising out of or incident to the perils insured against in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured regardless of any prior, concurrent, or subsequent active or passive negligence by the Additional Insureds.

8. It is hereby agreed that the laws of the State of California shall apply to and govern the validity, construction, interpretation, and enforcement of this contract of insurance.

9. This endorsement and all notices given hereunder shall be sent to City at:

City Manager
City of Beverly Hills
City Hall
455 North Rexford Drive, Suite 190
Beverly Hills, California 90210

10. Except as stated above and not in conflict with this endorsement, nothing contained herein shall be held to waive, alter or extend any of the limits, agreements, or exclusions of the policy to which this endorsement is attached.

TYPE OF COVERAGES TO WHICH THIS ENDORSEMENT ATTACHES	POLICY PERIOD FROM/TO	LIMITS OF LIABILITY

11. Scheduled items or locations are to be identified on an attached sheet. The following inclusions relate to the above coverages. Includes:

˜ Any Automobiles	˜ Truckers Coverage
˜ All Owned Automobiles	˜ Motor Carrier Act
˜ Non-owned Automobiles	˜ Bus Regulatory Reform Act
˜ Hired Automobiles	˜ Public Livery Coverage
˜ Scheduled Automobiles	˜ _____
˜ Garage Coverage	˜ _____

12. A □ deductible or □ self-insured retention *(check one)* of $_____applies to all coverage(s) except: _____ *(if none, so state)*. The deductible is applicable G per claim or G per occurrence *(check one)*.

13. This is an □ occurrence or □ claims made policy *(check one)*.

14. This endorsement is effective on _____ at 12:01 a.m. and forms a part of Policy Number _____.

I, _____ *(print name)*, hereby declare under penalty of perjury under the laws of the State of California, that I have the authority to bind the Company to this endorsement and that by my execution hereof, I do so bind the Company.

Executed _____, 20____

_____
Signature of Authorized Representative
(Original signature only; no facsimile signature or initialed signature accepted)

Telephone No.: (_____) _____

ADDITIONAL INSURED ENDORSEMENT
EXCESS LIABILITY

Name and address of named insured ("Named Insured"): _____

_____

Name and address of Insurance Company ("Company"): _____

_____

General description of agreement(s), permit(s), license(s), and/or activity(ies) insured:

Notwithstanding any inconsistent statement in the policy to which this endorsement is attached (the "Policy") or in any endorsement now or hereafter attached thereto, it is agreed as follows:

1. The City of Beverly Hills ("City"), its elected officials, officers, attorneys, agents, employees, and volunteers are additional insureds (the above named additional insureds are hereafter referred to as the "Additional Insureds") under the Policy in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured. The Additional Insureds have no liability for the payment of any premiums or assessments under the Policy.

2. The insurance coverages afforded the Additional Insureds under the Policy shall be primary insurance, and no other insurance maintained by the Additional Insureds shall be called upon to contribute with the insurance coverages provided by the Policy.

3. Each insurance coverage under the Policy shall apply separately to each Additional Insured against whom claim is made or suit is brought, except with respect to the limits of the Company's liability.

4. Nothing in this contract of insurance shall be construed to preclude coverage of a claim by one insured under the policy against another insured under the policy. All such claims shall be covered as third-party claims, i.e., in the same manner as if separate policies had been issued to each insured. Nothing contained in this provision shall operate to increase or replicate the Company's limits of liability as provided under the policy.

5. The insurance afforded by the Policy for contractual liability insurance (subject to the terms, conditions and exclusions applicable to such insurance) includes liability assumed by the Named Insured under the indemnification and/or hold harmless provision(s) contained in or executed in conjunction with the written agreement(s) or permit(s) designated above, between the Named Insured and the Additional Insureds.

6. The policy to which this endorsement is attached shall not be subject to cancellation, change in coverage, reduction of limits (except as the result of the payment of claims), or non-renewal except after written notice to City, by certified mail, return receipt requested, not less than thirty (30) Days before the effective date thereto. In the event of Company's failure to comply with this notice provision, the policy as initially drafted will continue in full force and effect until compliance with this notice requirement.

7. Company hereby waives all rights of subrogation and contribution against the Additional Insureds, while acting within the scope of their duties, from all claims, losses and liabilities arising out of or incident to the perils insured against in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured regardless of any prior, concurrent, or subsequent active or passive negligence by the Additional Insureds.

8. It is hereby agreed that the laws of the State of California shall apply to and govern the validity, construction, interpretation, and enforcement of this contract of insurance.

9. This endorsement and all notices given hereunder shall be sent to City at:

City Manager
City of Beverly Hills
City Hall
455 North Rexford Drive, Suite 190
Beverly Hills, California 90210

10. Except as stated above and not in conflict with this endorsement, nothing contained herein shall be held to waive, alter or extend any of the limits, agreements, or exclusions of the policy to which this endorsement is attached.

TYPE OF COVERAGES TO WHICH THIS ENDORSEMENT ATTACHES	POLICY PERIOD FROM/TO	LIMITS OF LIABILITY

□ Following Form
□ Umbrella Liability

□ _____

11. Applicable underlying coverages:

INSURANCE COMPANY	POLICY NO.	AMOUNT

12. The following inclusions, exclusions, extensions or specific provisions relate to the above coverages:

13. A □ deductible or □ self-insured retention *(check one)* of $_____ applies to all coverage(s) except: _____*(if none, so state)*. The deductible is applicable □ per claim or □ per occurrence *(check one)*.

14. This is an □ occurrence or □ claims made policy *(check one)*.

15. This endorsement is effective on _____ at 12:01 a.m. and forms a part of Policy Number _____.

I, _____ *(print name)*, hereby declare under penalty of perjury under the laws of the State of California, that I have the authority to bind the Company to this endorsement and that by my execution hereof, I do so bind the Company.

Executed _____, 20____

_____
Signature of Authorized Representative
(Original signature only; no facsimile signature or initialed signature accepted)

Telephone No.: (_____) _____

VII. APPENDIX I

SCOPE OF WORK

1.0 SCOPE OF WORK

1.1 Scope of Work shall be as described and in accordance with Technical Specifications, system Architecture and Controller Summary Sheets.

1.2 The scope of work includes:

General Description:
The City's Building automation system consists of a Legacy Honeywell XL500/ Symmetre control system combined with a Niagara AX system for the newer installations. Most of the sites were configured with Honeywell CARE engineering tool. There is a large portion of these controllers that are operating on the CBUS network. The remainder of the segments on the XL500 system is operating on an LNS based system using ILON600 devices as the network interfaces to each logical bus.

The scope of work includes converting All XL50, 500 and 100 controllers to an open protocol Sedona or Niagara based IP controller. Transfer all reports, trends, schedules, scripts, Alarming and graphical interfaces from the R-310 Symmetre server to the upgraded N4 Tridium Station. Removing all ILON 600 devices and replace with Niagara JACEs that support the AX Wizards for the large installed base of Lonworks controllers. Upgrading the existing Niagara Station to N4 and all the existing JACE devices to AX 3.8. Adding a tenant-billing module to the upgraded supervisor capable of 100 tenants. Upgrading the existing Trane system and devices to the Upgrades N4 workstation.

It is important to note. The existing legacy controllers are monitoring and controlling very critical applications within the City. They also contain various energy conservation measures and programming in which the City has invested in over the last 12 years.

Several of the City Sites have been installed with the latest system, which includes:

Roxbury Park, Public Work Warehouse, 9400 Santa Monica, 331 Foothill Road, Wilshire Fountain (pending), the Data Air Units for the Data Center and the new Central Plant Cooling Towers. These sites server will be upgraded to the latest version of Tridium to Niagara 4.

City of Beverly Hills Existing Jaces					
JACE	Model	Version	Spyder Tool	Honeywell Ax Wizards	Stryker
Supervisor	Supervisor	3.5.406	x	x	x
331 Foothill Core	JACE 600	3.5.406	x	x	
331 Foothill Google	JACE 600E	3.8.38	x	x	
331 Foothill Participant Media	JACE 600	3.5.406	x	x	
331 Foothill the Agency	JACE 600	3.5.406	x	x	
Library Data Center	JACE 200	3.5.406		x	
Warehouse	JACE 600	3.5.406	x	x	
Roxbury Park	JACE 600	3.5.406	x	x	
Central Plant Cooling Tower	JACE 600E	3.8.111	x	x	
Police Department 2/3 Floor	JACE 600E	3.8.111	x	x	x

The Existing Legacy panels include (list of controller included in attached document)

1) The Fire Station Air Handlers and Chillers
2) The Central Plant and Thermal Storage System
3) The Library Air Handlers, Data Center, Generators, Sewage Status and Exhaust Fans.
4) The City Hall Air Handlers, Boilers, Generator, Occupancy and Lighting.
5) The Police Facility Firing Range Air Handler and Range Initiation System.
6) The Police Facility Air Handlers and Boilers.
7) Parking Garage Data Interface.
8) Water Treatment Plant
9) Greystone Mansion

Infrastructure and Engineering Scope of Work

1) Provide project Management and Supervision for the project.
2) Upgrade the existing WEBs AX License to the latest N4 Software Package.
3) Provide new Licenses and maintenance licenses to extend the Capacity of the Work Station.
4) Upgrade the existing WEBS Niagara Station and Spyder device licenses on the campus wide network.
5) Provide the system engineering for the new IP Based upgrade including network and panel drawings of the upgraded system.
6) Provide the engineering to transfer the Symmetre and LNS Database to the Niagara N4 system

After Hours Billing and Tracking System for 331 Foothill Office Building, 9400 Santa Monica Office Building and Beverly Canon.

1) Provide and install a Niagara based Tenant Override, reporting and billing system
2) Set up tenant accounts and invoicing forms for up to 25 tenants.
3) Set up web based tenant interface for the remote request of afterhours use.
4) Provide documentation and onsite training on the new interface
5) Commission and test the operations.

Fire Station Scope of Work

1) Provide and install new controllers for the fire station air handlers, chillers, and exhaust fans.
2) New controls panels to be UL rated.
3) Remove and replace Lonworks IP device with a Niagara Based Device that can support the AX and Spyder and Striker Toolsets.
4) Migrate the existing Lonworks devices to the new device.
5) Start up and test the operations of the new system.
6) Test all existing sensors, transmitters' valves and actuators.
7) Provide floor plan graphics and equipment graphics for the building.
8) Start up and test the operations of the new system.
9) Provide the system drawings and documentation.

Central Plant Upgrade

1) Provide and install (1) new main central plant control panel with new IP based controllers to operate the central plant and thermal storage system.
2) Provide and install (1) Extreme Switching Industrial (City Approved) Ethernet switch and power supply.
3) Remove and replace Lonworks IP device with a Niagara Based Device that can support the AX and Spyder and Striker Toolsets.
4) The new panel will be installed next to the existing control panel
5) New control panel will be shop fabricated and UL approved.
6) Provide and install the required electrical and wire to support the retrofit.
7) Migrate the existing Lonworks devices to the new controller.
8) Program the existing sequence of operations into the new controllers including the past energy conservation measures.
9) Provide graphical interface for the new central plant control system.
10) Test all existing sensors, transmitters' valves and actuators.
11) Start up and test the operations of the new system.
12) Provide the system drawings and documentation and deficiency report of the mechanical systems.

The Library Air Handlers, Data Center, Generators, Sewage Status and Exhaust Fans

1) Safe off and remove the existing XL500 Controllers serving the air handlers, data center, generator, exhaust fans and general status points.
2) Provide and install new Niagara and IP based Io controllers in new control panels.
3) Remove and replace Lonworks IP device with a Niagara Based Device that can support the AX and Spyder and Striker Toolsets.
4) Provide and install (1) Extreme Switching Industrial (City Approved) Ethernet switch and power supply.
5) New controls panels to fabricated and UL approved.
6) Existing enclosure will be used when deemed suitable.
7) Remove and replace Lonworks IP devices with Niagara network devices.
8) Migrate all of the Lonworks devices to the new network manager.
9) Migrate the new Devices to the Niagara front end Server
10) Provide floor plan graphics and equipment graphics for the building.
11) Migrate the time schedules, graphics, trends and alarms to the Niagara Server.
12) Start up and test the operations of the new system.
13) Provide the system drawings and documentation and deficiency report of the mechanical systems.

City Hall Scope of Work

1) Provide and install new controllers for the City Hall Air Handlers, Boilers, Generator, Occupancy Lighting systems and the Council Chambers controls system.
2) New controls panels to fabricate and UL approved.
3) Remove and replace Lonworks IP device with a Niagara Based Device that can support the AX and Spyder and Striker Toolsets.
4) Migrate all the Lonworks devices to the new network manager.
5) Migrate the new Devices to the Niagara front end Server
6) Provide floor plan graphics and equipment graphics for the building.
7) Start up and test the operations of the new system.
8) Provide the system drawings and documentation and deficiency report of the mechanical systems.

Police Facility Firing Range Automation System Upgrade

1) Remove and replace the XL50 controller and replace with an IP based controller with the required IO modules.
2) Remove and replace Lonworks IP device with a Niagara Based Device that can support the AX and Spyder and Striker Toolsets.
3) Migrate the Lonworks devices to new controller.
4) Integrate the existing touch screen interface with the gun range operations.
5) Migrate the new Devices the front-end Server
6) Provide floor plan graphics and equipment graphics for the system
7) Start up and test the operations of the new system.
8) Provide the system drawings and documentation and deficiency report of the mechanical systems.

Police Facility Upgrade

1) Provide and install new panels and controls for the air handlers and boilers serving the PD.
2) New panels to be decentralized to the location of the air handlers.
3) Provide the required electrical conduits and supplies.
4) New controls panels to fabricate and UL approved.
5) Remove and replace Lonworks IP device with a Niagara Based Device that can support the AX and Spyder and Striker Toolsets.
6) Migrate all of the Lonworks devices to the new network manager.
7) Migrate the new controllers to the front-end Server.
8) Provide floor plan graphics and equipment graphics for the building.
9) Start up and test the operations of the new system.
10) Safe off and remove unused controls
11) Provide the system drawings and documentation and deficiency report of the mechanical systems.

Parking Garage Upgrade

1) Provide and install (1) network manager on the existing control network.
2) Provide new IO were the existing XL50 devices
3) Migrate all of the Lonworks devices to the new network manager.
4) Provide equipment graphics for the structure.
5) Migrate the time schedules, graphics, trends and alarms to the Server.
6) Start up and test the operations of the new system.
7) Provide the system drawings and documentation and deficiency report of the mechanical systems.

Water Treatment Plant Scope of Work

1) Provide and install (1) new Dell Professional Grade Operator terminal at the Treatment plant.
2) Provide and install (1) new back plate in the existing control panel to install the new IP based controllers for the air handlers and chillers on the rooftop.
3) Provide and install (1) Extreme Switching Industrial (City Approved) Ethernet switch and power supply.

4) Provide electrical conduits and wire as required to support the new controllers.
5) Test all existing sensors, transmitters' valves and actuators.
6) Migrate all the existing Honeywell Lonworks devices to a new network Manager.
7) Migrate all the existing sequence of operations from the air handlers, chillers, Fan Coils and VAVs.
8) Provide floor plan graphics and equipment graphics for the building.
9) Migrate the time schedules, graphics, trends and alarms to the Server.
10) Provide the system drawings and documentation and deficiency report of the mechanical systems.
11) Provide controller report with a network analyzing tool.
12) Note: Provide cost option to upgrade the Lonworks VAV, CVAHU and Remote IO Devices to new Lonworks or Bacnet devices.

Greystone Mansion Upgrade

1) Remove and replace the (2) XL500 controllers for the site.
2) Furnish and install (1) Niagara Network controllers and Lonworks IO Modules.
3) sing the controls cabinets at this site.
4) Provide the required programing to replicate the sequence of operations and touch screen programming.
5) Migrate the existing Lonworks devices to the system.
6) Migrate the time schedules, graphics, trends and alarms to the Sever.
7) Provide the system drawings and documentation and deficiency report of the mechanical systems.

Beverly Canon Building Upgrade

1) Provide and install (1) new Niagara JACE device loaded with Trane comm 3 and Comm 4 drivers.
2) Provide and install (1) Lonworks card for the Trane Comm 5 devices.
3) Integrate the existing VAV, RTU and VariTrac systems into the new JACE device.
4) Integrate the Trane programmable controllers to the Webs device.
5) Provide new 3D graphical interface to all the equipment and devices and floor plans.
6) The new upgraded N4 Niagara Server.
7) Provide controls drawings and component documentation for the new system.
8) Provide customer training on the upgraded system.
9) Provide the system drawings and documentation and deficiency report of the mechanical systems.

Phasing and Training

A phasing and Training Plan will need to be provided as a part of the RFP. Adequate training will need to be provided after each segment is integrated and taken over.

Qualifications

IP connections will be coordinated with the City's Network administrator group. Panel mounted industrial Ethernet switches must meet the minimum City Standards. Required switches hardware will be specified by the City. The requirements for the controllers have been provided on the provided specifications.

1.3 Bid Alternates:

1.3.1 Bid Alternate No. 1: Provide a cost to replace the VAV controllers to new FT-10 Stryker Controllers with new wall modules, actuators and sensors at the Public Works Facility.

2.0 LISTING OF DOCUMENTS AND SPECIFICATIONS

- Technical Specifications (APPENDIX II)

- Existing System Architecture showing network and basis of design for the system modification (APPENDIX III)

  1. The Fire Station Air Handlers and Chillers
  2. The Central Plant and Thermal Storage System
  3. The Library Air Handlers, Data Center, Generators, Sewage Status and Exhaust Fans.
  4. The City Hall Air Handlers, Boilers, Generator, Occupancy and Lighting.
  5. The Police Facility Firing Range Air Handler and Range Initiation System.
  6. The Police Facility Air Handlers and Boilers.
  7. Parking Garage Data Interface.
  8. Water Treatment Plant
  9. Greystone Mansion

- Controller Summary sheets for the point and hardware information (APPENDIX IV)

  1. The Fire Station Air Handlers and Chillers
  2. The Central Plant and Thermal Storage System
  3. The Library Air Handlers, Data Center, Generators, Sewage Status and Exhaust Fans.
  4. The City Hall Air Handlers, Boilers, Generator, Occupancy and Lighting.
  5. The Police Facility Firing Range Air Handler and Range Initiation System.
  6. The Police Facility Air Handlers and Boilers.
  7. Parking Garage Data Interface.
  8. Water Treatment Plant
  9. Greystone Mansion

VIII. APPENDIX II

TECHNICAL SPECIFICATIONS

COBH Campus Wide DDC Integration Project

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Existing XL500 Architecture with the Legacy controllers, Controls text files of the existing point data and programing.

1.2 SUMMARY

A. Provide and upgrade to the existing WEB supervisor to N4. Upgrade the existing Tridium Jaces from 3.4 to 3.8. Upgrade the Spyder Modules to 5.2 for the existing 3.4 Sites. Upgrade the Legacy XL500 controllers to N4 Tridium controllers or Sedona Based open controllers. The new Programmable controllers will be IP Based. Remove all the ILON600 Hardware and install N4 Jaces to bring the existing Lonworks FT-10 devices to the N4 WorkStation. Each Tridium and work station device will be provided with a 5 year license service credits. The new workstation will be provide with the proper amount of JACE connections to support the upgrades.

B. Provide integration and upgrades to the Building Automation System (BAS) as indicated as specified herein. The systems shall provide accurate and stable control using full electronic control devices and logic with electronic direct digital control (DDC), for sensing and controlling major equipment and devices. The DDC system shall be compatible with the existing Building Automation System (BAS).

C. The Building Automation System (BAS) shall be a complete system designed for use with the IT systems. This functionality shall extend into the equipment rooms. Devices residing on the automation network located in equipment rooms and similar shall be fully IT compatible devices that mount and communicate directly on the IT infrastructure in the facility. All points of user interface shall be on standard PCs that do not require the purchase of any special software from the BAS manufacturer for use as a building operations terminal. The primary point of interface on these PCs shall be a standard Web Browser.

D. Include, but not limited to, the following major items:
   1. A fully integrated building automation system (BAS), UL listed, incorporating DDC for energy management, equipment monitoring and control, alarm management, and historical data collection, including dynamic color graphic software for Central Control Station (CCS).
   2. Electronic control system with controllers,
   3. All wirings, conduit and panels.
   4. All final electrical connections to stand-alone DDC controller and Application Specific Controller (ASC).
   5. Shop drawings, equipment data and manuals.
   6. System start-up and Owner's instructions.

E. Integration
   1. The new BAS in this project shall integrate with the Upgraded N4 Control Station and the Central Control Station. The new sites upgraded XL500 sites will connect to the Tridium N4 Supervisor station
   2. Niagara 4 with HTML 5 graphics
   3. Haystack data modeling for every point in the system

1.3 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:
B. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 5 seconds.
C. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 5 seconds.
D. Object Command: Reaction time of less than 5 seconds between operator command of a binary object and device reaction.
E. Object Scan: Transmit change of state and change of analog values to control units or workstation within 5 seconds.

F. Alarm Response Time: Annunciate alarm at workstation within 2 seconds. Multiple workstations must receive alarms within five seconds of each other.
G. Program Execution Frequency: Programmable controllers shall execute DDC PI control loops, and scan and update process values and outputs at least once per second.
H. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
I. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
    1. Water Temperature: Plus or minus 1ºF.
    2. Water Flow: Plus or minus 5 percent of full scale.
    3. Water Pressure: Plus or minus 2 percent of full scale.
    4. Space Temperature: Plus or minus 1ºF.
    5. Ducted Air Temperature: Plus or minus 1ºF.
    6. Outside Air Temperature: Plus or minus 2ºF.
    7. Dew Point Temperature: Plus or minus 3ºF.
    8. Temperature Differential: Plus or minus 0.25ºF.
    9. Relative Humidity: Plus or minus 5 percent.
    10. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
    11. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
    12. Airflow (Terminal): Plus or minus 10 percent of full scale.
    13. Air Pressure (Space): Plus or minus 0.01" wg.
    14. Air Pressure (Ducts): Plus or minus 0.1" wg.
    15. Carbon Dioxide: Plus or minus 50 ppm.
    16. Electrical: Plus or minus 5 percent of reading.

1.4 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics and finishes for materials for each type of product indicated.
    1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
    2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
    3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, components, and location and size of each field connection.
    1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
    2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
    3. Wiring Diagrams: Power, signal, and control wiring.
    4. Details of control panel faces, including controls, instruments, and labeling.
    5. Written description of sequence of operation.
    6. Schedule of valves including size and flow characteristics.
    7. DDC System Hardware:
        a. Wiring diagrams for control units with termination numbers.
        b. Schematic diagrams and floor plans for field sensors and control hardware.
        c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.
    8. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
    9. Submit sample graphics for approval before starting system commissioning.
    10. Controlled Systems:
        a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
        b. Written description of sequence of operation including schematic diagram.
        c. Points list.
        d. Starter and variable speed drive wiring details of all automatically controlled motors.
        e. Reduced size floor plan drawings showing locations of control panels, sensors, and any devices mounted in occupied space.

C. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.

D. Software and Firmware Operational Documentation: Include the following:
1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for DDC workstations and control systems.

E. Software Tool Kit**: To include all configuration software for all devices newly installed for Owner to use in modifying software to suit future systems revisions or monitoring and control revisions. Include all super user login information and passwords.**

F. **Qualification Data:** For Installer and manufacturer.

G. Field quality-control test reports.

H. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
1. Lists of spare parts for each type of control device.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Calibration records and list of set points.

1.5 CONTROL MANUAL AND DOCUMENTATION

A. After completion of the project, insert final approved shop drawings include the following information:
1. An operator's manual including detailed man-machine interface.
2. An operator's reference table listing the addresses of all connected input points and output points. Show settings where applicable.
3. A programmer's manual including all information necessary to perform the programming function.
4. A language manual including a detailed description of the language used and all routines, modules, etc., used by the system.
5. Complete program listing file, and parameter listing file for all programs.

B. Provide two (2) AutoCad, Revit, or Visio (latest version) CD and one (1) full size reproducible of each control diagram and equipment schedule reflecting the "as-built" condition. Size shall be the same as the construction document drawings.

1.6 COMPLETION

A. Final system acceptance shall be contingent upon completion of final review and correction of all deficiencies. Satisfactory completion of the operational tests which shall demonstrate compliance with all performance and requirements of the Contract Documents.

B. Request a final review prior to final system acceptance after completion of the following items:
1. Installation of all systems required by the Contract Documents.
2. Submission and acceptance of service manuals.
3. Identification.
4. Cleaning.
5. Satisfactory operation of all systems for a period of one week.
6. Satisfactory completion of training programs. Submission of service manuals and record drawings. Delivery of control diagrams and valve charts.

C. System Start-Up: Upon completion of the installation, start up the system and perform all necessary testing, debugging and calibration of each component in the entire system. Perform an acceptance test in the presence of the Owner's representative. When the system performance is deemed satisfactory in whole or in part of the Owner's representative, the part(s) of the system shall be accepted.

D. Owner's Instructions: At the completion of the work, factory representatives under direct employment of the Contractor shall provide minimum two (2) four-hour training courses to the Owner's operating personnel who have responsibility for the operation of the building systems. As a minimum, the courses shall include system overview, operation of the system, function of the each component, system operating procedure, programming and maintenance procedures. Training courses will be videotaped. Provide two videotape DVD copies of the training course.

1.7 COORDINATION

A. Provide all wiring, conduit for low and line voltage wiring, and devices for the control systems, unless otherwise noted. Extend power wiring for control devices from a power source provided under Division 26. Make connections to motor control centers and starters to provide a complete operational system.

B. Conform to Division 26 for requirements for materials, equipment and interfacing.

C. Division 26 shall provide power wiring to motor control centers and starters, and wiring and connections to motors.

D. When it is not shown on the design document, provide 120V circuits (breakers, wiring, and conduits), unless otherwise noted, for the DDC controllers, CCS, ASCs, TCs, actuator required 120V.

E. Provide actuators for flow control valves and control dampers as specified. Set the end stroke of the actuator of full design flow from performance curves furnished with each valve and damper. Coordinate with flow control valve and damper manufacturer for the actuator and torque requirements.

F. Furnish control valves, flow transducers, separable wells for immersion elements, air flow measuring stations, couplings for flow and pressure switches to be installed as specified within Division 23.

G. Provide all field control wiring for major equipment including but not limited to chillers and associated equipment, and packaged pumping systems as specified herein. Coordinate with equipment manufacturers for specific requirements.

H. Provide time delay between large motors or between groups of small motors/actuators to start sequentially on initial start and after power failure. Coordinate with Division 26 work.

I. All motorized actuators located outdoors shall be rated for outdoor application or protected with weather covers.

1.8 GUARANTEE

A. Equipment materials and workmanship shall be guaranteed for a period of one year from date of final system acceptance.

B. Any defects due to faulty materials, methods of installation, or workmanship within this period shall be repaired or replaced promptly upon notice by the Owner, at on expense to the Contractor.

1.9 PROJECT MANAGEMENT

A. Have present at the project site on an as-needed basis, a project manager who shall, as a part of their duties, be responsible for the following activities:
1. Coordination between this Subcontractor and all other trades, Owner, Local Authorities, and design team.
2. Coordination of all activities between his subcontractors.
3. Attendance at subcontractor/general contractor meetings.
4. Scheduling of work progress, manpower loading, material delivery, equipment installation and checkout.
5. Coordination of all drawings and submittals between consultants, engineers, other sub-trades and his subcontractors.
6. Project manager shall be readily available.
7. Supervision of field technicians and interface with other trades.

1.10 QUALITY ASSURANCE

A. The BAS contractor shall have a facility within a 40 mile radius of the job site, supplying complete maintenance and support services on a 24 hour, 7 day-a-week basis.

B. As evidence and assurance of the contractor's ability to support the Owner's system with service and parts, the contractor must have been in the BAS business for at least 10 years and have successfully completed Niagara AX, Webs, Symmetre and N4 system integrations.

C. The Building Automation System architecture shall consist of the products of a manufacturer regularly engaged in the production of Building Automation Systems, and shall be the manufacturer's latest standard of design at the time of bid. Wireless system is not acceptable.

PART 2 **– PRODUCTS**

2.1 GENERAL

A. The Building Automation System (BAS) shall use an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the BAS shall be networked with open communication protocol standards to integrate a wide variety of third party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other Owner provided networks.

B. BAS shall consist of the following:
1. Standalone DDC controllers.
2. Application Specific Controllers (ASCs).
3. Terminal Controllers (TCs).
4. Multi-level communication network.

C. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers, and operator devices.

D. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. The failure of a single component or network connection shall not interrupt the execution of control strategies at other operational devices, where the devices do not share a global network point.

E. DDC controller shall operate independently by performing its own specified control, alarm management, operator I/O and data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

F. DDC controllers shall be able to access any data from, or send control commands and alarm reports directly to any other DDC controller or combination of controllers on the network without dependence upon a central processing device.

G. Materials and equipment shall be the catalogued products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design.

H. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Section 15, GOVERNING RADIO FREQUENCY ELECTROMAGNETIC INTERFERENCE and labeled.

I. Comply with UL 916 PAZX as well as UUKL 864 listed.

J. The system shall be modular in nature, and shall permit easy expansion through the addition of software applications, workstation hardware, field controllers, sensors, actuators, and point modules.
1. The system architecture shall support 100% expansion capacity of all types of DDC panels and all point types included in the initial installation.
2. Provide minimum 10% spare slots in the panels for future expansion and addition of point modules without adding a complete new panel, allow adequate wall space for installation of a future panel.

K. The building systems shall be controlled from the CCS located in the Engineer's Office, Public Works Control Room and Greystone Mansions control room.

L. Manufacturer: Honeywell Webs , Siemens Open Talon, Easy IO, Contemporary Controls or Niagara Based Product Lines that are in compliance with the specifications

2.2 BUILDING AUTOMATION SYSTEM ARCHITECTURE

A. All control products provided for this project shall comprise a BACnet internetwork Communication involving control components (i.e., all types of controllers and Operator Workstations) shall conform to ANSI/ASHRAE Standard 135-2003 BACnet.

B. Each BACnet device shall operate on the BACnet Data Link/Physical layer protocol specified for that device as defined in this section.

C. The Contractor shall provide all communication media, connectors, repeaters, bridges, hubs, switches, and routers necessary for the internetwork.

D. All controllers shall have a communication port for connections with the Operator Workstations using the BACnet Data Link/Physical layer protocol.

E. Communication services over the internetwork shall result in operator interface and value passing that is transparent to the internetwork architecture as follows:
   1. Connection of an Operator Workstation device to any one controller on the internetwork shall allow the operator to interface with all other controllers as if that interface were directly connected to the other controllers. Data, status information, reports, system software, custom programs, etc., for all controllers shall be available for viewing and editing from any one controller on the internetwork.
   2. All database values (e.g., objects, software variables, custom program variables) of any one controller shall be readable by any other controller on the internetwork. This value passing shall be automatically performed by a controller when a reference to an object name not located in that controller is entered into the controller's database. An operator/installer shall not be required to set up any communication services to perform internetwork value passing.

F. The time clocks in all applicable controllers shall be automatically synchronized daily. An operator change to the time clock in any controller shall be automatically broadcast to all controllers on the network.

G. The network shall have the following minimum capacity for future expansion.
   1. Each Building Controller shall have routing capacity for 99 controllers.
   2. The Building Controller network shall have capacity for 1,000 Building Controllers.
   3. The system shall have an overall capacity for 12,500 Building Controllers, Advanced Application Controllers, and Application Specific Controller input/output objects.

2.3 NETWORKING COMMUNICATIONS

A. The design of the BAS shall network CCS and stand-alone DDC controllers. The network architecture shall consist of two levels, a high performance peer-to-peer network and DDC controller specific local area networks.

B. Peer-to-peer network level: CCS and DDC controllers shall directly reside on an Ethernet network such that communications may be executed directly between DDC controllers, between DDC controllers and CCS on a peer-to-peer basis.

C. Control specific local area network: This level communication shall support a family of ASCs and shall communicate bi-directionally via a BACnet network between DDC controllers for transmission of global data.

2.4 INTEGRATION

A. Third Party Equipment: The BAS system shall include appropriate hardware equipment and software to allow bi-directional data communications between the BAS system and 3rd party manufacturers' control panels. The BAS shall receive, react to, and return information from multiple building systems, including but not limited to the chillers, boilers, variable speed drives, and power monitoring system. All data required by the application shall be mapped into the Automation Engine's database, and shall be transparent to the operator. Point inputs and outputs from the 3rd party controllers shall have real time interoperability with BAS software features, such as: control software, energy management, custom process programming, alarm management, historical data and trend analysis, totalization, and local area network communications.

B. BACnet Protocol Integration - BACnet: The neutral protocol used between systems shall be BACnet over Ethernet and comply with the ASHRAE BACnet Standard 135-2003 BACnet. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices with submittals for approval

before installation. The ability to command, share point object data, change of state (COS) data and schedules between the host and BACnet systems shall be provided.

2.5 STAND-ALONE DDC CONTROLLER

A. Microprocessor-based, multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies, battery backup and input/output point modules. Controller size shall be sufficient to fully meet the requirements of the project and point summary shown on drawing.

B. The DDC controller shall have sufficient memory to support its own operating system and databases, including:
   1. Control processes.
   2. Energy management applications.
   3. Alarm management.
   4. Historical/trend data for points specified.
   5. Custom processes.
   6. Operator I/O.
   7. Manual override monitoring.

C. The DDC controller shall be capable of providing the following control input and output without the addition of equipment outside the DDC controller cabinet.
   1. Analog input: 4-20 mA, 0-10V DC, thermistors and 1,000 ohm RTDs.
   2. Digital input: Dry contact closure, pulse accumulator and voltage sensing.
   3. Analog output: 4-20 mA, 0-10V DC.
   4. Digital output: Contact closure for motor starters, sizes 1 to 4.

D. Controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.

E. Controller must utilize the industry standard Niagara AX Workbench tool or Sedona tools from the Sedona Ecosystem with no need for special licenses.

F. Controllers shall be at a minimum a 32 bit Processors.

G. Controllers must have an integrated HTML Browser for configuration and addressing of the device.

H. Controller must support Sedona, Bacnet, TCOM and Modbus.

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

J. An orderly shutdown of all DDC controllers to prevent the loss of database or operating system software, in the event of the loss of normal power.

K. The HVAC controllers shall permit expansion of both capacity and functionality.

L. The new controller's software programs shall be nonproprietary.

M. The controllers analog and digital output points shall be made available to the JACE controller in writable data type.

N. The controllers shall be, at a minimum, 16-bit stand alone, multi-tasking, multi-user, real-time digital control processors. The JACE controller shall have an Ethernet port for network connection to the CSMS HVAC Network. The HVAC controller shall have an Ethernet port. All HVAC equipment algorithm/programs shall reside in the local HVAC controller. All required internal and external control points, required user graphical interfaces, data collections and alarms shall reside in the JACE controller.

O. Upon restoration of power, in the event of power loss, the JACE or the HVAC controllers shall automatically resume full operation without the need for manual intervention.

P. Should the controller's memory be lost, or the controller fails requiring replacement, the user shall have the capability of reloading the DDC controller via the local port or from the network server via a client workstation.

Q. Each controller shall have a minimum of 15 percent spare capacity for future point connection.

R. Controllers shall have at a minimum 25 percent of its memory available for future use and sufficient memory to support its own operating system and database.

S. Resident Software:
   1. DDC controllers shall have the ability to perform the following energy management routines.
      a. Time-of-day and holiday scheduling.

b. Calendar-based scheduling.
c. Temporary schedule overrides.
d. Start-stop time optimization.
e. Automatic daylight savings time switchover.
f. Peak demand limiting.
g. Fan speed/cfm control.
h. Discharge air temperature reset.
i. Hot water reset.
j. Chiller sequencing.

2. The DDC controllers shall be able to execute custom, job specific processes defined by the user, to automatically perform calculations and special control routines, including but not limited to the following:
   k. Any system measured point data or status.
   l. Any calculated data.
   m. Any results from other processes.
   n. User-defined constants.
   o. Arithmetic function (+, -, *, /, square root, exp., etc.).
   p. Boolean logic operators (and/or, exclusive or, etc.).
   q. On-delay/off-delay/one-shot timers.
   r. Provide alarm management to monitor and direct alarm information to operator devices. DDC controller shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost. Include custom alarm messages for each point in the system.
   s. Provide historical data collection utilities to manually and automatically sample, store and display system data for points.
   t. DDC controller shall store point history data for selected analog and digital input and output, capable of storing a minimum of 10,000 data samples.
   u. Store trend data at the DDC controller and uploaded to the operator devices when retrieval is desired.
3. Accumulate and store run time hours for digital input and output points.
4. Sample, calculate and store consumption totals on a daily basis for selected analog and digital pulse input type points.
5. Count events such as the number of times and duration a pump or fan system is cycled on and off.

T. Security:
1. Operator specific password access protection shall be provided to allow the administrator/manager to limit users' workstation control, display and data base manipulation capabilities as deemed appropriate for each user, based upon an assigned password.
2. Operator privileges shall "follow" the operator to any workstation logged onto.
3. The administrator or manager shall be able to further limit operator privileges based on which console an operator is logged onto.
4. The administrator or manager shall be able to grant discreet levels of access and privileges, per user; for each point, graphic, report, schedule, and BAS workstation application.

2.6 APPLICATION SPECIFIC CONTROLLERS (ASCs)

A. The DDC controller shall be able to extend its performance and capacity through the use of remote ASCs.

B. ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independent of other controllers in the network. ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor.

C. Controllers shall include all point input and output necessary to perform the specified control sequences. Provide a hand-off-automatic switch for each digital output for manual override capability.

D. Controller shall support its own real-time operating system. Provide battery backup to allow for stand-alone operation.

E. Provide central system controller with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All programs shall be field customized to meet the user's exact control strategy requirements.

F. Provide provisions for a portable operator's terminal interface.

G. Must provide configuration software able to address, program and fully configure these devices.

H. VAV Controllers must have a manufacturer developed and distributable air balance software capable of calibrating air flow sensors, setting minimum and maximum air flows and provide fault detections of VAV device.

2.7 TERMINAL CONTROLLERS (TCs)

A. TC shall include all point input and output necessary to perform the specified control sequences.

B. TC performing space temperature and/or humidity control shall be provided with a matching room temperature sensor with accuracy of ±0.5°F or ±1%RH, adjustable set point, temperature indication and a terminal jack.

C. Controller shall include algorithms incorporating proportional and integral gains for all applications.

D. Must provide configuration software able to address, program and fully configure these devices.

E. Provide terminal equipment controller with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All databases and programs shall be stored in non-volatile EEPROM, EPROM and PROM, or minimum of 72 hour batter backup.

2.8 LAPTOP COMPUTER (LC)

A. Personal laptop computer shall be 13-15" flat panel color screen, with minimum 8 GB RAM, minimum 100 GB solid-state, hard drive, DVD/CD drive, and include a mouse and keyboard. IBM or DELL with a minimum 2.50 GHz processor.

B. Software: Personal laptop computer based software with all necessary software to form a complete operating system as described in this specification shall be provided. The operating system shall be Windows 7.

2.9 CENTRAL CONTROL STATION (CCS) (Typical of 3)

A. SYSTEM DESCRIPTION

1. Controller or Controllers (NAC) within each facility. The NAC shall connect to the owner's local or wide area network, depending on configuration. Access to the system, either locally in each building, or remotely from a central site or sites, shall be accomplished through standard Web browsers, via the Internet and/or local area network. Each NAC shall communicate BACnet (IBC) controllers and other open and legacy protocol systems/devices.

2. The Facility Management and Control System (FMCS) as provided in this Division shall be based on the Niagara Framework (or "Niagara"), a Java-based framework developed by Tridium. Niagara provides an automation infrastructure that integrates diverse systems and devices (regardless of manufacturer, communication standard or software) into a unified platform that can be managed in real time over the Internet using a standard Web browser. SOFTWARE LICENSE AGREEMENT

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

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

5. The JACE Historical data shall be subscribed to the N4 Supervisor. All analog point Data (hardware and software points) will have history defined at 15 minutes intervals.

6. All digital data points need to be trended over COV change of value

7. Each JACE controller shall independently operate and perform its specified control, alarm management, I/O management and data collection functions.

8. The new JACE install shall be JACE8000 Series and higher with 5 year maintenance software packages.

9. Linking to external Jace devices through the graphics is not acceptable. All alarms, history, schedules, etc, need to be viewed from one location. Logging into specific Jaces to view this data is not acceptable. Everything shall be tunneled in to the supervisor station through the Niagara Network.

10. All control points shall have alarms in the JACE when out of range of set points, failed sensors, etc.
11. All control points with set point shall have the associated above normal alarm limit setup in the JACE.
12. All analog control points and other considered critical digital points shall be setup for historical data collection in the JACE.
13. All critical alarms shall be setup for email notification to site engineer, mechanical engineer and Design and construction supervisor.
14. Alarms shall be setup in JACE and subscribe in the Tridium Niagara 4 supervisor.
15. Data collection shall be setup in JACE and subscribe in the Tridium Niagara 4Supervisor.
16. All user interface graphics shall be in the Tridium N4 supervisor PC.

B. INTEROPERABLE NIAGARA CONTROLLERS (INC)

1. Controls shall be microprocessor based Interoperable Niagara Controllers (INC) in accordance with the JSR-60 Baja Specification. INCs shall be provided for applications as shown on the drawings. The application control program shall be resident within the same enclosure as the discrete input/output circuitry, which translates the sensor and actuator signals. The INC may communicate serially using standard protocols with control devices of the equipment that it is controlling The system supplier must provide a NICS document showing the installed system's compliance level to the Software Licensing Agreement in Division 25 of this specification.

2. The INCs shall communicate with the NAC via an Ethernet connection at a baud rate of not less than 10 Mbps.

3. All I/O control points for HVAC equipment shall be kept together in one controller. All applications should be resident and served by the local IO in the controller.
4. All INCs shall be fully application programmable. Controllers offering application selection only (non-programmable), require a 5% spare point capacity to be provided for all applications. All control sequences within or programmed into the INC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.

5. The Division 23 contractor supplying the INCs shall provide documentation for each device, with the following information at a minimum:

   a) IP and MAC address, name, type and Host ID

   b) Niagara Objects; name, type and instance number

   c) it is the responsibility of the Division 23 contractor to ensure that the proper Niagara objects are provided in each INC, as required by the Point Charts located in the POINTS LIST section.

6. Each I/O module shall have a minimum of two spares for each type of I/O for future use.

C. NETWORK AREA CONTROLLER (NAC)

1. The Division 25 contractor shall supply one or more Network Area Controllers (NAC) as part of this contract. Number of area controllers required is dependent on the type and quantity of devices provided under Divisions 23 and 26. It is the responsibility of the Division 25 contractor to coordinate with the Division 23 and 26 contractors to determine the quantity and type of devices.
2. The new JACE or HVAC controller, they shall be at their latest software firmware version.

3. The Network Area Controller (NAC) shall provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:
4. Calendar functions
5. Scheduling
6. Trending
7. Alarm monitoring and routing
8. Time synchronization
9. Integration of controller data through Niagara 4 drivers installed in the NAC.
10. Network Management functions for all controllers
11. The Network Area Controller must provide the following hardware features as a minimum:
    a) One Ethernet Port – 10/100 Mbps
    b) One RS-232 port
    c) One RS-485 ports
    d) Battery Backup
    e) Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)
    f) The NAC must be capable of operation over a temperature range of 32 to 122°F
    g) The NAC must be capable of withstanding storage temperatures of between 0 and 158°F
    h) The NAC must be capable of operation over a humidity range of 5 to 95% RH, non-condensing.

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

2. The NAC shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 32 simultaneous users.

3. Provide a “query” feature to allow review of specific alarms by user defined parameters.
4. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.
5. An Error Log to record invalid property changes or commands shall be provided and available for review by the user.

D. NETWORKS

1. The Local Area Network (LAN) shall be a 100 Megabits/sec Ethernet network supporting BACnet, Java, XML, HTTP, and SOAP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Area Controllers (NACs), user workstations and, if specified, a local server.

2. Local area network minimum physical and media access requirements:

    a) Ethernet; IEEE standard 802.3

    b) Cable; 100 Base-T, UTP-8 wire, category 5

    c) Minimum throughput; 100 Mbps.

E. NETWORK ACCESS

1. Remote Access.

    a) For Local Area Network installations, provide access to the LAN from a remote location, via the Internet. The Owner shall provide a connection to the Internet to enable this access via high speed cable modem, asynchronous digital subscriber line (ADSL) modem, ISDN line, T1 Line or via the customer’s Intranet to a corporate server providing access to an Internet Service Provider (ISP). Customer agrees to pay monthly access charges for connection and ISP.

F. Event Alarm Notification and actions

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

2. The NAC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up telephone connection, or wide-area network.

3. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to:
   a) To alarm
   b) Return to normal
   c) To fault
4. Provide for the creation of a minimum of eight of alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, Fire, etc.
5. Provide timed (schedule) routing of alarms by class, object, group, or node.
6. Provide alarm generation from binary object “runtime” and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.
7. Control equipment and network failures shall be treated as alarms and annunciated.
8. Alarms shall be annunciated in any of the following manners as defined by the user:
   a) Screen message text
   b) Email of the complete alarm message to multiple recipients. Provide the ability to route and email alarms based on:
      1. Day of week
      2. Time of day
      3. Recipient
   c) Pagers via paging services that initiate a page on receipt of email message
   d) Graphic with flashing alarm object(s)
   e) Printed message, routed directly to a dedicated alarm printer
9. The following shall be recorded by the NAC for each alarm (at a minimum):
   a) Time and date
   b) Location (building, floor, zone, office number, etc.)
   c) Equipment (air handler #, accessway, etc.)
   d) Acknowledge time, date, and user who issued acknowledgement.
   e) Number of occurrences since last acknowledgement.
10. Alarm actions may be initiated by user defined programmable objects created for that purpose.
11. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.
12. A log of all alarms shall be maintained by the NAC and/or a server (if configured in the system) and shall be available for review by the user.
13. Provide a “query” feature to allow review of specific alarms by user defined parameters.
14. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.
15. An Error Log to record invalid property changes or commands shall be provided and available for review by the user.

G. Data Collection and Storage
1. The NAC shall have the ability to collect data for any property of any object and store this data for future use.
2. The data collection shall be performed by log objects, resident in the NAC that shall have, at a minimum, the following configurable properties:

a) Designating the log as interval or deviation.

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

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

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

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

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

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

5. All log data shall be available to the user in the following data formats:

a) HTML

b) XML

c) Plain Text

d) Comma or tab separated values

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

7. The NAC shall have the ability to archive its log data either locally (to itself), or remotely to a server or other NAC on the network. Provide the ability to configure the following archiving properties, at a minimum:

a) Archive on time of day

b) Archive on user-defined number of data stores in the log (buffer size)

c) Archive when log has reached its user-defined capacity of data stores

d) Provide ability to clear logs once archived

H. AUDIT LOG

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

a) Time and date

b) User ID

c) Change or activity: i.e., Change setpoint, add or delete objects, commands, etc.

I. DATABASE BACKUP AND STORAGE

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

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

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

J. GRAPHICAL USER INTERFACE (GUI)

1. The GUI shall include navigation with logical grouping of the equipment into equipment summary screens such that all the VAV boxes being fed air from a particular AHU can be displayed together for comparison.

2. The GUI shall include Air Handler unit roll up screens showing the min/max and average airflow devices in the family of equipment and provide for a means to quickly reset static discharge set point for more efficient controls.

3. The GUI shall logically group graphics navigation by tenant so that in a multi-tenant building, only the equipment graphics associated with the tenants' space can be easily viewed.

4. The Custom Equipment graphics for VAV boxes shall allow the user to initiate the creation of trend storage and collection of a system point through a simple drag and drop.

5. Each custom VAV equipment graphic shall have the ability to display the detailed sequence of operations controlling the space from within each unique device and/or application.

6. The GUI shall provide a completely interactive user interface and must offer the following features as a minimum:
   a) Operating System: The GUI shall run on Microsoft Windows Operating Systems and/or standard Internet browsers including Internet Explorer, Firefox, and Chrome.

7. The GUI shall employ browser-like functionality for ease of navigation. It shall include a tree view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical structure of the database. In addition, menu-pull downs, and toolbars shall employ buttons, commands and navigation to permit the operator to perform tasks with a minimum knowledge of the HVAC Control System and basic computing skills. These shall include, but are not limited to, forward/backward buttons, home button, and a context sensitive locator line (similar to a URL line), that displays the location and the selected object identification.

8. Real-Time Displays. The GUI, shall at a minimum, support the following graphical features and functions:
   a) Graphic screens shall have the capability to contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.
   b) Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.
   c) Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.
      1. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
      2. Holidays shall be set by using a graphical calendar without requiring any keyboard entry from the operator.
   d) Commands to start and stop binary objects shall be done by selecting the appropriate object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.
   e) Adjustments to analog objects, such as set points, shall be done by right-clicking the selected object and using a graphical slider to adjust the value. No entry of text shall be required.

9. System Configuration. At a minimum, the GUI shall permit the operator to perform the following tasks, with proper password access:
   a) Create, delete or modify control strategies.
   b) Add/delete objects to the system.
   c) Tune control loops through the adjustment of control loop parameters.
   d) Enable or disable control strategies.
   e) Generate hard copy records or control strategies on a printer.
   f) Select points to be alarmable and define the alarm state.
   g) Select points to be trended over a period of time and initiate the recording of values automatically.

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

11. Security. Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.

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

13. Alarm Console:

    a) The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm. The use of the Alarm Console can be enabled or disabled by the system administrator.

    b) When the Alarm Console is enabled, a separate alarm notification window will supersede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and un-acknowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

K. WEB BROWSER CLIENTS

1. The system shall be capable of supporting an unlimited number of clients using a standard Web browser such as Internet Explorer™ or Chrome.
2. The Web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the System, shall not be acceptable.
3. The Web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the Graphical User Interface. Systems that require different views or that require different means of interacting with objects such as schedules, or logs, shall not be permitted.
4. The Web browser client shall support at a minimum, the following functions:
    a) User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented.
    b) Graphical screens developed for the GUI shall be the same screens used for the Web browser client. Any animated graphical objects supported by the GUI shall be supported by the Web browser interface.
    c) HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.
    d) Storage of the graphical screens shall be in the Network Area Controller (NAC), without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
    e) Real-time values displayed on a Web page shall update automatically without requiring a manual "refresh" of the Web page.
    f) Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:
        1. Modify common application objects, such as schedules, calendars, and set points in a graphical manner.
        2. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
        3. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.
        4. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.
        5. View logs and charts
        6. View and acknowledge alarms
        7. Setup and execute SQL queries on log and archive information

g) The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. Provide the ability to limit a specific user to just their defined home page. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.
h) Graphic screens on the Web Browser client shall support hypertext links to other locations on the Internet or on Intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

L. SYSTEM PROGRAMMING

1. The Graphical User Interface software (GUI) shall provide the ability to perform system programming and graphic display engineering as part of a complete software package. Access to the programming functions and features of the GUI shall be through password access as assigned by the system administrator.
2. A library of control, application, and graphic objects shall be provided to enable the creation of all applications and user interface screens. Applications are to be created by selecting the desired control objects from the library, dragging or pasting them on the screen, and linking them together using a built in graphical connection tool. Completed applications may be stored in the library for future use. Graphical User Interface screens shall be created in the same fashion. Data for the user displays is obtained by graphically linking the user display objects to the application objects to provide "real-time" data updates. Any real-time data value or object property may be connected to display its current value on a user display. Systems requiring separate software tools or processes to create applications and user interface displays shall not be acceptable.
3. Programming Methods:
   a) The software shall provide the ability to view the logic in a monitor mode. When on-line, the monitor mode shall provide the ability to view the logic in real time for easy diagnosis of the logic execution. When off-line (debug), the monitor mode shall allow the user to set values to inputs and monitor the logic for diagnosing execution before it is applied to the system.
   b) All programming shall be done in real-time. Systems requiring the uploading, editing, and downloading of database objects shall not be allowed.
   c) The system shall support object duplication within a customer's database. An application, once configured, can be copied and pasted for easy re-use and duplication. All links, other than to the hardware, shall be maintained during duplication.

4. The B-ASC, and Building Controller's sequence of operations must be visible and editable from Niagara AX and via the Web Services application. All Building Controllers shall be available on the network for command, control and editing through the Niagara AX without the requirement of the BACnet Driver on Niagara AX.

M. BACNET:

1 The BAS server and Operator Workstations shall meet the BACnet device profile of an Advanced Workstation Server (B-AWS) and Operator Workstation (B-OWS) and shall support the following BACnet BIBBs:

a) Data Sharing
   1. Data Sharing-Read Property-Initiate, Execute (DS-RP-A,B)
   2. Data Sharing-Read Property Multiple-Initiate, Execute (DS-RPM-A,B)
   3. Data Sharing-Write Property-Initiate, Execute (DS-WP-A,B)
   4. Data Sharing-Write Property Multiple-Initiate (DS-WPM-A)
   5. Data Sharing-COV-Initiate (DS-COV-A)
b) Scheduling
   1. Scheduling-Initiate (SCHED-A)
c) Trending
   1. Trending-Viewing and Modifying Trends-Initiate (T-VMT-A)
   2. Trending-Automated Trend Retrieval-Initiate (T-ATR-A)
d) Network Management
   1. Network Management-Connection Establishment-Initiate (NM-CE-A)
e) Alarming
   1. Alarm and Event-Notification-Initiate (AE-N-A)
   2. Alarm and Event-ACK-Initiate (AE-ACK-A)
   3. Alarm and Event –Alarm Summary-Initiate (AE-ASUM-A)
   4. Alarm and Event –Enrollment Summary-Initiate (AE-ESUM-A)
   5. Alarm and Event –Information-Initiate (AE-INFO-A)
f) Device Management
   1. Device Management-Dynamic Device Binding- Initiate, Execute (DM-DDB-A, B)
   2. Device Management-Dynamic Object Binding- Initiate, Execute (DM-DOB-A,B)
   3. Device Management-Device Communication Control- Initiate (DM-DCC-A)
   4. Device Management-Private Transfer- Initiate, Execute (DM-PT-A,B)

5. Device Management-Text Message-Execute (DM-TM-B)
6. Device Management-Time Synchronization- Initiate (DM-TS-A)
7. Device Management-UTC Time Synchronization- Initiate (DM-UTC-A)
8. Device Management-Reinitialize Device- Initiate (DM-RD-A)
9. Device Management-Backup and Restore- Initiate (DM-BR-A)
10. Device Management-List Manipulation- Initiate, Execute (DM-LM-A,B)
11. Device Management-Object Creation and Deletion- Initiate (DM-OCD-A)

2 The BAS Server and Workstations shall support the following Data Link Layers:
   a) BACnet IP Annex J
   b) BACnet IP Annex J Foreign Device
   c) ISO 8802-3, Ethernet (Clause 7)

3 The BAS Server and Workstations shall be able to interact with all of the BACnet objects in the controllers. In addition, the software shall be able to support the following objects as they relate to features in the workstation software:
   a) Calendar – Creatable, Deletable
   b) Command – Creatable, Deletable
   c) Event Enrollment – Creatable, Deletable
   d) Notification Class – Creatable, Deletable
   e) Schedule - Creatable, Deletable

4. The BAS Server and Workstations shall support transmitting and receiving segmented messages.
5. The BAS Server and Workstation shall have the capability to be the BACnet/IP Broadcast Management Device (BBMD) and support foreign devices.

N. ELECTRONIC DOCUMENTATION

1. Provide software applications and files to view documentation through the GUI.

2. Provide all controls cut sheets in PDF format. Make them available to any user accessing the system over the Internet.

3. Provide a text version of the sequence of operation. Make the written sequence available from the graphic that represents each system. The sequence shall pop up in a printable format such as HTML or PDF.

2.10 Training

A. Training at a minimum shall demonstrate how to navigate screens, force points, acknowledge alarms, create and edit time schedules, create and edit trends, run reports and back up Stations.

B. Training shall demonstrate how to operate the HVAC equipment both remotely and locally.

C. Training shall demonstrate how to use the occupied and unoccupied features for set points and time schedules.

D. Training shall demonstrate how to use the controller specific software (provided) provide instructions how to upload, download, edit programing code, add data points, set up communications and test the communications of the controller. Training must demonstrate the functionality of each screens capabilities.

2.11 Data Modeling of Building Systems and Equipment. Based on Project Haystack Open Source Data Modeling Standard

1. Purpose

2. The purpose of a data modeling standard is to provide a consistent, standardized methodology for naming and describing data points associated with facility automation systems, equipment systems, energy metering systems, other smart devices including mobile assets, and associated descriptive information known as metadata.Modern automation systems and smart devices have made it easy to collect vast quantities of data including environmental conditions, equipment operational status, and energy usage and performance. The reality, however, is that these data typically exist in a low-level ad-hoc format without standard or consistent

organization, making it difficult to interpret trends, perform analysis or generate useful reports and visualizations without significant manual effort. The result is that we are now awash in large volumes of unstructured data, we can't easily derive value from.

3. The first step to turning smart device data into actionable intelligence is to give the data "context" so that we know exactly what each piece of data "means" and how fits into an overall system. For example, to compare the discharge air temperature of an Air Handling Unit (AHU) against the return air temperature, how can we find this information? Today, often the only indication of what a data point means is found by deciphering an arbitrary name the system integrator gave it during configuration such as "DA_TEMP".

4. Given that there has previously not been any accepted standard for data point naming conventions associated with building systems and facility engineering, one key challenge the industry faces is to establish a common vocabulary to give meaning to information collected by the various building systems. Looking at the challenge from the perspective of complex systems, it becomes apparent that it is not possible to capture the full extent of descriptive information desired simply using data point names, even if standardized. For example, to model a complete air distribution system to determine which AHUs feed which Variable Air Volume (VAV)s; or to know all the relationships between sub-meters and equipment loads in an electrical system. Modeling these relationships enables analysis of operations at the systems level, building level, or even across an entire portfolio of buildings. Point names that attempted to capture this range of information would be impossibly long, therefore structured combinations are needed.

5. Project Haystack's mission is to define a methodology and common vocabulary so that models of building systems and smart devices can be interpreted automatically by a variety of software and web-based applications. This will enable owners, operators, manufacturers and service providers to more efficiently derive value from the vast amounts of data smart systems are collecting.

6. Project Haystack encompasses the entire value chain of building systems and related intelligent devices and enable owners and consultants to specify naming Haystack conventions for data contained in building automation and similar systems to ensure standards-based organization of system data and easy integration with external applications. Project-Haystack facilitates "mapping" of Haystack semantic tagging with other relevant standards.

A. **Technical Overview**

1. Overall Design Concepts: The Project Haystack data modeling standard for Buildings and Equipment systems shall use a simple metamodel based on the broadly accepted concept of "tags" as described below.
   a) **Tags:** Tags are name/value pairs, associated with entities like AHUs, electric meters, etc. Tags are simple and dynamic, add structure, and provide the flexibility needed to establish standardized models of diverse systems and equipment. Tags are a modeling technique that allows easy customization of data models on a per-task, per-project or per-equipment basis, while retaining the ability to be interpreted by external applications using a standard, defined methodology and vocabulary. Tags shall support the definition of the following essential data elements:

      1. **Entity:** An Entity is an abstraction for a physical object in the real world. Entities include sites, facilities, equipment, sensor points, weather stations, etc. In software systems, an entity might be a modeled as a record in a database, an object in a building automation system, or maybe just a row in a csv file or spreadsheet.
      2. **Id:** The id tag is used to model the unique identifier of an entity in a system using a Ref value type. Ref value types are determined by individual application. The scope of an entity may be undefined, but must be unique within a given system or project. This identifier may be used by other entities to cross-reference entities, associations, and systems.
      3. **Dis:** The dis tag is used with entities to define display text used to describe an entity. Dis values are intended to be short (less than 30 or 40 characters), but fully descriptive of the entity for a human user.

2. **Tag Kinds.** The standard shall provide the following permitted tag value types:
   a) Marker: this tag type is merely a marker annotation with no meaningful value. Marker tags are used to indicate a "type" or "is-a" relationship.
   b) Bool: boolean "true" or "false".
   c) Number: integer or floating point number annotated with a Unit of Measurement, where ideally, units of measure are prescribed for various tasks.
   d) Str: a string of Unicode characters.
   e) Uri: a Unversal Resource Identifier.

f) Ref: reference to another entity. The Project Haystack specification does not currently prescribe specific identities or reference mechanisms, but should be used to cross link entities. Refs are formatted with a leading "@" and require a specific subset of ASCII characters be used: a-z, A-Z, 0-9, underbar, colon, dash, or dot.
g) Bin: a binary blob with a MIME type formatted as Bin(text/plain)
h) Date: an ISO 8601 date as year, month, day: 2011-06-07.
i) Time: an ISO 8601 time as hour, minute, seconds: 09:51:27.354.
j) DateTime: an ISO 8601 timestamp followed by timezone name:
   1. 2011-06-07T09:51:27-04:00 New_York
   2. 2012-09-29T14:56:18.277Z UTC

- **Example of Usage**. The following presents an example for an entity describing a site:

- id: @whitehouse
- dis: "White House"
- site
- area: 55,000 ft²
- geoAddr: "1600 Pennsylvania Avenue NW, Washington, DC"
- tz: "New_York"
- weatherRef: @weather.washington

k) The example presents an entity with seven tags: id, site, dis, area, geoAddr, tz, and weatherRef. By convention, when writing examples each tag will be listed on their own line or separated by a comma. The site tag has no explicit value, it is assumed to be marker tag. The dis, geoAddr, and tz tags have string values, many which may be standardized by others, typically indicated by double quotes. The area tag has a number value indicated by a scalar with unit of square feet or square meters. The weatherRef tag is a reference to another entity, typically indicated using the "@" character.

3. **Standard Library of Tags and Library Extensibility:**The Project Haystack data modeling standard shall provide a comprehensive library of standard tags to address common equipment, building systems, and devices types. The standards development community shall engage in an open discussion forum to enable industry experts and interested parties to discuss, submit, fine-tune and eventually approve additional tags or standard schemas to address equipment, systems, and applications of numerous types. The open forum process shall be transparent to enable continued development of a taxonomy that will enable semantic understanding of facilities engineering data across and outside of the industry.

4. **REST API**

a) The Project Haystack data modeling standard shall provide a documented Representational State Transfer, Application Programming Interface (REST API) to define a simple mechanism to exchange “tagged” data over web services.
b) REST servers are programmed to implement a set of ops or operations. An operation is a uri that receives a request and returns a response. Standard operations are defined to query databases, setup subscriptions, or read/write histories of time-series data. Operations are pluggable so vendors can enhance open REST interfaces with customized, value-added functionality for their own business purposes.
c) Both requests and responses are modeled as grids. Grids are encoded using standard Multipurpose Internet Mail Extensions (MIME) types for grid serialization, may be pluggable using HTTP content negotiation, and other standardized web service protocols.
d) The Project Haystack REST API utilizing the “ops” design is more akin to a Remote Procedure Call (RPC) model, but the term REST is used to distinguish the design from traditional WS-* web services that use Extensible Markup Language (XML), Simple Object Access Protocol (SOAP), and other Internet standards although the current design could easily tunnel through those technologies

5. **Applications**

a) The goal of the Project Haystack data modeling standard is to ensure consistent modeling of building systems, devices and associated data. The following application requirements outline the use of the modeling standard in applications related to buildings, energy, and facility management.

6. **Minimum Model Requirements:** The Haystack Project implementation shall utilize defined data modeling tags

to create an expanding, and coherent model with the following minimum items, hierarchy and relationships when used in facilities-oriented applications:

a. **Sites**: Including display name, description, size (area) as a minimum. References to Internet-available weather stations are highly recommended, as are creating tags to represent other relevant characteristics of a Site such asyear constructed, facility usage type, occupancy class, schedule(s) of operation, building systems type (e.g., packaged or central HVAC).

b. **Equipment:** Including standardized associations with sites via id reference and display name as a minimum. Equipment and software vendors, model numbers, year of installation, and similar descriptive meta data are also recommended.

c. **Points:** Including standardized associations with sites and equipment via id reference, units of measure as a minimum. Where possible, ranges of acceptable values are recommended.

7. **Exposing the Project Haystack Model via REST API:** Software and web service applications, including control system devices will expose the model definitions described above using the Project Haystack REST API published as part of the Project Haystack standard, openly accessible and kept up to date at http://project-haystack.org/doc/Rest

8. **Software Reference Implementations:** The Project-haystack standard shall provide a reference implementation in Java, providing sample code for implementation of the Haystack REST protocol in software applications.

9. **Open Source Modules for Commercially Available Products.** The Project Haystack Community has developed, and makes available, a comprehensive implementation of the Haystack protocol in the form of a software module for use with NiagaraAX-based systems. The module, known as NHaystack, is licensed under the Academic Free License ("AFL") v. 3.0. Public access to the NHaystack software module shall be maintained via the project-haystack.org site.

   a) When NiagaraAX-based systems are used, the NHaystack module shall be the preferred method of communication between the NiagaraAX-based devices and other software applications that are consuming Niagara data or writing commands back to NiagaraAX-based systems.

10. **Open Source**
    a) The Project Haystack Facilities Engineering Data Modeling Standard for Smart Device Data modeling methodology, standards, supporting documentation and reference implementations shall be available via an open source license at no cost.
    b) The open source license shall use the Open Source Initiative Academic Free License 3.0 model. Full details on the terms of the license are available at: http://project-haystack.org/doc/License and http://opensource.org/licenses/AFL-3.0

2.12 FIELD DEVICES

1. Range for devices shall be selected for application.

2. Devices such as space thermostats, humidistats, sensors, exposed in occupied areas shall have white color finishes, unless otherwise directed.

3. Thermostats: Gradual acting type with knob adjustment of temperature from 55°F to 85°F and adjustable deadband. Thermostat covers mounted with tamperproof socket head screws.

4. Temperature Control Valves:
   1. General: Provide factory fabricated temperature control valves of type, material and manufacturer indicated. Provide selection as determined by the valve manufacturer for installation requirements and pressure class, based on maximum pressure and temperature in piping system. The control contractor shall determine the proper valve coefficient value (CV), where applicable, and valve size in accordance with manufacturer's recommendations for the given flow. In general, valves (2 or 3-way) serving variable flow air handling coils shall be sized for a pressure drop equal to the actual coil pressure drop. Control valves shall be equipped with heavy-duty actuators, and with proper close-off rating for each individual application. Minimum close-off rating shall be considered at dead head rating of the pump.

2. Manufacturers: Danfoss, Belimo, Tour/Andersson/Victaulic, Oventrop, or Flow Con. Valves shall be manufactured by one manufacturer throughout the project.

3. Authority: The design authority shall be greater than or equal to 0.5 and the minimum authority at partial load shall be greater than or equal to 0.25.
4. Pressure Independent Valves:
   a. General: Electronic or mechanical pressure independent valves are acceptable. Regardless of technology, the control valve shall require no maintenance and shall not include replaceable cartridges.
   b. Electronic PI Valves: The control valves shall incorporate an electronic flow meter (in lieu of a differential pressure regulator) to attain pressure independence and it shall accurately control the flow from 0 to 100% rated flow with an operating pressure differential range of 5 to 50 psi differential across the valve with a valve body flow accuracy of ± 5 total assembly error incorporating differential pressure fluctuation, manufacturing tolerances and valve hysteresis. Flow meter shall be wet calibrated, contain no moving parts, and provide dynamic feedback to measure flow and verify performance.
   c. Mechanical PI Valves: Factory fabricated pressure independent with internal differential pressure regulator which automatically adjusts to normal changes in system pressure and provides 100% control valve authority at all positions of the valve and maintain proportional/linear flow coil characteristics and maintain an equal percentage flow characteristic accurately control the flow from 0 -100% full rated flow with an operating pressure differential range of 5 to 50 psi, FCI 70-2 Class 4 shutoff on all sizes and field serviceable. Control valve shall incorporate control, dynamic system balancing and flow limiting. Hydronic system pressure independent control valve bodies shall meet ASME B16.34 or ASME B16.15 pressure and temperature class ratings based on the design operating temperature and 150% of the system design operating pressure.
   d. Body: Brass, nickel plated, bronze, or iron.
   e. Trim: Stainless steel.
   f. Rising Stem: Chromeplated brass or stainless steel.
   g. Disc or Ball: Chromeplated brass or stainless steel.
   h. Seats: PTFE or vulcanized EPDM.
   i. Measurement and Diagnostic: Valve shall have the ability to measure the flow on the valve.
   j. Third Party Test Results: The manufacturer shall submit in his submittal documentation package a set of third party test reports from a recognized testing agency verifying the accuracy and operation of the submitted valves and associated actuators. Separate reports for valves and actuators will not be acceptable.

5. Actuators:
   1. Actuators shall be electric type, or microprocessor with self calibrating feature. Actuator shall be driven by 24 VAC/VDC motor and acccept 0-10V DC, 2-10V DC, 0-20mA, or 4-20mA, signals for modulating, 2 position, or 3 point floating electric input signal with corrosion resistant construction, and of the proper size to meet system requirements as determined by the system supplier. Each actuator shall be properly selected to insure consistent operations over the desired nominal operating span.
   2. The actuator for valve shall be an integral part of the engineered valve assembly provided and assembled at the valve manufacturer. Actuator and valve need not be of the same manufacturer.
   3. Optional fail safe in case of power failure shall be available.
   4. Fail Safe Operation: Mechanical fail safe shall incorporate a spring-return mechanism. Electronic fail safe shall incorporate an active balancing circuit to maintain equal charging rates among the super capacitors with a visual indication of the fail safe status on the actuator face with the power fail position field adjustable between 0 to 100% in 10° increments, 0 to 10 seconds operational delay, and capable of changing the fail safe position through an integrated switch without removing the mounted actuator. All fail safe valve actuators shall be provided with 2 integral Form C (SPDT) dry contact end switches for positive proof of open/close positioning as well as analog feedback indication of positioning (2-10 vdc). All non-failsafe valve actuators shall have analog feedback indication of positioning (2-10 vdc) and an “add on” option for dry contact end switches for positive proof of open/close positioning.
   5. Butterfly Valve Actuators:
      a. NEMA 4X modulating butterfly valve actuators shall be provided with 2 integral Form C (SPDT) dry contact and switches for positive proof of open/close positioning as well as analog feedback indication of positioning (2-10 vdc). Actuator shall be multi-function technology (MFT) capable of being reprogrammed in the field utilizing manufacturer’s software.
      b. NEMA 4X “2 position” butterfly valve actuators shall be provided with 2 integral Form C (SPDT) dry contacts for positive proof of open/close positioning.
   6. Manufacturer: Belimo or approved equal.

6. Temperature Transmitter Assembly - Liquid Insertion:
    1. The assembly shall consist of a 10k thermistor, 2 wire, 4-20mA transmitter contained in a housing suitable for pipe mounting.
    2. The transmitter shall be compatible with the temperature element and the DDC. The assembly shall be factory calibrated to an accuracy of $\pm 0.75^{o}$F over the entire operating span of -40 to 140°F.
    3. Transmitter shall have built-in circuit protection against reverse polarity and supply voltage transients.
    4. Include a stainless steel thermowell with a variable extension for pipe insulation and threaded connection to pipe, maximum length shall be 6" or 3/4 of pipe diameter, whichever is smaller.
    5. Manufacturer: Dwyer BTT Series or approved equal.

7. Temperature Transmitter Assembly – Air Stream, Averaging for AHU Coil Discharge Temperature Sensing:
    1. The assembly shall consist of an averaging type 10k thermistors, housed in a flexible sheath and a solid-state, 2-wire, 4-20mA transmitter contained in a housing suitable for duct mounting.
    2. The transmitter shall be compatible with the temperature element and the DDC. The assembly shall be factory calibrated to an accuracy of ±0.75°F over the entire operating span of -40 to 140°F.
    3. Transmitter shall have built-in circuit protection against reverse polarity and supply voltage transients.
    4. Probe length: 1 ft/4 sq ft of duct area.

8. Temperature Transmitter Assembly – Air Stream, Non-Averaging Insertion Type for Duct Insertion:
    1. The assembly shall consist of 10k thermistors, mounted on a 18” probe and a solid-state, 2 wire, 4-20mA transmitter contained in a housing suitable for pipe mounting.
    2. The transmitter shall be matched to the temperature element and compatible with the DDC. The assembly shall be factory calibrated to an accuracy of ±0.75°F over the entire operating span of -40 to 140°F.
    3. Transmitter shall have built-in circuit protection against reverse polarity and supply voltage transients.
    4. Probe length: 18” or ½ duct diameter whichever is smaller.
    5. Manufacturer: Dwyer BTT Series or approved equal.

9. Temperature Transmitter Assembly – Space:
    1. The assembly shall consist of a 10k thermistor, or a silicon based sensor and a solid-state, 2 wire, 4-20mA transmitter contained in a decorative ventilated enclosure similar in appearance to room thermostats.
    2. The transmitter shall be compatible with the temperature element and the DDC. The assembly shall be factory calibrated to an accuracy of ±0.75°F over the entire operating span.
    3. Transmitter shall have built-in circuit protection against reverse polarity and supply voltage transients.
    4. Room temperature indication.
    5. Local room setpoint adjustment capability. Compatible with controller for setpoint adjustment by LC.
    6. Where space temperature sensor is located in a room which also has a space humidity sensor, provide a combination temperature/humidity sensor.

10. Humidity and Temperature Transmitter Assembly - Outside Air:
    1. The assembly shall consist of a capacitive type humidity sensing element with a 10k thermistor or a saturated salt-lithium chloride dewpoint assembly with two 100 ohm platinum RTDs (one for dewpoint and one for dry bulb) and two solid-state 2 wire, 4-20mA transmitters mounted in a housing suitable for outdoor installation. The sensing elements shall be installed in a weatherproof enclosure with a radiation shield.
    2. The transmitter shall be matched to their respective sensing elements and compatible with the DDC. The assembly shall be factory calibrated to an accuracy of $\pm$3% RH or $\pm 2^{o}$F dewpoint over a range of 10%-90% RH and an accuracy of $\pm 1^{o}$F dry bulb over the entire operating span.
    3. Transmitter shall have built-in circuit protection against reverse polarity and supply voltage transients.
    4. Submit detail, coordinate power requirements with Division 26 work.
    5. Manufacturer: Dwyer RHP Series or approved equal.

11. Humidity Transmitter Assembly – Space:
    1. The assembly shall consist of a solid-state humidity sensing element and transmitter contained in a decorative, ventilated enclosure similar in appearance to room sensor enclosure.
    2. The transmitter shall be compatible with the sensing element and the DDC. The assembly shall be factory calibrated to an accuracy of $\pm$3% RH over a range of 10%-90% RH.
    3. Transmitter shall have built-in circuit protection against reverse polarity and supply voltage transients.
    4. Room humidity indication.
    5. Compatible with controller for set point adjustment by LC.
    6. Where space humidity sensor is located in a room which also has a space temperature sensor, provide combination temperature//humidity sensor.

12. Humidity Transmitter Assembly – Air Stream:
    1. The assembly shall consist of a solid-state humidity sensing element mounted on an 8” probe and a solid-state transmitter contained in housing suitable for duct mounting with a filter assembly protecting the humidity and temperature sensor element.
    2. The transmitter shall be compatible with the sensing element and the DDCP. The assembly shall be factory calibrated to an accuracy of ±3% RH over a range of 10%-90% RH.
    3. Transmitter shall have built-in circuit protection against reverse polarity and supply voltage transients.
    4. Manufacturer: Dwyer RHP Series or approved equal.

13. Differential Pressure Transmitter – Air:
    1. Differential pressure sensor shall be half cell or piezo sensor with 1.0% of full scale. The unit shall be able to withstand 1 psig continuous pressure and 30 psig burst rating. Field upgradeable local LCD availability for trouble shooting and simultaneous analog outputs of VDC and mA.
    2. Manufacturer: Dwyer MS2 Series or approved equal.

14. Differential Pressure Switch - Air:
    1. Differential pressure switches shall utilize a diaphragm operated SPDT snap-acting switch with a setpoint range of 0.20” to 2.0” w.c. with visual setpoint scale. Body shall consist of UL 94V-0 plastic and ETL rated or meeting building code standards.
    2. Manufacturer: Dwyer EDPS Series or approved equal.

15. Differential Pressure Transmitter – Water:
    1. Shall consist of a differential pressure sensor and an electronic 2-wire, 4-20mA transmitter. Shall be enclosed in a gasketed, duct and water tight case accuracy meeting at least 0.5%. All body cavities open to the process fluid shall be provided with drain ports at the cavity bottom and vent ports at the top of the cavity. Both drain and vent ports shall be minimum ¼” NPT.
    2. Manufacturer: Dwyer 629 Series or approved equal.

16. Differential Pressure Switch - Water:
    1. Brass bellows shall operate snap-acting SPDT contacts.
    2. Contact rating: 5A at 110V resistive.
    3. High and low sensing ports shall be 1/4" NPT.
    4. Adjustable operating range capable of sustaining 200 psig in either direction.
    5. Manufacturer: Dwyer DX or approved equal.

17. Pressure Sensor – Steam:
    1. Pressure sensor shall be mounted on a pigtail siphon with manual shutoff ball valve.
    2. Manufacturer: Dwyer 628 Series or approved equal.

18. Flow Meters for Water Service:
    1. Acceptable Manufacturers: Onicon, or approved equal.
    2. Flow Meters for Chilled Water, Heating Hot Water:
        a. Single or dual turbine flow meter complete with all installation hardware necessary to enable hand insertion and removal of the transmitter without system shutdown.
        b. Flow meter shall have a rotating axial turbine for shingle turbine and two contra-rotating axial turbines for two turbines, with electronic impedance based sensing and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion.
        c. Wetted metal components: Nickel-plated brass, 316 stainless steel for applications above 250ºF.
        d. Maximum operating temperature: 280ºF, 300ºF peak.
        e. Maximum operating pressure: 400 psi.
        f. Pressure drop: Less than 1 psi at 20 f.p.s. velocity.
        g. Accuracy: Within ±0.5% of rate at the calibrated velocity, within ±1% of rate over 10:1 turndown (3.0 to 30 ft/s) and within ±2% of rate over a 50:1 turndown (from 0.4 to 20 ft/s).
        h. Integral analog output(s): 4-20 mA, 0-10V, or 0-5V.
        i. Pipe Size:

            1) 3/4” and 1”: Inline turbine meter, Model F-1310
            2) 1-1/4” to 2”: Single turbine meter, Model F-1110.
            3) 2-1/2” and larger: Dual turbine meter, Model F-1210.

    3. Flow Meters for Makeup Water, Bleed-off Water, Pumped Steam Condensate, Boiler Feed, and Boiler Blowdown:

a. Single or dual turbine flow meter complete with all installation hardware necessary to enable hand insertion and removal of the transmitter without system shutdown.
b. The flow meter shall have a rotating axial turbine for single turbine and two contra-rotating acial turbines for two turbines, with electronic impedance-based sensing and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion.
c. Welted metal components: 316L stainless steel.
d. Maximum operating temperature: 280ºF, 300ºF peak.
e. Maximum operating pressure: 400 psi.
f. Pressure drop: Less than 1 psi at 20 f.p.s. velocity.
g. Accuracy: Within ±0.5% of rate at the calibrated velocity, within ±1% of rate over 10:1 turndown (3.0 to 30 ft/s) and within ±2% of rate over a 50:1 turndown (from 0.4 to 20 ft/s).
h. Integral analog output(s): 4-20 mA, 0-10V, or 0-5V.
1) 3/4" and 1": Inline turbine meter, Model F-1310.
2) 1-1/4" to 2": Single turbine meter, Model F-1110.
3) 2-1/2" and larger: Dual turbine meter, Model F-1210.

4. Flow Meter for Condenser Water (also suitable for any water application with at least 20- micro of conductivity):
a. Insertion of electromagnetic flow meter complete with all installation hardware necessary to enable hand insertion and removal of the transmitter without system shutdown.
b. The flow meter shall average velocity readings from two sets of diametrically opposed electrodes.
c. Wetted metal components: 316L stainless steel.
d. Maximum operating temperature: 250°F.
e. Maximum operating pressure: 400 psi.
f. Pressure drop: Less than 1 psi at 12 ft/s velocity in 3" and larger pipes.
g. Accuracy: With ± 1% of rate from 2-10 ft/s. Overall turndown shall exceed 100:1.
h. Integral outputs: 1 analog output (4-10 mA, 0-10V, 0-5V jumper selectable), 1 scalable dry contact output.
1) 3" and larger: Insertion electromagnetic flowmeter, Model F-3500.

5. Energy Measurement System:
a. Provide Energy Measurement System for each flow meter as indicated on the drawings.
b. The entire Energy Measurement System shall be provided and calibrated by the same manufacturer as the flow meter, and shall consist of a flow meter, two temperature sensors, a Btu meter, temperature thermowells, and all required mechanical installation hardware and interconnecting cabling. A certificate of NIST traceable calibration shall be provided with each system. All equipment shall be covered by the manufacturer's two year warranty.
c. Btu meter: The Btu meter shall provide the energy total, energy rate, flow total, flow rate, supply and return water temperature information via both an integral LCD, and via network communications (open protocol conforming to ASHRAE BACnet). Each Btu meter shall be factory programmed for its specific application, shall be reprogrammable using the front panel keypad (no special interface device or computer required) and shall be interfaced with the BAS. Temperature sensors: Solid state, loop-powered current based (mA) and shall be bath-calibrated and matched (NIST traceable) for the specific temperature range for each application. The calculated differential temperature used in the energy calculation shall be accurate to within ±0.15ºF (including the error from individual temperature sensors, sensor matching, input offsets, and calculations).
d. Model: System-10.

19. Flow Meters for Steam Service:
1. Acceptable Manufacturer: Onicon, or approved equal.
2. Flow Meter for Steam:
a. Vortex mass flow meter shall be completed with integral density compensation to provide direct mass steam flow output. The flow meter shall calculate mass flow corrected for density with real time calculations based on temperature measured by an integral 1000 ohm platinum RTD. Mass flow inferred from specified steam pressure or calculated externally to the flow meter will not be acceptable.
b. Flow straightener: Where required, provide pipe flow straightener to meet the manufacturer's minimum upstream pipe run requirement.
c. Supports: Provide lateral and horizontal supports as required to minimize vibration at the meter location.
d. Calibration: Each individual flow meter undergo a multipoint calibration against the manufacturer's N.I.S.T. Traceable Flow Standards.
e. Accuracy: Within ± 1.5% of actual reading over the range of the meter, including all errors associated with velocity measurement, temperature and/or pressure measurement, and density compensation.

f. Flanges: The meter shall be provided with ANSI Class 150 or Class 300 or Class 600 flanges.
g. Maximum operating temperature: 500ºF.
h. Maximum operating pressure: ≤ flange rating or 1500 psi.
i. Construction: The flow meter body shall be constructed of 316L series stainless steel and include a weather-tight NEMA 4x aluminum electronics enclosures.
j. Display: The meter shall display steam mass flow rate and mass flow total with an integral LCD display and support field programming of all parameters.
k. Integral diagnostics: The meter shall have integral diagnostics to verify installation conditions and the proper operation of the meter.
l. Network interface module: The meter shall provide a loop-powered 4-20 mA output signal calibrated in direct mass flow rate units for connection to the BAS. The network interface shall transmit protocols ASHRAE BACNet. In addition, an integral pulse output for steam mass flow totalization shall be provided. All outputs shall be linear with mass flow rate.
m. Pressure transducer for accurate reading at the meter location.
n. Size: The flow meter shall be sized by the manufacturer for each specific application and installed according to manufacturer's recommendations. Model F-2600 with D-100 Network Interface Module.

20. Airflow Measuring Station (Duct Mounted):
    1. Acceptable Manufacturer: Air Monitor Corporation Model VOLU-probe/VS
    2. Provide where needed Airflow Measuring Stations (FMS) shall be capable of continuously monitoring the duct capacities (air volumes) they serve. Each airflow measuring station shall consist of an airflow measuring station and a transmitter. In order to guarantee the overall accuracy and performance of the airflow measuring station, the airflow measuring station and the transmitter shall be by the same manufacturer.
    3. Each airflow traverse probe mounted within the station shall contain multiple total and static pressure sensors located along its exterior surface, and internally connected to their respective averaging manifolds. The flow sensors shall not protrude beyond the surface of the probe(s), and shall be the offset type for static pressure and the chamfered impact type for total pressure measurement. The airflow station's measured accuracy shall not be affected by directional flow having yaw and/or pitch angles up to 30°.
    4. The airflow measuring station(s) shall have a 14 gauge [18 gauge for circular units] galvanized steel, 6" deep welding casing with 90° connecting flanges. Total and static pressure sensors shall be located at the centers of equal areas (for rectangular ducts) or at equal concentric area centers (for circular ducts) across the station's face area.
    5. Stations shall be AMCA certified and be capable of measuring the airflow rates within an accuracy of ±2% without the use of correction factors. The maximum allowable unrecovered pressure drop caused by the station shall not exceed .025' w.c. at 2000 FPM, or 0.085" w.c. at 4000 FPM.

21. CO_2 Sensors/Transmitters: CO_2 sensors shall use silicon based, diffusion aspirated, infrared single beam, dual-wavelength sensor.
    1. Accuracy: ±40 ppm full scale and 68°F.
    2. Stability: 5% over 5 years.
    3. Output: 4-20 mA, 0-10 Vdc or relay.
    4. Mounting: Duct or Wall as indicated.
    5. Manufacturer: Vaisala, Inc. GMD20 (duct) or GMW20 (wall), Dwyer CDT-2N/E or CDT-2D, or approved equal.

22. Current Sensors: Provide current sensors to monitor amperage of motors. Select current transducer range for normal amperage to be above 50 percent of the range. Current sensors shall have an accuracy of 1 percent and a 4 to 20mA output signal.

23. Smoke Detectors: Smoke detectors are furnished under Division 26 and installed under Division 23 in return and/or supply air ducts on downstream side of filters in accordance with NFPA 90A, except as otherwise indicated. Detectors to be UL listed or FM approved detectors for duct installation. Refer to drawings for locations.

24. Freeze Stats: Freeze stat shall contain 2 isolated sets of contacts, 4-wire, 2-circuit contact block, manual reset, BAS connection for alarm status, 20' of 1/8" O.D. capillary tubing, 34 to 70ºF temperature range. Manufacturer: Dwyer DFS or approved equal.

2.13 ENCLOSURES

1. All controllers, power supplies and relays shall be mounted in enclosures.
2. The main central plant enclosures, library, PD and city hall buildings will be installed in new UL labeled control panels.

3. Enclosures may be NEMA 1 when located in a clean, dry, indoor environment. Indoor enclosures shall be NEMA 12 when installed in other than a clean environment.

4. Enclosures shall have hinged, locking doors.

5. Provide laminated plastic nameplates for all enclosures in any mechanical room or electrical room. Include location and unit served on nameplate. Laminated plastic shall conform to Section 230553, HVAC IDENTIFICATION.

6. All field enclosures shall have 40% spare capacity for future installation of components.

7. Install all electronic controllers according to manufacturer's recommendations for ambient conditions.

2.14 CONTROL WIRING

1. Provide electrical wiring required for complete functional control systems, including power circuit to control panels, both line and low voltage, in accordance with applicable local codes, and latest version of National Electrical Code and NFPA.

2. Control panels serving equipment fed by emergency power shall also be served by emergency power. Equipment fed by emergency power is so indicated on mechanical equipment schedules and electrical motor schedules.

3. Tag each wire termination at control panels, junction boxes and remote control devices with unique wire ID number.

4. Terminate low-voltage DC instrument signal cables with black wire on negative terminal, and red or white wire on positive terminal. Where 3-conductor cable is used, standard DC wring shall be black for common, red for power and white for signal.

5. Run direct current instrument conductors separately from alternating current conductors. Where allowed by NEC wiring classification, AC-DC route crossings shall be at 90 degrees. Install special sensor to converter cables in accordance with manufacturer's installation drawings or in compliance with manufacturer's instructions. Extra precautions shall be taken when pulling and shortening these "vendor furnished" cables. Any extra length on these cables shall be neatly coiled into minimum 3" diameter coils and installed into junction box.

6. Route intrinsic safe wiring separately from other conductors. These conductors shall not be run with, nor cross, conductors of other NEC classifications and shall require barrier if run in the same path with wiring of other classifications.

7. Contractor's company standard cabling and color codes may be used.

8. Electrical Signal Cable:
    1. Analog electric signal cables from electronic transmitters to controllers/receivers and from controllers to other analog devices shall be continuously shielded to reduce effects of EMI on control signals residing on those cables. Electric signal cables to discrete devices typically do not require shielding, but for better noise immunity use twisted/shielded pairs.
    2. Shields shall be grounded at power source end only and floated at other end. Pay particular attention to floating shields through terminations points, maintaining only one single grounding point and insulating from ground at other points.
    3. Provide 250 ohm, 5 watt, 0.1% tolerance, dropping resistors as required to generate 1 – 5 VDC signals from 4 – 20 mA control loop powered by 24 VDC power supply

9. BAS Network Communication Cable:
    1. Install special cable connections in accordance with EMS manufacturer's recommendations.
    2. Maximum #22 AWG, but no smaller than #24 AWG, twisted pairs, twisted shielded pairs, coaxial cable, fiber optics or manufacturer's standard cabling for communication between remote control devices and EMS controllers.

3. BAS network communication cable shall not be spliced.
4. Provide isolated instrument grounding system as necessary per manufacturer's recommendations.

2.15 SAFETY SHUTDOWN DEVICES

1. Safety shutdown devices provided by the controls contractor requiring manual trip reset shall be mounted in an electrical panel for associated equipment, trip alarm shall be clearly annunciated via an alarm through the BAS and DDC input shall be designated as Local Manual Reset type in DDC database and graphics.

2. All safety shutdown devices shall be discretely wired to the DDC panel for the associated equipment. Series wiring between field devices (high static pressure cutouts, freezestats, door interlocks, etc.) is not permitted. Safety devices shall not be located inside air plenums. Safety shutdown status of equipment shall be clearly annunciated with visual indicator at their respective electrical panel.

PART 3 -EXECUTION

3.1 GENERAL

A. Refer to Section 230502, BASIC HVAC REQUIREMENTS and 230503 BASIC HVAC MATERIALS AND METHODS.

3.2 INSTALLATION

A. Install systems and materials in accordance with manufacturer's printed instructions and roughing-in drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division 26 sections of these specifications. Mount controllers at convenient locations and heights.

B. Install control wiring without splices between terminal points, color-coded. Install in neat workmanlike manner, securely fastened. Install in accordance with National Electrical Code.

C. Conduit shall be installed parallel to or at right angles to the building structure and shall be concealed in all finished spaces.

3.3 IDENTIFICATION

A. Provide permanent labels for all panels and devices. Refer to Section 230553, HVAC IDENTIFICATION.

B. Provide identification at the outside core of each space thermostat or temperature sensor indicating the HVAC unit and/or air terminal unit which it serves.

3.4 FLOW METERS

A. Contractor shall determine the exact locations of flow meters. Final locations shall be similar to the ones shown in the design drawings and included in the shop drawings for review and approval by both the project mechanical engineer and the meter manufacturer. The meter location shall be located such that it will meet the manufacturer's minimum upstream and downstream straight pipe run requirements. Engage the meter manufacturer to inspect the meter installation. Provide approval letter from the meter manufacturer.

B. Where in-line flow meter is used, provide an isolation ball valve and a strainer upstream of the meter, an isolation ball valve downstream of the meter, and a line size bypass pipe with a bypass ball valve per meter manufacturer's recommendation.

C. Where steam meter is used, provide isolation ball valves upstream and downstream of the meter, and a line size bypass pipe with a bypass ball valve.

D. Applications requiring isolation valves need straight pipe runs. Refer to manufacturer's minimum requirements for upstream and downstream straight pipe runs.

3.5 SEQUENCE OF CONTROLS

A. Provide all automatic control work necessary to accomplish the sequences indicated on the drawings. Some items of equipment are provided with integral control equipment. Verify degree and extent of integral control and coordinate with manufacturer to provide automatic control required in accordance with these sequences.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:
   1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
   2. Test and adjust controls and safeties.
   3. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
   4. Test each point through its full operating range to verify that safety and operating control set points are as required.
   5. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
   6. Test each system for compliance with sequence of operation.
   7. Test software and hardware interlocks.

C. DDC Verification:
   1. Verify that instruments are installed before calibration, testing, and **[**loop**]** or **[**leak**]** checks.
   2. Check instruments for proper location and accessibility.
   3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
   4. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
   5. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
   6. Check temperature instruments and material and length of sensing elements.
   7. Check control valves. Verify that they are in correct direction.
   8. Check dampers. Verify that proper blade alignment, either parallel or opposed, has been provided.
   9. Check DDC system as follows:
      a. Verify that DDC controller power supply is from emergency power supply, if applicable.
      b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
      c. Verify that spare I/O capacity has been provided.
      d. Verify that DDC controllers are protected from power supply surges.

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.7 ADJUSTING

A. Calibrating and Adjusting:
   1. Calibrate instruments.
   2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
   3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
   4. Control System Inputs and Outputs:
      a. Check analog inputs at 0, 50, and 100 percent of span.
      b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
      c. Check digital inputs using jumper wire.
      d. Check digital outputs using ohmmeter to test for contact making or breaking.
      e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

5. Flow:
   a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
   b. Manually operate flow switches to verify that they make or break contact.
6. Pressure:
   a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
   b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
7. Temperature:
   a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
   b. Calibrate temperature switches to make or break contacts.
   c. Thermistor temperature sensors shall be adjusted with an offset through the DDC system for initial and subsequent calibrations.
8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures. If the instrument is factory calibrated, provide documentation from the manufacturer.

B. Adjust initial temperature and humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Division 01 Section "Demonstration and Training."

3.9 Graphical User Interface Design Guide and Standards

A. The design of the GUI needs to be as close as possible, or at minimum meet or exceed the quality shown in the following section

B. The GUI shall be template based, with the ability to easily navigate to the region, site, alarms, trending, schedules, and help pages.

C. The home page needs to have a Region or City view. This will show all of the buildings within the Citys campus. The buildings are to be 3d rendered. Google maps or Pdfs are not acceptable. When the mouse is hovered over the building, the outline and building will change color. If the building is clicked, it will dive down into that buildings home page. The amount of alarms in each building shall be displayed in red next to the building on the graphic.

D. At the site level building home page, a high resolution building rendering shall be displayed. When the mouse is hovered over the building, the floors will be highlighted and change colors. Each floor will have its own polygon and link to floor it represents.

E. Once inside the floor level, a high resolution floorplan will be displayed. Furniture plans will be shown if provided. Each zone will show the space temperature. Deviation from set point will be calculated for every zone. The zone will have a color changing overlay, showing the deviation of space temperature versus set point. The zone will be green if it is +-1 degree from set point. The zone will turn from yellow to orange to red as it gets further above set point. The zone will be red once it is 5 degrees above set point. The zone will change to different shades of purple and blue to show the zone is too cold. The zone will be bright blue when it is 5 degrees below set point. The zone name and room number will be displayed on the graphic. Once you click on a zone with the mouse, it will take you into those zones graphic.

F. Once inside the zone unit page, a 3d graphic that represents that specific piece of equipment will be shown. Animations will show the movement in the fans, dampers, etc. See zone view examples and quality expectations below. All-important data related to the piece of equipment shall be displayed. Typically a zone controller will have 15-20 data points on a graphic, including configuration data. All hardware IO and software IO points shall be

displayed.

G. The alarm page should show the alarms from all of the connected buildings as shown below. The audit history log shall be displayed also

H. The schedule page for each building shall show the schedules for that building. If individual unit schedules are needed for each floor, then each floor will have its own schedules page. Each tab will have a units schedule on it. See example below.

I. Air handler or Ac unit pages shall have 3d renderings done showing the proper equipment that it is displaying. All hardware IO and software IO points shall be displayed.

J. Chiller plants and boiler plants shall have 3d renderings with piping to show the layout of the plant. All pumping systems and piping shall be drawn. Animations will show when each piece of equipment is running. All hardware and software IO points shall be placed on the graphic for viewing.

K. Once on a chiller/boiler plant page, you can hover over the equipment with the mouse. The piece of equipment will change color and you can click it to go into a detail page. The detail page will have a close up rendering of the exact piece of equipment that it is representing. All data points that are available shall be shown. Animations shall be provided to show running status of the equipment. See examples below.