



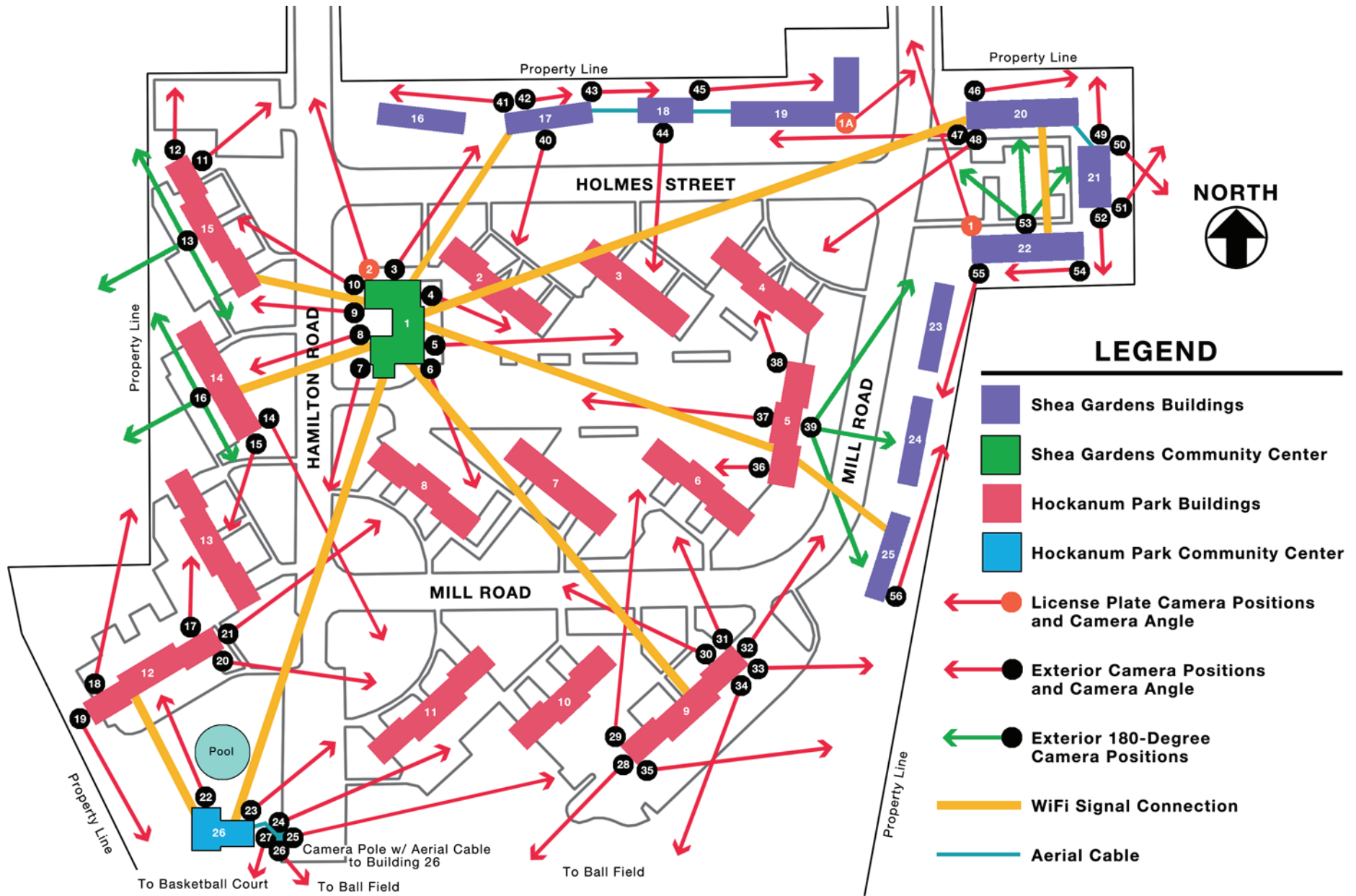
East Hartford Housing Authority *Security Camera Proposal*

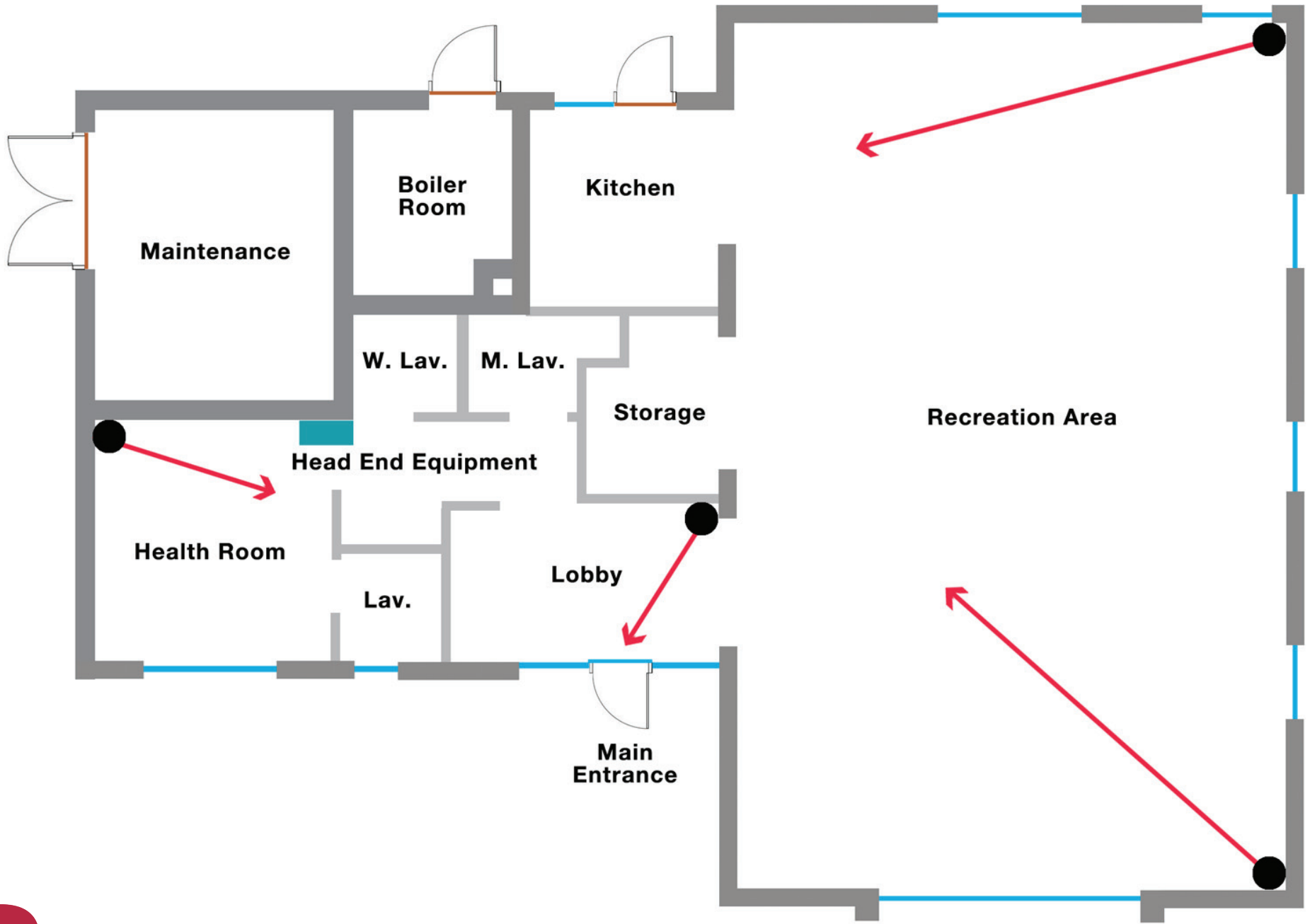
Shea Gardens Apartments • Hockanum Park Apartments

Presented by



Fernando Flores • 6 Edgewood Court • Simsbury, CT 06070 • 860-874-7400 • fflores@reedhill.net





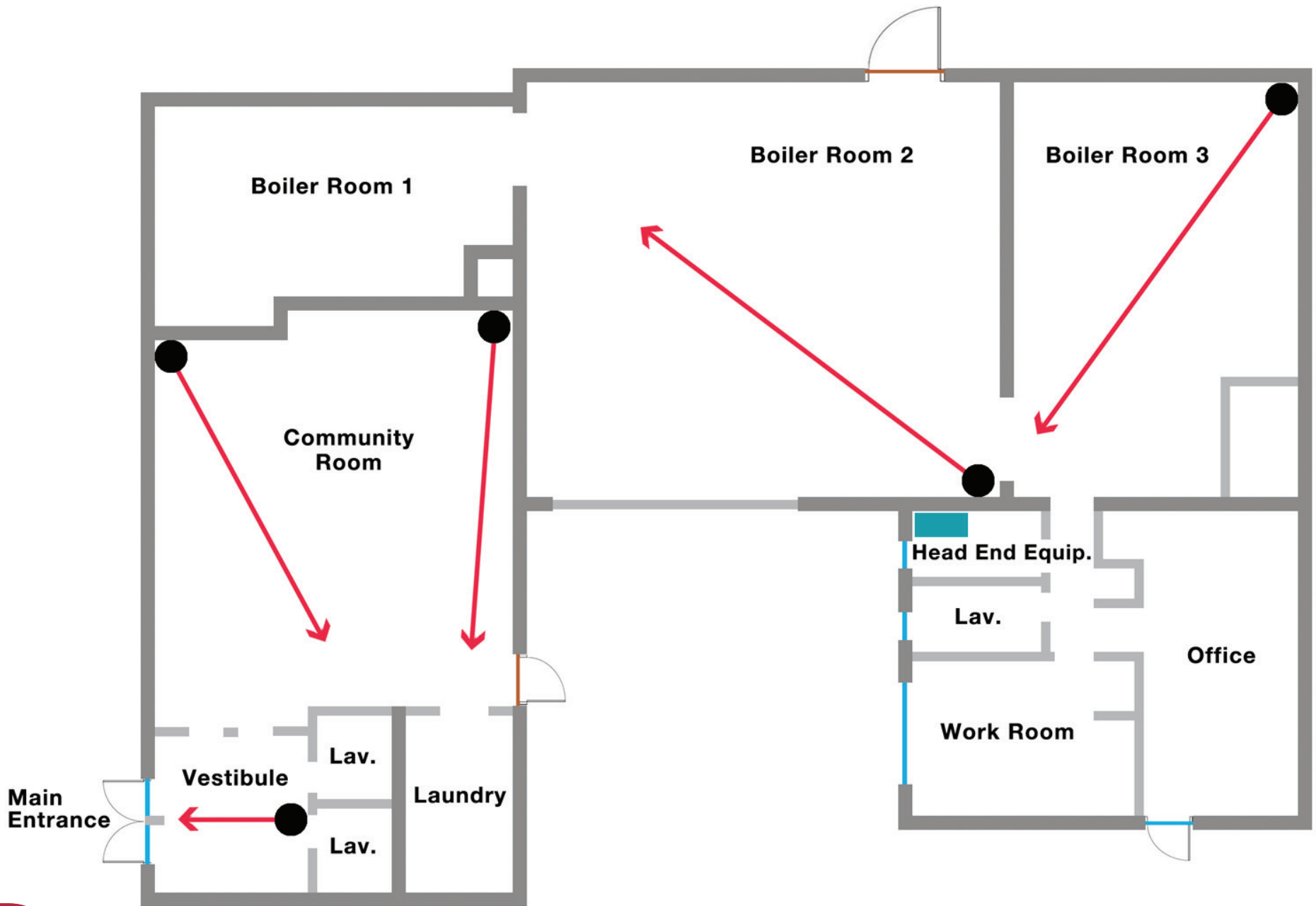


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LEGAL ADVERTISEMENT

FOR BIDS

The East Hartford Housing Authority is seeking sealed bid for the Upgrade Security Systems – Community Room. Bid Opening date is April 26, 2019 at 2:00 p.m. at the East Hartford Housing Authority Administration 546 Burnside Avenue East Hartford CT 06108.

All bids will be publicly opened and read aloud.

There will be a mandatory pre-bid meeting and walk-thru at 10:00 am, Wednesday, March 27th, 2019 at Shea Gardens Community room, at the corner of Hamilton Rd and Holmes St, East Hartford, CT 06108 and then proceeding through the sites. All bidders are required to attend. Any individual with a disability who needs special assistance to participate should contact the Jason Van Allen (jvanallen@ehhousing.org) at least, five (5) days before the pre-bid meeting.

Bidding documents, including drawings, specifications, and forms, will be available electronically commencing on March 15, 2019 online at (ehhousing.org.) website.

Any questions or request for electronic copies should be directed to EHHA Asset Coordinator Jason Van Allen at (jvanallen@ehhousing.org).

A 5% Bid Security and 100% Performance/Payment Bonds will be required at contract signing. Bidders will note requirements of minimum wage rates, nondiscrimination/equal opportunity rules (Executive Order 11246) and related provisions in the General Conditions. No bid to EHHA shall Be withdrawn for ninety (90) days. Complete bidding requirements are noted in the Contract Documents. The Housing Authority of the City of East Hartford is an Equal Opportunity/Affirmative Action Employer And conducts its business in accordance with all Federal, State and Local laws, regulations and guidelines. Small, Minority, Women Business Enterprises and Disabled are encouraged to participate in this process.

East Hartford Housing Executive Director is Debra Bouchard

INVITATION FOR BID

The East Hartford Housing Authority (EHHA) is seeking bids from qualified contractors for the following project:

Project Name	Upgrade Security Systems – Community Room
Pre-bid, mandatory Walk-thru Date	March 27, 2019- 10:00 am
Request for Clarifications Deadline	April 3,2019- 5:00 pm
Request for Clarifications Response	April 8, 2019
Bid Opening	April 26, 2019 - 2:00 pm

EHHA will receive sealed bids for the project, in triplicate, at East Hartford Housing Authority, 546 Burnside Avenue East Hartford, CT 06108. Packages must be clearly marked with the project name. Bids shall be received by April 26, 2019 by 2:00 pm. Bids received after this date and time will not be accepted.

Bids will be received for furnishing all labor, materials, tools and equipment necessary to construct, equip and finish the above project, in accordance with the documents prepared by Reed Hill and Associates 6 Edgewood Ct, Simsbury, CT 06070

There will be a mandatory, pre-bid meeting and walk-thru at 10:00 am, Wednesday March 27, 2019 at Shea Gardens Community room at the corner of Hamilton Rd and Holmes St, East Hartford, CT 06108. All bidders are required to attend.

Bidding documents, including drawings, specifications, and forms, will be available on line commencing on March 15, 2019 at the Housing Authority website (ehhousing.org).

A satisfactory Bid Security in an amount equal to a minimum of five percent (5%) of the Base Bid EHHA shall be submitted with each bid. At contract signing, a 100% Bid Bond will be required. The Bid Bond shall be made payable to the East Hartford Housing Authority and shall be properly executed by the Bidder and Acceptable Sureties. Individual sureties shall be considered only if they are listed in the U.S. Treasury Circular No. 570, published annually in the Federal Register. The registry contains a lists companies approved to act as surety on bonds securing Government contracts, the maximum underwriting limits on each contract bonded and the States in which each company is licensed to do business. Use of this Circular is mandatory.

The successful Bidder will be required to furnish and pay for a Performance and Payment Bond, in the amount of 100% of the Contract Amount, or a 20% cash escrow or a 25% irrevocable letter of credit, in the form included in the Project Specifications. Surety companies providing performance and payment bond(s) must be licensed to do business in Connecticut and be approved as sureties on Government contracts pursuant to U.S. Treasury Circular No. 570, published annually in the Federal Register.

Documents certificates of insurance evidencing the required coverage must be submitted before starting work on the project. Thirty days' notice is required before cancellation.

Attention is called to the provisions for equal opportunity and payment of not less than the minimum salaries and wages as set forth in the specifications.

EHHA reserves the right to reject any or all bids or to waive any informalities in the bidding. All bid forms must be fully completed when submitted.

No bid shall be withdrawn for a period of ninety (90) days subsequent to the openings of bids without the consent of EHHA.

In the event of an identical dollar amount for the total of the Base Bid, the lower bidder will be determined by EHHA as the bidder with the earliest recorded date and time as received by EHHA.

Any questions regarding the solicitation may be directed to Jason Van Allen through email correspondence at (jvanallen@ehhousing.org). This project is federally assisted, therefore, bidders must comply with the following requirements: Housing and Urban Development Act of 1968; Equal Opportunity provisions of Executive Order 11246; Non-Discrimination provision of Title VI of the Civil Rights Act of 1964; Labor Standards provisions of the Davis-Bacon Act and related acts and Contract Work Hours Standards Act; prevailing wage determinations as issued by the United States Department of Labor; and all applicable provisions under Title I of the Housing and Community Development Act of 1974.

The Housing Authority of the City of East Hartford is an Equal Opportunity/Affirmative Action Employer and conducts its business in accordance with all Federal, State and Local laws, regulations and guidelines. Small, Minority, Women Business Enterprises and Disabled are encouraged to participate in this process.

East Hartford Housing Authority

Ms. Debra Bouchard
Executive Director

April 1, 2019

Bidding Documents

TO:

Project:

Submitted by:

(Full name)

(Full address)

1. OFFER

Pursuant to and in compliance with the Invitation to Bid relating thereto, the undersigned,

Has familiarized himself/herself with the conditions present and carefully examined all the Documents including the specifications dated _____ as prepared by Reed Hill and Associates, Inc., Instructions to Bidders, Supplementary Instructions to Bidders, Bid Bond Form, Non Collusive Affidavit, Statement of Bidder's Construction Experience, Previous Participation Certificate, Representations Certifications and Other Statements of Bidders, Section 3 Certification, EEO Cert, Form of Contract, Notice to Proceed, Performance and Payment Bond, or 20% Cash Escrow, or 25% irrevocable letter of credit, General Conditions of the Contract for Construction, Supplemental General Conditions of the Contract for Construction, together with all Addenda issued and received prior to closing time for receipt of Bids hereby offers and agrees as follows:

To provide all materials, all labor and all else whatsoever necessary to erect and properly finish all work in accordance with said Documents for the above mentioned project(s) to the satisfaction of the Architect and Owner for the Stipulated Sum of:

_____ (\$ _____ -./

This amount EHHA shall be identified as the BASE BID. Note: The BASE BID EHHA shall be inclusive of all Deduct Alternates.

The following items EHHA shall be identified as Deduct Alternates:

1. Spare Equipment
2. Multifunction Interactive LCD Display

1. _____ (\$ _____ - _____)
this amount EHHA shall be identified as Deduct Alternate 1

2. _____ (\$ _____)
This amount EHHA shall be identified as Deduct Alternate 2

The Contract award will be made to the lowest responsible bidder as outlined above. The Housing Authority further reserves the right to increase or decrease the award, in accordance with the unit prices listed below (if applicable) depending on the availability of funds. The Housing Authority reserves the right to reject any and all bids, and to waive any informality in the bids when such action is deemed to be in the best interest of the Housing Authority.

Enclosed here with is the Bid Guaranty (5% of Base Bid minimum) which is in the form of: (

Bid Bond Bank Draft Certified Check US Gov. Bonds

East Hartford Housing Authority is tax-exempt. All State of Connecticut Taxes are excluded from the Bid Sum.

Attached hereto are the Bid Bond, Non-Collusion Affidavit, form HUD-5369A, form HUD-2530, Statement of Bidder's Construction Experience, Statement of Compliance with Section 3, and Certification of Bidder Regarding Equal Employment Opportunity.

The bidder represents that s/he has, has not participated in a previous contract or subcontract subject to the equal opportunity clause prescribed by Executive Orders 10925, 11114, or 11246 or the Secretary of Labor; that s/he has, has not, filed all required compliance reports; and that representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards. (The above representations need not be submitted in conjunction with contracts or subcontracts which are exempt from this clause.)

Certification of Non-segregated Facilities. By signing this bid, the bidder certifies that he/she does not maintain or provide for his/her employees any segregated facilities at any of his/her establishments, and that he/she does not permit his/her employees to perform their services at any location, under his/her control, , where segregated facilities are maintained. He/she certifies further that he/she will not maintain or provide for his/her employees any segregated facilities at any of his/her establishments, and that he/she will not permit his/her employees to perform their services at any location under his/her control, where segregated facilities are maintained. The bidder agrees that a breach of these certifications is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "Segregated Facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are

Segregated by explicit directive or are in fact, segregated on the basis of race, color, religion, or national origin, because of habit, local custom or otherwise. She/he further agrees that (except where she/he has obtained identical certifications from proposed subcontractors for specific time periods), s/he will obtain identical certification from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he/she will retain such certification in his/her files; and that he/she will forward a notice to his/her proposed subcontractors as provided in the Instructions to Bidders.

This project is federally assisted. Therefore, bidders must comply with the following requirements: Housing and Urban Development Act of 1968; Equal Employment Opportunity provisions of Executive Order 11246; Non-Discrimination provisions of the Davis-Bacon Act and related acts and Contract Work Hours Standard Act; prevailing wage determinations as issued by the United States Department of Labor; and all applicable provisions under Title I of the Housing and Community Development Act of 1974.

The Contract Award EHHA shall be made on available funds; the Housing Authority reserves the right to add/deduct work based on the availability of funds.

2. ACCEPTANCE

This offer EHHA shall be open to acceptance for ninety (90) days from the bid opening date.

If this Bid is accepted by the Owner within the time period stated above, undersigned will:

Execute this Agreement within ten days of receipt of acceptance of this Bid.

Furnish the required bonds(s) within ten days of receipt of acceptance of this Bid.

Commence work within thirty days after written Notice to Proceed.

If this bid is accepted within the time stated, and the Undersigned fails to provide the required Bond(s), the Owner may charge against the Undersigned the difference between the amount of this bid and the amount for which a contract for the work is subsequently executed, irrespective of whether the amount thus due exceeds the amount of the bid guaranty.

In the event this Bid is not accepted within the time stated above, the required security deposit EHHA shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

3. CONTRACT TIME

If this Bid is accepted, the Undersigned will *complete all the work within 120 calendar days from Notice to Proceed*. It is additionally understood that liquidated damages, in the amount of \$250.00 per day, will be assessed for failure to complete the project within the above time period.

4. CHANGES TO THE WORK

Equitable adjustments for Changes in the Work will be net cost plus a percentage fee in accordance with HUD General Conditions (See paragraph 29)

5. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Base Bid.

Addenda# _____

6. BID FORM SIGNATURE(S)

The Corporate Seal

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

Was hereunto affixed in the presence of:

(Authorized signing officer) (Title)

(Seal)

(Authorized signing officer) (Title)

If the Bid is a joint venture of partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

END OF BID FORM

BID BOND FORM

KNOW ALL MEN BY THESE PRESENTS, That we the undersigned,

_____ (Name of Principal)

As PRINCIPAL, and

_____ as SURETY

Are held and firmly bound unto the Housing Authority of the _____ hereinafter called the "LOCAL AUTHORITY", in the penal sum of

_____ Dollars,

Lawful money of the United States, 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 whereas the Principal has submitted the accompanying bid, dated _____ 20__

NOW, THEREFORE, if the Principal shall not withdraw said bid within the period specified. Within (_90_) days after the said opening, and shall within the period specified therefore, or, if no period be specified within ten (10) days after the prescribed forms are presented to him for signature, enter into a written contract with the Local Authority in accordance with the bid as accepted, and give bond with good and sufficient surety or sureties, or provide a 20% cash escrow, or a 25% irrevocable letter of credit, as may be required for the faithful performance and proper fulfillment of such contract; or in the event of the withdrawal of said bid within the period specified, or the failure to enter into such contract and give such bond within the time specified. If the Principal shall pay the Local Authority the difference between the amount specified and in said bid and the amount for which the Local Authority may procure the required work or supplies or both, if the latter amount be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESSETH WHEREOF, the above-bounded parties have executed this instrument under their several seals this _____ day of _____, 2019__. The name and corporate seal of each corporate party being here to affix and those presents duly signed by its undersigned representative, pursuant to authority of its governing body.

In presence of:

_____ SEAL
(Individual Principal)

_____ (Business Address SEAL

(Individual Principal)

Attest:

_____ (Corporate Principal)

(Business Address)

By _____ Affix
Corporate Seal

(Corporate Surety)

By ; Affix
Corporate Seal

(Power-of attorney for person signing for Surety Company must be attached to bond).

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the _____ Secretary of the corporation named as Principal in the within bond; that _____, who signed the said bond on behalf of the Principal was then _____ of said corporation; that I know his signature and his signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and on behalf of said corporation by authority of its governing body.

(Corporate Seal)

NON-COLLUSION AFFIDAVIT

STATE OF _____

COUNTY OF _____

_____ ; being first duly sworn deposes and says that:

1. He is (owner, partner, officer, representative or agent) of _____ the Bidder that has submitted the attached Bid.
2. He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
3. Such Bid is genuine and is not a collusive or sham Bid.
4. Neither the Said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the contract for which the attached bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm, person to fix the price or prices in the attached Bid or any other Bid, or to fix any overhead, profit or cost element through collusion, conspiracy or connivance, or unlawful agreement with any advantage against the Housing Authority of the _____ or any person interested in the proposed Contract; and,
5. The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affidavit.

(Signed)

(Title)

Subscribed and sworn to before me this _____ day of _____, 2019_.

Name

Title

My commission expires _____, 2019.

NON-COLL.

HUD 5369A SEE ATTACHED FILES

STATEMENT OF BIDDER'S CONSTRUCTION EXPERIENCE

Page 1 of 2

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, add separate sheets for items marked*.

1. Name of Bidder:
2. Permanent main office address:
3. When organized:
4. Where incorporated:
5. How many years have you been in the contracting business under your present firm name:
6. *Contracts on hand: (Schedule these, showing gross amounts of each contract and the approximate anticipated dates of completion.)
7. *General character of work performed by your company.
8. Have you ever failed to complete any work awarded to you? If so, where and why?
9. *Have you ever defaulted on a contract?
10. *List the more important structures recently erected by your company, stating approximate cost for each, and the month and year completed.
11. *List your major equipment available for this contract.
12. *Experience in construction work similar in importance to this project.
13. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Housing Authority?
14. The undersigned hereby authorizes and request any person, firm, or corporation to furnish any information requested by the Housing Authority in verification of the recitals comprising this Statement of Bidder's Experience.

STATEMENT OF BIDDER'S CONSTRUCTION EXPERIENCE

Dated at _____ this _____ day of _____, **2019**__

Name of Bidder _____

By _____

Title _____

State of _____

County of _____

Being duly sworn deposes and says that he is

Of _____
Name of Organization

And that the answers to the foregoing questions and all statements therein contained are true and correct.

Sworn to before me this _____ day of _____ • 20 _____

Notary Public

My commission expires _____

(Bidder May Submit Additional Information, if Desired)

Date _____

Project No.: _____

STATEMENT OF COMPLIANCE
WITH SECTION 3, HOUSING AND URBAN DEVELOPMENT ACT OF 1968

- A. The project assisted under this contract/agreement is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible opportunities for training and employment to be given to lower income residents of the project area and contracts for work in connection with the project be awarded to business concerns which are located in or owned in substantial part by persons residing in the area of the project.
- B. Notwithstanding any other provisions of this contract/agreement/recipient EHHA shall carry-out the provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary set forth in 24 CFR Part 135 and all applicable rules and orders of the Secretary issued there under prior to the execution of this contract/agreement. The requirements of said regulations include but are not limited to development and implementation of an affirmative action plan for utilizing business concerns located within or owned in substantial part by persons residing in the area of the project; the making of a good faith effort, as defined by the regulations, to provide training, employment and business opportunities required by Section 3; and incorporation of the "Section 3 Clause" specified by Section 135.20 (b) of the regulation in all contracts for work in connection with the project. The applicant/ recipient certifies and agrees that it is under no contractual or other disability which would prevent it from complying with these requirements.
- C. Compliance with the provisions of Section 3, the regulations set forth in 24 CFR Part 135, and all applicable rules and orders of the Secretary issued there under prior to approval by the Government of the application for this agreement/contract, EHHA shall be a condition of the Federal financial assistance provided to the project, binding upon the applicant/recipient, its successors and assignees.

Failure to fulfill these requirements EHHA shall subject the applicant/recipient, its Contractors and Subcontractors, its successors, and assignees to the sanctions specified by this agreement/ contract, and to such sanctions as are specified by 24 CFR Section 135.135.

Applicant/Company Name: _____

Address: _____

Telephone No.: _____

Authorized Signature

Typed/Printed

Contract Conditions and Forms

**U.S. Department of Housing and
Urban Development**
Office of Public and Indian Housing

See HUD 5369 in attachment

1. GENERAL

- A. In addition to the Instructions to Bidders, outlined on Form HUD-5369, pages 1 to 4 inclusive, the following supplementary instruction to bidders, as established by the Housing Authority of the City of East Hartford, CT, EHHA shall be incorporated and form a part of the Contract Documents.

2. PROPOSALS

- A. Bid Documents shall be sealed in an envelope which shall be clearly labeled with the words - "Bid Documents" Digital Video Management and Radio Backhaul System Project.

3. BIDDERS QUALIFICATIONS

- A. The Housing Authority of the City of East Hartford, CT (LHA) reserves the right to reject any bid where an investigation of the available evidence of information does not satisfy the LHA that the Bidder is qualified to carry out properly the terms of the Contract Documents. The LHA has the right to request additional information regarding the Bidders' financial resources, and construction experience, if deemed necessary.

4. BID BOND/PERFORMANCE AND PAYMENT BOND

- A. Each Bid must be accompanied by Bid Guaranty in the form outlined in Paragraph 9 Instructions to Bidders made payable to the Housing Authority of the City of East Hartford, CT. A Bid Bond shall be in the form contained herein, and must be with Surety Company acceptable to the EHHA and the Government. Individual sureties shall not be considered. The surety must be listed in U.S. Treasury Circular No. 570, published annually in the Federal Registry and must be licensed to do business in the State of Connecticut.
- B. The successful General Contract Bidder shall furnish and pay for surety in the full amount of the Contract. These bonds shall provide one-hundred percent (100%) of the total contract price as security for faithful performance, The Bonds shall be submitted on the forms included herein, and shall be with a surety company acceptable to EHHA and the Government. Individual sureties shall not be considered. The surety must be listed in U.S. Treasury Circular No. 570, published annually in the Federal Registry and must be licensed to do business in the State of Connecticut.

OR

- C. A twenty percent (20%) cash bond on the total construction cost.

OR

- D. A twenty-five percent (25%) irrevocable letter of credit based on the total construction cost.

5. REJECTION OF BIDS

- A. In determining the lowest responsible bidder, the Local Housing Authority will also consider that the Bidder involved has met the following requirement:
1. Maintains a permanent place of business.
 2. Has adequate plant equipment available to do the work properly and expeditiously.
 3. Has suitable financial resources to meet the obligations incident to the work.
 4. Has appropriate technical experience and personnel.

6. DOCUMENTS TO BE FILED WITH BID

- A. The Owner may reject any bid which does not include the following documents: Bid Form, Bid Guaranty, Non-Collusive Affidavit, Statement of Bidder's Construction Experience and Representations, Certifications and Other Statements of Bidders (HUD 5369-A), Previous Participation Certification and Section 3 Certification.

7. ADDENDA

- A. No oral interpretation will be made to any bidder as to the meaning of the Specifications and Drawings. Every request for an interpretation shall be made in writing to the Consultant at fflores@reedhill.net and carbon copied to jvanallen@ehhousing.org

8. EXAMINATION OF PREMISES

- A. Bidder shall familiarize himself/herself with all areas of construction. She/he shall not all omit pertinent facts and details, including the conditions under which the work must be carried out and no allowance will be made for failure to do so.
- B. The work to be done under the specifications includes the furnishing of all labor, tools, equipment, materials and supplies.
- C. Bidder shall familiarize himself/herself with the requirements and intent of all drawings.
- D. All work shall be performed in a neat workman like manner with due regard for good practice and best finished appearance.
- E. Any unsatisfactory work or materials supplied by bidder shall be corrected or replaced at once without additional cost to the Housing Authority.
- F. All work shall be done by first class experienced mechanics, and an experienced foreman who shall superintend the work. Said foreman shall be constantly on the premises when work is in progress.

- G. The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the work he shall remove all his waste materials and rubbish from and about the Project as well as all his tools, construction equipment, machinery and surplus material. If the Contractor fails to clean up at the completion of the project, the LHA may do so and the cost thereof shall be charged to the Contractor.
- H. All necessary safety precautions shall be taken to protect workers and all others from injury during the time work is in progress.
- I. Responsibility for the proper and safe storage of on-site materials rests solely with the bidder. All expenses related to the provision of physical security of Contractor's material and equipment, including the hiring of security personnel if required, shall be borne exclusively by the Contractor.

SUPPLEME.INS

Insert HUD 5370

PERFORMANCE & PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, That we _____ (Contractor)

Principal, _____ of _____ as
(address/city/state)

Surety, are held firmly bound unto the _____, in the penal sum of

\$ _____ Dollars
(100% of Contract Amount)

and to such persons, firms or corporations who may furnish materials for or perform labor on the work, construction or improvements contemplated in the Contract hereinafter mentioned for the payment whereof the Principal and Surety or Sureties bind their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT WHEREAS the said

_____ has entered into a Contract with the (Contractor) _____, dated _____ of which the Surety or Sureties acknowledged the receipt thereof.

NOW THEREFORE, if the said _____ shall well and
(Contractor)

truly keep and faithfully perform the Contract on its part to be kept and performed (including guarantee and maintenance provision therein), and shall pay for all materials and for all labor performed, and for the rental or hire of vehicles, machinery and equipment, tools and appliances used or employed in the execution of said Contract, and shall fully indemnify and save harmless said Housing Authority as therein stipulated, then this obligation shall be of no effect, otherwise it shall remain in full force, and effect.

AND THE SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or additions to the term of the Contract or to the work to be performed there under, or the specifications accompanying the same, shall in any way affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

This bond is made for the use and benefit of all persons, firms and corporations who may furnish materials or perform any labor for or on account of said work, construction or improvements, or rent or hire out any vehicles, machinery and equipment, tools and appliances used or employed in the execution of said Contract and they and each of them are hereby made obliges hereunder the same as if their own respective names were written herein as such and they and/or each of them may proceed or use hereon in their own names for their own use and benefit.

IN WITNESS WHEREOF, the parties hereto have executed this bond **in triplicate** on this

_____ Day of _____, 2019

ATTEST:

_____ (Seal)
(Name of Contractor)

CORPORATE SEAL

By _____

ATTEST:

_____ (Seal)
(Name of Surety)

By _____
(Attorney-in-Fact)

Sealed and delivered in the presence of:

(Power of Attorney of person executing Bond for Surety Company must be attached.)

The rate of premium on this bond is \$ _____ per thousand.

The total amount of premium charges is \$ _____

I _____ certify that I am the Secretary of the corporation named as principal in the within bond; that _____ who signed the said bond on behalf of the principal was then _____ of said corporation; that I know his signature, and his signature is thereto is genuine, and that said bond was duly signed, sealed and attested for and in behalf of said corporation by Authority of its governing body.

_____ (Corporate Seal)
(Secretary)

SECTION 3 CLAUSE

All Section 3 covered contracts EHHA shall include the following clause (referred to as .the "Section 3 Clause"):

A. The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701 u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, EHHA shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR Part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice EHHA shall describe the section 3 preference, EHHA shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work EHHA shall begin.

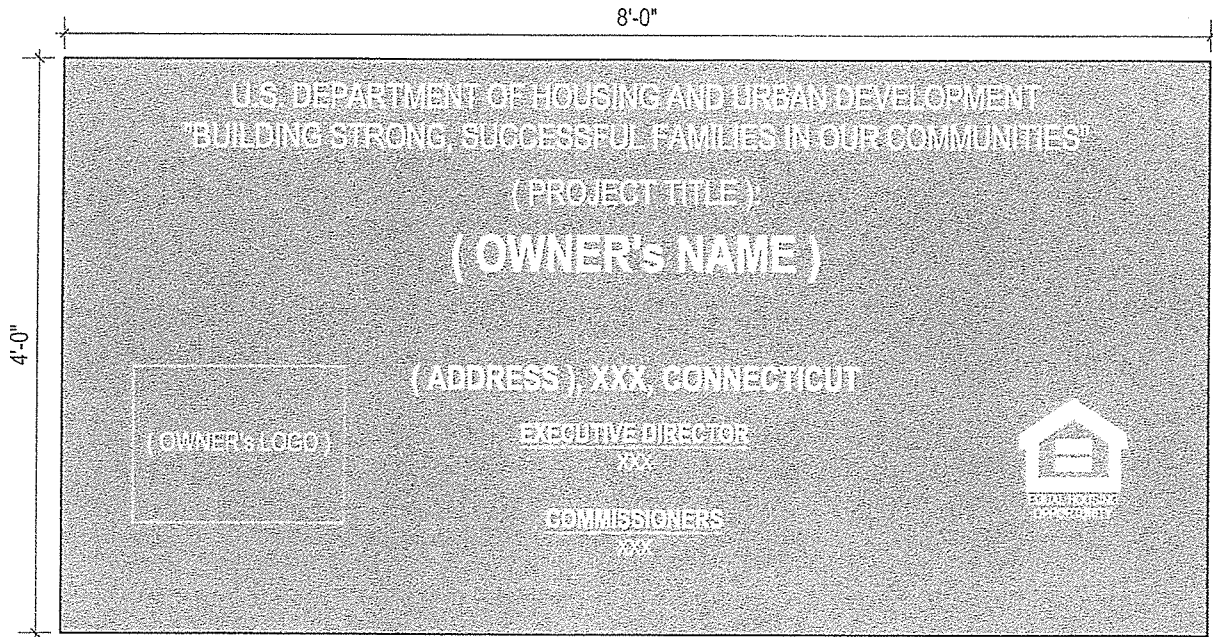
D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR Part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR Part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR Part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected by before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) Preference in the award of contracts and subcontracts EHHA shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

PROJECT SIGN (SAMPLE)



SIGN PANEL: 3/4" MDO-EXT- PLYWOOD SUPPORTED WITH (2) 4x4 TREATED WOOD COLUMNS AND SECURED 4' INTO GRADE. TOP OF SIGN AT 8'-0" ABOVE GRADE. SIGN IS TO BE MOUNTED TO THE 4" X 4" POST BACKGROUND WILL BE ROYAL BLUE ENAMEL. BACK OF PLYWOOD AND SUPPORT STRUCTURE SHALL BE PAINTED MATTE BLACK.

COLORS: ARIAL NARROW

SIGN MUST BE LOCATED TO BE CLEARLY VISIBLE TO THE PUBLIC.

TYPEFACE: INSTALL AT THE START OF CONSTRUCTION M1D REMOVE AT CONSTRUCTION COMPLETION.

LOCATION:

FORM OF CONTRACT

THIS AGREEMENT made this ___ day of _____, in the year *Two Thousand and nineteen* By and between _____ a company organized and existing under the laws of the State of _____ hereinafter called the "Contractor", and the *Housing Authority of the city of* East Hartford, hereinafter called the "LHA".

WITNESSETH, that the Contractor and the LHA for the consideration stated herein mutually agrees as follows:

ARTICLE 1: Statement of Work. The Contractor shall furnish all labor, material, equipment and services, and perform and complete all work as required for the project entitled:

_____ Name of project) at (location)

in strict accordance with the plans and specifications by _____ dated _____ and Addendum thereto numbered _____, which said Specifications and Addenda are incorporated herein by reference and made a part hereof.

ARTICLE 2. The Contract Sum. The LHA (EHHA) shall pay the contractor for the performance of the contract, in current funds, in accordance with the Specifications, the sum of _____ Dollars (\$XXX,XXX.XX).

ARTICLE 3. Contract Documents. The contract EHHA shall consist of this instrument and the following component parts:

Instructions to Bidders	<i>IX/</i>	Previous Participation (HUD-2530)	<i>/X/</i>
General Conditions (HUD-5370)	<i>IX/</i>	Notice to Proceed	<i>IX/</i>
Special Conditions	<i>IX/</i>	Performance and Payment Bond	<i>/X/</i>
Sup. General Conditions	<i>IX/</i>	Specifications	<i>/X/</i>
Drawings	<i>IX!</i>	Addenda	<i>/X/</i>
Wage Rate Decisions	<i>IX/</i>	Forms of Bid	<i>IX/</i>
Bid Bond	<i>IX!</i>	Certifications (HUD-5369-A)	<i>IX!</i>

ARTICLE 4. TIME COMMENCEMENT AND DATE OF COMPLETION. The work to be performed under this Contract EHHA shall be commenced as stated in the Notice to Proceed and, subject to authorized adjustments; completion shall be achieved no later than _____(XXX) Calendar Days.

This instrument, together with the other documents enumerated in this Article 3, which said other documents are as fully a part of the Contract as if hereto attached or herein repeated, form the Contract. In the event that any provision in any component part of this Contract conflicts with any provision of any other component part, the provision of the component part first enumerated in this Article 3 shall govern, except as otherwise specifically stated. The various provisions in Addenda shall be construed in the order of preference of the component part of the Contract which each modifies.

FORM OF CONTRACT

IN WITNESS WHEREOF, the parties hereto have caused this Instrument to be executed in *four (4)* original counterparts as of the day and year first above written.

Attest: _____
(company name)

By _____
(name)

Title _____

Business Address

Attest: _____
(LHA)

By _____
(name)

Title _____

LHA Business Address: _____ (SEAL)

I, _____ certify that I am _____
(title)

Of the corporation which executed the above contract; that _____
(Name)

who signed this contract on behalf of the corporation, was then _____
(title)

of the corporation signing for and on behalf of said corporation by authority of its governing body; and was acting within the scope of its corporate powers.

(Corporate Seal)

By _____
(Signature Required)

(Title)

NOTICE TO PROCEED

_____	Contract No. _____
Contractor	
_____	Date _____
Street Address	
_____	Project No. _____
City, State and Zip Code	
	Location _____

Gentlemen:

Pursuant to the terms of your contract, dated _____, **2019**, you are hereby notified to commence work thereunder at the start of business _____ **2019**. The time of completion set forth in the contract is _____ calendar days, including the starting day, which establishes _____ **2019** as the completion date.

Please note carefully and fulfill the requirements of the General Conditions relative to the submittal and approval of Workmen's Compensation and Manufactures' and Contractor's public liability insurance.

You are duly informed that _____ has been appointed Contracting Officer and is duly authorized to administer your contract for, and in the name of the _____ *Housing Authority*.

Under separate cover, there is being forwarded to you one executed set of Contract Documents, consisting of Contract, Performance and Payment Bond(s), Specifications and Drawings.

Please acknowledge receipt of this Notice to Proceed by signing and dating, and return all copies promptly to this office, retain one (1) copy for your file and record.

ENCLOSURES
ACCEPTED

(contractor)

Very truly yours,

By _____ By _____

Title _____ Title _____

PAYMENT REQUEST CERTIFICATION

I hereby certify to the best of my knowledge and belief that:

- (1) The amounts requested are only for performance in accordance with specifications, terms, and conditions or the contract;
- (2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontracts agreements; and
- (3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract.

Signature & Date

Typed or Printed Name

Title

Project Name

Project Number

***THIS CERTIFICATION NEEDS TO BE SUBMITTED WITH EACH PERIODIC ESTIMATE FOR PARTIAL PAYMENT.**

Section 3 Contractor Certification

Project Name: _____

Developer's Name: _____

I UNDERSTAND THAT MY CONTRACT WITH _____
(NAME OF PUBLIC HOUSING AUTHORITY) IS SUBJECT TO THE REQUIREMENTS OF
SECTION 3 OF THE HOUSING AND URBAN DEVELOPMENT ACT OF 1968, AS AMENDED
AND TO THE SECTION 3 PLAN FOR THIS PROJECT.

I CERTIFY THAT THE FIRM OF _____ (COMPANY'S
NAME) IS A BONAFIDE SECTION 3 COMPANY, AND THAT IT MEETS THE FOLLOWING
DEFINITION OF A SECTION 3 BUSINESS (CHECK ONE):

- 51% or more of the ownership of this company is owned by Section 3 residents, as defined by the developer of this project.
- Currently, at least 30% of the employees of the company are Section 3 residents, as defined by the developer of this project.
- At least 30% of the employees of the company were Section 3 residents, as defined by the developer of this project, within three years of the date of first employment with this company.
- I commit to subcontract at least 25% of the total value of this contract to Section 3 subcontractors, as these companies are defined above, and to provide the necessary evidence to substantiate this.

Signature of Chief Executive Officer

Date

Section 3 Resident Certification

Section 3 of the Housing and Urban Development Act of 1968, as amended, requires recipients of community development funds to make a good faith effort to provide employment and training opportunities resulting from this project to low- and very low-income persons.

In order to demonstrate that you meet the definition of a low-or very low-income person, please provide one of the following:

1. Proof of residency in a public housing development;
2. A copy of your section 8 voucher certificate or voucher;
3. Evidence of your eligibility or participation in a federally-assisted program for low- and very low-income persons (e.g. Jobs, JTPA, Job Corps, etc.);
4. Evidence of your eligibility or participation in a State or Local Assistance Program for low- or very low-income persons or receipt of AFDC;
5. Income tax records.
6. Other.

I _____(participant's name) certify that I meet the requirement stipulated in #_____ above. I have provided the following document to demonstrate evidence of this_____

Participant's Signature

Date

East Hartford Housing Authority – Security Project
April 1, 2019

Program Requirements

Contractor
Section 3 Plan Format

_____ agrees to implement the following specific affirmative action steps directed at increasing the utilization of lower income residents and businesses within the City of East Hartford, CT.

1. To ascertain from the locality's Workforce Investment Board and/or One Stop Career Center the exact boundaries of the Section 3 covered project area and, where advantageous, seek the assistance of local officials in preparing and implementing the affirmative action plan.
2. To attempt to recruit from within the city the necessary number of lower income residents through: local advertising media, signs placed at the proposed site for the project, and community organizations and public or private institutions operating within or serving the project area such as the local Workforce Investment Board and/or One Stop Career Center.
3. The following are fully explained in the text of this document and will greatly aid in implementing the spirit of affirmative action.
 - A. UTILIZATION of Lower Income Area Residents as Employees
 - B. UTILIZATION of Lower Income Area Residents as Trainees
 - C. UTILIZATION of Business Located and Owned in Substantial Part by Person Residing in The Area.
4. To maintain a list of all lower income area residents, also to employ anyone referred if eligible and if a vacancy exists.
5. To provide a training program for utilization of lower income area residents as trainees.
6. To insert this Section 3 Plan in all bid documents, and to require all bidders on subcontracts to submit a Section 3 affirmative action plan including utilization goals and the specific steps planned to accomplish these goals.
7. To insure that subcontracts which are typically entered on negotiation rather than the bid basis in areas other than Section 3 covered project areas are also entered on a negotiated basis, whenever feasible, when in a Section 3 covered project area.
8. To formally contact unions, subcontractors and trade association to secure their cooperation for this program.
9. To insure that all appropriate project area business concerns are notified of pending sub-contractual opportunities.
10. To maintain records, including copies of correspondence, memoranda, etc., which document that all of the above affirmative action steps have been taken.

11. To appoint or recruit an executive official of the company or agency as Equal Opportunity Officer to coordinate the implementation of this Section 3 Plan.
12. To list on table A information related to subcontracts awarded for the three year period preceding date of this bid submission.
13. To list on Table B, all projected workforce needs for all phases of this project by occupation, trade, skill level and number of positions.

As officers and representatives of _____
 (name of contractor)

We the undersigned have read and fully agree to this Affirmative Action Plan, and become a party to the full implementation of this program.

 Signature

 Title

 Date

 Signature

 Title

 Date

For more information about Workforce Investment Boards and One-stop Career Centers in the area applicable to this project, please contact:

Northwest Regional Workforce Investment Board
 249 Thomaston Ave
 Waterbury, CT 06702
 Phone: 203-574-6971
 Fax: 203-573-8951

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause: and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven calendar days after bid opening. No contract shall be awarded unless such report is submitted.

CERTIFICATION BY BIDDER

NAME AND ADDRESS OF BIDDER *(Include Zip Code)*

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause.

Yes

No

2. Compliance reports were required to be filed in connection with such contract or subcontract.

Yes

No

3. Bidder has filed all compliance reports due under applicable instructions, including SF-100.

Yes

No

None Required

4. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended?

Yes

No

NAME AND TITLE OF SIGNER *(Please Type)*

SIGNATURE

DATE

Upgrade Security Systems – Community Room

Sub-Contractor Program Requirements

REQUEST FOR ACCEPTANCE OF SUBCONTRACTOR

Date _____

TO: _____

Project No. _____

(project name)

(project location)

Gentlemen:

In accordance with our prime contract for _____

Of this project we request acceptance of the following proposed subcontractor to perform work or to supply material as indicated below:

I. _____

(name)

(street address)

(city)

(state)

(zip code)

2. Scope of work (state kind of work, if for labor, or material, or both, and give Specification reference):

3. The subcontractor's non-collusive affidavit in the form required by our contract is furnished herewith (original only attached to the original request).

4. We warrant that the provisions required by our contract to be inserted in each subcontract will be inserted in this subcontract.

5. We certify that this proposed subcontractor is not ineligible to receive awards of contracts from the United States as evidenced by the list or lists of such contractors maintained by HUD.

6. There will be no assignment of interest in this subcontract except as follows (if none, so state):

7. Terms of Payment

Price: \$ _____

8. Remarks

(prime contractor)

By _____

Title _____

If a sales agent, identify the manufacturer under "Remarks." If a subcontractor, identify principal subcontractor under "Remarks."

APPROVAL OR REJECTION

The proposed subcontractor named above is _____

If accepted, the contracting party giving such acceptance assumes no responsibility in connection with the form or terms of the subcontract nor the performance of the subcontractor, and this form will not be returned.

If rejected, the reason(s) will be briefly stated herein, and this form will be returned within 10 days after receipt.

(date)

(contracting officer,)

CERTIFICATION OF PROPOSED SUBCONTRACTOR REGARDING SECTION 3
AND SEGREGATED FACILITIES

Name of Subcontractor

Project Name & Number

The undersigned hereby certifies that

- (a) Section 3 provisions are included in the Contract
- (b) A written Section 3 plan was prepared and submitted as part of the bid proceedings.
- (c) No segregated facilities will be maintained.

Name

Name & Title of Signer (Print or Type)

Signature

Date

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
**CERTIFICATION BY PROPOSED SUBCONTRACTOR
REGARDING EQUAL EMPLOYMENT OPPORTUNITY**

NAME OF PRIME CONTRACTOR

PROJECT NUMBER

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed subcontractors, EHHA shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause: and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the Subcontractor has not filed a compliance report due under applicable instructions, such contractor EHHA shall be required to submit a compliance report before the owner approves the subcontract or permits work to begin under the subcontract.

SUBCONTRACTOR'S CERTIFICATION

NAME AND ADDRESS OF SUBCONTRACTOR *(Include Zip Code)*

1. Subcontractor has participated in a previous contract or subcontract subject to the Equal Opportunity Clause.

Yes

No

2. Compliance reports were required to be filed in connection with such contract or subcontract.

Yes

No

3. Subcontractor has filed all compliance reports due under applicable instructions, including SF-100.

Yes

No

None Required

4. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended?

Yes

No

NAME AND TITLE OF SIGNER *(Please Type)*

SIGNATURE

DATE

SUBCONTRACTOR'S CERTIFICATION
CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS

To (Department, Agency, or Bureau) _____ Date _____

C/o _____ Project Number _____

_____ Project Name _____

1. The undersigned, having executed a contract with _____
for _____ in the amount of \$ _____ in
the construction of the above-identified project, certifies that:

- a) The Labor Standards Provisions of the Contract For Construction are included in the aforesaid contract,
- b) Neither he nor any firm, cooperation, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary of Labor, Part 5 (29 CFR, Page 5) or pursuant to Section 3(a) of the Davis-Bacon Act, as amended (40 U.S.C. 276a-2(a)).
- c) No part of the aforementioned contract has been or will be subcontracted to any subcontractor of such subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated as an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

2. He agrees to obtain and forward to the contractor, for transmittal to the recipient, within ten days after the execution of any lower subcontract, a Subcontractor's Certification Concerning Labor Standards and Prevailing Wage Requirements, executed by the lower tier subcontractor(s), in duplicate.

The workmen will report for duty on or about _____
(date)

3. He certifies that:

_____ a) The legal name and the business address of the undersigned are:

_____ b) The undersigned is:

- (1) _____ A Single Proprietorship
_____ A Partnership
_____ A Corporation Organized in the State of **CONNECTICUT**
_____ Another Organization (describe)

c) The name, title, and address of the owner, partners or officers of the undersigned are:

NAME/TITLE	ADDRESS

d) The names and addresses of all other persons, both natural and corporate, having a substantial interest in the undersigned, and the nature of the interest are (if none, so state):

NAME	TITLE	NATURE OF INTEREST

e) The names, addresses and trade classifications of all other building construction contractors in which the undersigned has a substantial interest are (if none, so state):

NAME	TITLE	TRADE CLASSIFICATION

Social Security No. Or _____

Federal Employer I.D. No. _____

Date: _____

BY _____

(Contractor)

WARNING

U.S. Criminal Code, Section 1010, Title 18, U.S.C., provides in paragraph: "Whoever, makes, passes utters or publishes any statement, knowing the same to be false... shall be fined no more than \$5,000 or imprisoned not more than two years, or both."

See HUD 4010 attached

CONTRACTOR'S CERTIFICATION
CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS

To (Department, Agency, or Bureau)

Date

c/o

Project Number

Project Name

1. The undersigned, having executed a contract with _____
for the construction of the above-identified project, acknowledges that:
- a) The Labor Standards provisions are included in the aforesaid contract;
 - b) Correction of any infractions of the aforesaid conditions, including infractions by any of his subcontractors and any lower tier subcontractors, is his responsibility;

2. He certifies that:

- a) Neither he nor any firm, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary of Labor, Part 5 (29 CFR, Page 5) or pursuant to Section 3(a) of the Davis-Bacon Act, as amended (40 U.S.C. 276a-2(a)).
- b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor of such subcontractor or any form, corporation, partnership or association in which such subcontractor has a substantial interest is designated as an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

3. He agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards and Prevailing Wage Requirements executed by the subcontractors.

4. He certifies that:

a) The legal name and the business address of the undersigned are:

b) The undersigned is:

- _____ A Single Proprietorship
- _____ A Partnership
- _____ A Corporation Organized in the State of _____
- _____ Other Organization (describe)

c) The name, title, and address of the owner, partners or officers of the undersigned are:

NAME	TITLE	ADDRESS

d) The names and addresses of all other persons, both natural and corporate, having a substantial interest in the undersigned, and the nature of the interest are (if none, so state):

NAME	ADDRESS	NATURE OF INTEREST

e) The names, addresses and trade classifications of all other building construction contractors in which the undersigned has a substantial interest are (if none, so state):

NAME	ADDRESS	NATURE OF INTEREST

Social Security No. Or _____

Federal Employer I.D. No. _____

Date: _____

BY: _____
(Contractor)

WARNING

U.S. Criminal Code, Section 1010, Title 18, U.S.C., provides in part: "Whoever, makes, passes utters or publishes any statement, knowing the same to be false...EHHA shall be fined no more than \$5,000 or imprisoned not more than two years, or both."

INSTRUCTIONS FOR COMPLETING CERTIFIED PAYROLL

General: The use of the Certified Payroll (WH-347) is not mandatory. This form has been made available for the convenience of contractors and subcontractors required by Federal or Federally-aided construction contracts to submit weekly payrolls. Properly filled out, this will satisfy the requirements of Regulations Part 3 and 5 (29 CFR Subtitle A) as to payrolls submitted in connection with contracts subject to the Davis-Bacon and related Acts.

This form meets needs resulting from the amendment of the Davis-Bacon Act to include fringe benefits provisions. Under this amended law, the contractor is required to pay not less than fringe benefits as predetermined by the Department of Labor, in addition to payment of not less than the predetermined wage rates. The contractor's obligation to pay fringe benefits may be met either by payment of the fringes to the various plans, funds, or programs, or by making those payments to employees as cash.

This payroll provides for the contractor's showing on the face of the payroll all monies paid to the employees, whether as basic rates or as cash in lieu of fringes, and provides for the contractor's representation in the statement of compliance on the rear of the payroll that he is paying to other fringes required by the contract and not paid as cash in lieu of fringes. Detailed instructions concerning the preparation of the payroll follow:

Contractor or Subcontractor: Fill in your firm's name and check appropriate box.

Address: Fill in your firm's address:

Column 1 - Name, Address, and Social Security number of Employee: The employee's full name must be shown on each weekly payroll submitted. The employee's address must also be shown on the first week in which the employee works on the project. The address need not be shown on fringe amounts predetermined as fringe benefits in the wage decision made part of the contract. See "FRINGE BENEFITS" below.

FRINGE BENEFITS - Contractors who pay all required fringe benefits: A contractor who pays fringe benefits to approved plans, funds, or programs in amounts not less than were determined in the applicable wage decision of the Secretary of Labor shall continue to show on the face of the payroll the basic cash hourly rate and overtime rate paid to his employees just as he has always done. Such a contractor shall check paragraph 4(a) of the statement on the reverse of the payroll to indicate that he is also paying to approved plans, funds or programs not less than the amount predetermined as fringe benefits for each craft. Any exceptions shall be noted in Section 4(c).

Contractors who pay no fringe benefits: A contractor who pays no fringe benefits EHHA shall pay to the employee, and insert in the straight time hourly rate column of the payroll, an amount of fringe benefits determined for each classification in the applicable wage decision. Inasmuch as it is not necessary to pay time and a half on cash paid in lieu of fringes the overtime rate EHHA shall be not less than the sum of the basic predetermined rate

plus the half time premium on basic or regular rate. In addition, the contractor shall check paragraph 4(b) of the statement on the reverse of the payroll to indicate that he is paying fringe benefits in cash directly to his employees. Any exceptions shall be noted in Section 4(c).

Use of Section 4(c) Exceptions: Any contractor who is making payment to approved plans, funds or programs in amounts less than the wage determination requires is obliged to pay the deficiency directly to the employees as cash in lieu of fringes. Any exceptions to Section 4(a) or 4(b), whichever the contractor may check, shall be entered in Section 4(c). Enter in the Exception column the craft, and enter in the Explanation column the hourly amount paid to plans, funds, or programs as fringes. The contractor shall pay and shall show that he is paying to each such employee for all hours worked (unless otherwise provided by applicable determination) on subsequent weekly payrolls unless his address changes. Although not required by Regulations Parts 3 and 5, space is available in the name and address section so the Social Security numbers may be listed.

Column 2 - Withholding Exemptions: This column is merely inserted for the employer's convenience and is not a requirement of Regulations, Parts 3 and 5.

Column 3 - Work Classifications: List classifications descriptive of work actually performed by employees. Consult classifications and minimum wage schedule set forth in contract specifications. If additional classifications are deemed necessary, see Contracting Officer or Agency representative. Employee may be shown as having worked in more than one classification provided accurate breakdown of hours so worked is maintained and shown on submitted payroll by use of separate line entries.

Column 4 - Hours Worked: On all contracts subject to the Contract Work Hours Standards Act enter as overtime hours all hours worked in excess of 40 hours a week.

Column 5 Total: Self explanatory

Column 6 - Rate of Pay, including Fringe Benefits: In straight time box, list actual hourly rate paid the employee for straight time worked plus, cash in lieu of fringes paid the employee. When recording the straight time hourly rate, any cash paid in lieu of fringes may be shown separately from the basic rate. This is of assistance in correctly computing overtime. See "Fringe Benefits" below. In overtime box show overtime hourly rate paid plus any cash in lieu of fringes paid the employee. See "Fringe Benefits" below. Payment of not less than time and one half the basic or regular rate paid is required for overtime under the Contract Work Hours Standards Act of 1962. In addition to paying not less than the predetermined rate for the classification in which the employee works, the contractor shall pay to approved plans, funds, or programs or shall pay as cash in lieu of Federal or Federally assisted project an amount not less than the predetermined rate plus cash in lieu of fringes as shown in Section 4(c). The rate paid and amount of cash paid in lieu of fringe benefits per hour should be entered in column 6 on payroll. See paragraph on "Contractors who pay no fringe benefits" for computation of overtime rate.

Column 7 - Gross Amount Earned: Enter gross amount earned on this project. If part of the employee's weekly wage was earned on projects other than the project described on the payroll, enter in column 7 first the amount earned during the week on all projects, thus \$63.00/120.00.

Column 8 - Deductions: Five columns are provided for showing deductions made. If more than five deductions should be involved, use first 4 columns, show the balance of deductions under "Other" column, show actual total under "Total Deductions" column, and in the attachment on the payroll describe the deductions contained in the "Other" column. All deductions must be in accordance with the provisions of the Copeland Act Regulations, 29 CFR, part 3. If the employee worked on other jobs in addition to this project, show actual deductions from his weekly gross wage, but indicate that deductions are based on his gross wage.

Column 9 - Net Wages Paid for Week: Self-explanatory

Totals - Space has been left at the bottom of the column so that totals may be shown if the contractor so desires.

Statement Required by Regulations, Part 3 and 5: While this form need not be notarized, the statement on the back of the payroll is subject to the penalties, provided by 18 UBC 1001, namely possible imprisonment for 5 years or \$10,000.00 fine or both. Accordingly, the party signing this required statement should have knowledge of the facts represented as true.

Space has been provided between items (1) and (2) of the statement describing any deductions made. If all deductions made are adequately described in the "Deductions" column above, state "See Deductions column in this payroll". See paragraph entitled "FRINGE BENEFITS" above for instructions concerning filling out paragraph 4 of the statement.

PERMISSIBLE PAYROLL DEDUCTIONS

The following payroll deductions may be made without requesting approval:

(a) Any deduction made in compliance with the requirements of Federal, State, or local law, such as Federal or State withholding income taxes and Federal social security taxes.

(b) Any deduction of sums previously paid to the employee as a bona fide prepayment of wages when such prepayment is made without discount or interest. A "bona fide prepayment of wages" is considered to have been made only when cash or its equivalent has been advanced to the person employed in such manner as to give him complete freedom of disposition of the advanced funds.

(c) Any deduction of amounts required by court process to be paid to another, unless the deduction is in favor of the contractor, subcontractor, or any affiliated person, or when collusion or collaboration exists.

(d) Any deduction constituting a contribution on behalf of the person employed to funds established by the employer or representatives of employees, or both, for the purpose of providing either from principal or income, or both, medical or hospital care, pensions or annuities on retirement, death benefits, compensation for injuries, illness, accidents, sickness, or disability, or for insurance to provide any of the foregoing, or unemployment benefits, vacation pay, savings accounts, or similar payments for the benefit of employees, their families and dependents: Provided, however, that the following standards are met: (1) The deduction is not otherwise prohibited by law; (2) it is either: (a) voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of or for the continuation of employment, or (b) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees; (3) no profit or other benefit is otherwise obtained, directly or indirectly, by the contractor or subcontractor or any affiliated person in the form of commission, dividend, or otherwise; and (4) the deductions EHHA shall serve the convenience and interest of the employee.

(e) Any deduction contributing toward the purchase of United States Defense Stamps and Bonds when voluntarily authorized by the employee.

(f) Any deduction requested by the employee to enable him to repay loans to or to purchase EHHA shares in credit unions organized and operated in accordance with federal and State credit union statutes.

(g) Any deduction voluntarily authorized by the employee for the making of contributions to governmental or quasi-governmental agencies, such as the American Red Cross.

(h) Any deduction voluntarily authorized by the employee for the making of contributions to Community Chests, United Givers Funds, and similar charitable organizations.

(i) Any deductions to pay regular union initiation fees and membership dues, not including fines or special assessments. Provided, however, that a collective bargaining agreement between the contractor or subcontractor and representatives of its employees provides for such deductions and the deductions are not otherwise prohibited by law.

U) Any deduction not more than for the "reasonable cost" of board, lodging, or other facilities meeting the requirements of section 3(m) of the Fair Labor Standards Act of 1938, as amended, and Part 531 of Title 29, Code of Federal Regulations. When such a deduction is made the additional records required under Section 516.25(a) of Title 29, Code of Federal Regulations, and EHHA shall be kept.

ACCEPTABLE APPRENTICESHIP PRACTICES

1. To be eligible to employ apprentices, any contracting organization engaged in any part of the construction of a federally-assisted project must be able to identify itself as a participant in the state or federally-approved apprentice training program.

These apprentice training programs are of two general types:

(a) An area-wide program covering a specific trade (or trades) supervised by a joint committee representing the participating contractors and local union. In such cases, the participating contractor can obtain evidence that the program and the apprentices he employs thereunder have been properly registered.

(b) An individual program involving one company, with or without a bargaining agreement. In this case, the contractor should have in his own files a copy of the registered apprenticeship program or apprenticeship agreement with the State Apprenticeship Agency or, where none exists, with the Bureau of Apprenticeship, U.S. Dept. of Labor.

2. For a contractor or any subcontractor to be eligible to employ an apprentice on any federally-assisted project, he must:

(a) Be certain that his apprentice training program (including a program operated by a Joint Apprenticeship Committee in which he is a participant) and all apprentices to be employed on the project are registered with the appropriate apprenticeship agency and that he has, or can easily obtain, proof of such registration.

(b) He must submit to the appropriate Town official with his payrolls evidence of the registration of each apprentice the first time such apprentice's name appears on a payroll.

Evidence of such registration may be any one of the following: A true or photo-static copy of the apprenticeship agreement showing the approval of the appropriate state or federal apprenticeship agency; a list of apprentices, including those employed by the contractor, showing approval of the appropriate apprenticeship agency and respective dates of registration; a written statement from a member of a Joint Apprenticeship Committee not a party to the project contract certifying that the named apprentices are employed under the supervision of the JAG and are registered with the named or federal apprenticeship agency.

3. The responsibility for enforcing the requirements set forth in 1 and 2 above rests directly on the general contractor, not only with respect to his own employees, but with respect to the employees of any subcontractor under his general contract.

4. The Bureau of Apprenticeship and some of the State Apprenticeship Agencies maintain field representatives in the heavily populated areas. The state or federal apprenticeship representatives are currently informed concerning apprenticeship training practices in their areas. They are available to provide information to contractors seeking to set up apprentice programs consistent with the standards of the state or federal registration agency. They are also available to provide information and assistance to Town officials upon request.

INSERT PAYROLL FORM ATTACHED

General Decision Number: CT190008 02/15/2019 CTB

Superseded General Decision Number: CT20180008

State: Connecticut

Construction Type: Residential

County: Hartford County in Connecticut.

RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015.

If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.S (a) (1) (ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a) (2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019
1	01/18/2019
2	02/15/2019

ELEV0091-00101/01/2019

Rates		Fringes
ELEVATOR MECHANIC.....	53.37	33.705+a+b

FOOTNOTE:

a Vacation: 6%/under5 years based on regular hourly rate for all hours worked. 8%/over 5 years based on regular hourly rate for all hours worked.

b PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

ENGI0478-006 04/05/2015

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Backhoe/Excavator 2 cubic yards and over.....	\$ 37.23	23.05
Backhoe/Excavator under 2 cubic yards; Rubber Tire		
Backhoe/Excavator.....	\$36.49	23.05
Bulldozer (Rough Grade Dozer)	\$35.20	23.05
Bulldozer Fine Grade	\$36.49	23.05
Combination Hoe and Loader..	\$35.51	23.05
Loader (3 cubic yards up to 7 cubic yards)	\$35.20	23.05
Loader (7 cubic yards or over)	\$37.55	23.05
Loader (under 3 cubic yards)	\$34.03	23.05

a. PAID HOLIDAYS: New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday.

* ROOF0009-005 01/01/2019

	Rates	Fringes
ROOFER		
Composition.....	\$ 37.00	20.57
Slate and Tile.....	\$ 37.50	20.57

SFCT0676-002 04/01/2017

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....		
	\$ 43.92	15.84

a. PAID HOLIDAYS: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

SHEE0040-003 07/01/2018

	Rates	Fringes
SHEET METAL WORKER.....	\$ 37.50	36.79

SUCT2002-003 12/16/2008

	Rates	Fringes
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CARPENTER, Including Drywall Hanging	S. 15.50	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 21.22	0.00
DRYWALL FINISHER/TAPER	\$ 16.25	2.70
ELECTRICIAN	\$ 19.99	2.00
LABORERS		
Common or General	\$ 13.09	1.63
Landscape...•.	\$ 14.96	4.63
PAINTER: Brush and Roller, Excludes Drywall Finishing/Taping.....	\$ 15.33	1.56
PLUMBER/PIPEFITTER (Including HVAC Pipe Installation)	\$ 16.67	2.63

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate

(weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicating that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CSA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) Is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W. Washington,
DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requester considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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Schedule of Amounts for Contract Payments

U.S. Department of Housing
and Urban Development
Office of Public and Indian Housing

OMB Approval No. 2577-0157
(Exp. 1/31/2017)

No progress payments shall be made to the contractor unless a schedule of amounts for contract payments in accordance with the construction contract is received.

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. This agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless that collection displays a valid OMB control number.

Construction practices and HUD administrative requirements establish the need that LHA maintain certain records or submit certain documents in conjunction with the oversight of the award of construction contracts for the construction of new low-income housing developments or modernization of existing developments. These forms are used by HAs to provide information on the construction progress schedule and schedule of amounts for contract payments. Responses to the collection of information are required to obtain a benefit or to retain a benefit. The information requested does not lend itself to confidentiality.

Project Name and Location	Project Number
---------------------------	----------------

Name, Address, and Zip Code of Contractor

Nature of Contract	Contract Number		
Approved for Contractor by	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:60%;">11119</td> <td style="width:40%;">Date (mm/dd/yyyy)</td> </tr> </table>	11119	Date (mm/dd/yyyy)
11119	Date (mm/dd/yyyy)		
Approved for Architect by	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:60%;">11119</td> <td style="width:40%;">Date (mm/dd/yyyy)</td> </tr> </table>	11119	Date (mm/dd/yyyy)
11119	Date (mm/dd/yyyy)		
Approved for Owner by	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:60%;">11113</td> <td style="width:40%;">Date (mm/dd/yyyy)</td> </tr> </table>	11113	Date (mm/dd/yyyy)
11113	Date (mm/dd/yyyy)		

It. N:1 (1)	Description of Item (2)	Quantity (3)	Unit of Measure (4)	Unit Price in Place (5)	Amount of Sub-Item (6)	Amount of Principal Item (7)

Total Amount of Contract or Carried Forward	\$
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To the best of my knowledge, all the information stated herein, as well as any information provided in the accompaniment here with, is true and accurate. **Warning:** HUD will prosecute false claims and statements. Conviction may result in criminal and/or civil penalties. (18 U.S.C. 1001, 1010, 1012; 31 U.S.C. 3729, 3802)

Signature of authorized representative	Date signed (mm/dd/yyyy)
--	--------------------------

Instructions for Preparation of form HUD-51000

1. A separate breakdown is required for each project and prime contract instructions for preparation are given below.
 - a. **Heading.** Enter all identifying information required for both forms.
 - b. **Columns 1 and 2.** In column 1, enter the item numbers starting with No. 1, and in column 2 enter each principal division of work incorporated in the contract work.
 - (1) **Master List.** The Master list contains the basic items into which any construction contract may be subdivided for the purpose of preparing the Construction Progress Schedule and the Periodical Estimates for Partial Payments. Only those items EHHA shall be selected which apply to the particular contract. To ensure uniformity, no change EHHA shall be made in the item numbers. Generally, about 25 to 40 major items appear in a contract.
 - (2) **Items Subdivided.** In the Contractor's breakdown, against which all periodical estimates will be checked prior to payment, each major item must be subdivided into sub-items pertinent to the project involved and in agreement with the Contractor's intended basis for requesting monthly payments.
 - c. **Column 3.** Enter the total quantity for each sub-item of each principal division of work listed in the breakdown.
 - d. **Column 4.** Enter the appropriate unit of measure for each sub-item of work opposite the quantities described in column 3, such as "sq. ("tons," "lb.," "lumber per M/BM," "brickwork per M," etc., applicable to the particular sub-item. Items shown on "lump sum" or equivalent basis will be paid for only on completion of the whole item and not on a percentage of completion basis.
 - e. **Column 5.** Enter the unit price, in place, of each sub-item of work.
 - f. **Column 6.** Enter the amount of each sub-item obtained by multiplying the quantities in column 3 by the corresponding unit prices in column 5.
 - g. **Column 7.** Enter the amount of principal item only, obtained by adding the amounts of all sub-items of each principal division of work listed in column 6. Continue with the breakdown on form HUD-51000.
 - h. The "Schedule of Amounts for Contract Payments" EHHA shall be signed and dated in the space provided at the bottom of each sheet of the form by the individual who prepared the breakdown for the Contractor.
2. The minimum number of copies required for each submission for approval is an original and two copies. When approved, one fully approved copy will be returned to the Contractor.

Master List of Items

Item No.	Division of Work	Item No.	Division of Work	Item No.	Division of Work
	Bord	2)	Rough Carpentry		Site Improvements
21	General Conditions \1	21	Metal Bucks	44	Retaining Walls
	Demolition & Clearing	22	Caulking	45	Storm Sewers
	Structures	23	Weatherstripping	46	Sanitary Sewers
	General Excavation	24	Lath & Plastering-Drywall	47	Water Distribution System
	Footing Excavation	25	Stucco	48	Gas Distribution System
	Backfill	26	Finish Carpentry	49	Electrical Distribution System
	Foundation Piles & Caissons	27	Finish Hardware	5)	Street & Yard Lighting Fire &
	Concrete Foundations	28	Glass & Glazing	51	Police Alarm System Fire
	Concrete Superstructures	29	Metal Doors	52	Protection System Street
	Reinforcing Steel	30	Metal Base & Trim	53	Work
	Waterproofing & Dampproofing	31	Toilet Partitions	54	Yard Work
	Spandrel Waterproofing	32	Floors	55	(Other)
	Structural Steel	33	Painting & Decorating	EB	(Other)
	Masonry	34	Screens		Equipment
	Stonework	35	Plumbing	57	EHHades & Drapery Rods
	Miscellaneous & Ornamental Metal	36	Heating	53	Ranges
• •	Metal Windows	37	Ventilating System	Ef:J	Refrigerators
	Roofing	38	Electrical	0J	Kitchen Cabinets & Work Tables
	Sheet Metal	39	Elevators	61	Laundry Equipment
		40	Elevator Enclosures-Metal	62	(Other)
		41	Incinerators-Masonry & Parts		Punch List \2
		42	(Other)	63	Lawns & Planting
		43	(Other)	64	

1 General Conditions should be 3% to 5% of contract amount.

2 Punch List should be approximately 1/2 of 1% or \$30 per dwelling unit, whichever is greater.

Periodic Estimate for Partial Payment

**U.S. Department of Housing
and Urban Development**
Office of Public and Indian Housing

OMB Approval No. 2577-0157
(exp. 1/31/2017)

Submit original and one copy to the Public Housing Agency.
Complete instructions are on the back of this form.

Public reporting burden for this collection of information is estimated to average 3.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. This agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless that collection displays a valid OMB control number.

This information is collected under the authority of Section 6(c) of the U.S Housing Act of 1937 and HUD regulations. HAs are responsible for contract administration to ensure that the work for project development is done in accordance with State laws and HUD requirements. The contractor/subcontractor reports provide details and summaries on payments, change orders, and schedule of materials stored for the project. The information will be used to ensure that the total development costs, identified in the ACC, are kept as low as possible and consistent with HUD construction requirements. Responses to the collection are necessary to obtain a benefit. The information requested does not lend itself to confidentiality.

Name of Public Housing Agency		Periodic Estimate Number	Period From (mm/dd/yyyy) To (mm/dd/yyyy)
Location of Project			Project Number
Name or Contractor			contract Number
Item Number (1)	Description of Item (2)	Completed to Date (3)	

\$

Value of Contract Work Completed to Date (Transfer this total to line 5 on back of this sheet)

\$

Instructions

Headings. Enter all identifying data required. Periodic estimates must be numbered in sequence beginning with the number 1.

Columns 1 and 2. The "Item Number" and "Description of Item" must correspond to the number and descriptive title assigned to each principal division of work in the "Schedule of Amounts for Contract Payments", form HUD-51000.

Column 3. Enter the accumulated value of each principal division of work completed as of the closing date of the periodic estimate. Enter the total in the space provided.

Certifications. The certification of the contractor includes the analysis of amounts used to determine the net balance due. In the first paragraph, enter the name of the Public Housing Agency, the contractor, and the date of the contract. Enter the calculations used in arriving at the "Balance Due This Payment" on lines 1 through 16.

Enter the contractor's name and signature in the certification following line 16.

The latter portion of this certification relating to payment of legal rates of wages, is required by the contract before any payment may be made. However, if the contractor does not choose to certify on behalf of his/her subcontractors to wage payments made by them, he/she may modify the language to cover only himself /herself and attach a list of all subcontractors who employed labor on the site during the period covered by the Periodic Estimate, together with the individual certifications of each.

Certification of the Contractor or Duly Authorized Representative

According to the best of my knowledge and belief, I certify that all items and amounts shown on the other side of this form are correct; that all work has been performed and material supplied in full accordance with the items and conditions of the contract between the (names of owner) _____ and

(date) _____

dated (mm/dd/yyyy) _____ and duly authorized deviations, substitutions, alterations, and additions; that the following is a true and correct statement of the Contract Account up to and including the last day of the period covered by this estimate, and that no part of the "Balance Due This Payment" has been received.

1. Original Contract Amount \$ _____

Approved Change Orders:

2. Additions (Total from Col. 3, form HUD-51002) \$ _____

3 Deductions (Total from Col. 5, form HUD-51002) \$ _____

(net)\$ _____

4 Current Adjusted Contract Amount (line 1 plus or minus net) \$ _____

Computation of Balance due this Payment

5. Value of Original Contract work completed to date (from other side of this form) \$ _____

Completed Under Approved Change Orders

6. Additions (from Col. 4, form HUD-51002) \$ _____

7. Deductions (from Col.5, form HUD-51002) \$ _____

(net)\$ _____

8 Total Value of Work in Place (line 5 plus or minus net line 7) \$ _____

9. Less: Retainage, _____% \$ _____

10. Net amount earned to date (line 8 less line 9) \$ _____

11. Less: Previously earned (line 10, last Periodic Estimate) \$ _____

12. Net amount due, work in place (line 10 less line 11) \$ _____

Value of Materials Properly Stored

13. At close of this period (from form HUD-51004) \$ _____

14. Less: Allowed last period \$ _____

15. Increase (decrease) from amount allowed last period \$ _____

16. Balance Due This Payment \$ _____

I further certify that all just and lawful bills against the undersigned and his/her subcontractors for labor, material, and equipment employed in the performance of this contract have been paid in full in accordance with the terms and conditions of this contract, and that the undersigned and his/her subcontractors have complied with, or that there is an honest dispute with respect to, the labor provisions of this contract.

Name of Contractor

Signature of Authorized Representative

Date (mm/dd/yyyy)

Certificate of Authorized Project Representative and of Contracting Officer

Each of us certifies that he/she has checked and verified this Periodic Estimate No. _____ - that to the best of his/her knowledge and belief it is a true statement of the value of work performed and material supplied by the contractor; that all work and material included in this estimate has been inspected by him/her or by his/her authorized assistants; and that such work has been performed or supplied in full accordance with the drawings and specifications, the terms and conditions of the contract, and duly authorized deviations, substitutions, alterations, and additions, all of which have been duly approved.

We, therefore, approve as the "Balance Due this Payment" the amount of \$ _____

Authorized Project Representative

Date (mm/dd/yyyy)

Contracting Officer

Date (mm/dd/yyyy)

Schedule of Change Orders

U.S. Department of Housing and Urban Development
Office of Public and Indian Housing

OMB Approval No. 2577-0157

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. This agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless that collection displays a valid OMB control number.

This information is collected under the authority of Section 6(c) of the U.S Housing Act of 1937 and HUD regulations. HAs are responsible for contract administration to ensure that the work for project development is done in accordance with State laws and HUD requirements. The contractor/subcontractor reports provide details and summaries on payments, change orders, and schedule of materials stored for the project. The information will be used to ensure that the total development costs, identified in the ACC, are kept as low as possible and consistent with HUD construction requirements. Responses to the collection are necessary to obtain a benefit. The information requested does not lend itself to confidentiality.

Instructions: Contractors use this form for reporting the details of approved Change Orders. Attach an original (or a copy) to each copy of the Periodic Estimate for Partial Payment (form HUD-51001) submission, and send to the Public Housing Agency. Complete all entries. Only Change Orders which bear the signatures required by the contract are to be recorded.

Name of Public Housing Agency	Supporting Periodic Estimate Period For Partial Payment Number From (mm/dd/yyyy) to (mm/dd/yyyy)
Location of Project	Project Number
Name of contractor	contract Number

Approved Change Orders		Additions		Deductions
Change Order Number (1)	Dated (mm/dd/yyyy) (2)	Total Amount of Change Order (3)	Value of Work Completed to Date (4)	Total Amount of Change Order (5)
		\$	\$	\$
Totals		\$	\$	\$

Authorized Project Representative

Date (mm/dd/yyyy)

Previous editions are obsolete.

Schedule of Materials Stored

U.S. Department of Housing
and Urban Development
Office of Public and Indian Housing

OMB Approval No. 2577-0157
(exp. 1/31/2020)

Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. This agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless that collection displays a valid OMB control number.

This information is collected under the authority of Section 6(c) of the U.S Housing Act of 1937 and HUD regulations. HAs are responsible for contract administration to ensure that the work for project development is done in accordance with State laws and HUD requirements. The contractor/subcontractor reports provide details and summaries on payments, change orders, and schedule of materials stored for the project. The information will be used to ensure that the total development costs, identified in the ACC, are kept as low as possible and consistent with HUD construction requirements. Responses to the collection are necessary to obtain a benefit. The information requested does not lend itself to confidentiality.

Instructions: This form is to be used to support the Periodic Estimate for Partial Payment (form HUD-51001). The contractor must prepare a separate schedule for his/her materials and for those of his/her subcontractors. Attach an original (or a copy) to each copy of the Summary of Materials Stored (form HUD-51004). Enter all identifying data and list materials stored. The listing of materials stored must correspond to the arrangement established on the Schedule of Contract Payments (form HUD-51000) and each item will be keyed by corresponding item number. This form must be signed as noted.

Name of Public Housing Agency	Supporting Periodic Estimate for Partial Payment Number	Period From (mm/dd/yyyy) to (mm/dd/yyyy)
Name and Location of Project	Project Number	

Name of General Contractor	Contract Number
----------------------------	-----------------

Name of sub-contractor	HUD contract Number
------------------------	---------------------

Item Number*	Description and Quality	Quantity	Unit of Measure	Unit Price at Site	Total Price
Amount Carried forward		\$			

Total Amount or Amount Carried Forward \$

Prepared by (Contractor's Representative)	Date (mn/dd/yyyy)	Checked by (Owner's Representative)	Date (mm/dd/yyyy)
---	-------------------	-------------------------------------	-------------------

Warning: HUD will prosecute false claims and statements. Conviction may result in criminal and/or civil penalties. (18 U.S.C. 1001, 1010, 1012; 31 U.S.C. 3729, 3802)

Summary of Materials Stored

U.S. Department of Housing
and Urban Development
Office of Public and Indian Housing

OMB Approval No. 2577-0157
(exp. 01/31/2020)

Public reporting burden for this collection of information is estimated to average 2.5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. This agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless that collection displays a valid OMB control number.

This information is collected under the authority of Section 6(c) of the U.S Housing Act of 1937 and HUD regulations. HAs are responsible for contract administration to ensure that the work for project development is done in accordance with State laws and HUD requirements. The contractor/subcontractor reports provide details and summaries on payments, change orders, and schedule of materials stored for the project. The information will be used to ensure that the total development costs, identified in the ACC, are kept as low as possible and consistent with HUD construction requirements. Responses to the collection are necessary to obtain a benefit. The information requested does not lend itself to confidentiality.

Instructions: This form is for the Contractor to summarize the value of materials stored at the site (as shown on the schedule, form HUD-51003). Use a separate line for the contractor and each of his/her subcontractors. Prepare an original and one copy, attach form HUD-51003, and send to the Public Housing Agency with the Periodic Estimate for Partial Payment, form HUD-51001. **Payment Value.** No more than 90 percent of the estimated value of the stored materials will be allowed, and only the net amount will be carried to line 13 on the back of the Periodic Estimate for Partial Payment, form HUD-51001. **Signatures.** This form must be signed by those employees of the contractor and of the Public Housing Agency who prepare and check the Schedule of Materials Stored form HUD-51003.

Name of Public Housing Agency	Supporting Periodic Estimate for Partial Payment Number	Period From (mm/dd/yyyy)	To (mm/dd/yyyy)
Location of Project			Project Number
Name of General Contractor			Contract Number
Name of General Contractor or Subcontractor			Amounts
General Contractor			\$
Subcontractors			\$
			Total
			\$
			Less 10%
			\$
			Net
			\$

Prepared by _____ Date (mm/dd/yyyy) _____ Checked by _____ Date (mm/dd/yyyy) _____

I certify that I or my authorized representatives have examined and checked in detail the invoices representing the cost of materials set forth in appended "Schedule of Materials Stored", form HUD-51003, dated (mm/dd/yyyy) _____ submitted by _____ consisting of _____ sheets with an indicated cost of \$ _____, and find that the net unit prices set forth in the schedule are the same or less than the invoices examined, and that such materials were suitably stored at the site of the development as of (date)(mm/dd/yyyy) _____

Name of Owner _____ By (Authorized Representative) _____ Title _____ Date (mm/dd/yyyy) _____

Warning: HUD will prosecute false claims and statements. Conviction may result in criminal and/or civil penalties. (18 O.S.c.1001.1010, 1012; 31 O.S.c.3729, 3802)

East Hartford Housing Authority- Digital Video Management System Project
April 21, 2019

Closeout Documents

5. That in consideration of the payment of the amount stated in paragraph 1 hereof the undersigned does hereby release the Local Authority from any and all claims arising under or by virtue of this contract except the amount listed in paragraph 2 hereof; provided, however, that if for any reason the Local Authority does not pay in full the amount stated in Paragraph 1 hereof, said deduction shall not affect the validity of this release, but the amount so deducted shall be automatically included under Paragraph 2 as an amount which the Contractor has not released but will release upon payment thereof. The Contractor further certifies that upon payment of the amounts listed in Paragraph 2 hereof, and of any amount which may be deducted from Paragraph 1 hereof, he will release the Local Authority from any and all claims of any nature whatsoever arising out of said contract or modification thereof, and will execute such further releases or assurances as the Local Authority may request.

IN WITNESS WHEREOF, the undersigned has signed and sealed this instrument this

_____ day of _____, 2019

(SEAL)

(name of contractor)

(signature and title of officer)

_____, being first duly sworn on oath, deposes and says, first, that he is the
(affiant)

_____ of the _____, second, that he has read
the (title) (name of contractor)

foregoing Certificate and Release by him subscribed as _____ of the _____
(title) (name of contractor)

Affiant further states that the matters and things stated herein are, to the best of his knowledge and belief, true.

(signature of affiant)

SUBSCRIBED AND SWORN TO BEFORE ME THIS ____ day of _____, 20__ .

(SEAL)

(Notary)

My commission expires _____
(Date)

**Subcontractor/Supplier
Release**

I/We, the undersigned, _____
of _____ President-Treasurer _____ Company of
the Town or City of _____ do hereby release the General
Contractor _____ and Housing Authority
of the _____ of all claims arising under and by virtue
Of Construction Contract dated _____
between the aforesaid parties other than such claims, if any, as are specified accepted by me/us, from
the operation of this Release in stated amounts set forth herein, provided the amount of such accepted
claims are not included in voucher for final payment.

Claims: _____	\$ _____
_____	\$ _____
_____	\$ _____
_____	\$ _____
_____	\$ _____

If none, so state:

By: _____
Title (Duly Authorized)

Notary Public:

Signed and sworn to before me this
_____ day of _____, **2019**

Commission expires _____

CERTIFICATE OF COMPLETION

THIS IS TO CERTIFY that all work and materials have been carefully inspected by duly authorized representatives or agents of the _____ hereinafter called the Local Authority, and that _____, hereinafter called the Contractor, has furnished all labor, materials, and services required for the _____ at _____ located in _____ accordance with the requirements of the Specifications and Drawings and Contract No. _____, dated _____ between the Local Authority and the Contractor.

THIS IS TO CERTIFY:

- 1. That all work covered by this contract, originally required to be completed on _____, was actually completed on _____
- 2. That all changes permitted or required to be made, except minor modifications and field adjustments, have been authorized by written and duly approved Change Orders, and all stop orders have been confirmed and listed in writing;
- 3. That all Proceed Orders have been supported by approval Change Orders equitably adjusting the contract price and/or time, where adjustment is indicated;
- 4. That Change Orders No. _____ constitute the only amendments to the contract price and/or time, and that ALL orders issued in connection with this contract are listed on the attached Schedule;
- 5. That all certificates, bonds, guarantees, warranties, insurance and tests, required under the contract have been furnished or performed;
- 6. That the Local Authority has obtained from the Contractor the attached Certificate and Release, releasing the Local Authority in full from all further claims under this contract;
- 7. That all laborers and mechanics have been paid not less than the minimum wage rates as established in said Contract; and that there have been no claims made for infringement of any patent;
- 8. That no claims of any nature by any laborer, mechanic, subcontractor, materialman, or vendor are outstanding against the Local Authority; and
- 9. That:

Date of completion fixed in contract _____

Date of completion as extended _____

Actual completion date of contract work _____

Original contract price = \$ _____

Authorized additions \$ _____

Subtotal = \$ _____

Authorized deductions excluding Liquidated damages (PAYMENTS TO DATE) ""\$ _____

BALANCE \$ _____

And

- 10. That voucher for final payment in the amount of _____ Dollars (\$0.00) is due and payable.

FORM OF SIGNATURES FOR CERTIFICATES OF COMPLETION

(Name of Local Authority)

By: _____

Title: _____

Date: _____

(Name of Architect)

By: _____

Title: _____

Date: _____

Upgrade Security Systems – Community Room
April 1 , 2019

28 23 00 Specification

28 23 00 - Upgrade Security Systems – Community Room

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PART 1 - GENERAL

1.01 GENERAL

- A. The Owner's general provisions of the Contract, including General and Supplementary Conditions, and Bidding Instructions, apply to this Section.
- B. Project Locations

[Type here]

[Type here]

[Type here]

1. Shea Gardens - 32 Hamilton Rd... East Hartford, CT, 06108
2. Hockanum Park -32 Hamilton Rd, East Hartford, CT 06108
3. Administration Office – 546 Burnside Avenue., East Hartford, CT, 06108

C. Security Equipment Drawings, Details, System Riser Diagram, Device and camera schedules apply to this Section.

1. Project drawings - The security drawings provided with the solicitation to Bidders are diagrammatic only and are not intended to show every detail of construction or arbitrary location of wiring. Each system EHHA shall be complete with minor parts not specifically noted on the drawings, but required for a fully functioning, properly installed system conforming to all state and local codes.
 - a. TY0.01 Title Sheet
 - b. TY0.02 General Notes Legend
 - c. TY1.00 Shea Gardens Device Locations
 - d. TY1. Shea Gardens Wireless Layouts
 - e. TY1.03 Hockanum Device Locations
 - f. TY1.04 Hockanum Wireless Layouts
 - g. TY3.00 Shea Gardens Device Schedule P1
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 - i. TY4.00 Security Installation Details
 - j. TY5.00 Shea Gardens Riser Diagram
 - k. TY5.01 Hockanum Riser Diagram
 - l. TY5.02 Typical Details

1.02

DEFINITIONS:

The following general definitions EHHA shall apply:

1. AFG - Above Finished Grade.
2. AFF - Above Finished Floor.
3. Approved - Unless otherwise stated, materials, equipment or submittals approved by the Owner.
4. Approved Equal - Unless otherwise stated, materials, equipment or submittals approved by the Owner's Representative or Owner. It EHHA shall be the Contractor's burden to prove that any manufacturer other than the ones listed for each product meet or exceed that sections requirements, if submitted.

5. AWG: American Wire Gauge
6. Bidders - Prospective companies approved to submit proposals in response to the enclosed contract documents.
7. BFG - Below Finished Grade
8. CFA - Call for Assistance Station
9. Construction Site Review - A visit to the project site (s) for the purpose of evaluating project progress and compliance with contract documents. Any deficiencies or deviations from the specification will be communicated in writing to all relevant parties
10. Contractor - During the Bid phase, this is the Bidder. After the Bid phase, this will be the Contractor who is selected by the owner and any of its Sub-Contractors to carry out the scope of work outlined within this specification and all associated contract documents.
11. Sub-Contractors: vendors, suppliers or fabricators to perform the work outlined in these contract documents and supporting documentation. The Contractor EHHA shall supply all equipment, labor, material and services necessary to complete the project construction in accordance with the Contract Documents.
12. Coordinate with Existing ADO - This term is used to describe an interconnection between and existing automatic door opener (ADO) and the access control system. This interconnection will be an electric connection of contact closure, however the ADO may be either electromechanical or pneumatic-mechanical operation. Where this term is used within these contract documents, the Contractor EHHA shall plan accordingly to provide an interface with wiring and an isolation relay(s) as described in Part 3, ISOLATION OF DISPARATE SYSTEMS section of this specification.
13. CPU - Central Processing Unit
14. Exposed - Where used in connection with installation of wire, cable, piping or conduit and accessories, EHHA shall mean "visible" or "not concealed."
15. Furnish - Supply and deliver materials
16. Install - Install materials, mount and connect equipment or assemblies.
17. IMC - Intermediate Metallic Conduit-Aluminum
18. 1TB - Invitation to Bid
19. Line Voltage - 110VAC - 240VAC
20. Low Voltage - 50V or less
21. P & I - Purchase and install or provide and install
22. Owner - East Hartford Housing Authority (EHHA)
23. Owner's Representative (Designer) – Reed Hill and Associates
24. PC - Personal Computer
25. Provide - Furnish and Install.
26. Punch List - Report containing documentation associated with deficiencies or deviations from the specification. Punch list items must be corrected to the satisfaction of the Owner or Owner's representative prior to turnover, acceptance and warranty commencement unless otherwise noted (UON).
27. PVC - Poly Vinyl Chloride - PVC Electrical Conduit
28. RAID - Redundant Array of Independent Disks

29. RFP - Request for Proposal
30. Retention - the retaining of recorded video images on a video storage device for a period of time, defined in the number of days.
31. RMC - Rigid Metallic Conduit - Steel
32. RS232: A TIA/EIA standard for asynchronous serial data communications between terminal devices. This standard defines a 25-pin connector and certain signal characteristics for interfacing computer equipment.
33. SMS - Security Management System: Any 1 or more electronic or electromechanical systems comprised to provide a comprehensive system, integrated or not, to manage security related issues and tasks. Systems comprising an SMS can be one or more of the following but not limited to:
 - a. Access Control System (ACS)
 - b. Video Management System (VMS)
 - c. Intrusion Detection System (IDS)
34. ACS "Complete System Test" - In several instances throughout this specification, the Contractor may be required to conduct a comprehensive test of the complete SMS. Where a complete SMS system test is specified, it EHHA shall include the following tasks as appropriate:
 - a. Mechanical inspection of each security portal to ensure that each operates, closes and latches without human intervention.
 - b. Verification of door held open alarms
 - c. Verification of door forced open alarms
 - d. Verification of enclosure tamper alarms
 - e. Verification of all panic alarms
 - f. Verification of all integrated system elements
 - g. System battery checks, verification and replacement as necessary. Ensure all batteries are labeled as to the date of checking and installation.
 - h. Verification of ACS back up by conducting a complete restoral of a "back up" data set in a clinical setting.
 - i. Updating all software and firmware unless doing so may impact the integration of the ACS with other subsystems. In this case, the Owner EHHA shall be provided with options and consequences of proceeding with a software and firmware update.
35. System - Where utilized within this specification EHHA shall refer to ALL systems to be installed within the purview of this scope and specification, irrespective of the individual systems.
36. TCP/IP - Transmission Control Protocol/Internet Protocol
37. TOP - Technical Data Package
38. UON - Unless otherwise noted
39. UPS: Uninterruptible power supply
40. URL: Uniform Resource Locator.
41. UTP: Unshielded Twisted Pair.
42. VMS - Video Management System

43. VMS "Complete System Test" - In several instances throughout this specification, the Contractor may be required to conduct a comprehensive test of the complete VMS. Where a complete VMS system test is specified, it EHHA shall include the following tasks:
 - a. Validation of VMS recording duration per server.
 - b. Provision of screen capture for day time and night time images (after dark) (pre-commissioning testing only).
 - c. Cleaning of all camera domes and housings (inside and out).
 - d. Verification that all VMS and camera software and firmware are installed with the most current manufacturers' release version. In the case of a pre-warranty expiration test or ongoing maintenance service if the upgrade of software or firmware will adversely impact any integration between the VMS and any other system, the Owner EHHA shall be provided with options and consequences of proceeding with a software or firmware update.
 - e. Verification of the functionality of all UPS equipment.
 - f. Validation of all VMS client connectivity and functionality.
 - g. Verification that all cameras are producing images which are correctly framed and focused.
 - h. Running available health monitoring utilities in the VMS software, providing reports and remediation recommendation to the Owner.
 - i. Verification that all cameras are being recorded at the proper settings.
 - j. Verification of all integrated system elements.
44. VPIDS Video based perimeter intrusion detection system.
45. VPN: Virtual Private Network.
46. WAN: Wide Area Network.
47. Wi-Fi: Registered Trademark of WiFi Alliance.

1.03

PROJECT SUMMARY

- A. This Section is intended to specify the requirements for the provision of all equipment, materials, labor, documentation and services necessary to furnish and install an integrated VMS at the East Hartford Housing Authority locations listed above which, will consist of a new video management system (VMS).
- B. Cameras are located as shown on the contract drawings in locations that have been selected to provide both general and specific coverages based on the requirements of the Owner.
- C. The Contractor for EHHA shall provide a rack mounted VMS recording and storage server at the Community Center located at the Shea Gardens Complex for recording and storage. The Server EHHA shall be sized appropriately for the number of cameras to be installed as shown on the contract drawings plus an additional 10% capacity for processing and storage.
- D. The Contractor for EHHA shall provide a rack mounted UPS for each equipment rack provided for powering all equipment located within the equipment rack. The UPS EHHA shall be supplied with an auto- shutdown feature to allow an automatic orderly shutdown of the connected server(s). The auto- shutdown feature EHHA shall be connected to and programmed to shut down, any servers(s) contained within the equipment rack being powered from the UPS.
- E. The Contractor for EHHA shall provide a rack mounted integrated 8 port KVM for each rack location for server administration and setup.

- F. The Contractor shall program camera names and recording parameters to optimize the camera
- G. The Contractor shall program cameras, as required in the contract documents, for video motion detection
- H. The Contractor shall provide and install software for up to five (5) VMS Client Stations.
- I. The Contractor for EHHA shall create a new hardwired and wireless VMS network at the Shea Garden and Hockanum Park locations specifically designed for the transmission and recording of IP based CCTV video streams.
- J. The Contractor for EHHA shall connect the new VMS network to the Owner's existing LAN for connectivity of the client workstations to the VMS recording /archiving server to view live and recorded video.
- K. The video server from the client stations located at the Administration Building location.
- L. Where this connectivity requires a firewall or other gateway device, for access of the Servers through a public network Contractor for EHHA shall furnish, install and program the firewall or gateway device for the connectivity outlined herein.
- M. Aerial cable, hardware and camera brackets mounted to poles for EHHA shall be fastened to the face of the pole by drilling and tapping the pole face or bolting through the pole where fasteners can be reached from within the pole. Banding or strapping of mounts around the pole is acceptable
- N. Cabling for EHHA shall route out of the back of the camera mount and down the pole. The cabling hole through the pole face shall be bushed to prevent chafing and damage to the cable.
- O. Aerial cabling for EHHA shall be supported by means of stainless steel aerial messenger cable. Aerial cabling for EHHA shall be lashed to the messenger by fastening devices designed for the purpose.
- P. The Owner will furnish
 - 1. All client personal computers associated with the VMS.
- Q. For the Shea Gardens Community Center Complex
 - a. A network switch port to connect the VMS network server to the EHHA business network for client station connectivity, live monitoring and playback of recorded VMS images.
 - b. Space for head end vertical equipment rack for VMS equipment.

- R. The following items shall be included as Alternate Deducts:
1. Provide the following spare equipment:
 - a. 5 - Type Fixed lens single sensor Camera as described herein
 - b. 1 - Type multi sensor Camera as described herein
 - c. 1 - IP Camera Surge Suppressor as described herein
 - d. 1 - 26 port PoE+ Network Switch as described herein
 - e. 2 - 6TB Replacement drive for VMS Server

1.04

SYSTEM DESCRIPTION

A. VMS

1. Server

- a. The Contractor shall provide a VMS server, software, and storage for the purpose of processing and storing video at designated diagram location
- b. The VMS server software shall support and be programmed to receive a connection from a Network Time Protocol server for time synchronization across all servers in the system.

2. Client Workstations:

- a. The Contractor for EHHA shall install and program VMS software onto each Owner provided workstation.
- b. The Contractor for EHHA shall install the VMS client software on existing workstations in the following locations:
 1. Shea Gardens – 32 Hamilton Rd. East Hartford, CT:
 1. Office of Jason Van Allen - Facilities / Maintenance Manager
 2. Administration Office – 546 Burnside Avenue, East Hartford, CT:
 3. Office of Frank Healy - IT Director
- c. All client connections for EHHA shall be considered concurrent connections.

2. Privacy Masking:

- a. The Contractor for EHHA shall program a privacy masking zone for each camera that has a window or windows of any tenant unit in its field of view.
- b. Window masking for EHHA shall be set so that no person or object is discernable through the window in the field of view at the satisfaction of owner or owner's representative.

B. Cabling shall be installed in the following manner:

1. Community Center/ Maintenance Complex:

- a. For interior applications where cabling is unable to be concealed / fished in walls and ceilings, horizontal cabling for EHHA shall be run in surface metal raceway such as Wiremold® or approved equal, in hallways and exposed areas and in areas where they may be subject to physical damage.
- b. It is permissible to utilize Wiremold® flexible sections to get around difficult angles. Where used, flexible sections EHHA shall be fastened with two-hole clips so that there is no more than 6" of flexible section between two-hole clips or a two hole clip and an end fastening fitting.

- c. Penetrations for cabling between floors and horizontally between rooms for EHHA shall be made new and installed by the Contractor.
- d. The Contractor for EHHA shall coordinate exact locations of the penetrations with Owner prior to installation.
- e. Penetrations for EHHA shall be appropriately sleeved with EMT that EHHA shall extend to a height of 48" above the finished floor. Cores for EHHA shall penetrate through the floor to a distance of not less than 6" below the finished ceiling of the floor beneath. For horizontal penetrations, sleeves for EHHA shall extend no less than two (2) inches on either side of the wall penetrated.
- f. Sleeves for EHHA shall be fastened in place by means of u-channel strut with appropriately sized channel clips
- g. Sleeves for EHHA shall be sized accordingly to accommodate all cables associated with the VMS but EHHA shall not fill the sleeve to a cross sectional area totaling more than 80% of the total cross sectional area of the sleeve.
- h. Penetrations and sleeves for EHHA shall be appropriately fire stopped around the exterior and interior of the sleeve in accordance with this specification and the instructions provided by the manufacturer of the fire stopping material.
- i. Where installed between sleeves, or traversing horizontal areas where metal raceways are not required, cabling for EHHA shall be contained with and tied to aluminum distribution rings installed at intervals of no less than 18".
- j. Vertical Riser Sleeve to the Equipment Rack:
 - 1. The vertical riser from the overhead to the equipment rack for EHHA shall be no less than 2" EMT.

2. This riser for EHHA shall start at a height of no less than 30" AFF then extend into the overhead of the Community center space where there is no longer a risk for physical damage.
 3. To relieve stress from the wiring hanging inside the vertical riser, the riser for EHHA shall turn at 90 degrees once in the overhead and extend a minimum of 24" once a horizontal segment is established or to the nearest structural support where the end of the riser will be fastened.
 4. Under no circumstances at EHHA shall the horizontal segment be less than 24".
 5. A flexible conduit for shall extend from the lower end of the riser to the equipment rack.
 1. The flexible conduit for EHHA shall be of sufficient length so that the enclosure can be rolled out and accessed from the back.
 2. The flexible conduit for EHHA shall not be installed in the back of the equipment rack in a manner that will prevent the rear door from being operated.
 3. The flexible conduit shall not be installed in the rear door of the equipment rack.
2. Shea Gardens and :Hockanum Park
- a. Cabling at EHHA shall be fished within the eaves and trussed roof structures of all buildings.
 - b. For low voltage cabling where it is necessary to transition from one trussed roof structure to another, an EMT conduit sleeve traversing from vertically from the eaves of one roof structure to the trussed roof structure of another roof is required.
 - c. EMT at EHHA shall be run around soffits, through rake boards, along rake boards and vertically on corner boards to transition from one roof elevation to another.
 - d. No roof penetrations are allowed.
 - e. Line voltage wiring from combination meter / main locations to the equipment enclosure EHHA shall be a minimum of 1" PVC.
 - f. For wiring to poles or from building to building mounted network equipment enclosures, cabling for EHHA shall be installed with aerial guidewires as shown on the contract drawings. The Contractor is responsible for, installation of raceways and surface restoration.
- C. Cameras for EHHA shall be installed in the following manner:
1. Shea Gardens:
 - a. Cameras for EHHA shall be mounted at the transition between the first and second floors pointing in the direction shown on the Contract Drawings.
 - b. Cameras at EHHA shall be mounted above the brick on the vinyl siding section of the sidewall allowing easy accessibility into the soffit at the transition.
 2. Hockanum Complex:
 - a. For cameras viewing entry doors with overhangs, the camera at EHHA shall be mounted at a height that allows the camera view to clearly see under the overhang of the door to be viewed.

- b. For cameras viewing entry doors without overhangs, the cameras at EHHA shall be mounted at approximately 10' AFG.
- D. No device at EHHA shall be mounted on the exterior of a building within 36" of a window that is designed to be opened, doors, porches, balconies, ladders stairs, and fire escapes of similar locations. *Exception: where special permission is granted by the Owner or the Owner's representative.*
- E. Video Management System (VMS)
 - 2. Camera Field of View
 - a. All cameras are shown on the drawings in locations to provide the intended field of view. These locations are not to be adjusted without prior approval. Each fixed camera will be specified with a lens that will provide the intended field of view within its focal length range prior to installation and with acceptance by the owner.
 - b. Camera images will be reviewed with the Owner and/or the Owner's Representative. The Contractor for EHHA shall plan for three adjustments of the camera's field of view as follows:
 - 1. Initial setup and testing
 - 2. Owner and/or Owner's Representative adjustments #1
 - 3. Owner and/or Owner's Representative adjustments #2
 - c. Cameras for EHHA shall also be back focused at night when available utilizing the on-board automatic back focus adjustment tool accessed from either the VMS software or from the IP Camera's IP based Web interface.
 - 3. Browser Based Web Client
 - a. The VMS for EHHA shall be provided with a browser-based web client that will allow authorized users to remotely view live video, playback recorded video, and control cameras via the Internet.
 - b. The VMS for EHHA shall include built-in web server software that is fully integrated with the DVMS software.
 - c. Browser-based access to the system for EHHA shall require the same level of user authentication and passwords as required by the client workstation.
 - d. The Web-client for EHHA shall allow recorded video from cameras to be played back based on time, date or event and EHHA recorded clips to be stored on the user's local computer hard drive.
 - e. At a minimum, the Web-client at EHHA shall allow users to view any combination of cameras in a 2x2 (quad view), 3x3, and 4x4 camera display.
 - 4. Project Camera, Classifications and Types
 - a. Cameras at EHHA shall be installed to meet stated requirements and standards
 - b. Project Cameras are classified and labeled in the device schedule as to their type and functionality. The following performance requirements apply to each classification:
 - 1. C1 - Fixed IP based CCTV mini-dome camera, interior or exterior mounted with 2.5mm-6mm lens, 5MP.
 - 2. C2 - Fixed IP based CCTV micro-dome camera, interior or exterior mounted with 3.3mm-12mm lens, 2 MP.
 - 5. Recording Parameters:

- a. H.264-H265 Recording
 - b. 3IPS for all cameras for non-motion based recording
 - c. 15IPS for all cameras during motion detection based recording
 - d. Full camera resolution during all recording parameters
 - e. 30 day retention
6. Programming:
- a. All VMS Servers at EHHA shall be programmed to monitor all connected cameras for video loss.
 - b. Video loss detection at EHHA shall create an alarm on the VMS, alert any connected workstation and simultaneously, send an email to the system administrator conveying the video loss alarm condition.

1.05 ADDITIONAL REQUIREMENTS

- A. Requests for Information (RFI) - RFIs for submitted for consideration of alternative configurations or equipment at EHHA shall be submitted no later than 10 days prior to the bid opening.
- B. By submitting a proposal, the Contractor agrees to indemnify and hold harmless, to the fullest extent of the law, the Owner, the Owner's Representative and agents and employees from and against any claims, damages, losses and expenses arising from these specifications and associated contract documents.
 - 1. There may arise during the bid process a situation where the plans and specifications do not completely agree or coincide with respect to quality, quantities, capacities, compatibilities (hardware, software and/or any combination of those) and costs with other equipment or supporting contract documents. In the event such a discrepancy exists, the Bidder at EHHA shall notify the owner/design professional prior to submitting the proposal or no relief for EHHA shall be granted after the bid award.
 - 2. For the purposes of preparing the bid submittal, bidders should select the item presenting the higher quality, greater quantity and/or higher cost or capacity unless specifically directed by the Owner in writing prior to the bid submission date.
 - 3. So that the matter may be resolved prior to contract award, Bidders should call attention to the matter by citing it in the "exceptions" portion of the submittal or in a request for clarification by submission of an RFI, 10 days prior to the bid opening.
- C. The Contractor at EHHA shall consider these plans and specifications as containing confidential information of the Owner and EHHA shall not be distributed to anyone without a need to know.
 - 1. The Contractor EHHA shall ensure that these plans and specifications are kept secure at all times and not copied for any reason unless authorized by the Owner and Owner's Representative.
 - 2. The Contractor at EHHA shall restrict disclosure of specific design information to any other duly assigned and authorized sub-Contractor personnel who require such disclosure to perform their work under this Contract.
 - 3. ALL electronic copies of sensitive transmitted documents for EHHA shall be password protected. Passwords at EHHA shall be provided in a separate transmission.

1.06 SUBMITTALS

A. **At the time of the bid**, if requested, the Contractor for EHHA shall submit the following material organized electronically with sections identified and segregated as described below. Three hard copies to EHHA shall be produced and shipped as required. An electronic copy for EHHA shall be emailed to the Owner's Design Representative. Submittals to EHHA shall include:

1. TAB 1 - Background information
 - a. Provide corporate background, history.
 - b. Provide complete contact information for the Contractor's firm with a telephone number and email address to whom clarification questions can be directed.
 - c. Specifically identify in the bid response the name(s) and title(s) of the Bidder's Sales Manager/Sales Person/Estimator who will be responsible for the preparing the bid and answering subsequent questions if they arise during the bid review process.
 - d. Specifically identify in the bid response the name and qualifications of the Bidder's Project Manager assigned to this project, the name of the person to whom the Contractor's on-site technical installation personnel will report and the name of the Contractor's senior technical representative to be assigned to this project.
 2. TAB 2 - Technical Information
 - a. The Contractor **must** acknowledge receipt of all addendums to this RFP in the proposal submission. To accomplish this, bidders to EHHA shall include a statement similar in intent to "the bidder acknowledges the receipt of addendums one through "X" and considered the information provided in those documents in the preparation of this submittal.
 - b. Provide manufacturers' model numbers, quantities and unit costs for all parts proposed under this project. This information for EHHA shall be listed in Appendix C, detailed pricing worksheet. Do not modify Appendix C unless adding or removing rows. Do not change the formulas, do not change the formatting unless for printing purposes and do not add or remove columns. This document for EHHA shall be provided as a soft copy with the bid, in its native Excel format. *Exception: the formula for project management may be changed or deleted and replaced with a Jump sum value rather than calculating a percentage.*
 - c. Provide a summary of suggested changes (if any) to the bid document floor plans and block diagram indicating the architecture of the proposed system or the relationship between the SMS, IDS and VMS. Changes may be submitted for the sole purpose of increasing system functionality and efficiency or reducing costs, however, changes must maintain the minimum specified requirements.
 - d. Manufacturer's printed product data, catalog pages and descriptions of installed equipment and any special installation procedures to be used for the SMS at the Owner's facility. Data sheets to EHHA shall be printed and separated by individual component. No combined or mass grouping of data sheets is acceptable in either physical or electronic submission formats.
 - (a) All data sheets submitted electronically to EHHA shall have a logical filename describing the product that is represented within the data sheet. The file naming convention to EHHA shall be developed with the device category first, followed by the manufacturer, then product model number. Example: for a recessed door contact, the filename would be [Door Contact-UTC-1078].
- 2) Where multiple models or devices exist on one data sheet, a red arrow for EHHA shall identify the exact model number bid.
 - 3) Model numbers for EHHA shall include all prefixes and suffixed to positively

identify the specific part to be provided.

- e. A screen shot image showing the current version of design publishing software that the contractors / engineering staff are currently utilizing.
 - f. A detailed proposed schedule of installation milestones, events, testing and commissioning and turnover for approval by the owner. This should be prepared and submitted in graphical representation citing the complete duration of the construction (e.g. should include provisioning for pre-commission testing, performance testing, 30 day trouble-free operation prior to warranty start up). Refer to TOP 111 for project close out requirements.
3. TAB 3 - Pricing and Base Bid information
- a. Provide a base bid and complete proposal per the enclosed proposal instructions on a firm fixed price system installation and complete system turnover basis per project phase as shown on Appendices B and C. This project may be awarded in whole or in part solely at the Owner's discretion. The detailed portion of the cost worksheet has been marked as proprietary and will be treated as such.
 - b. Appendices B and C will be provided as a single Microsoft Excel Workbook with two Worksheets, one for each Appendix. Appendix B will automatically populate as Appendix C is populated. Note the following when completing the sheet:
 - 1) All labor costs, labor hours allotted per device and equipment costs as bid, to EHHA shall be maintained for 2 years from the date of acceptance of the bidder's proposal. If manufacturer prices increase to the Contractor for EHHA shall be required to provide documentation of the increase to justify an equipment cost increase. No one-time discounts are allowed.
 - 2) For the detailed cost worksheet provided as Appendix B:
 - (a) Provide the manufacturer (Column B) and model number (Column C) for each SMS component.
 - (b) Provide unit costs for all systems components (Column D) and quantities (Column E). Suggested components are populated in the cost worksheet. Update supplied parts as necessary to accurately reflect the Contractors' submittals.
 - (c) Provide the Installation hours per unit for each SMS component (Column G).
 - (d) Provide the per hour values being used for installation labor (Column I). Contractor to provide an hourly rate for work that is performed outside the scope of work defined herein. This will include warranty work on owner provided equipment.
 - (e) In Appendix C provide individual costs for:
 - (i) Project Management and Engineering

- (ii) Training
 - (iii) Freight
 - (iv) Preparation of Record Drawings
 - (f) Ongoing system maintenance for years two through five per the Tab 4 instructions below.
 - 3) Contractor to provide an hourly rate for work that is performed outside the scope of work defined herein. This will include warranty work on owner provided equipment.
 - 4) A schedule of values as to how the Contractor proposes to invoice the Owner for the project. Note that a 10% retainage will be held until all punch list items are corrected and all TOP III expectations are satisfactorily met.
 - 5) A listing of Sub-Contractors proposed for the project and the role of each Sub-Contractor.
 - 6) Return both Appendices in their native Microsoft Excel format.
4. TAB 4 - For ongoing annual and preventative maintenance **for years two through five**, the Contractor for EHHA shall provide pricing for a complete SMS and VMS test (note the owner will execute system repairs on a time and materials basis and the Contractor will be required to meet the expectations defined in the Maintenance and Service section of this RFP):
- a. One complete SMS test
 - b. One complete VMS test
5. TAB 5 - Compliance Affirmation
- a. The Contractor for EHHA shall provide a proposal compliance statement indicating bidder's written agreement with the terms and conditions of the specification.
 - 1) The bidder must submit a completed certification of compliance statement included as Appendix A to the RFP.
 - 2) The Bidder to EHHA shall submit a signed and dated Appendix A, acknowledging they comply with the terms and conditions contained therein.
 - 3) The bidder to EHHA shall list any and all deviations or exceptions to the specification at the bottom of the certification of compliance. Where entries are made, bidders to EHHA shall provide an explanation as to why he takes exception with the particular requirement and what he proposes as a substitution and why.
6. TAB 6 - Capability, Project Experience and References
- a. Submit references for three projects with the bid proposal.
 - 2) Listed projects must be similar in size and system function, completed within the most recent five year period and feature the same major components as proposed for this project.

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- 3) Include a brief project description, the customer contact names, telephone and email addresses for each project reference.
 - 4) Submit references for three customers with active service contracts with the bid proposal. Include a brief project description, customer contact names, telephone and email addresses for each service reference.
- b. Submit the following licensing and certifications with the bid proposal:
- 1) Certificates of training for the technicians, for the products being installed by the individuals who will be assigned to this project. The Contractor for EHHA shall employ, a minimum of:
 - (a) One (1) factory trained and certified installation technician and a minimum of,
 - (b) Two (2) factory trained and certified service technicians.
 - 2) The installation and service technicians required in this section EHHA shall be two (2) Individuals. Individual technicians who have joint duties for the Contractor for EHHA shall only be considered to fulfill on or two (1) of the three (3) required in this section.
- c. Submit sample of publishing software (i.e. Illustrate) to demonstrate capability to produce final record drawings. One or more of the following drawings types for EHHA shall be submitted:
- 1) Title Sheet
 - 2) Floor Plan Drawing
 - 3) Riser Drawing
 - 4) Device Schedule Drawing
 - 5) Drawings and drawing title blocks for EHHA shall be "sanitized" to remove any and all references to a client, specific building name etc.

7. TAB 7 - Communications and Project Management

- a. The Contractor for EHHA shall provide a description of how the project will be managed based on the following elements:
 - 1) Communications and coordination on planned work on a weekly basis to minimize the Owner's working environment
 - 2) Coordination between the sales and technical team to ensure that all of the technical bid documents are in the hands of the installing contract personnel at all times.
 - 3) Progress invoicing per the schedule of values.
 - 4) Plan for management and oversight of subcontractors and coordination with the elevator contractor.

- 5) Confirmation that the Contractor will provide a conference bridge number for weekly or bi-weekly project look-ahead calls.
 - 6) Contractor's strategy for staying out in front of project requirements and not allowing project schedule slippage.
 - 7) Coordination of the training and assessing trainee competency.
 - 8) Coordination with the Owner's IT Department for network security, connectivity, port assignment, accessibility and provisioning of IP addresses.
8. Three hard copy binders of the proposal to EHHA shall be shipped to the Owner at 295 Everett Street, East Hartford, CT.
 9. One complete electronic copy of the proposal EHHA shall be provided to RHA via email, attention Fernando Flores (fflores@reedhill.net). With the exception of product cut sheets, which for EHHA shall be submitted individually, one PDF file of each Tab is requested in order to keep the document size to 5 MB or less. Where file sizes for a single tab exceeds 5 MB, the file to EHHA shall be broken up further into subsections so that each subsection is less than 5 MB. Subsections EHHA shall be labeled with a suffix of a, b, c, d etc. until all subsections are accounted for.

B. After contract award and prior to purchasing equipment;

1. Pre-Construction Meeting
 - a. A pre-construction meeting will be scheduled after the selection of the Contractor.
 - b. Items to submit at Pre-Construction Meeting
 - 1) Contact information for key project personnel (e.g. project manager, engineer, technicians, trainers, Sub-Contractors)
 - (i) Name
 - (ii) Title
 - (iii) Phone number
 - (iv) Email address
 - 2) Insurance certificates required by Owner for the Prime and all Sub-Contractors.
 - 3) The pre-construction meeting with EHHA shall be used at a minimum to revise and fine-tune the project installation, training, commissioning and turnover schedule. The revised schedule for EHHA shall be due by TOP submission. Additionally, it shall be used to coordinate with the Owner's design representative to incorporate Construction Site Review visits by the design representative, into the project schedule.
2. Contractor for EHHA shall provide three documentation submissions on a schedule, which will be determined, that consist of the following:
 - a. Technical Data Package (TOP) I, II, III.
 1. TOP I EHHA shall be submitted in concert with the project shop drawings
 2. TOP II EHHA shall be submitted during the construction and system implementation work phase BUT prior to programming, training and final testing.

3. TOP III EHHA shall be submitted and approved prior to the final commissioning of the system.
 - (a) Project retainage will not be released prior to the approval of TOP III.
3. The Contractor for EHHA shall submit product and device samples as requested by the owner.
4. The Contractor for EHHA shall bear all liability and penalties for damages arising from his failure to submit equipment that meets these Specifications.
5. Final determination of compliance with these contract documents and specifications for EHHA shall rest with the owner, who, at its discretion, may require proof of performance.
 - a. Required proof may include, but EHHA shall not be limited to, visits by the project manager and other owner representatives to sites where identical equipment is installed and providing use consistent with the intentions of these contract documents.

C. Technical Data Package I Submission Requirements:

1. At a minimum all TOP I submittals will be uploaded electronically to the project FTP site as directed by the Owner's representative.
2. Project Planning:
 - a. Verification of Site Conditions - a report outlining site conditions and any areas of concern of that need special coordination for access, or site work.
 - b. Project Schedule
 - (1) Provide an updated project schedule that identifies target dates for product ordering, start of installation.
 - (2) The Owner's representative will provide dates of projected construction site reviews to insert into the project schedule (refer to definitions for purpose of construction site reviews).
 - c. Implementation Plan - a description of the approach to the project. This should follow the Project Schedule closely but expand upon and provide more detail to the high level tasks outlined in the Project Schedule.
 - d. Schedule of Values - for EHHA shall be broken down by major task inclusive of labor and materials for that task. This document will be utilized for invoice verification.
 - e. Permits - submit copies of any permits required for the project by the local authorities.
 - f. Insurance - Provide certificates of insurance for the Contractor and any sub-Contractors utilized to perform work in concert with this specification.
3. Data Sheets
 - a. Furnish physical and electronic copies of manufacturer's color printed product data, catalog pages and descriptions of proposed equipment and any special installation procedures to be used for the system(s) at the owner's facilities.
 - b. Miscellaneous data sheets for wire, cable; terminal block connector's. Marking and identification provisions applied at the time of bid EHHA shall apply here as well.
 - c. Provide equipment quantities and model numbers for all equipment being proposed. All model numbers should include any prefixes and/or suffixes which

the manufacturer utilizes to indicate minor modifications, variations or unique characteristics of the specific unit proposed to be provided. An explanation of all prefixes and suffixes at EHHA shall be included.

- d. Data sheets for EHHA shall be printed double sided in full color, separated by individual component/device.
 - 1. No combined or mass grouping of data sheets is acceptable in either physical or electronic submission formats.
 - 2. All data sheets submitted electronically for EHHA shall have a logical filename describing the product that is represented within the data sheet. The file naming convention for EHHA shall be developed with the device category first, followed by the manufacturer, then product model number. Example: for a recessed door contact, the filename would be [Door Contact-UTC-1078]. For an overhead door contact the filename would be [Door Contact-UTC-2207ADL]
 - a. Where multiple models or devices exist on one data sheet, a red arrow or highlight for EHHA shall identify the exact model number bid. The markings must be clear and unequivocal.
 - b. Provide a manufacturer's data or spec sheet and an MSDS for all chemicals and similar substances to be utilized on this project.
 - 1. This is to include all fire stopping, waterproofing and similar compounds.
 - (a) Indicate the purpose for which each compound will be utilized.
 - (b) Prior to substituting or using additional products, the above listed information must be provided to the owner.
 - c. If, during the bid phase, the bidder, who is awarded this contract, has correctly submitted the data sheets in the format requested, those cut sheets will be accepted to fulfill this requirement.
 - 1. The successful bidder to EHHA shall bear the responsibility of populating the FTP site with these files. Access will be provided after the contract is awarded.
 - 2. Incomplete or missing cut sheets will be noted as such during the initial TOPI review process.
4. Configurations & Calculations:
- a. Servers & Workstation minimum requirements. Where a "low, medium, high" server and workstation scenario exists, the requirements for ALL servers & workstations for EHHA shall be provided.
 - b. Infrastructure Requirements – at EHHA shall include:
 - (1) Network
 - (c) The Contractor for HHA shall provide an inventory of requirements as they relate to IP address needed from the Owner.
 - (b) Data network drops, patch panel and network switch port assignments.

- (c) Network bandwidth requirements for all network connected equipment.
 - (d) Other network infrastructure items as required.
- 5. Locking hardware and door hardware submittal:
 - a. Provide a door hardware schedule detailing each piece of electromechanical and non-electrified locking hardware to be installed.
 - b. This schedule to EHHA shall detail this information on a per location basis.
 - c. No locking hardware or door hardware work at EHHA shall commence until this hardware submittal has been reviewed and approved by the Owner and/or Owner's Representative.
 - d. Approval of the hardware submittal does not release the Contractor from the responsibility of providing a functional locking solution that allows the door(s) to close, lock and release properly.
 - e. This schedule may be included as a drawing schedule or a spreadsheet listing out each location and associated hardware.
- 6. Drawing Package
 - a. Prepare and submit complete Shop Drawings in the manner described herein. Shop Drawings to EHHA shall include all necessary rack elevation drawings, wiring diagrams and connectivity points of all equipment. Shop drawings at EHHA shall be required of all SMS devices including all peripheral alarm devices, access control devices, magnetic door contacts, electric locking devices, power supplies and request to exit devices and related equipment.
 - b. Drawings for EHHA shall be created in publishing software a version that is no older than two releases from the most current released version. Drawings submitted for this requirement at EHHA shall be submitted in PDF format.
 - c. ALL drawings for EHHA shall be provided in a landscape format with the same title block.
 - d. Provide a title sheet and legends that indicate device types, symbols abbreviations and manufacturers' model numbers. The title sheet for EHHA shall be provided as the front page of the Shop Drawing package. This shall include the project title, owner's company name, Security Contractor's company name, system designer's company name, legends and notes as applicable. If an additional page for legends and notes is desired it may be on the second page of the Shop Drawing package
 - e. Drawing sheet numbers for EHHA shall be identical to the bid set of drawings. Where additional sheets are added in addition to what was provided in the bid set, the sheet numbers for EHHA shall follow the same format and be incremented in a logical fashion.
 - f. The Security Contractor at EHHA shall provide a Device and Wiring Schedule as part of the Shop Drawings showing the individual SMSNMS device type, wiring type, device location, associated panel(s) location, and alarm zone for wiring and connection of all interior and exterior SMSNMS devices.
 - g. Complete wire path drawings, showing all proposed wire paths for EHHA shall be submitted to the owner for approval:

- 1) No work will be initiated until the wire path submittals have been approved for that site.
 - 2) All wire runs must be completed as shown on the approved wire path drawings
 - (a) Should field conditions necessitate that the actual wire paths deviate from those submitted and approved, the owner must be contacted, the difficulty explained and permission to modify the wire paths be requested
 - 3) A copy of the approved wire path drawings must be in the possession of all field technicians when wire is being installed.
 - (a) Should a site inspection be made by the owner, or the owner's representative and the on-site personnel do not have the correct wire path drawings, work may be stopped until they are obtained and delivered to the site.
- h. Complete and legible legends should be provided for each of the documents or one sheet at the front of the drawing package documenting this information.
 - i. Provide a "one-line riser" diagram, which shows the system as proposed, with device counts accurately depicted..
 - j. Provide mounting details, indicating mounting, protective housing, etc.
 - k. Provide wiring diagrams and point wiring schematics to panels, indicating utilized inputs and spare inputs
 - l. Details of connectors to power sources, including power supplies

D. Technical Data Package II Submission Requirements:

1. At a minimum all TOP II submittals will be uploaded electronically to the project FTP site as directed by the Owner's representative.
2. Training Materials
 - a. Provide lesson plans and training manuals for the training phases, including type of training to be provided.
 - b. Provide a list of reference material, which shall be delivered for approval by the owner's representative.
 - c. Provide operation manuals for the system.
3. Programming Data Sheets
 - a. The Contractors at EHHA shall prepare programming data sheets to be utilized for owner approval of programming conventions, naming or otherwise, and shall be submitted as record documentation at the commencement of the project.
 - b. The Contractor for EHHA shall identify and request any additional programming data needed to provide a complete and operational SMS. Any requests for additional programming data to EHHA shall be made least 10 days prior to the Contractor's scheduled need date.
 - c. The Contractor for EHHA shall confirm the programming data and obtain approval from the Owner.

- d. Programming data and Owner acceptance will be verified during commissioning and deficiencies recorded in the punch list.
- 4. Pre-Commissioning Test Procedures
 - a. Prepare test reports for the performance verification test, including any tests conducted on all project wiring.
 - b. Pre-commissioning test sheets will be provided, which will outline testing procedures for each component installed. One sheet for each portal or location to EHHA shall be completed and submitted to the project FTP site.
 - c. The Contractor for EHHA shall deliver the performance verification test procedure to the owner or owner's representative for approval. After receipt by the Contractor of written approval of the test procedures, the Contractor may schedule the tests.
 - d. The Contractor for EHHA shall provide a report detailing the results of the field test as specified in the "Contractor's Field Testing" section of this specification. The final performance verification report to EHHA shall be delivered after completion of the tests.
- 5. Draft Copy - Operations & Installation Manuals - The Contractor for EHHA shall provide a draft copy of the operation and maintenance manuals, as specified for the Technical Data Package III EHHA shall be delivered to the Owner prior to beginning the performance verification test for use during site testing.
- 6. Draft Copy - Record Drawings for verification during the final commissioning walk through.
- 7. Warranty Matrix
 - a. Provide a matrix listing the manufacturers' warranty for all SMS components. The matrix for EHHA shall indicate the number of days or years for which the component is warrantied.

E. Technical Data Package III Submission Requirements, as defined in PART 3 - EXECUTION:

- 1. Operations and Installation Manuals
- 2. Operations Manuals
- 3. Installation Manuals
- 4. Maintenance instructions
- 5. Record Drawings
- 6. Record Documents and Electronic Files

1.07 REFERENCES AND CODE REQUIREMENTS

- A. The Systems at EHHA shall be installed in accordance with all applicable national, state, provincial, regional and local codes and standards, including, but not limited to the most current issue of the following publications, including all amendments thereto of the issue that is current on the date of the contract award. Where conflicts exist between the Contract Documents and the referenced publications, local codes EHHA shall govern. All equipment at EHHA shall be U.L. listed or meet U.L. requirements for its intended use. Applicable requirements of the following publications to EHHA shall apply to the work under this specification as if fully written herein.
 - 1. Institute of Electrical and Electronic Engineers (IEEE)
 - 2. National Electric Code® (NEC)

3. National Fire Protection Association National Electric Code® (NFPA 70)
4. National Fire Protection Association National Fire Alarm Code® (NFPA 72)
5. National Fire Protection Association Life Safety Code (NFPA 101)
6. Uniform Construction Code (UCC) of Pennsylvania
7. Americans with Disabilities Act (ADA)
8. Underwriters Laboratories (UL) Applicable Standards for Safety
9. EIA/TIA Standards 569 and 606 (Commercial Building Wiring Standard and Administration Standard for the Telecommunications Infrastructure of Commercial Buildings)
10. National, State, and Municipal Building Codes and all other Authorities having Jurisdiction
11. ANSI C62.41 (surge suppression)
12. Generally accepted good workmanship practices

1.08 COMPLETION

- A. The Contractor for EHHA shall substantially complete the SMS installation according to the established target date to the facility by the Owner. Substantially complete is defined as the security system being operational locally.
- B. A point to point test of all parts of the system will be required for acceptance. System acceptance testing will establish system operability and the warranty commencement date, and will be completed and documented by Contractor and an owner representative.

1.09 QUALITY ASSURANCE

- A. Installer Qualifications: The successful bidder will be an employer of workers and sub-contractors trained and approved by manufacturer.
 1. Work specified herein at EHHA shall be the responsibility of a single electronic security systems integration Contractor.
 2. Contractor for EHHA shall document a minimum of five years' experience in the fabrication, assembly and installation of systems of similar complexity as specified herein.
 - a. This requirement for EHHA shall apply equally to suppliers and manufacturers of the security subsystems and major components to be used on this project. The documentation for EHHA shall include the names, locations, and points of contact for at least three installations of the type and complexity specified herein.
 3. Materials, devices and/or equipment that is installed, maintained, serviced, programmed, etc. by a single representative due to proprietary equipment and/or manufacturer region exclusive agreements shall not be acceptable. All equipment proposed by the Contractor at EHHA shall be available through two (2) dealer/installer representatives.
 4. The Contractor for EHHA shall have local in-house engineering and project management capabilities consistent with the requirements of the Work. The Contractor for EHHA shall provide a full-time Project Manager who is to be present on site at all times that Work is actively in progress. This person at EHHA shall be the same individual throughout the course of the project and shall be the person responsible for system programming, preparation of Operation

and Maintenance Manuals, training programs and schedules and test protocols, documentation of system testing, maintenance of Record Documentation and coordination and scheduling of all subcontract labor (as applicable). The owner reserves the right to approve the Contractor's Project Manager.

5. By submitting a bid, the Contractor thereby certifies that Contractor and Sub-Contractors are qualified in all areas pertaining to, either directly or indirectly, the Work. In the event the Contractor becomes unable to complete the Work in accordance with the Contract Documents, or the satisfaction of the owner or its representatives, due to a lack of understanding of equipment, systems or services required by the Contract Documents, it \ shall be the responsibility of the Contractor to retain the services of the applicable manufacturers' representatives to expeditiously complete the Work in accordance with the owner's construction schedule with no additional cost to the owner.
6. The Contractor for EHHA shall have a fully staffed office including a service center capable of providing comprehensive maintenance and service to the security system for the project. The Contractor for EHHA shall staff the service center with factory trained technicians and adequately equip the office to provide emergency service within four (4) hours after being called, twenty-four (24) hours per day, whether or not the owner elects to purchase a maintenance contract from the Contractor.
7. The Contractor for EHHA shall ensure compliance with, and have a thorough understanding of, all local codes and contract conditions pertaining to this project.

1.10 PRODUCT STANDARDS

- A. Within the technical specifications for the Security Management System, certain manufacturers have been specified. For those manufacturers listed as "Available Manufacturers" the Contractor is encouraged to substitute manufacturers and models that may be more cost effective or readily available than that specified.
- B. All substitutions for EHHA shall meet or exceed the minimum functional and technical specifications.
 1. Acceptance of such substitutions is at the discretion of the owner. For those manufacturers listed as "Manufacturers" the Contractor to EHHA shall submit products from one of the manufacturers listed.
- C. Provide at the time of installation the latest version of all equipment and software.
 1. Discontinued equipment at EHHA shall not be acceptable.

1.11 DELIVERY, STORAGE, AND HANDLING

A. VMS Hardware

1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50° and 85° Fahrenheit, and not more than 80% relative humidity, non-condensing.
2. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
3. Mark packing list with designations that have been assigned to materials and equipment for recording in the system labeling schedules that are generated by cable and asset management system specified in Part 2.
4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.12 PROJECT CONDITIONS

A. Environmental Conditions: System for EHHA shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Interior, Controlled Environment: System components, installed in temperature- controlled interior environments EHHA shall be rated for continuous operation in ambient conditions of 36° to 122° Fahrenheit dry bulb and 20% to 90% relative humidity, non- condensing. NEMA 250, Type 1 enclosure.
2. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments EHHA shall be rated for continuous operation in ambient conditions of 0° to 122° Fahrenheit dry bulb and 20% to 90% percent relative humidity, non-condensing. NEMA 250, Type 4 enclosures.
3. Exterior Environment: System components installed in locations exposed to weather EHHA shall be rated for continuous operation in ambient conditions of -30° to plus 122° degree F dry bulb and 20% to 90% relative humidity, condensing.
 - a. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 85 mph. NEMA 250, Type 4X enclosures.

1.13 TROUBLESHOOTING

- A. The Contractor is responsible for providing system troubleshooting and bench testing as necessary to ensure proof of concept.
- B. Failure on the part of the Contractor to provide adequate troubleshooting and bench testing to ensure component compatibility and adhere to the requirements listed below, does not relinquish the responsibility for a complete and operational system nor does it provide a means by which a change order may be issued for troubleshooting or remedial bench testing.
- C. If a non-compatibility is suspected, the Contractor for EHHA shall notify, in writing, the Owner's Representative and document the following:
 1. Identification of the faulty condition leading to the determination by the Contractor that the components are incompatible.
 2. Documentation from the manufacturer and the Contractor indicating that the incompatibility or issue has been reviewed and that all equipment has up to date firmware and software.

3. Cost to implement corrective actions or components that correct incompatibilities.
4. Impact to the installation schedule to implement the changes.
5. Where components are required to be replaced, submission of component datasheet(s) and approval from the Owner's Representative is required prior to ordering or implementing the solution.

1.14 WARRANTY

- A. The project will not be deemed "complete" until all phases are installed and fully operational, with the final testing completed and the cleanup "punch list" compiled and completion dates assigned to each deficiency. In the event that a sizable punch list develops, at the option of the Owner, it may be required that some, or all, unsatisfactory items are corrected prior to final acceptance.
- B. The Contractor for EHHA shall warrant to the Owner that it is the Owner of the equipment (provided by the Contractor) and that the equipment will be free and clear of any lien or encumbrance on the final acceptance date.
- C. Manufacturer's software support agreements to EHHA shall be provided for the first year for all servers and clients. The cost of the support agreements EHHA shall be included in the base bid.
- D. Where the manufacturers' equipment is warranted by the manufacturer for a period of longer than one year, the additional equipment warranty for EHHA shall be passed along to the Owner at no additional charge. This information to EHHA shall be documented in the Warranty Matrix submitted as part of TDPII.
- E. The Contractor for EHHA shall provide all services required and equipment necessary to maintain the entire Systems in an operational state as specified for a period of one year after formal written acceptance of the system, and shall provide all necessary material required for performing scheduled adjustments or other nonscheduled work consistent with the guidelines set forth in the MAINTENANCE AND SERVICE section of this specification.
- F. The Contractor for EHHA shall warrant from the final acceptance date agreed by the Owner that all security equipment and labor provided in the system(s) will, under normal use and service, be free from defects and faulty workmanship as stated below:
 1. The warranty at EHHA shall be one year from the final acceptance date or match the manufacturers' warranty, whichever is greater
 2. Power supplies and transformer equipment at EHHA shall have a three (3) year warranty
 3. Warranty coverage will not begin until completion of both of the two following conditions (As long as these two conditions have been satisfied, regardless of the sequence, or whether they overlap, warranty coverage may begin.): When legal Ownership of the system has passed to the Owner. This will not occur until the all portions of the acceptance testing process have been completed and the system has been deemed as "passed." The point that some devices, or portions of the project, may be powered up for testing, training, burn in, debug or for other purposes, prior to the execution of the acceptance test shall not imply that acceptance or legal Ownership has taken place.
 4. After thirty (30) consecutive days of trouble free operation. "Trouble free operation" at EHHA shall be defined as when the system is in full, normal, operation and when no problems or outages of the system occur, which cannot be traced to an outside cause.
 - a. The occurrence of an outage or other disruption which cause a failure, or a shutdown of the system, or which requires a service call to restore operability will reset the 30 day clock described in the preceding subsection, and cause it to restart when the system is once again operational.

5. The warranty coverage inception date will commence as described above.
 - a. Multiple coverage beginning dates, or initiating coverage on devices as soon as they are individually installed under the "beneficial use" scheme, or early warranty kickoff ploy, will not be permitted.
- G. The Contractor's obligation under this warranty is to repair or replace defective equipment, parts, and associated labor thereto at the Contractor's expense.
 1. The programming and/or configuration of the repaired or replaced parts are to be performed in concert with the repair and/or replacement of said parts.
 2. The Contractor for EHHA shall warrant that replacement or repaired equipment furnished hereunder and labor to EHHA shall be in accordance with current industry standards.
- H. The foregoing warranty does not extend to the equipment or any part thereof which has been subjected by the Owner to unauthorized modification, movement, misuse, neglect, or accident, faulty installation, maintenance, or repairs performed by the Owner or a third party.
 1. This applies to Systems equipment used in violation of instructions provided by Contractor as well as removal, defacement, or alteration of the date of manufacture or manufacturer's serial number.
 2. This includes increased or additional warranty service requirements for the equipment resulting from Owner's connection of devices, which are incompatible with the equipment, or to any other external cause not attributable to defects in material or workmanship on the part of Contractor.
- I. The Owner (EHHA) shall be granted a nontransferable fully paid license to use all software provided by the Contractor as part of the security equipment under terms established by the software manufacturer.
 1. The Owner will be provided with a copy of all applicable licenses and the Contractor shall warrant that it has the right to grant such licenses.
- J. Warranty service at EHHA shall not be assigned or transferred to any agent or other Contractor without prior knowledge being given to the Owner not less than fourteen days (14) prior to such action.
- K. Pre-Warranty Expiration & Test: Prior to the 1 year warranty expiration date the Contractor for EHHA shall provide a complete system test of ALL devices and software included under this contract, to include the following:
 1. Test all SMS workstations for proper functionality and access to all software and hardware components.
 2. Test card readers for proper read range, function and LED indication of valid and invalid card reads.
 3. Test for alarm conditions, held open, forced open, alarms from monitor points.
 4. Test for trouble conditions, loss of 120VAC power, loss of battery, power supply fault, fire alarm notification.
 5. Locking hardware to include electrified and non-electrified hardware and door closers installed under this contract.
 6. Test all VMS workstations for proper functionality and access to all software and hardware components.

7. Ensure desired retention times for video images are being met.
8. Run health monitoring statistics reports to ensure system is performing with optimal operation.
9. Where applicable, initiate an autofocus on the VMS Cameras
10. The Contractor for EHHA shall conduct this test between months 10 and 11 of the warranty expiration date and EHHA shall be complete no later than 15 days prior to the 12-month warranty expiration date.
11. The Contractor for EHHA shall produce a report to the Owner stating which devices did not pass the test then commence warranty service on defective devices.
12. The requirements of this section shall be a line item option in the bid submission.

1.15 MAINTENANCE AND SERVICE

- A. The Contractor for EHHA shall have and provide a telephone number that is staffed on a 24 hour, 365 day basis, or connected to a monitoring location which EHHA shall answer that number on a 24 / 365 basis.
- B. Repairs - Repair or replacement service throughout the lifecycle of this project and contract shall be performed in accordance with the following parameters:
 - a. For failures associated with major system components defined as servers, client applications badge printing operations or network connected access control panels, the Contractor's maintenance personnel shall be on-site within four hours from the time the owner reports a system failure if the Contractor is notified between 7 A.M. and 4 P.M. Monday through Friday.
 1. All failures shall be corrected within eight (8) hours of the arrival of the Contractor's service personnel.
 - b. For all other system component failures the Contractor's maintenance personnel shall be on-site within eight hours from the time the owner reports a system failure if the Contractor is notified between 7 A.M. and 4 P.M. Monday through Friday.
 1. All failures shall be corrected within twenty four (24) hours of the arrival of the Contractor's maintenance personnel.
- C. The Contractor for EHHA shall keep records and logs of each repair.
 1. A continuous log at EHHA shall be maintained for the SMS. The log at EHHA shall contain calibration, failures, repairs made, and programming data.
 2. Complete logs shall be kept and shall be available for inspection on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for the Systems.
 3. The Contractor shall separately record each service call request, as received.
 4. The form shall include the serial number identifying the component involved, its location, date and time the call was received, nature of trouble, names of the service personnel assigned to the task, instructions describing what has to be done, the amount and nature of the materials to be used, the time and date work started, and the time and date of completion.

5. The Contractor shall deliver a record of the work performed within 5 days after work is accomplished.

D. Penalties

1. Failure of the Contractor to provide appropriate response within the specified time period shall result in the imposition of a penalty against the Contractor.
2. For major system failures,
 - a. For technician late arrival to the site, the penalty will be for each hour, or fraction thereof, in excess of four hours; the Contractor shall credit the Owner with one (1) Hour of current service labor cost. Appropriate response shall be defined as the arrival on site of a technically certified and qualified service representative, who is trained, equipped and experienced to repair, said problem or malfunction.
 - b. For late correction of system failures, the penalty will be for each hour, or fraction thereof, in excess of twenty-four hours, the Contractor shall credit the Owner with one (1) hour of current service labor cost.

E. Preventative Maintenance

1. Preventative maintenance and system testing and inspection activities (as defined in specification section relating to services for years two through five) shall be conducted once between months ten (10) and twelve (12) within the first year warranty cycle and for each year the Owner wishes to purchase this service for years two through five. This service shall be coordinated and scheduled with the Owner. For the first year, all findings from this system test and inspection shall be addressed as warranty matters with the exception of neglected or accidentally damaged equipment. If the owner contracts with the Contractor for services after the year one (1) warranty expiration, these services shall be coordinated with the Owner at the beginning of each service year or as otherwise agreed.
2. The adjustment and repair of the Systems includes all computer equipment, software updates, communications transmission equipment, local processors, facility interface, and support equipment. Provide the manufacturer's required adjustments and other work as necessary.
3. After each annual test and inspection, all test results for each door and device shall be documented (indicating pass, fail and if failures are reported, the exact deficiency) and supported by VMS output event reports.
4. Leave proof of service.
5. The Contractor shall prepare an estimate of costs to repair any deficiencies discovered in the course of the test.
6. The Contractor shall make recommendations for system modification in writing to the Owner. No system modifications, including operating parameters and control settings shall be made without prior approval of the Owner. Modifications made to the systems shall be incorporated into the operations and maintenance manuals and other affected documentation.
7. The Contractor shall provide software updates automatically the first warranty year and upon approval of the Owner in subsequent years based upon an extended service agreement, if negotiated. These updates shall be accomplished in a timely manner, be fully coordinated and approved by the Owner, and shall be incorporated in the operations and maintenance manuals and software documentation. There shall be at least one scheduled update near the end of the first year's warranty period, at which time the VMS

Contractor shall install and validate the latest released version of the manufacturer's software.

8. Maintenance and repair service (post warranty) shall not be assigned or transferred to any agent or other Contractor without prior knowledge being given to the Owner not less than fourteen days (14 days) prior to such action.

PART 2.00 - PRODUCTS

2.01 PRODUCT STANDARDS

The technical specifications for the VMS are for Exacqvision Enterprise Servers. No substitutions are allowed. Provide at the time of installation the latest version of all equipment, software and firmware. Discontinued equipment shall not be acceptable.

- A. Acceptance of substitutions, based on submittal documents furnished by the Security Contractor, \ shall only be construed as permission to proceed with the installation pending final test and approval of the system. The Security Contractor shall continue to bear the liability for replacement of substituted equipment if, in the opinion of the Owner, the substitute equipment fails to perform as specified within three (3) months after scheduled project completion.
- B. Units of the same type of equipment shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's model and serial number in a conspicuous place. All parts, other than small hardware items and fittings, but not including locks, latches, strikes, card readers, ETC. shall be of the same model throughout the course of this project.

2.02 PRODUCT SELECTION

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
- B. Manufacturers: Subject to compliance with requirements, or provide products by one of the manufacturers specified.

2.03 VIDEO MANAGEMENT SYSTEM (VMS) SOFTWARE

- A. The Video Management System ("VMS") shall be a software package for comprehensive management of live and recorded video, and associated audio and data.
- B. General Functionality- The VMS shall possess the following general characteristics:
 - 1. Provide effective monitoring of video from IP cameras and encoding devices, two-way audio and data in real time over local and wide area networks
 - 2. Data integration from retail and access control systems
 - 3. Interactive mapping
 - 4. Single-screen administration across multiple servers and systems, including:
 - 5. Global configuration and monitoring of camera, encoder, and storage settings across the enterprise
 - 6. Administration of all users on multiple servers
 - 7. E-mail and text (SMS) notifications
 - 8. Automatic identification and IP address assignment of compatible IP cameras and encoders with status display
 - 9. Open architecture supporting IP cameras and encoders and access control systems from multiple manufacturers

10. Available client software to allow remote access to live and recorded video, including access from mobile devices
11. Support simultaneous access to video from multiple servers
12. Virtual matrix functionality
13. Provisioned as a service without requiring any application to be running in order to operate
14. 2-way audio support between server, client, and camera

C. Architecture

1. The VMS shall have a client/server-based architecture that can be configured as a standalone VMS with the client software running with equal functionality on the server hardware and/or the client running on any network-connected TCP/IP workstation.
2. User Interfaces - The VMS shall support installed client and web client interfaces.
 - a. The VMS shall record and retrieve video, audio and alarm data and provide it to the VMS clients upon request.
 - b. Installed client characteristics:
 1. Downloadable at no charge from the Manufacturer's web site
 2. Fully compatibility with all available features of the VMS server software
 3. View live video and audio, recorded video and audio and be able to configure the complete system all from a single application.
 4. Add and remove features based on the permissions of the user and the licensed functionality.
 - c. PC Web Client - The web client interface shall operate without requiring installation of any software.
 1. Functions:
 - (a) View live video
 - (b) View recorded video
 - (c) Control pan-tilt zoom (PTZ) cameras
 - (d) Activate triggers
 - (e) Allow connections to multiple VMS servers simultaneously
 - (f) The VMS server shall be able to transcode video into a JPEG file sized for compatibility with the browser screen before sending it to the client browser.
 - (g) The web client shall be capable of decoding JPEG and H.264 video streams.
 - d. Mobile web client - A free mobile application shall be available from the Manufacturer.
 1. The mobile application shall support Apple IOS, Google Android, and Microsoft Windows Mobile operating systems.
 2. Functions:

- (a) Remote view of live and recorded video through the Video Server
 - (b) PTZ control and the monitoring and activation of alarms and events from the mobile device.
 - (c) Simultaneous interaction with multiple NVR, server, and storage devices from the Manufacturer
 - (d) Monitoring of events configured by a Client
 - b. The web service supporting the mobile application shall size the video stream to accommodate both low bandwidth and high bandwidth networks.
 - 3. The VMS software shall allow the user to have any combination of VMS client applications running on any of the supported operating systems and be able to connect to any of the VMS servers running on any of the supported operating systems.
 - a. Multiple client workstations shall be capable of simultaneously viewing live and/or recorded video from one or more servers.
 - 4. The VMS software shall have the capability to run multiple client applications simultaneously on one workstation with multiple monitors.
 - a. Up to 12 monitors shall be configurable on a single workstation with one (1) client application running on each monitor.
 - 5. Multiple servers shall be able to simultaneously provide live and/or recorded video to one or more workstations.
 - 6. The VMS server software shall have the ability to be installed on an IP edge device such as an IP camera or encoder that allows for 3rd party applications-allowing the device to serve as both a server and IP video recording device.
- D. Specific Functionality - The VMS shall have the following elements:
- 1. Video Streaming
 - a. Video formats supported: MJPEG, MPEG-4, H.264, H265
 - b. Each video stream shall have the ability to be recorded, viewed live, saved to views, exported, and available in search and playback.
 - c. Streams shall be individually configurable for recording schedules, storage rules and
 - d. Multistreaming - The VMS shall allow the setting of multiple, independent video streams from the IP camera, each configurable for frame rate, resolution and quality level.
 - 1. Streams shall be able to be recorded, viewed live, saved to views, exported, and available in search and playback.
 - 2. All streams can be individually configurable for recording schedules and storage rules.
 - 2. Recording
 - a. Functions:
 - 1. Continuous, uninterrupted and unattended recording of all video and audio transmitted to the VMS, including during times of administration and configuration of any feature

2. Recording triggered by video motion detection within a defined region of interest of the camera's view
 3. configurable recording of video prior to the detection of the motion
 4. Record video based on metadata generated by an edge network device and included in the video stream sent to the VMS server
 5. Configure each video input's recording time on an hourly basis, to further allow the user to schedule when to record on motion, when to record on event and when to not record
- b. File system and operations:
1. The VMS shall use the operating system's native file system for recording the video.
 2. The video file shall contain the data of the video, audio, and associated metadata.
 3. **The index file shall contain the index of the metadata from the network device.**
 4. When the VMS searches for video, it shall retrieve and display the information in the index files.
 5. When a client requests to display the video, the VMS shall transmit the video file data from the server to the client
- c. Bookmarking
1. A bookmarking feature shall allow the tagging, naming, and retention of video clips.
- d. Recording Storage
1. Content
 - (a) The VMS shall provide for recording of video as well as associated audio and data files, as determined by rules, events, or manual selection.
 - (b) The VMS shall support recording video based on the following classifications
 - i. Free run video (all video)
 - ii. Time-lapse video @ 1frame per second or less
 - iii. Video associated with motion events as detected by the device
 - iv. Video associated to triggered alarm states as configured by event linking
 - (c) The VMS shall support the configuration of unique weekly recording schedules per camera
 - (d) The VMS shall support a graphical representation of drive status for associated RAID-based storage.
 2. Storage Types
 - (a) The VMS shall support local HOD disk storage

- (b) The VMS shall support iSCSI extended storage whereby a remote storage unit can appear as a local drive.
- 3. Storage Retention
 - (c) The VMS shall support configurable "At Most" rules that will automatically delete video for a camera after a specified amount of time.
 - (d) The VMS shall support configurable "At Least" rules that will delete newer video on other cameras to preserve older video from cameras with an "at least" rule specified.
- e. Video Archiving
 - 1. Content
 - (a) The VMS shall provide for the archival of video, audio, and data files, as determined by rules, events, or manual selection.
 - (b) Each archive target has its own set of rules for what cameras and video are archived and when.
 - 2. Location
 - (a) The VMS shall support CIFS and NFS network res for archive target locations
 - (b) The VMS shall be able to archive video to multiple locations and base the archive on camera, event type, or an archive schedule.
 - 3. Schedules - The VMS shall be able to archive continuously or on a scheduled basis.
 - (a) Archive tasks shall continue until completion of the current requirement or terminate at a scheduled time.
 - (b) Weekly schedules shall be supported.
 - (c) Multiple schedules may be combined to derive specific schedules.
- 3. Events - The VMS software shall use events to initiate desired actions, including the following:
 - a. Events:
 - 1. Video motion, operating on the encoded video
 - 2. Video loss of analog video signals
 - 3. ASCII input string, including POS information
 - 4. Device, server, and system health
 - 5. IP camera connection
 - 6. Software initiated trigger through VMS display
 - 7. Analytics rule
 - 8. Date and time
 - b. Actions:
 - 9. Record video

10. Output trigger
 11. Output analog video
 12. Send an email
 13. Support SSL and TLS protocols for encrypted communications
 14. Burn a CD/DVD
 15. Call a camera PTZ preset
- c. Users shall have the ability to create rules based on a combination of events.
 - d. The VMS client shall be configurable to automatically switch views on any event within the event monitoring function.
4. Search and Playback (from Client interface) - This function shall allow a user to:
 - a. Search and play back recorded video, audio and events from VMS servers
 - b. Search and play back video from multiple cameras simultaneously in a synchronized multi-camera layout
 - c. Search recorded video based on time, date, video source and image region, with results displayed as both a clickable timeline and a series of thumbnail images
 - d. Search and play back audio in synchronization with video
 - e. Search a specific area of recorded video to display only frames where motion occurred
 - f. Perform a visual thumbnail search, selecting one image per cameras per set time period
 1. Play video from selected image
 2. Zoom in to a time range around selected image
 - g. Archived video shall be seamlessly searched during any video search eliminating the need for a user to separately search the archive location.
 5. Video and information display
 - a. The VMS shall have a live display mode, wherein a user shall be able to view live video, live audio, point of sale (POS) data, and alarm information.
 - b. The VMS shall allow users to view multiple video streams per device, depending on the device's streaming capability.
 - c. The VMS client shall be able to use OpenGL and Direct 3D to decompress and render video.
 - d. The VMS shall allow viewing of cameras in logical groups and preset views.
 1. Views shall save the location of video streams, audio streams, POS data, maps and event views.
 2. Views shall be accessible in both live and recorded video modes.
 3. The VMS shall be able to automatically cycle through two or more saved views to create a video tour, with a configurable dwell time for each view.
 - e. The VMS shall allow the viewing of live video from guard tour sequences.
 - f. The VMS shall support the use of a panoramic lens on an analog or IP camera.

1. The VMS client shall de-warp the image on both live and recorded video.
- g. The VMS shall be able to organize the camera video view panel in the following layout patterns:
 1. 1-camera (full-screen)
 2. 4-camera (2x2)
 3. 8-camera (1 large view and 7 small views)
 4. 10-camera (2 large views and 8 small views)
 5. 13-camera (1 large view and 12 small views)
 6. 16-camera (4x4)
 7. 8-camera (1 very large view and 7 small views)
 8. 9-camera (3x3)
 9. 6-camera (2x3) widescreen
 10. 12-camera (4x3) widescreen
 11. 20-camera (5x4) widescreen
 12. 30-camera (6x5) widescreen
 13. 48-camera (8x6) widescreen
 14. 16:9 display panels
 15. Custom
- h. The VMS shall allow the customization of the user interface to display software (soft) triggers and initiate actions.
 1. The VMS shall also display the status of any soft triggers on connected VMS servers.
- i. Overlay controls shall appear when hovering over a camera in live view
 1. Appearance: text color, font, style, transparency, location
 2. Control types: audio inputs and outputs, alarm outputs, input events, soft triggers, serial data, manual record
- j. System information shall be capable of display on a single page to include the following:
 1. Status of all servers and cameras currently connected
 2. Alarms, events, MAC addresses, camera configuration, format and frame rate from each individual camera
- k. The VMS shall be able to display the following additional system information:
 1. Users currently logged in to the system
 2. Plug-in file version information number and status
 3. System log containing a detailed history of system processes
- l. The VMS shall creation of user views, based on the permission level of the user.
6. Pan Tilt Zoom (PTZ)

- a. The VMS shall allow control of PTZ cameras to authorized users and be used to maneuver and zoom a PTZ camera at adjustable speed.
 - b. When used on a non-PTZ camera, the VMS shall allow a user to digitally pan, tilt and zoom on any video, whether in live or recorded mode.
 - c. The VMS shall allow following methods of controlling a PTZ camera to be available:
 - 1. PTZ graphics control windows
 - 2. Live graphic overlay PTZ control icons
 - 3. Keyboard control (up, down, left, right arrows; page up, page down for zoom)
 - 4. PTZ presets
 - 5. Digital PTZ
 - 6. USB joystick
 - 7. Proportional PTZ control using a mouse
7. Mapping
- a. The VMS shall have a map capability, accessible to users with the appropriate permission levels.
 - b. The map capability shall provide for the following:
 - 1. Display video sources and their status.
 - 2. Place, view and activate soft triggers from a map
8. Export
- a. The VMS software shall have the capability to export video, maps, POS data and audio files, without overwriting previous exports.
 - 1. Export file formats supported: .exe, .avi, .ps, .mov, .psx
 - b. The VMS software shall have a feature to export a video segment from specific cameras or audio inputs to a CD or DVD upon an event.
 - c. VMS standalone player
 - 1. The VMS standalone player shall package all of the exported video into a single executable file.
 - 2. The VMS standalone player shall be able to authenticate that the video has not been tampered with using a keyed Hash Message Authentication Code (HMAC).
9. Administration and Configuration
- a. User administration functions:
 - 1. Permissions
 - (a) Authenticate the user's permission level by
 - i. Active Directory or LDAP
 - ii. Combination of user name and password

- (b) Allow for a user's permissions to be configured across multiple servers from a single screen
 - (c) Allow granularity of permissions by creating custom user groups toll have the same permissions
 - 2. Audit - record an audit trail of when users log in that shows what changes they have made, what video they have viewed and what they have exported
 - b. Third-party integrations - supported methods: command line, API, web SDK
 - c. Server updates: local and remote
 - d. Client updates: automatic check
 - e. Configuration functions:
 - 1. Video devices - allow the configuration of the video devices to be performed in the client and pushed out to the devices
 - (a) Store camera settings on both the camera and the VMS
 - (b) Configure the following camera properties on supported cameras:
 - i. Wide Dynamic range
 - ii. Auto-Focus
 - iii. Flip/mirror/rotate
 - (c) Users shall have the ability to create logical groups of cameras connected to one or more systems.
 - (2) Video recording - configuration of rules to set the maximum or minimum number of days on a per video stream basis
 - (3) Storage - select and configure drives to use for recording video, including local drives, direct attached storage drives or iSCSI drives
- E. Performance
- 1. Compatibility
 - a. Video - The Video Server shall be compatible with the following manufacturer: Exacqvision.
 - b. Access control - The Video Server shall be compatible with the following access control manufacturers: AMAG, Brivo, CDVI, CEM Systems, DSX, G4S, Gallagher, ICT, Identicard, Infinias, Inner Range, Kantech, Keyscan, Lenel, Maxxess, Open Options, Paxton, PCSC, RBH Access, R2 Technologies, S2 Security and Software House.
 - c. POS and retail analytics - The Video Server shall be compatible with the following POS and retail analytics manufacturers: Micros, Agilence, Sensormatic, Prism Skylabs, Tokheim and Voloforce.
 - d. PSIM - The Video Server shall be compatible with the following PSIM manufacturers: ConnectOne, Honeywell, NICE, Proximex, SureView Systems and VidSys
 - 2. Cameras per server
 - a. IP: 128

3. Number of simultaneous clients per server:
 - a. Installed client: 512
 - b. Web client: 16
4. Display
 - a. Local client display rate:
 - (4) Windows OS: Up to 1800 frames per second
 - (5) Linux OS: Up to 1200 Mbps frames per second

F. Computing Requirements

1. Server requirements:
 - a. Acceptable operating systems:
 1. Microsoft Windows Server 2008/2008R2/2012
 2. Microsoft Windows 7 Pro, 8.1
 3. Linux Ubuntu 10.04, 12.04, 14.04
 - b. Processor: Intel Celeron G1610 minimum
 - c. RAM: 2 GB minimum
 - d. Operating System Drive: 32 GB partition
 - e. Network interface: 1000BASE-T Ethernet
2. Client workstation minimum requirements:
 - a. Acceptable operating systems:
 1. Microsoft Windows Server 2008/2008R2/2012
 2. Microsoft Windows 7 Pro, 8.1
 3. Linux Ubuntu 10.04, 12.04, 14.04
 4. Apple Mac OSX 10.7 -10.10, operating on Intel CPU
 - b. Processor: Intel Celeron G1610 or higher
 1. RAM: 2 GB minimum
 2. Network interface: 1000BASE-T Ethernet
 3. HOD Storage: 10 GB minimum
 4. Graphics: Intel HD 2000 Series or better
 - c. Multi-monitor client workstation
 - d. Acceptable operating systems:
 1. Microsoft Windows Server 2008/2008R2/2012
 2. Microsoft Windows 7 Pro, 8.1
 3. Linux Ubuntu 10.04, 12.04, 14.04
 4. Apple Mac OSX 10.7 -10.10, operating on Intel CPU
 - e. Processor: Intel Core i7-4770

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- f. RAM: 12 GB minimum
 - g. Graphics: Intel HD 4000 or Nvidia NVS Series
 - h. Network interface: 1000BASE-T Ethernet
 - i. HDD Storage: 64 GB SSD minimum
3. Acceptable web browsers:
- a. PC: Internet Explorer, Firefox, Safari, Opera, Chrome, all non-JavaScript browsers
4. HTML compliance: HTML 4.0
5. Mobile device: Apple iOS, Google Android, Microsoft Windows Phone 8

2.04

VIDEO MANAGEMENT SYSTEM HARDWARE

1. Server Requirements

The VMS server software shall operate on and be provided with the following minimum requirements:

- a. Processor: Gen 4 Intel Core i7, Gen 4 Intel Xeon E3 or higher
- b. Graphics: 1280x1024x32 bits
- c. RAM: 16 GB
- d. NIC: Dual Gb NIC
- e. Hard Disk:
 - 1. Digital Enterprise Class drive (RE4 or better), or
 - 2. Seagate Barracuda ES 2 drives or better
 - 3. JBOD, minimum sustained non-sequential write capacity 15MBps
 - 4. 30 GB shall be reserved for the operating and VMS server software
- f. Operating Systems:
 - 1. Microsoft® Windows 7 64 bit
 - 2. Microsoft® Windows 2012
 - 3. Ubuntu 14.04 Linux on 60GB SSD
- g. Redundant power supplies
- h. RAID 6 configuration
- i. 3 year warranty and software updates
- j. DVD drive
- k. RS-232/485 serial port
- l. 4U chassis configuration 
- m. A sliding rail kit specifically designed for the server chassis
- n. IP Inputs: up to 128 cameras or encoders

3. Client Workstation Requirements

The VMS client software shall operate on the following minimum required hardware:

1. Processor: i3 - 4690
2. Video: Intel HD 4000 Series
3. RAM: 6GB
4. NIC: 1Gb
5. Hard Disk: 64 SSD

6. Operating Systems:

- a. Microsoft® Windows 7 Pro or higher
- b. Linux Ubuntu 10.04 or higher
- c. Mac OSX 10.7 or higher

4. Multi-Monitor Client Workstation Requirements (4 VGA monitors at up to 1920x1200 resolution). The VMS client software shall operate on the following minimum required hardware:

1. Processor: Intel® Core i7 -4770 or higher
2. Video Card: Intel HD4000 or Nvidia VNS Series
3. RAM: 12GB
4. NIC: 1Gb
5. Hard Disk: 64 SSD

6. Operating Systems:
 - a. Microsoft® Windows 7 Pro or higher
 - b. Mac OSX 10.6 or higher
 - c. Linux Ubuntu 10.04 or higher

2.05 CAMERAS

A. General Requirements - Design based on Hanwha IP cameras

1. The specified unit shall be of manufacturer's official product line, designed for commercial and/or industrial 24/7/365 use.
2. The specified unit shall be based upon standard components and proven technology using open and published protocols.
3. Cameras shall be IP-based and comply with established network and video standards.
4. Cameras shall be powered by the switch utilizing the network cable.
5. Cameras shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third party applications.
6. Cameras shall comply with relevant ONVIF profile as defined by the ONVIF Organization.

B. Sustainability

1. The specified unit shall be manufactured in accordance with ISO 14001.
2. The specified unit shall be compliant with the EU directives 2011/65/EU (RoHS) and 2012/19/EU (WEEE).
3. The specified unit shall be compliant with the EU regulation 1907/2006 (REACH).
4. The specified unit shall be PVC-free in accordance with IEC 61249-2-21. Camera Types C1 and C2 shall be positioned as shown on the Contract Documents and shall be fitted with a mount as specified within the Device Schedule sheets and meet the following minimum requirements:

C. General abbreviations and acronyms

1. AGC: Automatic gain control
2. API: Application Programming Interface
3. Aspect ratio: A ratio of width to height in images
4. Bit Rate: The number of bits/time unit sent over a network
5. Bonjour: Enables automatic discovery of computers, devices, and services on IP networks.
6. DHCP: Dynamic Host Configuration Protocol
7. DNS: Domain Name System
8. EIS: Electronic Image Stabilization
9. FPS: Frames per Second
10. FTP: File Transfer Protocol
11. H.264 (Video Compression Format)

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12. H.265 (Video Compression)
13. IP: Internet Protocol
14. IR light: Infrared light
15. JPEG: Joint Photographic Experts Group (image format)
16. LAN: Local Area Network
17. LED: Light Emitting Diode
18. Lux: A standard unit of illumination measurement
19. MPEG: Moving Picture Experts Group
20. Multicast: Communication between a single sender and multiple receivers on a network
21. NTP: Network Time Protocol
22. NTSC: National Television System Committee - a color encoding system based on 60Hz
23. ONVIF: Global standard for the interface of IP-based physical security products
24. PAL: Phase Alternating Line - a color encoding system based on 50Hz
25. PoE: Power over Ethernet (IEEE 802.3af/at) standard for providing power over network cable
26. Progressive scan: An image scanning technology which scans the entire picture

27. PTZ: Pan/Tilt/Zoom
 28. QoS: Quality of Service
 29. SMTP: Simple Mail Transfer Protocol
 30. SMPTE: Society of Motion Picture and Television Engineers
 31. SNMP: Simple Network Management Protocol
 32. SSL: Secure Sockets Layer
 33. TCP: Transmission Control Protocol
 34. TLS: Transport Layer Security
 35. Unicast: Communication between a single sender and single receiver on a network
 36. UPnP: Universal Plug and Play
 37. UPS: Uninterruptible Power Supply
 38. VMS: Video Management System
 39. WDR: Wide dynamic range
- D. The specified unit shall carry the following EMC approvals:
1. EN55022 Class B, EN55024, EN61000-6-1, EN61000-6-2
 2. FCC Part 15 - Subpart B Class B
 3. VCCI Class B
 4. C-tick AS/NZS CISPR22 Class B
 5. ICES-003 Class B
 6. KCC KN22 Class B, KN24
- E. The specified unit shall meet the following product safety standards:
1. IEC/EN/UL 60950 -1
 2. IEC/EN/UL 60950-22
 3. IEC/EN 62471 (risk group 1)
- F. The specified unit shall meet relevant parts of the following video standards:
1. SMPTE 296M (HDTV 720p)
- G. The specified unit shall meet the following standards
1. MPEG-4:
 - a. ISO/IEC 14496-10 Advanced Video Coding (H.264)
 2. Networking:
 - a. IEEE 802.3af/802.3at (Power over Ethernet)
 - b. IEEE 802.1X (Authentication)
 - c. IPv4 (RFC 791)
 - d. IPv6 (RFC 2460)
 - e. QoS - DiffServ (RFC2475)

3. Network video
 - a. Relevant ONVIF profile as defined by the ONVIF Organization.
 4. Mechanical Environment:
 - a. IEC 60529 IP66
 - b. NEMA 250 Type 4X
 - c. IEC 62262 IK10
 - d. IEC 60068-2-1
 - e. IEC 60068-2-2
 - f. IEC 60068-2-14
 - g. IEC 60068-2-27
 - h. IEC 60068-2-30
 - i. IEC 60068-2-64
 - j. IEC 60068-2-78
 5. Railway environment:
 - a. EN 50121-4
 - b. IEC 62236-4
- H. Manufacturer's Warranty: 3 years
- I. Camera Type C1 shall have a 2.8mm - 12mm fixed lens.
- J. Camera Type C2 multi-sensor panoramic camera lenses will be specified prior to ordering.
- K. Exterior 2-3M vandal-resistant network dome IR camera
1. The network dome IR camera shall meet or exceed the following design specifications:
 - a. The camera shall operate on an open source; Linux-based platform, and including a built-in web server.
 - b. The camera shall be equipped with an IR-sensitive progressive scan sensor.
 - c. The camera shall provide a removable IR-cut filter, providing day/night functionality.
 - d. The camera shall be equipped with a varifocal lens with P-iris.
 - e. The camera shall provide local video storage utilizing a SD/SDHC/SDXC memory card expansion, supporting memory up to 128 GB.
 - f. The camera shall be manufactured with an IP66- and NEMA 4X-rated, IK10 impact-resistant outdoor casing.
 - g. The camera shall provide a manual 3-axis (pan/tilt/rotation) positioning to allow adjustment for optimum camera rotation and placement.
 - h. The camera shall be equipped with IR LED functionality with adjustable intensity and angle of illumination. Range up to 30 m (100 ft.).
 2. The network dome IR camera shall meet or exceed the following performance specifications:
 - a. Illumination

- (1). The camera shall meet or exceed the following illumination specifications:
 - (a). Type 1 - 6 mm models: Color: 0.1 lux B/W: 0.02 lux
 - (b). Type2 - 12 mm models: Color: 0.15 lux B/W: 0.03 lux
 - (c). B/W: 0 lux with IR illumination on
- b. Resolution
 - (1). The camera shall be designed to provide at least three video streams in HDTV 720p (1280x1024) at up to 30 frames per second (60Hz mode) or 25 frames per second (50Hz mode) using H.264, H265 or Motion JPEG.
 - (2). The camera shall support video at minimum resolutions including:
 - (3). (a). 1920x1080
 - (4). (b). 1280x1024
 - (5). The camera shall provide both landscape format (4:3 and 16:9 aspect ratio) as well as corridor format (3:4 and 9:16 aspect ratio).
- c. Encoding
 - (1). The camera shall support the following video encoding algorithms:
 - (a). Support Motion JPEG encoding in a selectable range up to 30 frames per second in all resolutions.
 - (b). Support Baseline Profile H.264 encoding with motion estimation in up to 30 frames per second in all resolutions.
 - (c). Support Main Profile H.264/H265 encoding with motion estimation and context-adaptive binary arithmetic coding (CABAC) in up to 30 frames per second in all resolutions.
 - (2). The camera shall provide independently configured simultaneous H.264-H265 and Motion JPEG streams.
 - (3). The camera shall support Constant Bit Rate (CBR) and Variable Bit Rate (VBR) in H.264.
 - (4). The camera shall provide configurable compression levels.
 - (5). Support motion estimation in H.264/H265 MPEG-4 Part 10/AVC.
- d. Transmission
 - (1). the camera shall allow for video to be transported over:
 - (a). HTTP (Unicast)
 - (b). HTTPS (Unicast)
 - (c). RTP (Unicast & Multicast)
 - (d). RTP over RTSP (Unicast)
 - (e). RTP over RTSP over HTTP (Unicast)

- (2). The camera shall support Quality of Service (QoS) to be able to prioritize traffic.
- e. Image
- (1). The camera shall incorporate Automatic and Manual White Balance
 - (2). The camera shall be equipped with an electronic shutter.
 - (3). The camera shall incorporate automatic and manually defined exposure zones.
 - (4). The camera shall be equipped with Wide Dynamic Range functionality - dynamic contrast.
 - (5). The camera shall support a configurable maximum shutter in the range from 2 seconds to 1/24500 seconds in 50Hz mode
 - (6). The camera shall support a configurable maximum shutter in the range from 2 to 1/29500 seconds in 60Hz mode.
 - (7). The camera shall incorporate backlight Compensation.
 - (8). The camera shall allow for rotation of the image in steps of 90°.
 - (9). The camera shall support manually defined values for:
 - (a). Color level
 - (b). Brightness
 - (c). Sharpness
 - (d). Contrast
- f. Audio

- (1). the camera when required shall be able to support two-way full duplex audio:
 - (2). Input sources
 - (a). External microphone
 - (b). External line device
 - (3). Output sources
 - (a). External line device
 - (4). Encoding
 - (a). The camera shall support:
 1. AAC LC at 8/16 kHz
 2. G.711 PCM at 8 kHz
 3. G.726 ADPCM at 8 kHz
- g. IR Illumination
- (1). The camera shall be equipped with built-in IR LEDs with adjustable angle of illumination and intensity.
 - (A). The IR LEDs shall have a range of up to 30 m (100 ft.).
 - (b). The IR LEDs shall emit light with a wavelength of 850 nm.
- h. User Interface
- (1). Web server
 - (a). The camera shall contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software.
 - (b). Optional components downloaded from the camera for specific tasks, e.g. Active X, shall be signed by an organization providing digital trust services, such as Verisign, Inc.
 - (2). IP addresses
 - (a). The camera shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server.
 - (b). The camera shall allow for automatic detection of the camera based on UPnP and Bonjour when using a PC with an operating system supporting this feature.
 - (c). The camera shall provide support for both IPv4 and IPv6.
- i. Event functionality
- (1). the camera shall be equipped with an integrated event functionality, which can be triggered by:
 - (a). Video Motion Detection
 - (b). Schedule

- (c). Camera tampering
 - (d). Embedded third party applications
 - (e). External input
 - (f). Audio Detection
 - (g). Edge storage disruption detection
- (2). Response to triggers shall include:
- (a). Notification, using TCP, SMTP or HTTP
 - (b). Image upload, using FTP, SMTP or HTTP
 - (c). Activating external output
 - (d). Activating embedded illumination/IR LED
 - (e). Recording to local storage and/or network attached storage
- (3). The camera shall provide memory for pre & post alarm recordings.

K Edge storage

- (1). The camera shall support continuous and event controlled recording to:

- (a). Local memory added to the cameras SD-card slot
 - (b). Network attached storage, located on the local network
 - (2). The camera shall be able to detect and notify Edge storage disruptions.
- I. Protocol
 - (1). The camera shall incorporate support for at least IPv4/v6, HTTP, HTTPS, SSL/TLS, TCP, ICMP, SNMPv1/v2c/v3 (MIB-II), RTSP, RTP, UDP, IGMP, RTCP, SMTP, FTP, DHCP, UPnP, ARP, DNS, DynDNS, SOCKS, NTP and Bonjour.
 - (2). The SMTP implementation shall include support for SMTP authentication.
- m. Text overlay
 - (1). The camera shall:
 - (a). Provide embedded on-screen text with support for date & time, and a customer-specific text, camera name, of at least 45 ASCII characters.
 - (b). To ensure accuracy, the camera shall accept external time synchronization from an NTP (Network Time Protocol) server.
 - (c). Provide the ability to apply privacy masks to the image.
 - (d). Allow for the overlay of a graphical image, such as a logotype, into the image.
- n. Security
 - (1). The camera shall support the use of HTTPS and SSL/TLS, providing the ability to upload signed certificates to encrypt and secure authentication and communication of both administration data and video streams.
 - (2). The camera shall support IEEE 802.1X authentication.
 - (3). The camera shall provide support for restricting access to pre-defined IP addresses only, so-called IP address filtering.
 - (4). The camera shall restrict access to the built-in web server by usernames and passwords at three different levels.
- o. API support
 - (1). The camera shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third party applications.
 - (2). The camera shall support relevant ONVIF profiles as defined by the ONVIF Organization.
- p. Embedded applications
 - (1). the camera shall provide a platform allowing the upload of third party applications into the camera.
- q. Installation and maintenance
 - (1). The camera shall be supplied with Windows-based management software which allows the assignment of IP addresses, upgrade of firmware and backup of the cameras' configuration.

- (2). The camera shall support the use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-I1.
 - (3). The camera shall allow updates of the software (firmware) over the network, using FTP or HTTP.
 - (4). The camera shall provide the ability to apply a rectangle of customer-defined number of pixels to the image, which can be used as a pixel counter identifying the size of objects in number of pixels.
 - (5). The camera shall store all customer-specific settings in a non-volatile memory that shall not be lost during power cuts or soft reset.
- r. Access log
- (1). The camera shall provide a log file, containing information about the 250 latest connections and access attempts since the unit's latest restart. The file shall include information about the connecting IP addresses and the time of connecting.
 - (2). Provide a connection list of all currently connected viewers. The file shall include information about connecting IP address, time of connecting and the type of stream accessed.
- s. Camera diagnostics
- (1). The camera shall be equipped with LEDs, capable of providing visible status information. LEDs shall indicate the camera's operational status and provide information about power, communication with receiver, the network status and the camera status.
 - (2). The camera shall be monitored by a Watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected.
- t. Hardware interfaces
- (1). Network interface
 - (a). The camera shall be equipped with one 100BASE-TX Fast Ethernet-port, using a standard RJ-45 socket and shall support auto negotiation of network speed (100 MB/s and 10 MB/s) and transfer mode (full and half duplex).
 - (2). Inputs/Outputs
 - (a). The camera shall be equipped with one digital (alarm) input and one digital output, accessible via a removable terminal block. This input shall be configurable to respond to normally open (NO) or normally closed (NC) dry contacts.
 - (3). Audio
 - (a). The camera, when required, shall be equipped with one 3.5 mm jack for line/mic input and one 3.5 mm jack for line output.
- u. Enclosure
- (1). The camera shall camera shall be manufactured with an IP66- and NEMA 4X-rated, IK10 impact-resistant outdoor casing.

- v. Power
 - (1). Power over Ethernet IEEE 802.3af/802.3at Type 1 Class 3
- w. Environmental
 - (1). Operate in a temperature range of -40 °C to +55 °C (-40 °F to 131 °F).
 - (2). Operate in a humidity range of 10-100% RH (condensing).

2.06 28 PORT, MANAGED ETHERNET SWITCH:

A. Performance Requirements:

1. Provide 28 (twenty eight) 10/100TX RJ-45 PoE ports, with 2 (two) 10/100/1000TX RJ-45 ports,
2. Use of an SFP port disables the corresponding 10/100/1000TX RJ-45 port. Similarly, use of a 10/100/1000TX RJ-45 port disables the corresponding SFP port.
3. The system may have SFP ports allowing for the use of SFP modules for flexibility in determining operating wavelength, range, number of fibers, type of receptacle, and type of fiber or use of RJ-45 copper based SFP device.

B. General Requirements:

1. The module shall be mounted to a 15mm DIN rail within a NEMA4x enclosure.
2. All SFP, if required, modules shall be supplied from a single manufacturer.
3. The module shall support transmission utilizing Category 5 cable or better, multimode, or single-mode fiber.
4. The module shall support the Ethernet data IEEE 802.3 protocol using Auto-negotiating and Auto-MDI/MDI-X features.
5. The module shall feature 28 (twenty eight) 10/100TX RJ-45 PoE ports, 2 (two) 10/100/1000TX RJ-45 ports...
6. Use of an SFP port disables the corresponding 10/100/1000TX RJ-45 port. Similarly, use of a 10/100/1000TX RJ-45 port disables the corresponding SFP port. The module EHHA shall require no in-field electrical or optical adjustments or in-line attenuators to ease installation.
7. The module shall provide power, link speed, and fiber port status indicating LED's for monitoring proper system operation.
8. The modules shall provide automatic re-settable solid-state current limiters on each module to reduce the chance of a single point failure of the system.
9. The module shall have redundant power supply connections to minimize single point failure.
10. The module shall provide a serial connection for local management of the device.
11. The module shall have a lifetime warranty to reduce system life cycle cost in an event of a module failure.

C. The following IEEE Networking Standards shall be supported:

1. IEEE 802.3 10Base-T Ethernet

2. IEEE 802.3u 100Base-TX Fast Ethernet
3. IEEE 802.3ab 1000Base-TX
4. IEEE 802.3z Gigabit Ethernet Fiber
5. IEEE 802.3x Flow Control and Back-pressure
6. IEEE 802.1p class of service
7. IEEE 802.1Q VLAN and GVRP
8. IEEE 802.1D-2004 Rapid Spanning Tree Protocol (RSTP)
9. IEEE802.3ad LACP
10. IEEE802.1X Port-based Network Access Control
11. IEEE802.3at, up to 240 watts of PoE or PoE+ power.

D. Switching Performance:

1. Switch Technology: Store and Forward Technology with 32Gbps Switch Fabric.
2. System Throughput: 14,880pps for 10M Ethernet; 148,800pps for 100M Fast Ethernet; 1,488,100 for Gigabit Ethernet
3. Transfer Packet Size: 64 bytes to 1522 bytes (with VLAN Tag)
4. MAC Address: 8K MAC
5. Packet Buffer: 1Mbits
6. Relay Alarm: Dry Relay output with 1A@24V ability

E. Management Requirements:

1. Configuration: Web, HTTPS, SSH, TFTP/Web Update for firmware and configuration backup/restore, DHCP Client, Warm reboot, Reset to default, Admin password, Port Speed/Duplex control, status, statistic, MAC address table display, Static MAC, Aging time, SNMP v1, v2c, v3, Traps and RMON1.
2. SNMP MIB: MIB-II, Bridge MIB, VLAN MIB, SNMP MIB, RMON and Private MIB.
3. Port Trunk: Up to 5 Static Trunk and 802.3ad LACP.
4. VLAN: IEEE802.1Q VLAN, GVRP. Up to 64 VLAN groups.
5. Quality of Service: Four priority queues per port.
6. IEEE802.1p COS and Layer 3 TOS/DiffServ.
7. IGMP Snooping: IGMP Snooping V1N2N3 for multicast filtering and IGMP Query.
8. Rate Control: Ingress filtering for Broadcast, Multicast, Unknown DA or all packets, and Egress filtering for all packets.
9. NTP: Network Time Protocol to synchronize time from Internet.
10. Embedded Watchdog: Embedded hardware watchdog timer to auto reset system when switch system failure.
11. Port Mirroring: Online traffic monitoring on multiple selected ports.

12. Port Security: Assign authorized MAC to specific port.
13. IP Security: IP security to prevent unauthorized access.
14. 802.1x: Port-based Network Access Control.
15. DHCP Server: Can assign 255 IP address, support IP and MAC binding.
16. System Log: Supports both Local mode and Server mode.
17. Network Redundancy.
18. Rapid Spanning Tree Protocol: IEEE802.1D-2004 Rapid Spanning Tree Protocol.
19. Compatible with Legacy STP and IEEE802.1w.
20. Rapid Super Ring (RSR): Ring Redundancy Technology.
21. Failure recovery within 5ms.
22. Dual Homing II: Multiple uplink paths to upper switches.
23. Multiple Ring: Couple or multiple Rapid Super Rings.
24. Legacy Super Ring: Backward compatible in client mode.
25. Any Ring: Inter-operate with other vendors' ring Interface.

F. Data Requirements:

1. Data Interface: Ethernet IEEE802.3
2. Data Rate: up to 1000 Mbps
3. Data Inputs/Outputs: up to 10
4. Operation Mode: Half or Full Duplex

G. Optical Requirements:

1. Number of Optical ports: up to 2 SFP-based
2. Number of Fibers Required: 1 or 2, SFP-dependent
3. Optical Wavelength: 1310 or 1550 nm, SFP-dependent
4. Optical Power Budget: SFP-dependent
5. Maximum Distance: up to 120 km (70 mi) single-mode, SFP-dependent

H. Status Indicators:

1. Power: Proper Power = Green
2. RJ-45 Link/Data: Green, No Link/No Data: Off
3. SFP Link/Data: Green, No Link/No Data: Off

I. Electrical Requirements:

1. Power: 12VDC to 24VDC @ 1A maximum

2. Current Protection: Automatic re-settable solid-state current limiters
3. Voltage Regulation: Solid-state, Independent on each board
4. Circuit Board: UL 94 flame rated and meets all IPC standards.

J. Mechanical Requirements:

1. Surface Mount Dimensions: 4.84" x 3.78" x 5.43" (123 mm x 96 mm x 138 mm)
2. Finish: Module EHHA shall be constructed of a metal enclosure with a powder coat.
3. Weight: <2 lb./1kg

K. Environmental Requirements:

1. Operating Temperature: -40° to 167° Fahrenheit without the assistance of fan-forced cooling.
2. Storage: Store in original packaging in a climate controlled environment. Storage Temperature not to exceed 104° to 185° Fahrenheit.
3. Humidity: 0% to 95% (non-condensing)

L. Regulatory Agencies, Approvals and Listings

1. Underwriters Laboratory (UL) Listing Number: I.T.E. 6D16
2. Underwriters Laboratory Canada (ULC) Listing Number: I.T.E. 6D16
3. UL 94-flame rated PCB board: 94VO

2.07 ETHERNET SWITCH POWER SUPPLY:

A. General Requirements:

1. The power supply shall be mounted to a 15mm DIN rail.
2. The power supply shall be mounted such that its chassis is at least 1" (one inch) on all sides from any other objects to allow for adequate cooling to occur.
3. The power supply shall be a switching mode power supply (SMPS).
4. The SMPS shall take 90 to 264 VAC@ 47 to 63 Hz or 120 to 370 VDC as input voltage.
5. The SMPS shall produce a stable 48 to 53 VDC and be capable of supplying 10 amperes at 48 PoE (240 W).
6. Line regulation shall be within +/- 0.5%.
7. Ripple shall be no more than 150 mV, pk-pk.
8. The SMPS shall incorporate automatic power factor correction.
9. To minimize damage to a powered device (PD), the SMPS shall have output overvoltage protection to limit the maximum output voltage to 57 to 63 VDC.
10. The SMPS shall incorporate current limiters to provide output short circuit protection.

- B. Status Indicators: Power: Proper Power= Green

- C. Connectors: Power Connections shall be screw terminals capable of accommodating wire sizes from 10 to 24 AWG conductors.

- D. Mechanical Requirements:
 - 1. Screw terminal connector: 12.5 x 17.5 x 12.3 cm (4.9 x 6.9 x 4.8 in)
 - 2. Plug connector version: 14.2 x 17.5 x 12.3 cm (5.6 x 6.9 x 4.8 in)
 - 3. Finish: Module shall be constructed of a metal enclosure with a powder coat.
 - 4. Weight: <4.3 lb./1.9 kg

- E. Environmental Requirements:
 - 1. Operating Temperature: -13° to 159° Fahrenheit
 - 2. Storage Temperature: -13° to 185° Fahrenheit
 - 3. Humidity: 20% to 95% (non-condensing).
 - 4. Cooling: Natural convection

- F. Approvals and Compliance:
 - 1. Insulation voltage 1/0 3.000Vac
 - 2. Insulation resistance 1/0@ 500VDC 100Mohm
 - 3. UL/ cUL UL508 listed, UL60950-1, Recognized
 - 4. TUV EN60950-1
 - 5. CE EN61000-6-3
 - 6. EN55022 class B
 - 7. EN61000-3-2
 - 8. EN61000-3-3
 - 9. EN61000-6-2
 - 10. EN55024

2.08 ETHERNET SWITCH – 10-16 Port

- A. General:
 - 1. The module shall support transmission utilizing Category 5 cable or better, multimode, or single-mode fiber.
 - 2. The module shall support IEEE 802.3 protocol using Auto-negotiating and Auto-**MDI/MDI-X** features.
 - 3. The module shall be capable of supporting IEEE 802.3at 30Watt PoE at every port simultaneously with a fully internal power supply.

4. The module shall feature at least (ten) 10/100/1000TX RJ-45 ports with PoE ports.
5. The module shall require no in-field electrical or optical adjustments or in-line attenuators to ease installation.
6. The module shall provide power, link speed, indicating LED's for monitoring proper system operation.
7. The module shall provide automatic re-settable solid-state current limiters on each module to reduce the chance of a single point failure of the system.
8. The module shall provide a serial connection for local management of the device.
9. The module shall have a lifetime warranty to reduce system life cycle cost in an event of a module failure.

B. IEEE Networking Standards:

1. IEEE 802.3 10Base-T Ethernet
2. IEEE 802.3u 100Base-TX Fast Ethernet
3. IEEE 802.3ab 1000Base-TX Gigabit Ethernet
4. IEEE 802.3at Power over Ethernet
5. IEEE 802.3z Gigabit Ethernet Fiber
6. IEEE 802.3x Flow Control and Back-pressure
7. IEEE 802.1p class of service
8. IEEE 802.1Q VLAN and GVRP
9. IEEE 802.1D-2004 Rapid Spanning Tree Protocol (RSTP)
10. IEEE 802.1s Multiple Spanning Tree Protocol
11. IEEE802.3ad LACP
12. IEEE802.1X Port-based Network Access Control
13. IEEE 802.1AB LLDP

C. Switching Performance:

1. Switch Technology: Store and Forward Technology with 56Gbps Switch Fabric.
2. Transfer Packet Size: 64 bytes to 9000 bytes (with VLAN Tag)
3. MAC Address: 8K MAC
4. Packet Buffer: 1Mbits
5. Relay Alarm: Dry Relay output with 1A@24V ability

D. Management:

1. Configuration: Web, HTTPS, SSH, TFTP/Web Update for firmware and configuration backup/restore, DHCP Client, Warm reboot, Reset to default, Admin password, Port Speed/Duplex control, status, statistic, MAC address table display, Static MAC, Aging time, SNMP v1, v2c, v3, Traps and RMON1.

2. SNMP MIB: MIB-II, Bridge MIB, VLAN MIB, SNMP MIB, RMON and Private MIB
3. Port Trunk: Up to 5 Static Trunk and 802.3ad LACP
4. VLAN: IEEE802.1Q VLAN, GVRP. Up to 64 VLAN groups
5. Quality of Service: Four priority queues per port,
6. IEEE802.1p COS and Layer 3 TOS/DiffServ
7. IGMP Snooping: IGMP Snooping V2N3 for multicast filtering and IGMP Query
8. Rate Control: Ingress filtering for Broadcast, Multicast, Unknown DA or all packets, and Egress filtering for all packets
9. NTP: Network Time Protocol to synchronize time from Internet
10. PTP: Precision Time Protocol for clock synchronization.
11. Port Mirroring: Online traffic monitoring on multiple selected ports
12. Port Security: Assign authorized MAC to specific port
13. IP Security: IP security to prevent unauthorized access
14. 802.1x: Port-based Network Access Control
15. DHCP Server: Can assign 255 IP address, support IP and MAC binding
16. System Log: Supports both Local mode and Server mode

E. Network Redundancy:

1. Rapid Spanning Tree Protocol: IEEE802.1D-2004 Rapid Spanning Tree Protocol.
2. Compatible with Legacy STP and IEEE802.1w.
3. Multiple Spanning Tree Protocol: IEEE 802.1s

F. Data Requirements:

1. Data Interface: Ethernet IEEE 802.3
2. Data Rate: up to 1000 Mbps
3. Data Inputs/Outputs: up to 28
4. Operation Mode: Half or Full Duplex

G. Status Indicators:

1. Power: Proper Power= Green
2. RJ-45 Link/Data: Green, No Link/No Data: Off
3. SFP Link/Data: Green, No Link/No Data: Off

H. Connectors:

1. Optical: LC or SC, SFP-dependent
2. Power: IEC60320 connector for standard AC line cord.

3. Data: RJ-45
4. Console: OB9 serial communication.

I. Electrical Requirements:

1. Power: Internal power supply, 100 to 240VAC, 50-60 Hz input.
2. PoE Support: 400 Watts across 24ports
3. Current Protection: automatic re-settable solid-state current limiters
4. Voltage Regulation: Solid-state, independent on each board
5. Circuit Board: UL 94 flame rated and meets all IPC standards.

J. Environmental Requirements:

1. MTBF: >100,000 Hours
2. Operating Temp: 14" to +140" Fahrenheit
3. Relative Humidity: 5% to 95% (non-condensing).

K. Regulatory Agencies, approvals and listings:

1. Underwriters Laboratory (UL) Listing Number: I.T.E. 6D16
2. Underwriters Laboratory Canada (ULC) Listing Number: I.T.E. 6D16

2.09 ENCLOSURES:

- A. A NEMA 4x enclosure shall be provided at each location where an Ethernet switch is to be mounted.
- B. The enclosure shall house the \Ethernet switch, Ethernet switch power supply and any additional power supplies or ancillary equipment for power and/or connectivity of the wireless Ethernet LAN devices and cameras.
- C. In addition to other sections of this specification with regard to fitting out and mounting of the enclosure, the enclosure shall also be provided with the following minimum requirements:
1. NEMA 4x manufactured completely from 14 gauge Type 304 stainless steel
 2. Exterior dimensions of 24" High x 24" Wide x 12" Deep for exterior enclosures in exterior environments.
 3. Seams continuously welded and ground smooth.
 4. A full height continuous stainless steel hinge.
 5. Door removed by pulling stainless steel continuous hinge pin.

6. Shall have an included data pocket / print pocket manufactured from high impact thermoplastic.
 7. Collar studs are provided for mounting back panel.
 8. All enclosure hardware is Type 304 stainless steel.
 9. A stainless steel lock or hasp capable of accepting a 3/8" diameter tackle padlock.
 10. Seamless foam-in-place polyurethane gasketing.
 11. Bonding / grounding provision on door; ground study on body.
 12. Finish: Door, sides, top and bottom shall have a smooth #4 brushed finish.
 13. Provided with a stainless steel backplane manufactured by the same manufacturer as the enclosure.
 14. The backplane shall be mounted on fixed studs, molded or welded to the back of the enclosure. Drilling enclosures for the purpose of mounting of backplanes is prohibited.
- D. The enclosure shall carry the following industry standard ratings:
1. UL 508A Listed
 2. NEMA/EEMAC Type 3, 3R, 4, 4X, 12, 13
- E. Acceptable Manufacturers:
1. Hammond Manufacturing
 2. Hoffman Enclosures
 3. Wiegmann

2.10 PADLOCKS

- A. If the NEMA 4x enclosure is supplied with a lock hasp, the Contractor shall provide padlocks for the enclosure.
- B. Padlocks shall have the following features:
1. Rated for harsh outdoor conditions with covering to protect padlock from water, ice, dirt and debris
 2. Laminated body
 3. 3/8" Diameter hardened boron tackle
 4. 1 3/8" length
 5. All keyed alike for all facilities
 6. Dual ball locking mechanism to resist pulling and prying
 7. High security 5-pin cylinder with spool pins

2.11 EQUIPMENT RACK

- A. The equipment rack shall furnished with or have the following minimum features:

1. EIA compliant 19" gang able equipment rack, fully welded construction allowing for a UL listed load capacity of 2,500 lbs. and a static load capacity of 10,000 lbs. and a Seismic certified load capacity of 900 lbs.
 2. 1/8" thick structural steel internal braces
 3. 24 1/4" outside dimension in width and 32 5/8" outside dimension in depth
 4. A usable height of no less than 24U or 42.13"
 5. A usable depth of no less than 30/75"
 6. Two extra-wide pair of 11 gauge rack rails with numbered Rackspace increments and 10-32 machine threads for equipment mounting, finished in black e-coat
 7. Caster base with casters
 8. Rack Top
 9. Side Panels
 10. Power Strip
 11. Front and Rear lockable doors
 12. 1U blank panels as depicted in the contract drawings
 13. Warranty - Lifetime for workmanship and material defects
- B. Caster Based shall be furnished with the following minimum requirements:
1. Four heavy duty, 3" swivel type wheels
 2. 1300 lb. capacity
- C. Rack Top shall be furnished with the following minimum requirements:
1. Integrated 10" fan rated at 550 free air CFM
- D. Side Panels shall be furnished with the following minimum requirements:
1. Lift on/off
 2. Black textured powder coat finish
 3. Beveled corners
 4. Include internal locking kit
- E. Front Door shall be furnished with the following minimum requirements:
1. Left or right hinging to allow for the most logical hinge arrangement based on the installation
 2. Black textured powder coat finish
 3. 25% open area mesh
 4. Key lock
- F. Blank Panels shall be furnished with the following minimum requirements:
1. EIA compliant 19" rack mountable
 2. Manufactured from aluminum or steel
 3. Have a smooth or textured back powder coat finish

- G. Keyboard, Video, Mouse (KVM) for the purpose of servicing and/or administering the computer equipment contained within, shall be furnished with the following minimum requirements:
1. EIA compliant 19" rack mount LCD monitor, keyboard with integrated touchpad mouse
 2. 1 Rack unit in height
 3. LCD shall be 17" diagonal with 1280 x 1024 resolution with 350:1 aspect ratio
 4. Power source shall be 50/60 Hz, 120-240vac with 25W power consumption
 5. Keyboard with LCD display shall have an operating range of 32° - 122° Fahrenheit
 6. Warranty - 1 year
- H. Regulatory Agencies, approvals and listings:
1. Underwriters Laboratory
 2. RoHS EU Directive 2002/95/EC compliant
 3. Rack shall be manufactured by an ISO9001 and ISO14001 registered company

2.12 UPS

- A. A rack mounted UPS shall be provided in the equipment rack at the VMS server location
- B. The UPS shall meet the following minimum requirements:
1. 3000VA / 3kVA. 2400 watt.
 2. Rack Mounted 3U with four-post mounting
 3. Maximum installed depth of 26 inches.
 4. On-line double conversion meaning the raw incoming AC power is converted into DC, then is re-converted to provide a completely regulated and filtered AC output.
 5. Can be configured for an expandable runtime by the installation of additional battery packs.
 6. Hot-swap batteries.
 7. Output AC Waveform (AC Mode): Pure Sine Wave.
 8. Output AC Waveform (Battery Mode): Pure Sine Wave.
 9. Input current (maximum load): 24A.
 10. Input cord length: 10'
 11. Input Voltage and Phase: 120VAC / 30A / single phase.
 12. 110/v120V +/-2% output at 50/60Hz, high efficiency economy mode option.
 13. USB, RS232 & EPO ports; support for SNMP/WEB card options.
 14. Front panel status LEDs with detailed load and battery metering.
 15. Two independently switchable output load banks.
 16. Input: NEMA L5-30P.
 17. Output: NEMA L5-30R, 5-15/20R & 5-15R outlets.
 18. Data line surge suppression for dialup, DSL or network Ethernet connection.

19. Utility power and voltage regulation LEDs.
20. Audible alarm.
21. Self-test.
22. Full Load Runtime (min.): 5 min. (2400W).
23. Half Load Runtime (min.): 14 min. (1200W).
24. Battery Re-charge Rate with included batteries: Less than six (6) hours from 10% to 80% (typical, full load discharge).
25. DC System Voltage: 72VDC.

2.13 WIRELESS ETHERNET DEVICES:

A. General:

1. All wireless devices shall be from the same manufacturer

B. Type 1:

1. The module shall be a single unit designed to work with other wireless units and interfaces.
2. The module shall support IEEE 802.3 protocol using the 802.11a/n standard.
3. The module shall feature 1(one) 10/100TX RJ-45 port that supports 802.3af PoE as a Powered Device.
4. The module shall support two antenna utilizing MIMO technology and a maximum throughput of 95Mbps.
5. The wireless link shall be able to transmit an Ethernet signal 2 miles.
6. The modules shall be encased in an IP67 dust and water immersion housing.
7. The module shall provide power, link, and signal strength status indicating LED's for monitoring proper system operation.
8. The system shall be capable of up to 15 Client modules communicating to one Access Point module.
9. The module shall have a lifetime warranty to reduce system life cycle cost in an event of a module failure.
10. The system shall provide point to point and point to multipoint wireless connectivity.
11. The system shall operate in the license-free 5GHz band or 900 MHz, or 2.4 GHz
12. The system shall provide either auto-selectable or user static selectable frequency modes of operation.
13. The system shall provide up to 26dBm power output.
14. The system shall have selectable channel bandwidth capacity- 10, 20 or 40MHz.
15. The system shall be available with a selection of omni-directional and directional, integral or external antenna options.
16. The system shall use 2x2 MIMO technology.

- a. Configuration: Web, HTTPS, Telnet Server, TFTP/Web Update for firmware and configuration backup/restore, DHCP Client, User configurable Watchdog and Auto-Reboot Mechanism, Reset to default, Multi-Level Configuration and Monitoring Login Accounts, User Configurable Long Range Parameters, Admin password, Port Speed/Duplex control, status, SNMP v2c
 - b. NTP: Network Time Protocol to synchronize time from Internet
 - c. 802.1x: Port-based Network Access Control
 - d. DHCP Server
 - e. System Log
30. Data Requirements:
- a. Data Interface: Ethernet IEEE 802.3
 - b. Data Rate: up to 95 Mbps
 - c. Data Inputs/Outputs: 2
 - d. Operation Mode: Half or Full Duplex
31. Electrical Interface Requirements:
- a. Data Interface: Ethernet IEEE 802.3
 - b. Number of Electrical ports: 1
 - c. Physical connector: RJ-45
32. Wireless Radio Interface Requirements:
- a. Data Interface: Ethernet IEEE 802.3
 - b. Number of wireless radios: 1
 - c. Physical connector: N-type connector for external antenna (optional)
33. Electrical Requirements:
- a. Operating Voltage: 24VDC@ 140mA; 48VDC@ ?0mA
 - b. PoE Support: IEEE 802.3af PD compliant
 - c. Power Consumption: 3.5W
34. Mechanical Requirements:
- a. 10.0" Wide x 10.0" Height x ¾" Depth
35. Environmental Specifications:
- a. MTBF: >100,000 Hours
 - b. Operating Temperature: -40° to 167° Fahrenheit
 - c. Storage Temperature: -40° to 185° Fahrenheit
 - d. Relative Humidity: 5% to 95% (non-condensing)
36. Regulatory Agencies/Approvals and Listings:
- a. Federal Communications Commission (FCC) Part 15 Compliant

C. Type 2:

1. The module shall support IEEE 802.3 protocol using the 802.11a/n standard. Each module shall feature 2(two) 10/100/1000TX RJ-45 ports. One port shall support 802.3af/at PoE as a Powered Device, and the second shall support IEEE802.3af PoE as a PSE. The module shall support two antenna utilizing MIMO technology and a maximum throughput of 145Mbps. The wireless link shall be able to transmit an Ethernet signal 2 miles. The modules shall be encased in an IP67 dust and water immersion housing. The module shall provide power, link, and signal strength status indicating LED's for monitoring proper system operation. The system shall be capable of up to 15 modules communicating in a ring topology. The module shall have a lifetime warranty to reduce system life cycle cost in an event of a module failure.
2. The system shall provide a redundant ring or drop & repeat wireless Ethernet network.
3. The system shall operate with one radio in the license-free 5GHz, 900 MGZ or 2.4 GHZ
4. All modules shall support two, 10/100/1000Mbps RJ45 ports.
5. All modules shall support passive PoE and IEEE802.3af PoE PD.
6. The system shall provide either auto-selectable or user static selectable frequency modes of operation.
7. The system shall provide up to 26d8m power output.
8. The system shall have selectable channel bandwidth capacity - 10, 20 or 40MHz.
9. The system shall be available with a selection of omni-directional and directional, integral or external antenna options.
10. The system shall use 2x2 MIMO technology.
11. The system shall provide a throughput rate of up to 300 Mbps.
12. The system shall provide antenna alignment, signal strength, and site survey tools.
13. The system shall use WPA2 - either AES or TKIP encryption.
14. The system shall have an operating temperature of -40°C to +75°C.
15. The system-radiated emission shall be compliant with FCC Part 15.
16. The system shall be supplied in an IP67 compliant housing.
17. All modules and system parameters shall be configurable via a Graphical User Interface (GUI)
18. The following IEEE Networking Standards shall be supported:
 - a. IEEE 802.3 10Base-T Ethernet
 - b. IEEE 802.3u 100Base-TX Fast Ethernet
 - c. IEEE 802.3ab 1000Base-TX Gigabit Ethernet
 - d. IEEE 802.3af Power over Ethernet
 - e. IEEE 802.1X Port-based Network Access Control
 - f. Spanning Tree Protocol
 - g. NTP Client
19. Wireless Radio Performance:
 - a. EIRP: +35dBm

- b. RF Output: +26dBm Rated Transmitter
 - c. Operational Frequency: 5745-5825MHz
 - d. Bandwidths: 10, 20, 40MHz
20. Wireless Antenna Performance:
- a. Standard Internal Antenna - Internal 19dBi Dual Polarized
 - (1). Gain: 19dBi
 - (2). Azimuth 17° Horizontal Vertical
 - (3). Elevation: 17° Horizontal Vertical
 - b. Optional External Antenna - Internal 8dBi Dual Polarized
 - (1). Gain: 8dBi
 - (2). Azimuth: 70° Horizontal Vertical
 - (3). Elevation: 30° Horizontal Vertical
 - c. Optional Sector Antenna - External Dual Polarized
 - (1). Gain: 16-18dBi
 - (2). Azimuth: Selectable 60°, 90°, 120° Horizontal Vertical
 - (3). Elevation: 8° Horizontal Vertical
 - d. Optional Omni Directional Antenna - External 5dBi Dual Polarized
 - (1). Gain: 5dBi
 - (2). Azimuth: 360° Horizontal Vertical
21. Management:
- a. Configuration: Web, HTTPS, Telnet Server, TFTP/Web Update for firmware and configuration backup/restore, DHCP Client, User configurable Watchdog and Auto-Reboot Mechanism, Reset to default, Multi-Level Configuration and Monitoring Login Accounts, User Configurable Long Range Parameters, Admin password, Port Speed/Duplex control, status, SNMP v2c
 - b. NTP: Network Time Protocol to synchronize time from Internet
 - c. 802.1x: Port-based Network Access Control
 - d. DHCP Server
 - e. System Log
22. Data Requirements:
- a. Data Interface: Ethernet IEEE 802.3
 - b. Data Rate: up to 240Mbps
 - c. Data Inputs/Outputs: 2
 - d. Operation Mode: Half or Full Duplex
23. Electrical Interface Requirements:
- a. Data Interface: Ethernet IEEE 802.3
 - b. Number of Electrical ports: 2

- c. Physical connector: RJ-45
- 24. Wireless Radio Interface Requirements:
 - a. Data Interface: Ethernet IEEE 802.11
 - b. Number of wireless radios: 1
 - c. Physical connector: N-type connector for external antenna (optional)
- 25. Electrical Requirements:
 - a. Operating Voltage: 24VDC@ 175mA; 48VDC@ 87.5mA
 - b. PoE Support: IEEE 802.3af PD compliant
 - c. Power Consumption: 4.2W
- 26. Mechanical Requirements:
 - a. 10.0" Wide x 10.0" Height x ¾" Depth
- 27. Environmental Specifications:
 - a. MTBF: >100,000 Hours
 - b. Operating Temperature: -40° to 167° Fahrenheit
 - c. Storage Temperature: -40° to 185° Fahrenheit
 - d. Relative Humidity: 5% to 95% (non-condensing)
- 28. Regulatory Agencies/Approvals and Listings:
 - a. Federal Communications Commission (FCC) Part 15 Compliant
- D. Type 3:
 1. The module shall support IEEE 802.3 protocol using the 802.11a/n standard.
 2. The module shall feature two (2) 10/100/1000TX RJ-45 ports that support one port as an 802.3af/at PoE Powered Device and the other port as an 802.3af/at PoE Power Sourcing Equipment.
 3. The module shall support two antennas utilizing MIMO technology and a maximum throughput of 867Mbps.
 4. The wireless link shall be able to transmit an Ethernet signal 4 miles.
 5. The modules shall be encased in an IP67 dust and water immersion housing.
 6. The module shall provide power, link, and signal strength status indicating LED's for monitoring proper system operation.
 7. The paired link shall be pre-configured by the manufacturer through MAC-locking the Client and Access Point modules.
 8. The module shall have a lifetime warranty to reduce system life cycle cost in an event of a module failure.
 9. The system shall provide point-to-point wireless connectivity.
 10. The system shall operate in the license-free 5GHz, 900MHz, or 2.4 GHz band.
 11. All modules shall support one, 10/100/1000Mbps RJ45 port.
 12. All modules shall support passive PoE and IEEE802.3af PoE PD.

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13. The system shall provide either auto-selectable or user static selectable frequency modes of operation.
14. The system shall provide up to +30dBm RF power output.
15. The system shall have selectable channel bandwidth capacity - 10, 20 or 80MHz.
16. The system shall use 2x2 MIMO technology.
17. The system shall provide a throughput rate of up to 150Mbps.
18. The system shall provide antenna alignment, signal strength, and site survey tools.
19. The system shall use WPA2 - either AES or TKIP encryption.
20. The system shall have an operating temperature of -40°C to +70°C.
21. The system-radiated emission shall be compliant with FCC Part 15.
22. The system shall be supplied in an IP67 compliant housing.
23. All modules and system parameters shall be configurable via a Graphical User Interface (GUI).
24. The following IEEE Networking Standards shall be supported:
 - a. IEEE 802.3 10Base-T Ethernet
 - b. IEEE 802.3u 100Base-TX Fast Ethernet
 - c. IEEE 802.3ab 1000Base-T Gigabit Ethernet
 - d. IEEE 802.3af Power over Ethernet
 - e. IEEE 802.3at Power over Ethernet
 - f. IEEE 803.3D Spanning Tree Protocol (STP)
 - g. IEEE 802.1X Port-based Network Access Control
 - h. NTP Client
25. Wireless Radio Performance:
 - a. FCC (with MAC lock): +49dBm
 - b. RF Output: +30dBm Rated Transmitter
 - c. Operational Frequency: 5500-5825MHz
 - d. Bandwidths: 10, 20, 40 and 80MHz
26. Wireless Antenna Performance:
 - a. Standard Internal Antenna - Internal 19dBi Dual Polarized
 - (1). Gain: 19dBi
 - (2). Azimuth 17° Horizontal Vertical
 - (3). Elevation: 17° Horizontal Vertical
27. Management:
 - a. Configuration: Web, HTTPS, Telnet Server, TFTP/Web Update for firmware and configuration backup/restore, DHCP Client, User configurable Watchdog and Auto-Reboot Mechanism, Reset to default, Multi-Level Configuration and

- Monitoring Login Accounts, User Configurable Long Range Parameters, Admin password, Port Speed/Duplex control, status, SNMP v3
 - b. NTP: Network Time Protocol to synchronize time from Internet
 - c. 802.1x: Port-based Network Access Control
 - d. DHCP Server
 - e. System Log
28. Electrical Interface Requirements:
- a. Data Interface: Ethernet IEEE 802.3
 - b. Physical connector: 2 x RJ-45
 - c. Data Rate: up to 1000Mbps
 - d. Data Inputs/Outputs: 2
 - e. Operation Mode: Half or Full Duplex
29. Wireless Radio Interface Requirements:
- a. Data Interface: Ethernet IEEE 802.11a, IEEE 802.11n, IEEE 802.11ac
 - b. Number of Electrical ports: 1
 - c. Physical connector: None
30. Electrical Requirements:
- a. Operating Voltage: 48 to 57VDC@ 170mA
 - b. PoE Support: IEEE 802.3af/at PD compliant, IEEE 802.3at PSE compliant
 - c. Power Consumption: SW Max with no PD load connected on Port 2
31. Mechanical Requirements:
- a. 10.0" Wide x 10.0" Height x ¾" Depth
32. Environmental Specifications:
- a. MTBF: >100,000 Hours
 - b. Operating Temperature: -40° to 158° Fahrenheit
 - c. Storage Temperature: -40° to 185° Fahrenheit
 - d. Relative Humidity: 5% to 95% (non-condensing)
33. Regulatory Agencies/Approvals and Listings:
- a. Federal Communications Commission (FCC) Part 15 Compliant

2.14 INTERACTIVE MULTIFUNCTION LED DISPLAY:

- A. A single multi-function display shall be installed, if requested, at the Administration Building. The display shall meet the following minimum requirements and features:
1. Multi, simultaneous user interaction with application software for computers, tablets and mobile devices supporting up to 16 user synchronization in the same workspace.
 2. Connectivity of mobile devices via Bluetooth®
 3. ability to write over all applications
 4. Zoom in, zoom out and move the screen with hands and fingers
 5. Integration with Microsoft Exchange and Office 365
 6. Object Awareness:
 - a. Using fingers to select
 - b. A palm can be used to erase
 - c. Pens automatically write
 7. Pen ID whereby two users can simultaneously write in two different colors
- B. Display
1. Type: LED
 2. Aspect Ratio: 16:9
 3. Optimal Resolution: 3840 x 2160 at 30 Hz (HDMI®) or 60 Hz (DisplayPort)
 4. Horizontal Frequency: 122-140 kHz (typically 135 kHz)
 5. Vertical Frequency: 47-64 Hz (typically 60 Hz)
 6. Contrast Ration (typical): 1200:1
 7. Brightness (typical): 280-360 cd/m²
 8. Pixel Pitch: 0.429 mm x 0.429mm
 9. Gamut: 72% of NTSC
 10. Viewing Angle: 178°
 11. Response Time: 9ms (typical) 12ms (maximum)
- C. Presence detection sensor on the bottom frame.
- D. Audio: 10W integrated side-firing speakers (x2)
- E. Noise Level: <35 db
- F. Included cables and accessories:
1. 8' power cable
 2. 16.5' USB Cable
 3. Pen manufactured by the same manufacturer as the LED display: Qty. 2
- G. The multi-function display shall have the following connectivity options:
1. Side connector panel:
 - a. USB 2.0 Type-B: Qty. 3
 - b. HDMI 1.4 in: Qty. 2

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- c. DisplayPort in
- d. Stereo 3.5mm out
- e. RS-232 in
- c. Accessory to OPS interface supporting HDMI, DisplayPort and USB
- 2. Bottom:
 - a. USB 2.0 Type-A
- 3. Back:
 - a. AC power inlet

H. Mounting:

- 1. Standard VESA® 600mm x 400mm mounting plate
- 2. Furnish and install VESA compliant full motion, swivel, tilt, articulating mount

I. Physical Characteristics:

- 1. Screen:
 - a. 75" Diagonal
 - b. 65" Wide
 - c. 36 5/8" High
- 2. Overall:
 - a. 68 1/8" Wide
 - b. 43 3/8" High
 - c. 4 3/4" Deep
- 3. Weight: 185 lbs.

J. Environmental Specifications:

- 1. Operating Temperature: 41° to 95° Fahrenheit
- 2. Storage Temperature: -4° to 140° Fahrenheit
- 3. Relative Humidity: 5% to 80% (non-condensing)

K. Power Consumption at 77° Fahrenheit

- 1. Normal Standby: 1.7W
- 2. Normal operating mode: 180W
- 3. Maximum operating: 350W

L. Warranty: two years on equipment with optional 1 and 3 year warranty extensions

2.15 WIRELESS RADIOS

- A. The approximate location shown on the contract drawings shall allow line-of-sight as depicted on the contract drawing. The wireless design uses Ubiquity Rocket M radios with 900 MHZ, 2.4 GHZ and 5.0 GHZ spectrums a final radio spectrum analysis will be performed by the chosen contractor to determine frequencies and optimal placement of antennas prior to finalizing design and installation. All renderings on provided schematics are for planning purposes and do not reflect final placement of antennas they represent a suggested arrangement based on coverage requirements.
- B. AirOS operating management platform will be required for control and installation of radios.

2.16 SURGE PROTECTION

- A. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.
1. All equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall meet the requirements of ANSI C62.41. Fuses shall not be used for surge protection.
 1. All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors.
 2. All communications equipment shall be protected against surges induced on any communications circuit.
 3. All cables and conductors, except fiber optic cables, shall have surge protection circuits installed per manufacturers' recommendations.
 4. All line voltage circuits leaving buildings shall be provided with additional transient protection per circuit.
 5. All line voltage circuits generating from an exterior source or load center, powering an exterior enclosure, shall be provided with surge protection.
 6. Surge suppressors for Ethernet signals shall have the following features:
 - a. UL 497B approval
 - b. CAT6, EIA/TIA568B standards compliance
 - c. RJ45 IN/OUT connections
 - d. Provide protection for all 8 pins
 - e. Rated for 1GB data rate
 - f. Continuous current rating of 1.5A minimum
 - g. Operating range of -40° - 158° Fahrenheit

2.17 PRINT POCKET

- A. Each VMS panel location shall contain at least one (1) print pocket, located within a lockable enclosure, to house all record documentation, configuration sheets and individual equipment manuals for all equipment supported and installed at the panel location.

- B. The print pocket for enclosures shall be the Hammond Manufacturing PKT1212 or approved equal.
- C. Where panel assemblies are not of sufficient width, height or depth to accommodate the aforementioned PKT1212, a separate lockable wall mounted enclosure for the sole purpose of housing the print pocket and required documentation shall be installed along side of the VMS panel(s) and/or assemblies. This panel shall also contain a tamper switch and keyed alike lock as required elsewhere in this specification.

2.18 DISTRIBUTION RING

- A. Where distribution rings are utilized to contain cabling, they shall meet the following minimum requirements:
 - 1. Be manufactured from no less than 3/8" diameter die-cast aluminum or steel
 - 2. Have a closed 'D' or 'U' shaped
 - 3. Have a mounting flange on each leg for mounting
 - 4. Have two holes in each flange for mounting options
 - 5. Be fastened to the mounting surface with a minimum of two fasteners of 1 1/2" in length
 - 6. Have a minimum internal distance at the mounting base of 3 1/8"
 - 7. Have a minimum internal distance from the mounting surface to the underside of the 'D' or 'U' of 3 3/4"

2.19 DETECTABLE TRENCH TAPE

- A. Detectable Trench Tape - Brady Identoline® Warning Tape Electric - #91601 or approved equal.

2.20 WIRE AND CABLE

- A. The Contractor shall provide all wire necessary to comply with the Contract Drawings. All wire components shall be able to withstand the environment the wire or cable is installed in for a minimum of 20 years.
- B. Security Systems wiring shall consist of cable types recommended by the manufacturer, shall be color coded using a green colored external jacket (including CAT6 cables and CAT6 patch cables), shall be a minimum of No. 22 AWG for signal/control (unless otherwise specified or required by the manufacturer of the specific devices to which those wires be connected) and shall be installed in accordance with manufacturers' specifications. *Exception: direct burial and water- blocked cables may be black.*
- C. The VMS shall use supervised wiring with all functions to operate as herein described, referenced and as shown on the Contract Documents.
- D. The manufacturers' specifications for wire and cable shall be followed and supersede the wire details contained in this specification.
- E. The Contractor shall verify all wire type and gauge and furnish for approval in TDP I.
 - 1. Interconnecting cable carrying digital data shall be not less than 18-22 AWG and shall be copper wire for each conductor.
 - 2. The cable or each individual conductor within the cable shall have a shield that provides 100 percent coverage.
 - 3. Cables with a single overall shield shall have a tinned copper shield drain wire.
 - 4. Plenum or riser cables shall be ANSI-C2 CL2P certified.

5. All wiring shall meet NFPA 70 standards.
- F. All wiring/cabling is to be protected from accidental and/or intentional tampering through the use of conduit and/or concealment. In areas where cabling is exposed and accessible, it must be placed into conduit or armored cable.
1. In offices, lobbies and similar environments, all wire shall be enclosed in a coordinated color of metal Wiremold® or Panduit®. (Verify all color selections with the Owner)
 - a. Wires shall be protected until they pass above the ceiling plane.
 2. In utility spaces, such as equipment rooms loading docks, etc. wire shall be enclosed in metal conduit.
 - a. Wires shall be protected up to a point that is at least twelve (12) feet AFF, or until they pass above the bottom of trusses, rafters or similar members.
 - b. EMT conduit is suitable for wet locations.
 - c. EMT conduit installed in wet or damp locations shall be installed with the use couplings and connectors manufactured of steel, which shall be of the compression type.
 - d. EMT conduit shall be used indoors where surface metal raceway is not required and shall be installed with the use of couplings and connectors manufactured of steel, which shall be of the setscrew or compression type.
- G. All wiring shall be rated for the environment in which it is installed.
1. All interior wire must be plenum rated.
 2. Use wet or direct burial rated cable for all wet and exterior applications and direct burial cable for all underground applications, which must be installed in a conduit or pipe.
 - a. If using PVC conduit, no less than Schedule 80 must be used.
 - b. All risers, or other points where the conduit transitions from a wall mounted vertical run, to a horizontal, underground run, must be steel. It is permissible to transition to PVC once the horizontal run commences.
- H. No aerial or buried cable shall be so installed unless it is designed and labeled for such use.
1. Unless the manufacturer states that one is not necessary, a properly installed messenger shall be used for all aerial runs.
 - a. Lashing of the wire to the messenger must employ properly rated lacing tape, which must be correctly installed and knotted.
 - b. All knots must be tied so that the tape does not unravel if it is broken between the knots.
- I. Wire and cable shall conform to current National Electrical Code (NEC) standards.
- J. All conductors shall be copper and shall be in accordance with the Institute of Electrical and Electronic Engineers (IEEE) standards.
- K. All cable carrying voice or data shall be shielded with the exception of CAT cabling.
- L. Available Manufacturers
1. Anixter, Inc.
 2. Belden Inc.; Electronics Division.
 3. Berk-Tek; a Nexans Company.

4. BIW Cable Systems; a Draka USA Company.
 5. Champlain Cable Corporation.
 6. Chromatic Technologies; a Draka USA Company.
 7. Coleman Cable.
 8. General Cable Technologies Corporation.
 9. KRONE Incorporated.
 10. Mohawk/CDT; a division of Cable Design Technologies.
 11. West Penn Wire/CDT; a division of Cable Design Technologies.
 12. Windy City Wire & Cable.
 13. Tappan Wire & Cable.
- M. Plenum-Type, Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
1. NFPA 70, Type CMP.
 2. Flame Resistance: NFPA 262 Flame Test.
- N. UTP Cable - 100 ohm, 4-pair UTP, covered with a green thermoplastic jacket
1. Comply with ICEA S-90-661 for mechanical properties.
 2. Comply with TIA/EIA-568-b.1 for performance specifications.
 3. Comply with TIA/EIA-568-B.2, Category 6.
 4. Conductors: solid copper.
 5. Outer jacket color: Green
 6. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - a. The cables shall meet the required UL ratings based on the installation requirements.
 - b. Communications, Plenum Rated: Type CMP, complying with NRPA 262
- O. UTP CABLE HARDWARE
1. All new UTP cables shall be installed to current standards for structured cable installation.
 2. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, JDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
 3. Patch Panels: Modular panels housing multiple-numbered jack units with JDC-type connectors at each jack for permanent termination of pair groups of installed cables.
 - a. Number of Jacks per Field: One for each four-pair UTP cable indicated
 - b. Comply with TIA/EIA-568-B.2, Category 6
 - c. Mounting: Rack mounted

- d. Modular patch panels shall be specified as 24 port configurations, Category 6 or higher, ANSI/TIA/EIA-568-B Series RJ45 jacks. The patch panel jack shall terminate to an IDC PCB or approved mounted connector, 8 position, un-keyed, capable of universal T568-A/B wiring scheme, designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.
 - e. The panels shall have a universal whole pattern for mounting onto any rack, with horizontal cable management to ensure proper bend radius and strain relief.
 - f. The patch panels shall have; have front write-on designation areas, have the ability to accept color-coded identification tags and port protecting shutters, be compliant with ANSI/TIA/EIA - 607-A, labeling specifications and have designation strips on front and rear.
 - g. Acceptable Manufacturers or equal
 - (1). Hubbell - 24port patch panel - Model P6E24U
 - (2). Panduit - 24 port patch panel - Model DP24688TGY
 - (3). Legrand - OR-PHD66U24
4. Horizontal Cable Management: Horizontal cable management shall be used to route network patch cables and field wiring to network ports for termination or interconnections of patch panels and network switched.
- a. Acceptable Manufacturers or equal
 - (1). Hubbell - Model #HC219CE3N
 - (2). Panduit - Model NCMHF1
 - (3). Legrand - OR-MM6HM61 RU
5. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular RJ-45 receptacle units with integral IDC-type terminals.
- a. 8-position modular jack inserts shall meet Category 6 or higher performance as defined by the references in this document including ANSI/TIA/EIA-568 performance requirements. All pair combinations must be considered, with the worst-case measurement being the basis for compliance.
 - b. Jack modules shall terminate on 110D-type IDC PCB mounted connector, be 8 position, un-keyed, for UTP, and be capable of T568-A wiring scheme.
 - c. The wiring scheme shall be consistent throughout the project
 - d. The modular jack inserts shall be compatible with single-conductor 110-impact termination tools, maintain the paired construction of the cable to facilitate minimum untwisting of the wires (0.5 inch maximum untwisting) be compliant with TIA/EIA-606 labeling specifications.
 - e. They should have the ability to accept color-coded icons to designate voice or data application, snap-in and shall be front removable from the faceplate, and provided with blank modules for all unused module locations.
 - f. Modular jack insert colors shall be based on type of device terminated within the faceplate. Modular inserts used for data connections shall be blue in color. Modular inserts used for voice connections shall be gray in color.
 - g. The Contractor is responsible for providing and installed the patch cables.

6. Surface Mount CAT6 Junction Box - Surface mount box accepts one or two Mini-Com Modules; includes built-in removable blank to add a second module.
 - a. Comply with TIA/EIA-568-B.2, Category 6
 - b. Mounting - Surface

2.8. Access Control System Requirements:

There are existing access control systems located in the Community rooms at both the Shea and Hockanum community rooms. EHHA is requesting an additional door to be added to an existing RS2 two door control panel at Shea Community use the existing wiring and provide new door equipment. The Hockanum Community room will require a new RS2 door to replace a discontinued GE panel please use existing wiring and enclosures if possible, new door hardware is required

The Modular access control system shall be a security solution providing controlled access to the facility at specified locations through the use of high security proximity technology. The system shall provide distributed supervised inputs and outputs to allow for alarms to be detected and triggered. These inputs and outputs shall be configurable via software to control building functions such as power control.

The system control panels will be fully upgradeable using flash memory firmware.

2.8.1 SYSTEM ARCHITECTURE:

The access control system shall be a flexible single-user, open-architecture facility management system. The system shall be designed using reliable state-of-the-art technology allowing for easy and economical expansion. The scale-able design shall allow for operation from an embedded Web based server without a dedicated server or PC workstation. The panel must also have the capability to operate in a hosted mode with access control software.

The system shall feature embedded Linux software that intelligently controls the reader network to provide automated data collection and configuration updates, facilitating seamless operation from controllers. All control panels shall utilize off-line distributed processing concepts including inter-controller communication if upgraded.

Connecting to the RS2 or equal web server shall be accomplished via USB, Ethernet through a web server hub connection or Ethernet through web server direct connection.

2.8.2 SYSTEM SOFTWARE:

The software suite shall comprise various integrated software modules that allow for the full integration and retrieval of transactions from the hardware, as well as, reporting, and scheduling capabilities. The software modules shall allow editing of personnel, access levels, system configuration and reporting to be controlled by a password protected user interface. System operation for individual operators shall be possible using assigned passwords only.

The user shall have the ability to perform hardware configuration changes during or after the installation which shall include functions such as door open time, door contact time, location and reader names, and access rights configuration.

The system software shall support configuration of alarms triggering the system.

The system shall incorporate scheduled events activated by either time or a specific programmed event, therefore being time or event triggered.

Access control functions shall include validation based on time of day, day of week, holiday scheduling, and access validation based on positive verification of card or card + PIN (Personal Identification Number).

2.8.3. Zone-related Software Features

Supervisor card unlock

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2.8.4 Card-related Software Features

- Time-limited access
- PIN codes
- Suspension of cards
- Multiple card access
- Card access groups
- Time patterns (schedules)
- Anti-pass back (APB) control
- Reporting
- First Card Rule (Activates the door time zone)
- Two Card Rule-Supervisor card and regular card to allow access
- Time zone card toggle for door locks
- Latching mode for door locks

2.8.5 HARDWARE:

The quantities of components shall be determined and installed by the contractor based on the requirement to provide a fully operational integrated access control system as per the intent of the specification.

Communication between components i.e. gateway controller shall be RS485.

All terminals and controllers must allow for direct Firmware upgrade from the RS485 network connection. The units must be upgradeable during normal system operation, therefore should one unit be in upgrade mode all other units will continue to operate normally. The firmware shall be stored in FLASH memory on the individual units.

A. System Controller:

The system controller shall be the RS2-1, 2 controller or equal. Each controller loop shall be capable of (31) panels or 124 readers.

The standard controller configuration shall support 10,000 card capacity and 25,000 event capacity.

B. Door Control:

The terminals and remote readers supported by the controller shall be any combination of the following: card only, card and pin, card or pin, pin only, lockdown, disabled, supervisor, escort, limited use card, expire on date, first card rule, snow day rule, time zone toggle and anti-pass back with local/global capability and hard and soft implementation.:

C. Proximity Readers

1. Proximity card reader shall be HID Corporation MiniProx, (Wiegand)

2. Provide surface mounting style 125 KHz proximity card readers suitable for door or window mullion mounting, and for minimal space mounting configurations as shown on the project plans.

3. The reader shall be capable of reading access control data in standard Wiegand formats up to 84 bits in length from any HID Proximity card or equivalent, outputting the data in one of the following configurations:

a. The card reader shall output credential data in compliance with the SIA ACM I Wiegand standard, compatible with all standard access control systems.

b. The card reader shall output credential data using a Clock and Data interface, and be compatible with systems requiring a magnetic stripe read

4. The reader shall be capable of outputting a periodic reader supervision message at a configurable time interval, enabling the host system to signal an alarm condition based on the absence of this message.

5. The Proximity card reader shall provide the ability to change operational features in the field through the use of a factory-programmed command card. Command card operational programming options shall include:

- a. Reader beeps and flashes green on a card read, LED normally red, single line control of LED
- b. Reader flashes green on a card read, LED normally red, single line control of LED.
- c. Reader beeps on a card read, LED normally red, single line control of LED.
- d. Beeper and LED are controlled by host only, LED normally red, single line control of LED.

e. Proximity card readers shall meet the following electrical specifications

1. Operating voltage: 5 16 VDC, reverse voltage protected. Linear power supply recommended.

a. Current requirements: (average/peak) 20/110mA @ 12 VDC

2. Proximity card readers shall meet the following certifications:

a. UL 294 2. Canada/UL 294

b. FCC Certification

c. Canada Radio Certification

d. EU and CB Scheme Electrical Safety

e. EU — R&TTE Directive

d. Proximity card readers shall meet the following environmental specifications:

1. Operating temperature: -22 to 150 degrees F (-30 to 65 degrees

2. Operating humidity: 0% to 95% relative humidity non-condensing

3. Weatherized design suitable to withstand harsh environments the reader shall be of potted, polycarbonate material, sealed to a NEMA rating of 4X (1P55).

4. Proximity card reader cabling requirements shall be:

a. Cable distance: Wiegand: 500 feet (150m); Clock & Data: 50 feet (15m)

b. Cable type: 5-conductor 422 AWG w/overall shield. Additional conductors will be required for 2-line LED control, beeper, hold, or card present functions

c. Standard reader termination: 18" (.5m) cable pigtail

d. Optional reader termination: 10 screw terminals located under reader cover.

e. Warranty of Proximity card readers shall be lifetime against defects in materials and workmanship.

f. The quantity and location of readers shall be as specified in contract documents and drawings.

6. Inputs: Provides 14 fully configurable four-state supervised input points. System capacity must have a total of 78 inputs

7. Outputs: Provides 8 SPDT Form C relay outputs rated at 10A @ 28vdc, 8 open collector's outputs 16ma @12vdc, 4 reader LED aux output and 4 reader buzzer output.

8. Cards and Database:

The card and event buffer capacity shall be 10,000 card capacity and 25,000 event capacity.

The firm ware revision shall have on-board flash memory for field firmware revisions and feature expansion. Offline database backup shall be available. Export capabilities for card database, alarms and events. The panel shall support 128 unique card formats and 8 site codes. Maximum card format size shall be 75bit suitable for handling the card format of PIV, TWIC, and FRAC cards. The time zones support will be a minimum of 127 with 128 access levels and 255 holidays.

9. Proximity Keyfobs

A. Proximity keyfobs shall be from HID Corporation.

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- B. The keyfobs shall be RF programmable, 125 kHz, and charcoal gray, with customer specified ID numbers.
- C. Keyfob shall be of passive, no-battery design allowing for an infinite number of reads.
- D. The keyfobs shall offer over 137 billion unique codes.
 - 1. The read range of the keyfob shall be up to 2" with the MiniProx reader.
 - 2. The dimensions shall be 1.9" x 0.9" x 0.345" max.
 - 3. The construction shall be an ultrasonically welded, polycarbonate shell resistant to cracking and breaking.
 - 4. The operating temperature shall be -50° to 160° F.
 - 5. The keyfob shall weigh less than 0.26 oz.
 - 6. The quantity of keyfobs per site shall be specified on the contract drawings.
- 10. Electric Door Strikes
- E. The electric door strikes shall be of the manufacturer, type, and style required for the individual door.
- F. All door strikes shall have been tested by the manufacturer and successfully completed at least 100 uninterrupted cycles, in both the left and right hand positions.
- G. All door strikes shall be made of stainless steel, and available with different finishes.
- H. All door strikes shall have the option of fail secure and fail safe operation.
- I. Door strikes shall be UL listed as burglary-resistant electric door strikes.
- J. All door strikes shall be capable of operating continuous duty at 10/24 volts AC/DC.
- K. The quantity and location of electric strikes shall be as specified in the contract documents and drawings.
- L. The electromagnetic lock shall be Securitron or equal.
- M. The lock shall have a 12 VDC or 24 VDC input.
- N. The lock shall be rated for three (3) watts of power (125mA @ 24VDC) or (250mA @ 12 VDC).
- O. The lock shall have a pull-apart or tensile holding force of at least 1200 pounds. The manufacturer must submit a laboratory test certifying the minimum holding force on request.
- P. The strike plate shall be mounted using a steel sex bolt and roll pins to provide a "floating" movement to assure automatic self-alignment with the lock.
- Q. The lock shall be mounted using four .25 inch x 3 inch machine screws into blind finishing nuts with steel threads that go through the entire body of the lock. G. Anti-tamper caps shall be provided for the exposed holes.
- R. The lock and strike shall be plated to provide corrosion proofing.
- S. The lock shall be fully sealed in resin to make it tamper and weather proof.
- T. The lock shall be available in standard architectural brushed Stainless Steel 630/US32D finish.
- V. The lock shall contain a suppression circuit to prevent residual magnetism and inductive kickback. The circuit also shall provide accelerated field collapse and radiation suppression.
- W. The lock measures 42 cubic inches (8 inches x3 inches x1.75 inch).
- X Ten feet of jacketed stranded conductor shall be provided for electrical connection. The quantity and location of electromagnetic locks shall be as specified in the contract document and drawings.
- Aa. Door hardware shall be of the manufacturer, type and style required for the individual door.
- B.b. All door hardware shall be approved by the Consultant and Owner before installation.
- C.c The detector shall have closed or open loop types with a SPDT, Form C relay. D. A piezo shall be included within the detector
- D.d The detector shall have a separate door position relay to monitor the door contact for door position to eliminate excessive amounts of time the door is unlocked.
- E.e The detectors maximum lock relay rating shall be 30 VDC, 1A and maximum monitor relay rating shall be 24 mA.

- F.f. The detectors approximate lock relay durations shall be 5s, 30s, 75s, and 120s. H. The detector shall be able to be mounted on the wall, door frame, or ceiling.
- G.g. The dimensions of the detector shall be 7.1"W x 1.65"D x 1.65"H and it shall weigh 4.5 oz.
- H.h The operating temperature of the detector shall be 32° to 120° F at 10% to 95% relative non-condensing humidity.
- I.i The quantity and location of the request for exit motion detectors shall be as specified in contract documents and drawings.

15. Reports and Analysis:

The system shall be capable of integrated reports, import/export of card database and alarms and events can be exported and saved in offline storage.

16. Embedded Web Server:

Supported browsers shall include Internet Explorer. The web browser control will allow full control monitor, view live events and manually control doors and readers. Secure web browsing shall be SSL and SHA-1 secure socket layer encryption.

17. System Information:

The system shall support Global Geographic Time Zone support and Daylight Saving Time support. The system must be CE and FCC compliant with UL-294 listing.

18. System Testing:

The Contractor shall demonstrate the functionality of the system upon completion of installation, and shall document the result of all tests and provide these results to the Customer.

19. The system shall be capable of producing the following reports, based on any combination.

A Report of valid accesses for a selected cardholder, selected card reader, on selected area

B Report of rejected access attempts for a selected cardholder, selected card reader, and selected alarm activation's for a selected alarm point, on selected area.

C. Alarm reporting by individual alarm or group of alarms.

D. Report of operator entered comments in conjunction with alarm acknowledgments. Report of manual operator override commands such as performed alarm point masking/unmasking, manual card reader door locking and unlocking, and manual auxiliary relay activate/deactivate.

E. Report of automatic time controlled system commands such as automatic masking/unmasking, and automatic door lock/unlocks.

F. In addition, the system shall offer the user the option of directing the historical reports to a workstation monitor, printer or text file for display or report printing.

G. The system shall be capable of producing lists of selected cardholder data records on a workstation monitor, printer, or text file. The system shall allow the user to select sorting by card number, cardholder name or other fields.

1. Standard Cardholder Record Reports may be requested by an operator, with the data records sorted numerically by encoded card number, alphabetically by cardholder name, numerically by employee number, and numerically by the embossed card serial number. Such listings may also be requested to include only those cardholders who are authorized access to a specified area (list by security area).

2. Special Employee Report Generator reports may be created by the operator to provide cardholder record listings that include only operator specified data fields. Each report may include conditional testing on up to two (2) data fields in order to include data for only those cardholders that comply with those conditions specified. Each report shall be capable of being sorted in alphabetical or numeric order.

3.. Cardholder Report Formats: The system shall allow the user to create and design the Ad Hoc reports with report Format Names. The system shall save and store these named formats on the system hard disk for later use and recall by format name.

20. Surface Mount Magnetic Contacts

- A. The surface mount magnetic contacts shall be GE or equal.
- B. The contact and magnet shall be hermetically sealed reed switches nominally 2.5"L x .5"W x .56"D.
- C. Their loop type shall be closed and electrical configuration shall be N/O.
- D. They shall have a gap distance of up to 34".
- E. The connection to the contact shall be made through #6 screw terminals.
- F. The color of the contact shall be determined by the individual door: white, mahogany brown, or gray.
- G. The quantity and location of surface mounted magnetic contacts shall be as specified in contract documents and drawings.

21. Power Supply

- A. The power supply shall be an Altronix with battery back-up.
- B. The power supply shall have four filtered and electronically regulated outputs.
- C. The power supply shall have 6 amps of continuous supply current at a selectable 12 VDC or 24VDC.
- D. The power supply shall have fused outputs.
- E. The power supply shall have short circuit and thermal overload protection.
- F. The power supply shall have a built in battery charger for sealed lead acid or gel type batteries and shall have automatic switch over to stand-by battery when AC fails.
- G. There shall be zero voltage drop when switched over to battery back-up.
- H. The power supply shall have Form C contacts for AC fail supervision, Low Battery supervision, and battery presence supervision.
- I. The unit shall include a power supply, enclosure, cam lock, battery leads, and batteries.
- J. The quantity and location of the power supplies shall be as specified in contract documents and drawings.

PART 3.00 - EXECUTION

3.01

GENERAL

- A. The Contractor shall install all proposed Systems components in accordance with the manufacturers' instructions, and as shown on the Contract Drawings. Furnish all necessary interconnections, services, and adjustments required for a complete and operable System as specified and shown during each phase of construction as shown on the Contract Drawings.
- B. The contractor shall perform at least 50% of the required work with their own work force.
- C. Project Communications and Correspondence:
 - 1. Project construction meetings will take place weekly at the 546 Burnside Avenue East Hartford CT location.
 - 2. To support construction meetings, the Contractor shall provide a conference call line and shall conduct the meetings.
 - 3. The Design Consultant will track, compile and distribute meeting minutes from each construction meeting in a format provided at project commencement. Meeting minutes shall be distributed no more than two business days after the conclusion of the meeting.
- D. In the event the Contractor notes any condition that affects or potentially could *affect* the performance of the systems, the Contractor shall submit a report to the Owner documenting any changes to the site or conditions. Failure of the Contractor to become familiar with the site conditions prior to the TDP I project stage shall not relieve the Contractor of responsibility for full completion of the work in accordance with the contract provisions.
- E. At the TDP I project phase, the Contractor shall inspect locations where installation work will be performed and verify that conditions found are in accordance with the Contract Documents and are acceptable for the Contractor's installation work. Report any discrepancies in writing to the architect, stating suggested means of correction in TDP I.
 - 1. Change orders for field conditions which vary from those represented during the bidding portion of the project and which should have been discovered during the inspection described in the preceding subsection are not likely to be allowed.
- F. Specific device mounting locations, precise wire and cable runs, and any conduit routing have not been specified on the Contract Drawings. Coordinate all aspects of installation and ensure that adequate conduit is provided, that equipment back boxes are adequate for system installation, that power has been provided and properly located and that doors and door frames are properly prepared for door hardware.
- G. The Contractor shall check all power and communications cabling for continuity before making connections.
- H. Coordinate all card reader and request to exit device mounting with the Owner's representative prior to installation.
- I. All devices shall be manufactured of materials and durability for the environment in which it is to be installed.
- J. The Contractor shall coordinate finishes and colors of all equipment with the Owner. Locking devices shall be coordinated to match the existing door hardware at each door location where new locking hardware will be installed.
- K. The Security Contractor shall furnish and keep on the job at all times, one (1) complete separate set of red-line drawings, elementary diagrams and wiring diagrams of the SMS on which shall be clearly, neatly and accurately noted, promptly as the work progresses, all architectural and electrical/electronic changes, revisions and additions to the work.

1. Wherever work is installed otherwise than as shown on the Contract Drawings, such changes shall be noted.
 2. The Contractor should keep on the job, at all times, and in the possession of the tradesmen performing work, a copy of these specifications and all project drawings, including the approved wire path prints.
 - a) Should the owner, or a representative of the owner present on the job and request to see these documents, and they are not available, work may be stopped until the documents are obtained.
- L. Tobacco and seed use:
1. There is NO SMOKING or use of any tobacco products including e-cigarettes, personal vaporizers (PV) or electronic nicotine delivery systems (ENDS), on or in ANY Owner owned facilities or property.
 2. Additionally, if the Contractor has personnel who consume sunflower seeds or other types of seeds and/or nuts, all shells shall be placed in a container and properly discarded. No seeds, husks, shells or hulls shall be discarded or spit onto the grounds or within the buildings.
 3. There will be a \$500.00 per incident fine, charged to the Contractor for each incident.
 4. The Contractor is also responsible for its sub-contractor's actions as they apply to this specification.

3.02 IT SECURITY

- A. The Contractor shall coordinate any/all network connections with the Owner's IT department prior to making any physical connections to the Owner's network components. Failure to follow this directive may result in expenditures for repair and troubleshooting by the Owner's IT department or 3rd party IT contractor/vendor. Such expenditures to remedy any issues caused by incorrect coordination by the Contractor shall be borne by the Contractor.
- B. The Contractor will be responsible for establishing the security of all IP devices, servers and VMS storage from adversary compromise (internal or external) in conjunction with the owner's IT Department. Security shall be applied at the operating system level and at the application level within the scope of this project.
- C. The cost of investigation, repairs and reprogramming resulting from any security breaches during construction or operation of the system (while under warranty or service agreement) attributable to the failure of the Contractor to implement approved IT security measures shall be borne by the Contractor.

3.03 EQUIPMENT SETUP AND PROGRAMMING

- A. The following section defines the parameters by which the electronic and electromechanical equipment shall be setup and/or programmed for each device within the system. These parameters shall be programmed into each door location for the entire system. *Note: There may be certain situations where these parameters may not be practical for a given application. One such situation would be an extended hold open time. Slight adjustments may be required based on actual site conditions and the Contractor will be responsible for adjustments through the commissioning process at no additional cost to the project.*
- B. General Conditions:
 1. The Contractor shall enter and program all data needed to make the system operational.
 2. Naming conventions for all portals and other security devices covered under this project will be established in the device schedule (s) and will be provided prior to the initiation of

Work. These names should be used throughout the life of the project, including for all programming into the SMS software and IDS controllers.

- a) The Contractor shall identify and request any additional data needed to provide a complete and operational security system.
- b) The completed forms shall be delivered to the Owner for review and approval at least 21 days prior to the Contractor's scheduled need date in TDP 11.
- c) In the event that the Contractor is lacking any portion of the information to complete system programming, a Request for Information (RFI) shall be transmitted prior to commencing any programming.
 - (1) Incorrect programming and device naming will be required to be corrected by the Contractor, at no expense to the owner.
 - (2) A statement by the Contractor that not all information was made available, in the event of inaccurate programming, will not be an acceptable defense.
- d) Programming shall include, but not be limited to, elimination of duplicate or redundant information, synchronization of system clocks, camera sequences, dome presets, salvos and tours as appropriate.
- e) Programming of any system passwords or limiting of accessibility prior to or after commissioning and training is prohibited. With the exception of individual end-user (Owner) employees, ALL user names and passwords shall be handed over to the Owner at the time of final system acceptance. Usernames and passwords shall be submitted in an electronic spreadsheet format.

C. Databases:

1. Each SMS database shall be programmed to accommodate all host communications, client communications, card readers, inputs, outputs, integrations and interconnections required for all devices installed under this scope.
2. Up to five user levels in the VMS as appropriate, shall be programmed, which shall be coordinated with the Owner.
3. Up to 2 time schedules in each subsystem as appropriate, shall be programmed, which shall be coordinated with the Owner.
4. Each SMS database shall be set to automatically backup each database on a quarterly schedule. Partial backups are allowed but a full backup is required at least once a month. The backup may be to a local drive or preferably a network drive.
5. In all circumstances, the VMS system and database services shall be set to automatically restart upon system startup.

D. Cameras:

1. Each installed camera shall have its factory default user name and password changed.
2. Initial PTZ home positions and presets as noted.
3. Initial view setup, camera sequences, tours and salvos.
4. New IP Video cameras shall be setup with video motion detection zones. Cameras shall be recorded in the following manner:
 - a) For interior and exterior cameras:
 - (1) 15ips on video motion detection full resolution

(2) 3ips full resolution at all other times

5. The username and password shall be coordinated with the Owner and handed over to the Owner as part of the record documentation process.

E. Tamper Switches:

1. Regardless of system or connection, the tamper switch input shall be programmed to generate and alarm condition upon activation of the tamper switch.
2. The alarm condition shall be programmed to create a visual and audible alarm condition on the VMS system monitoring screen and send out an alarm message via Text Message or Email to the System Administrator.
3. Tamper Switches for the following devices shall be monitored:
 - a) All system enclosures
 - b) All card readers
 - c) All VMS cameras

F. UPS:

1. Where a server or servers are connected to a UPS, the UPS and server or servers shall be connected together to allow the server or servers to perform an orderly shutdown in the event of an extended power outage.
2. Interconnectivity may be by Ethernet, USB or serial connectivity. *Note: It is understood that in most cases, a software application will also need to be loaded onto any servers that are to be shut down. This shall be part of the scope where a UPS is installed.*
3. For or 120VAC power loss:
 - a) An output from the UPS shall be setup and programmed to transfer contacts in the event of a power failure to the UPS.
 - b) The UPS output contact shall be connected to an alarm input of an access control system or camera nearest to the UPS location.
 - c) The camera input shall be programmed to generate and alarm condition upon activation from the UPS loss of power output connection. The alarm condition shall be programmed to create a visual alarm condition on the VMS system monitoring screen and send out an alarm message via Text Message or Email to the System Administrator.

3.04 POWER AND POWER MATTERS

- A. The Contractor shall provide the necessary power supplies for all panels and field devices provided in this project.
- B. Branch circuits shall be run in EMT to a junction box at the panel location. EMT shall be continued from this junction box to each panel requiring power.
- C. Where panels are mounted on hollow walls made of studs and GWB, it is permissible to fish MC Cable in the walls, to feed the panels through the back of the panel.
- D. Owner will provide power for this project, subject to the following stipulations:

1. In some cases the owner will designate an empty slot in a panel box or an unused circuit breaker, which is in close proximity to the actual point of consumption. In these cases, this is "owner provided power."
 2. In other cases, the owner may designate a box or enclosure with suitable power contained within, which is in close proximity to the point of consumption. In these cases, this is "owner provided power."
- E. It will be the responsibility of the successful bidder to provide all materials and labor to span the remaining distance and get the power into the subject enclosure or rack.
- F. At no time will the owner connect to any project provided enclosure or rack or provide power inside an enclosure or rack.
- G. When a manufacturer of an enclosure or a rack which is being provided for this project offers a power distribution system designed for that particular enclosure or rack, it shall be provided with the enclosure or rack.
- H. Plug-in transformers, designed for providing low voltage power for portions of this system shall not be plugged into a plastic terminal, or power, strip. All power strips so employed must feature a metal housing and must be properly secured to a supporting structure.
- I. At any location where plug-in low voltage power supplies or transformers are utilized, they shall be secured in some manner so that they may not become loose or dislodged by anything other than intentional means. In addition, they shall be installed within an enclosure or box to prevent tampering.
1. The preferred method to accomplish this shall be to employ transformers, which have an integral eye and screw for fastening them to the receptacle on which they are mounted.
 2. As an alternative, a device designed for the purpose may be used.

3.05

WORKMANSHIP AND INSTALLATION REQUIREMENTS

A. GENERAL

1. Deliver and store materials in manufacturers' original packaging labeled to show name, brand, type and grade. Store materials in protected dry location off ground in accordance with manufacturer's instructions. Do not open packaging nor remove labels until time for installation.
2. Install Systems in accordance with manufacturer's recommendations.
3. The entire work provided by the Contractor in this Specification shall be constructed and finished in every respect in a workmanlike and substantial manner.
4. It is not intended that the contract drawings shall show every installation support device, pipe, fitting or fixture associated with installation and operation.
5. The Contractor shall furnish and install all parts as may be necessary to complete the Systems in accordance with the best trade practice and to the satisfaction of the architect.
6. The Contractor shall keep other Sub-Contractors fully informed as to shape, size and position of all openings required for his equipment and shall give full information to the architect and other Sub-Contractors sufficiently in advance of the work so that all openings may be built in advance.

7. In the case of failure on the part of the Contractor to give proper notice and timely information as noted above, the Contractor shall do his own cutting and patching or have the same done by another Sub-Contractor, but in any case, without expense to the project.
8. The Contractor shall obtain detailed information from the manufacturers of equipment as to the proper method of installation and connecting same. He shall also obtain all information from the owner and the other Sub-Contractors that may be necessary to facilitate his work and the completion of the whole project.
9. Remove daily to a centrally designated location on each site all rubbish and debris and all refuse from workmen's lunches and at completion, remove all surplus materials, temporary works and leave all work in clean condition, acceptable to the owner.
 - a) All bare floor or tiled office, residential and corridor spaces shall be broom clean each night.
 - b) If carpeted, all areas in which work occurred on any given day will be vacuumed each night.
10. No chemical may be brought on owner property, whether in the performance of this project or not, without being accompanied by the proper and current MSDS.
 - a) No hazardous materials or chemicals will be left unsecured or unattended at any time.
11. The Contractor is responsible for providing all tools, materials, equipment, workmen and labor to successfully complete the project, without any assistance from owner resources UON
12. No direct burial cable shall be directly buried in the ground or below finished surfaces for any part of the installation unless it is installed within a conduit. *Exception: Wiring loops cut into roadways, driveways or similar surfaces for the purpose of detection of vehicles for a gate or barrier arm entry, exit or safety system are allowed to be directly buried in the surface without the use of a conduit.*
13. The installing vendor is responsible for making all requests for stakeouts and utility mapping prior to the initiation of any excavations, and shall ensure that all applicable parties suitably respond prior to any excavation. To be considered as included within the parameters of this subsection are requests for the movement of overhead or underground utilities, as well as the sleeving of any appropriate electrical conductors
 - a) Notifications made without waiting for a corresponding utility response will not be considered a defense in the case of damaged utilities and disrupted services.
 - b) Any firm or entity damaging or interrupting any utility or service shall be responsible for the full cost of repairs and interruption of services costs.
14. Arrange all components to be mounted in the rack(s), or on a wall in accordance with owner' representative coordination. Design shall provide a neat appearance and accessibility for servicing equipment.
15. The Contractor shall keep other Sub-Contractors fully informed as to size and position of all openings required for his equipment and shall give full information to the owner' representative and other Sub-Contractors sufficiently in advance of the work so that all openings may be built in advance.
16. In the case of failure on the part of the Contractor to give proper notice and timely information as noted above, the Contractor shall do his own cutting and patching or have

The same done by another Sub-Contractor, but in any case, without expense to the project.

17. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. Provide mounting hardware as required.
18. The Security Contractor shall install the security equipment in accordance with the appropriate installation manual for each equipment type. Components within the system shall be configured with appropriate service points to pinpoint system trouble in less than 20 minutes.
19. All wiring, including low voltage wiring, cabinets, boxes, and similar enclosures shall be plenum rated.
20. All fasteners and washers used in exterior, wet or damp locations shall be manufactured from stainless steel. This includes where drop-in style anchors are utilized. Where a piece of equipment is provided, with fasteners, from the manufacturer, and they are not manufactured from stainless steel, they shall be replaced with stainless steel fasteners. Fasteners shall be defined as, screws, nuts, bolts, washers of any type, lag bolts, lag screws, screw eyes, sheet metal screws, wood screws, machine screws. *Exceptions: J-bots and/or anchor bolts embedded/captive in poured concrete for the purpose of mounting poles, stanchions or other similar structures may be manufactured from steel but shall be hot dipped galvanized.*
21. All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors.
22. All communications equipment shall be protected against surges induced on any communications circuit. All cables and conductors, except fiber optics, shall have surge protection circuits installed.
23. All hardware used in exterior venues, including "open air" spaces, even if a roof covers them shall utilize hardware that is made of a non-rusting, no-corrosive metal to prevent rust and other stains from defacing the exterior of the buildings.
24. Inspect each component, determine obvious defects, if any, and correct.
25. Perform tests as recommended by manufacturer or as required to ensure the security equipment is operating properly and meets specified requirements.
 - a) Where there are technical irregularities in system performance, Contractor shall be responsible for contacting the manufacturers or their representatives for initial troubleshooting.
 - b) Correct all deficiencies detected and retest affected components.
26. Record test data, tabulate, and write narrative describing tests, results, deficiencies found, corrective measures, and results of retesting. Certify to the Owner that the security equipment has been tested and is ready for performance verification testing and project close out as part of TOP III.

B. ENCLOSURES AND RACKS

1. Enclosures and equipment racks shall be constructed and laid out as shown in the elevation details of the contract documents including the individual counts of all boards and batteries. If there is a desire to deviate from the design depicted within the contract drawings, the Contractor may submit an alternative design to the Owner's Design Representative for review. Submission of an alternate design does not guarantee

Acceptance of the design. Acceptance of the design will be at the sole discretion of the Owner's Design Representative.

- a) *Exception 1: Heavy equipment such as UPS units and UPS auxiliary battery enclosures are permitted to be installed at the bottom of an equipment rack; all other equipment shall be laid out as shown.*
2. System enclosures shall be metallic or PVC. All terminal devices to be used in an interior environment shall be housed in an enclosure that provides protection against dust, falling dirt, and dripping non-corrosive liquids.
 - a) *Note: PVC system enclosures shall not be utilized in an interior environment, however, they may be utilized in the field where not subject to physical damage or any damp or wet environments.*
3. All enclosures mounted in damp or wet environments or where exposed to an exterior environment shall be of the NEMA4X classification.
4. NEMA4X enclosures shall be manufactured from stainless steel or aluminum. Fiberglass enclosures shall not be used.
5. Enclosures, cabinets, and racks of every description having hinged doors or removable covers, and which contain circuits or connections of the equipment or power supplies, shall be provided with cover operated, corrosion resistant tamper switches, arranged to initiate an alarm signal when the door or cover is moved.
 - a) Tamper switches shall be mechanically mounted to maximize the defeat time when enclosure covers are opened or removed.
6. In any panel or enclosure, no board, battery or component shall be "flown" or mounted (suspended) over the top of, or placed in front of any portion of any other board or component. This is to ease wire connection, troubleshooting, component replacement and to promote the circulation of cooling and drying air around boards and components.
 - a) All panels, subpanels, relay boards and similar devices installed within an enclosure shall be mounted with metal screws and metal standoffs or by the use of SnapTrack®. The mounting of any device or component with nylon or plastic standoffs or double-sided adhesive tape will not be permitted.
 - (1) *Exception 1: where isolation from the backplane or the enclosure, of the panel, subpanel, relay board or similar device is required by the manufacturer, or to prevent shorting, nylon standoffs may be used, however, every effort will be made to mount equipment with metal standoffs.*
7. Enclosures shall not be used as raceways. Field cabling shall not pass through an enclosure to another enclosure where it is to be terminated. Field cabling shall only enter the enclosure in which is to be terminated.
8. Enclosure penetrations:

- a) All exterior enclosure penetrations shall be from the bottom or sides, unless the system design requires penetrations from other directions. Under no circumstance shall the top of an exterior enclosure be penetrated.
 - (1) Penetrations of interior enclosures involving transitions of conduit from interior to exterior, shall be sealed with rubber silicone sealant to preclude the entry of water.
 - (2) Penetrations of exterior enclosures and termination of raceways shall be made with Meyer's type hubs and thread sealant. For this requirement, silicone is not considered a thread sealant. For interior enclosures and racks only, field cabling shall enter the enclosure through a metal conduit properly terminated in the top or side of the enclosure.
 - b) For interior enclosures and racks only, field cabling shall enter the enclosure through a metal conduit properly terminated in the top or side of the enclosure.
 - (1) Conduits shall extend to a cable tray either within the closet or to the nearest cable tray outside of the closet. In no case shall the conduit be less than 2" trade size. Where cables tray does not exist, the conduit shall be extended up into the structural steel of the floor in which the enclosure is mounted.
 - (2) Where multiple enclosures exist at a location, conduits and steel surface metal raceways may be utilized to connect multiple enclosures. In no case shall the surface metal raceway be smaller than 4" x 4" in width and height.
 - (3) Plastic raceway of any type is not permitted outside of an enclosure. This includes PVC pipe between or around enclosures or as the cable entrance raceway.
9. Panels shall incorporate a metal backplane and/or fixed standoffs within the enclosure for the purpose of mounting all components. The backplane may be solid or perforated in nature and shall be one piece within the interior of the enclosure.
10. All components shall be mounted on the backplane. No components shall be mounted on the sides, top, bottom, or door of the enclosure.
- a) *Exception 1: Indicator lights/LEDs showing the status of power or any fault conditions may be mounted on/in the door to facilitate viewing of status indicators without having to open the enclosure.*
 - b) *Exception 2: Where an enclosure is manufactured by a specific security equipment manufacturer and is laid out with pre-installed standoffs or threaded studs and designed to have circuit boards mounted to the sides or door, it shall be allowed.*
11. All circuit board components shall be mounted to the backplane using metal standoffs or by use of SnapTrack®.
- a) *Exception 1: where isolation from the backplane or enclosure, of the panel, subpanel, relay board or similar device is required by the manufacturer, or to prevent shorting, nylon standoffs may be used.*
 - b) No double sided adhesive tape or mounting pads shall be used for mounting components.
 - c) Standoffs shall be mounted to the backplane in a captive fixed manner so that removal of the board supported by the standoff can be accomplished without

- Removing the entire backplane and without loss of the standoff or mounting hardware.
- d) Where full population of support equipment, such as circuit boards and transformers, is not required due to device counts, all standoffs and brackets shall be installed for a full configuration.
12. The mounting of any device, component, wire or wire bundle with double-sided adhesive tape will not be permitted. This includes adhesive backed tie-wrap mounts which may be only be used if fastened with screw, to the enclosure.
13. Line voltage connections to the interior of the racks and enclosures shall be concealed by metallic raceway and/or boxes or terminated on terminals designed to prevent accidental contact by service personnel.
- a) Line voltage conductors shall enter the enclosure or rack at the point nearest where it will be terminated and shall not be run in any low voltage raceway within the enclosure or supporting cable management for low voltage cable around the enclosure.
- b) Under no circumstance shall enclosures be cord and plug connected.
- c) Racks that are mounted on casters shall be hardwired to the branch circuit by means of Liquidtite® or metallic flex from a wall mounted junction box or transition from conduit. The Liquidtite® or metallic flex shall be of appropriate length to allow the rack to be moved out away from the wall or other racks for service.
- d) Where racks are mounted to the wall, floor or mounted on static feet, the rack shall be hardwired with Liquidtite® or metallic flex from a wall mounted junction box or transition from conduit, to the rack. The Liquidtite® or metallic flex shall be of appropriate length to allow the rack to be moved out away from the wall or other racks for service.
- e) If a UPS is supplied with a factory assembled cord and plug connection and removal of the cord and/or plug in any way voids the manufacturer's warranty, the UPS shall be plugged into a receptacle mounted within the rack, which meets the other requirements listed within this specification for receptacles mounted within enclosures and racks.
14. Raceways shall be provided within the enclosure for the purpose of routing and dressing cables within the enclosure. Raceways shall be plastic 'finger duct' appropriately sized for the amount of cable to be installed within.
- a) Covers for all internal raceways shall be provided and installed. Where full population of support equipment is not required due to device counts, all raceway shall be installed for a full configuration as depicted within the contract drawings.
15. All panels shall contain a print pocket for the purpose of holding all panel documentation. Print pockets shall be affixed the interior of the enclosure on the back of the door and be large enough to accommodate all documentation required in this specification.
- a) Documentation contained within each panel shall include the floor plan and riser diagram as well as the device schedule and device naming conventions for the area in which the panel is servicing.
- b) Additional documentation shall include component level manuals for all equipment contained within the equipment enclosure or enclosures contained or grouped at a panel location.

- c) Where the depth of the enclosure, batteries or board/component layout does not permit the installation of the print pocket, a separate document enclosure shall be provided and installed with the other panels at the same location.
16. All racks, panels and enclosures shall be furnished with a key lock as part of the door mechanism for the purpose of securing the enclosure.
- a) All enclosures and panels shall be keyed alike throughout the SMS. The terminology **all** refers to new and existing enclosures and racks utilized as part of the SMS system.
 - b) All racks shall be keyed differently from the enclosures, however both rack doors shall be keyed alike. A minimum of 10 keys, of each cut, shall be provided to the owner at the completion of commissioning.
17. Other than the following listed exceptions, no part or device installed within a junction box or enclosure shall be mounted directly on a side, wall or any other portion of the housing. A back plate shall be attached to the box with standoffs to which all devices shall be attached.
- a) This clause shall not apply to indicator lamps, switches or other devices that are to be mounted so that portions of them are both inside and outside the enclosure.
18. All closed racks, meaning any rack with front and rear doors, and sides, which either solely enclose the rack, or adjacent racks which function as sides, shall feature adequate means of cooling to exhaust heated air and/ or introduce fresh, ambient, air.
- a) Such devices shall be capable of maintaining the internal rack temperature at no more than 85° F (at the top of the rack, with all doors closed) with a space temperature of no more than 72°F.
19. All racks must include adequate protection for the equipment contained within, which is appropriate for the environment in which it is placed.
- a) For example, if installed in a dirty space, or a location with more than the normal amount of air-borne dust the rack should be provided with devices and filters to prevent the intrusion of dust and dirt into the rack space.
20. All rack-mounted equipment shall employ a mounting screw in each hole intended for the purpose of rail mounting the equipment within the equipment rack. Mounting screws for rack-mounted equipment shall be black.

21. All terminations, junctions and splices that are contained in junction boxes and enclosures shall be made at a terminal strip that permits all wires and conductors to be secured by a screw or similar fastener.
 - a) No connectors used to terminate any wire or cable carrying 50v or less, shall employ "twist-on" connectors, such as "wire nuts" commonly used by electricians in 120VAC wiring.
22. No wire or cable shall pass through an enclosure, junction box, wall or partition without an appropriate conduit, sleeve or bushing of the proper size and length installed to protect the wire. No wire or cable shall pass through the end of a length of conduit, or other raceway, such as Panduit® without being protected from damage by a bushing, or other device specifically designed to protect that wire from chafing and other damage to the insulation, conductors and jacket. A snap in plastic bushing or chase nipple shall be utilized for this purpose. For these applications an EMT connector is not considered an appropriate type bushing.
23. Whenever a wire or cable exits from a conduit, the edges of that conduit shall be covered by a bushing or similar device designed to protect the wire from the conduit edges. Box fittings and couplings shall not be considered appropriate.
24. Wires or armored whips entering into junction boxes or enclosures shall be entered through a metallic cord type compression connector or metallic Romex® connector. No plastic fittings are allowed.
25. Plug-in transformers, designed for providing low voltage power for portions of this system shall not be plugged into a plastic terminal, or power, strip. All power strips so employed must feature a metal housing and must be properly secured to a supporting structure.
 - a) At any location where plug-in low voltage power supplies or transformers are utilized, they shall be secured in some manner so that they may not become loose or dislodged by anything other than intentional means. In addition, they shall be installed within an enclosure or box to prevent tampering.
 - b) The preferred method to accomplish this shall be to employ transformers, which have an integral eye and screw for fastening them to the receptacle on which they are mounted.
26. System Monitoring shall be employed for each panel location and shall encompass all sub-segments of a panel location.
 - a) Sub-segments are defined as camera, wireless radio and network equipment power supplies and auxiliary power supplies.
 - b) Where two power supplies support a single reader and/or 1/0 panel enclosure, the monitoring of those sub-segments may be series together. However, each reader and/or 1/0 panel enclosure shall monitor only its associated sub- segments.
 - c) System monitoring shall consist of monitoring for the following:
 - (1) Loss of 120VAC.
 - (2) Loss of battery.

- (3) Power supply fault/trouble not related to the loss of 120VAC.
 - (4) Loss of AC power to the UPS, where provided under this scope.
 - (a) UPS system monitoring shall be by physical hardwired connection from the UPS output to an alarm input on the nearest access control system input or video camera input to the UPS unit.
27. At the conclusion of all work in each panel, enclosure and rack, all debris, such as bits of wire and insulation, sheet rock dust, metal chips and drill streamers, and unused parts and fasteners shall be removed and the bottom of the enclosure shall be vacuumed.

C. JUNCTION BOXES, CONDUIT BODIES AND RACEWAYS

1. Raceways, and junction boxes and conduit bodies used as pull boxes or splice boxes, shall be of adequate size for the wiring to be contained within.
2. Junction boxes and conduit bodies shall be made of a suitable material for the environment for which it is installed.
 - a) For dry interior locations, a Wiremold® box or standard electrical box and standard EMT raceway may be used. *Note: for aesthetic reasons, Wiremold® may be required over EMT for aesthetic reasons.*
 - b) For wet or damp locations, stainless steel or cast aluminum boxes shall be used. Raceways may be rigid steel or aluminum conduit and in some instances EMT. These will be defined within this specification or shown on the contract drawings. Under certain circumstances PVC conduit and PVC boxes may be allowed but only by special permission from the Owner or Designer. Permission to utilize PVC conduit and PVC boxes must be submitted in writing and state the exact location or locations where the PVC is intended to be used.
 - c) Certain instances may only allow for a PVC conduit and PVC boxes, or PVC coated rigid steel conduit, such as a corrosive environment. Where these types of environments exist, it will either be noted elsewhere in this specification or on the contract drawings, or by direction of the Owner or Designer.
3. Cabling entering junction boxes and conduit bodies shall be entered through a connector designed to effectively capture the wire and prevent it from being pulled out of the box. This shall be accomplished by means of a Romex® or cable compression type connector. A knot in the cable shall not be used to keep the wire from being pulled out of the box. Connectors shall not compress the cable insulation to the point where any of the jacketing is damaged.
4. Any junction box exceeding 6" x 6" in size shall have a tamper switch that shall be connected to an alarm input for notification of the removal of the cover.
5. Conduit bodies, where stamped or cast with a number indicating the cubic inch or cm size of the conduit body, may be utilized for splices.
6. Boxes in standard electrical "gang" configurations shall be fitted with blank covers appropriate for the number of gangs the box contains.

- a) For interior applications, blank covers shall be manufactured from stainless steel unless specified otherwise by the Owner.
 - b) For damp or wet locations, the cover shall be manufactured from aluminum or stainless steel and fitted with an appropriately sized gasket to keep rain, dust and moisture out of the box.
 - c) Plastic and nylon covers will not be permitted for any application unless a specific color is required by the Owner.
- 7. Box extension rings of any type shall not be used solely as a junction or pull box.
 - 8. Where used in exterior environments, EMT shall be fitted with steel compression type connectors and couplings. Under no circumstances shall cast or setscrew type connectors or couplings be used.
 - 9. Where used in interior environments, EMT may be fitted with either steel setscrew or steel compression type connectors or couplings. Under no circumstances shall cast connectors and couplings be used.
 - 10. Raceways buried underground shall have detectable warning tape indicating there is a raceway buried beneath. The detectable warning tape shall be installed 4" - 6" below the finished grade or surface.

D. FUSING, TVSS AND POWER ISOLATION

- 1. All electric locking devices connected to and controlled by the field control panels shall be electrically isolated from the field control panels and shall be independently fused by locking device.
- 2. Electric locking devices shall re no other output and shall be fused with appropriately sized glass fuses. PTC protected outputs are not permitted.
 - a) A separate fused output isolation board with fire alarm connectivity and individual lock release capability shall be provided for the purpose of isolating lock outputs.
 - b) Provide spare glass fuses for overcurrent protection, in a quantity of no less than four (4) spare replacement fuses, of the same type and ampacity, for every sixteen (16) devices shall be left within the power supply enclosure.
- 3. All REX if required, Glass Break, Motion Detector and other power devices shall be connected to individually fused outputs by device and shall be fused with appropriately sized glass fuses. PTC protected outputs are not permitted. Provide spare glass fuses for overcurrent protection, in a quantity of no less than four (4) spare replacement fuses of the same type and ampacity, for every sixteen (16) devices shall be left within the enclosure. These devices shall re no other fused output.
 - a) A separate fused output isolation board shall be provided for the purpose of isolating device outputs.
 - b) Provide spare glass fuses for overcurrent protection, in a quantity of no less than four (4) spare replacement fuses, of the same type and ampacity, for every sixteen (16) devices shall be left within the power supply enclosure.

4. Transient voltage surge suppression (TVSS) shall be provided on all line voltage connections to panels and power supplies. *Exception: where TVSS is already provided or is inherent within a UPS device, no additional protection is required.*
5. TVSS shall be provided on all exterior mounted cameras on both the power and data signals, which includes both PTZ controls and video streams as applicable. The TVSS shall be mounted within 36" of the connection to the camera for building mounted cameras. For pole-mounted cameras, the TVSS shall be mounted within an equipment enclosure serving the camera at the pole.
6. In addition to the requirements above, where aerial cables are utilized the following shall be included:
 - a) An additional TVSS device shall be installed at the head end location so that there is TVSS protection at both ends of the aerial run.

E. GROUNDING OF TVSS, EQUIPMENT RACKS AND ENCLOSURES

1. All TVSS, equipment racks and enclosures covered under this specification shall be grounded as per the NEC and the following requirements.
2. Where multiple points on the same equipment rack or enclosure have individual grounding points, such as an enclosure door and the enclosure cabinet, both grounding points shall be grounded/ bonded in the manners described herein.
3. Grounding conductors for TVSS device shall be a minimum of size #12 AWG or as recommended by the manufacturer of the device, whichever is larger.
4. Grounding conductors for equipment racks and enclosures shall be a minimum of size #6 AWG or as recommended by the manufacturer of the device, whichever is larger.
5. Grounding conductors for TVSS devices, equipment racks and enclosures shall be bare solid copper conductor or an insulated solid or stranded copper conductor covered with a green outer jacket.
6. Grounding conductors for TVSS devices, equipment racks and enclosures shall be terminated at the equipment racks and enclosures with a ring terminal appropriately sized for the screw or bolt and wire gage used.
7. Grounding conductors for TVSS devices, equipment racks and enclosures shall be terminated at the ground reference point with an appropriate grounding clamp. Standard beam clamps for mounting equipment and raceways are not considered an appropriate grounding clamp.
 - a) Where grounding is required where no steel or copper grounding system exists, a grounding method shall be established in the following manner:
 - (1) A ¾" x 8' grounding electrode shall be driven into the earth at a point closest to the device to be grounded.
 - (2) The grounding electrode shall be driven vertically into the ground in a manner that is perpendicular to the ground and shall be driven no less than 2" below the finished grade.
 - (3) The grounding electrode shall be a made electrode designed for the

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purpose of providing a grounding point.

- (4) The grounding electrode shall be solid copper or copper bonded where the copper bonding plating thickness is 13mils or greater. Where soil conditions are not compatible with copper electrodes, stainless steel electrodes shall be utilized. Under no circumstances shall zinc galvanized or steel grounding electrodes be used.
 - (a) Copper bonded grounding electrode: Erica 613483 or approved equal.
 - (b) Stainless steel grounding electrode: Erica 683480 or approved equal.
- b) Where grounding electrode conductors must traverse the exterior of a wooden pole, the grounding electrode conductor shall be no less than #6 AWG solid copper and may be stapled to the wooden pole. Staples utilized to fasten the #6 AWG solid copper grounding electrode conductor shall be rated for this type of installation.
- c) Where grounding electrode conductors can be concealed within a raceway or pole, the afore mentioned grounding electrode conductor requirements shall apply.
- d) Grounding electrode conductor to grounding electrode clamps shall be made of bronze, silicon bronze or tinned bronze. If the grounding clamp will be utilized in any type of wet or outdoor environment, the clamp shall be of the direct burial type, regardless of whether the clamp is in direct contact with the earth or not. The clamp material shall be suitable for and compatible with the metal in which it is being connected to.

F. BONDING OF POLES

1. Grounding of poles and footings shall be in accordance with the current edition of the NEC.

- a) The grounding electrode shall be driven vertically into the ground in a manner that is perpendicular to the finished grade and shall be driven no less than 2" below the finished grade.
- b) The grounding electrode shall be a made electrode designed for the purpose of providing a grounding point.
- c) The grounding electrode shall be solid copper or copper bonded where the copper bonding plating thickness is 13mils or greater. Where soil conditions are not compatible with copper electrodes, stainless steel electrodes shall be utilized. Under no circumstances shall zinc galvanized or steel grounding electrodes be used.
 - (1) Copper bonded grounding electrode: Erica 613483 or approved equal.
 - (2) Stainless steel grounding electrode: Erica 683480 or approved equal.

G. WIRE INSTALLATION & OTHER WIRING MATTERS

1. All field wiring, cables, armored whips, flex and similar components and raceways shall be run at right angles to the floors and wall.
2. All wire must be completely and entirely installed and tested to the current standards appropriate for the actual wire being installed. For example, when CAT6 wire is utilized, it must be installed to the TIAA standards for CAT 6 wire. CAT6 wire, installed to CAT5 standards, will be rejected.
3. Provide all panel wiring required, including temporary wiring. Install wiring in accordance with NEC and NFPA regulations (as applicable), local building codes and ordinances, and all owner wiring standards. Contractor shall be responsible for obtaining and adhering to applicable regulations, codes, ordinances, and standards.
4. Existing wiring that is to be replaced or that is no longer required for VMS operation is to have all exposed parts removed in their entirety as per NEC Art. 800.25 Abandoned Cable. *Exception: Abandoned cable shall not be left in place and identified for future use as allowed by Art. 800.25.*
5. The mounting of any device, component, wire or wire bundle with double-sided adhesive tape will not be permitted. This includes adhesive backed tie-wrap mounts, which may only be used if fastened with a screw to the enclosure.
6. Wiring consisting of one or two cables where run under desks or for panic buttons or intercom units, must be laid out neatly and secured with high quality adhesive backed mounting pads and wire ties. Wires that are flown from their entrance point to the point at which they are connected or terminated will not be permitted.
 - a) Adhesive backed mounting pads shall not rely solely upon the adhesive back for permanent securing of the pad. An additional metal screw shall be utilized.
 - b) Alternatively, a complete, 360 degree plastic or rubber coated metal cable loop, appropriately sized for the cable to be mounted and provided with a hole for securely mounting with a metal screw, may be utilized.

7. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation. Provide mounting hardware as required.
8. Four state end of line supervision shall be employed for all inputs to the SMS panels. All end of line supervision whether for SMS panels or IDS panels, shall be located at the device being monitored. Under no circumstances shall this vary in any way.
9. All wire and cable utilized in this project shall have a green outer jacket.
10. The Contractor shall prepare a wire schedule, which shall report the identification number of each wire or cable as they will appear in the field at the project conclusion and be consistent with the directives of the device schedule (s).
11. Upon the completion of the installation of fiber optic cable a certified OTDR report shall be furnished to the owner attesting to the quality of the cable. The report shall precisely identify each cable length by the number appearing on the wiring schedule to enable ready location of section not meeting the project requirements.
12. All wire must be properly sized in accordance with either the manufacturer's requirements or NEC®§ 220/210/19.
13. All wire must be installed in a neat and workmanship manner.
 - a) At a minimum the following sections of the NEC will be enforced:
 - (i) 110.12, 300.4,300.7,310.10, 400.8, 640.6, 720.11, 725.24, 725.25 760.24, 800.2, 800, 24, 800.25, 800.26, 820.24, 820.25, 820.26, 830.24, 830.25 & 830, 26.
14. All system wirng in exposed, public, office, and other areas, except in data or communication closets, shall be concealed and protected by a device suitable for the installation location.
 - a) Conduit, EMT, Metal Panduit®, Wiremold®, Liquid-Tite® or flexible armored cable shall be employed.
 - b) In office and public spaces, the protection must continue from the floor, or device, until the wire passes through and above the ceiling plane to a distance of 12" above the ceiling plane.
 - c) If there is no ceiling, the protection must extend to a point that is in line with or above the bottom of the truss/bar joist, or structural steel system holding the roof or floor above. Conduits shall be stubbed at 90 degrees off the wall and extend to the nearest truss where the end of the conduit is to be appropriately fastened to the truss.
 - d) Where ceilings are concrete and no truss or bar joist system exists to fasten J-hooks, bridle rings or D-rings, the conduit shall extend along the ceiling to a point at which it is concealed within an acoustical ceiling or can enter a cable tray.
 - e) At the finished installation, no wire shall be visible, other than are provided for in the preceding sections.
15. Conductor splicing and terminations:

- a) No connectors used to terminate any low voltage wire or cable carrying 50v or less shall employ "twist-on" connectors, such as "wire nuts" commonly used by electricians in 120vac wiring.
 - (1) Note: Line voltage connections shall use twist on connectors, butt connectors, terminal strips or screw type connections to terminate line voltage conductors.
 - (a) *Exception: Splices from field cabling to devices with a factory installed wiring harness or assembly may be spliced without the use of a terminal strip.*
 - b) Where cabling is not spliced with the use of a terminal strip, molded jack or factory assembled connector, one of the following methods shall be used:
 - (1) Insulated crimp-on connector
 - (2) Parallel or Western Union manual twist, soldered; all exposed conductor shall then be covered with heat shrink tubing appropriate for the conductor and splice size
 - c) Any conductors being spliced shall be mechanically fastened prior to the application of the crimp on connector, Wirenut® or the application of solder.
 - d) After conductors are spliced, all splices for the specific device shall further be insulated with insulating electrical tape or heat shrink tubing.
16. No wire or cable shall pass through an enclosure, junction box, wall or partition without an appropriate conduit, sleeve or bushing of the proper size and length installed to protect the wire.
17. No wire or cable shall pass through a wall, partition or slab without an appropriate conduit sleeve appropriately sized for the final diameter of the cable bundle plus 25%. Where a fire rated wall, partition or slab is encountered, the installation shall be in accordance with the FIRESTOPPING section of this specification.
18. No wire or cable shall pass through the end of a length of conduit, or other raceway, such as Panduit® without being protected from damage by a bushing, or other device specifically designed to protect that wire from chafing and other damage to the insulation, conductors and jacket.
19. Whenever a wire or cable exits from a conduit, the edges of that conduit shall be covered by a bushing or similar device designed to protect the wire from the IP conduit edges. Box fittings and couplings shall not be considered appropriate.
20. Enclosure grounds and shield/drain wires shall be terminated on a grounding buss or ground lug designed for the purpose. Wires of different size shall not be terminated under the same screw or lug. No mounting screws, nuts or bolts shall be utilized for equipment grounds, shields or drain wires.
21. A single, unknotted, pull string will be left behind in all conduit runs made with trade size ¾" conduit, or larger.

- a) String shall be left with sufficient slack to that it can be verified to be "free" and also shall be firmly attached at each end to prevent an end from retreating into the conduit, making the string unusable.
22. Where J-hooks, bridle rings or 'D' rings are utilized to support wiring in overhead or vertical environments, the J-hooks, bridle and 'D' rings shall not exceed 48" between supports. Wiring supported by the J-hooks, bridle or 'D' ring shall be shall be fastened with a cable tie or hook and loop strap at each J-hooks, bridle or 'D' ring and shall have a minimum of two additional cable ties or hook and loop straps between each J-hook, bridle or 'D' ring regardless of the spacing between J-hooks, bridle or 'D' rings.
23. Where a single multi-conductor cable supports multiple devices, such as a door release button, panic button and/or other device(s) co-located at a reception desk or similar scenario, each individual device shall have its own jacketed cable run to a readily accessible junction box. The preference of the location of the junction box would be under the desk. The intention of this requirement is to prevent individual exposed conductors anywhere within the system.
24. Cable ties or hook and loop straps shall be utilized where appropriate to fasten/bundle wiring and shall be appropriately sized for the bundle and shall not be strung together to form a longer tie to accommodate any size bundle of cable. Where used in exterior environments, tie wraps/cable ties shall be made of UV resistant plastic and shall contain a stainless steel locking tab.
25. Adhesive backed cable tie mounts shall not be utilized outside of an enclosure. *Exception: Where wiring is installed under counters or desks, it is permissible to use adhesive backed cable tie mounts as long as they are installed with one or more screws so as not to rely solely upon the adhesive for mounting.*

H. LABELING

1. All SMS System labels, whether installed on devices or cables shall be a one piece machine printed label designed for the type of surface and environment in which it will be installed.
2. All wires, cables, devices, panels and enclosures shall be labeled clearly and legibly as directed and documented in the SMS Device Schedules.
3. Enclosures and panels with a line voltage electrical connection shall have a label on the interior of the enclosure identifying the electrical panel and circuit number the device is powered from.
4. Where the same wire or cable is looped, or chained, from one termination to another, both within the same box, it shall be labeled in at least one (1) location.
5. Wiring labeling shall be consistent across the entire project.
6. All wires and cables not wholly contained and terminated within the enclosure in which they originate, shall display a unique number within six (6) inches of entering the cabinet where the cable is to be terminated.

7. Hand written paper tags or labels will not be permitted nor is it permissible to write on the cable jacket with a pen or marker, unless these are solely for the use of tradesmen during the project and will be replaced with compliant labels prior to the project completion.
8. All wire labels, or their means of attachment, must surround, completely, the outer jacket of the cable.
9. At the field device end, all cables shall be marked within six (6) inches of the termination point.
10. All components connected to a data network should bear a label designating whether the address is static or dynamic. All devices with a static address shall also contain a label displaying their TCP/IP address. These cables shall also be marked with the SMS System number and marked within six (6) inches of the termination point.
11. Jumpers connecting SMS related cables terminated on network patch panels to network switches shall be marked with the SMS System camera and/or panel number as it is designated when programmed into the SMS System. If one network patch cable carries multiple video or panel data signals, the cable shall be marked with each of the camera and/or panel ID numbers supported by the cable.
12. When tradesmen inscribe wire designations on the jackets of wire during the pulling in of project wire, and those designations do not precisely match the markings on the finished machine printed label installed prior to project completion, the hard written marking shall be permanently obliterated or removed. Care shall be taken so that the cable jacketing is not damaged while removing old markings.
13. All component labeling, as well as all other labeling required to be inside an enclosure or box, must be provided on a printed sheet or label. Writing the information on the box or its' cover will not be accepted.
14. Prior to the final inspection and turnover, the nearest upstream source of power disconnection must be identified and marked on all system enclosures. When an enclosure contains devices that are fed from multiple sources, a label to that effect must be prominently displayed, as well as the identity of each of those power sources.
15. Card readers, cameras and glass break detectors shall be labeled on the exterior of the device with their system number as it is designated when programmed into the VMS System. The labeling system convention shall be coordinated with the owner.
16. All panel-mounted devices supplied by the Contractor shall be clearly identified with an identification label and by the inclusion of a layout drawing in each panel or junction box. This shall identify all mounted equipment, any relays, fuses and all other devices. All identification numbers shall be the same as those that identify corresponding item on all project drawings and diagrams.
17. All system batteries shall be labeled with the date at which the batteries were connected to the system and charging commenced.

I. FIRESTOPPING

1. All penetrations of floor slabs and fire rated walls and partitions shall be sleeved in appropriately sized rigid steel conduit and fire-stopped in accordance with the Owner's specification or the electrical specification for the project as well as building and fire

Codes, by the individual penetrating the slab or wall. If no fire stopping system is specified with the electrical specification, an appropriate **Hilti** brand fire stopping system shall be used for the penetration being fire stopped.

2. Safety or electrical inspectors from the affected site must approve any substitutions to this material requirement, in advance.
3. All penetrations made, but not sleeved or completed on the day that they are created, shall have an approved temporary fire-stopping material in place at the end of each workday, until permanent treatment is completed.
4. Persons opening any existing sleeve or conduit shall replace an adequate amount of fire-stopping material within the sleeve or conduit prior to their departure at the end of each day.
5. Any unprotected, or improperly fire-stopped penetrations should be correctly treated to bring it into compliance upon the completion of work in the vicinity of the offending opening. In the event that such a violation is discovered, but was not caused by this project, it should be drawn to the attention of the project manager or owners representative.
6. Please see requirements in TDP I for submission of product names, and all appropriate manufacturers information sheets and MSDS sheets.
7. All penetrations of fire rated walls, floors or any other structural member must have that member sleeved by a suitably sized conduit or other approved sleeve.
 - a) Such sleeve must extend at least three (3) inches beyond the surface of the member being penetrated (on both sides) to provide evidence to the inspectors that the sleeve is in code compliance.
 - b) The ends of all sleeves shall be treated with a bushing, or equivalent device, manufactured to protect the wires and cables exiting thereof from damage by the edges of the sleeve.
 - c) Sleeves shall be installed with a permanent pipe clamp or flange to prevent the sleeve from slipping or moving.

J. SURFACE RESTORATION

1. This section shall apply to all surfaces disturbed during the installation process of this scope and specification regardless if they were caused by the Contractor, the Contractor's Sub-Contractor(s) or the vehicles, lifts, tools, ladders or equipment of either.
2. All structural and non-structural walkways, driveways, slabs, walls, partitions and other decorative surfaces shall be restored to match the material and quality of the original finish at the completion of work in the area, or prior to the completion of the project.
3. All painted walls or areas decorated with wall coverings shall have any holes filled and the surface restored to the original texture and level or grade. All special, or custom, final treatments, to include painting with special coverings or custom colors and all wall coverings will be the responsibility of the Contractor.

4. Conduit and Wiremold® installed in finished painted areas shall be painted to match the surrounding surfaces. Paint shall be provided by the Owner.
5. When hardware, enclosures, panel boxes or other items are removed all holes exposed by such removal shall be filled so that a smooth, level and true surface results.
6. In metal surfaces, such as doors, it is acceptable to fill any holes resulting from device removal with caps or plugs, which are attached to the surface by means of fingers which expand on the inner side of the exposed surface.
7. Additionally, all surfaces trenched or disturbed during the installation of the VMS equipment shall be restored to the identical condition in which it stood, prior to the installation with materials identical to the surface disrupted.
8. Where footings are being installed or poured in excavations and/or forms, the spoils from the excavations shall be removed after backfilling of the excavation is complete.
9. Trenches with buried conduit shall contain detectable warning tape, which shall be installed 4" - 6" below the finished grade or surface.
10. Grassy areas shall have soil replaced that matches the original in quality and depth and shall be re-seeded. Soil replacement shall be such that the soil is filled to the original surrounding grade.
11. Plantings that have been disrupted, removed or damaged during the installation process shall be replaced with like and suitable plantings approved by the Owner.
12. Areas of grass needing replanting, which exceed 50 square feet, shall be hydro seeded.

3.06

TRAINING

- A. The Contractor shall conduct training courses for designated Owner personnel in the maintenance and operation of the Systems as specified. The training shall be oriented to the specific systems being installed under this contract.
- B. A task driven competency assessment (involving some hands on work with the system(s)) will be given to all students during which they should be able to correctly perform the required tasks. During the test, student generated notes and "cheat sheets" will be permitted. Similar materials and manuals provided by the trainer will also be allowed.
- C. The trainer shall provide a comprehensive manual for use during the class sessions which should detail the tasks necessary in the operation of the system, their purpose and the background regarding when and why they are necessary, as well as the step by step procedure to be followed to complete each task.
 1. Training manuals shall be delivered for each trainee with two additional copies delivered for archiving at the project site.
 2. When presentations, such as Microsoft® Power Point®, are utilized to training purposes a copy of the presentation shall be provided to the students.
 3. When presentations are printed from a presentation set of slides, the printed materials shall be completely legible. Multiple features of text and graphics shall not be overlaid on top of each other when printed.
 4. Training manuals shall be printed single sided in color.

- D. A manufacturer operation manual shall be delivered for each trainee with two additional copies delivered for archiving at the project site. These manuals shall be printed doubled sided and in color.
- E. The Contractor shall prepare, administer and conduct a training program for designated Owner operator personnel to fully and efficiently operate the installed radio equipment and maintain the configurable databases. At a minimum, the following training elements shall be incorporated into the training program and documented separately for individual training segments:
 - 1. Radio management System Training:
 - a) Logging into the System.
 - b) Adding and deleting users for the system software.
 - (1) System User Report
 - (a) Verify Administrator privileges are not assigned all users, particularly non-employees.
 - (b) Confirm that no two persons are ring log-on credentials.
 - (c) Confirm that only authorized users have credentials to log into the system.
 - (2) Exporting of reports in CSV and TXT formats
 - c) Launch of main viewing monitor.
 - d) Changing parameters
 - e) Changing fields
 - f) First line troubleshooting techniques to determine cause of failure or malfunctioning system software or hardware devices.
 - g) System back-up and restoration.
- F. The training venue shall be set up with a sufficient number of workstations so that each workstation has no more than two students assigned to it.
- G. The Contractor shall provide and use all training aids such as films, slides, audio/video tapes, etc. as necessary to complement instruction and enhance learning.
- H. The instructor(s) shall be responsible for determining the appropriate password to be issued to the student commensurate with each trainee's acquired skills at the beginning of each of these individual training sessions.
- I. Training shall be provided for the topics and periods indicated herein at least one week prior to the scheduled turnover to the Owner of the system. Upon completion of training, each trainee, using appropriate documentation, should be able to perform elementary operations with guidance and describe the general hardware architecture and functionality of the system.
- J. The Contractor shall provide a competency assessment at the conclusion of the training.
- K. Training sessions shall be fulfilled with the following minimum requirements:
 - 1. Initial Administrator Training - four (2) hours for four (1) individuals over two (2) sessions.
 - 2. Supplemental End User Training - two (2) hours for one or two individuals for one (1) session.
- O.

- P. Initial training is conducted when the system is set up and constitutes the first training sessions for the operators. It is the intention of this session to be structured as recommended by the manufacturer to cover all software/hardware/and operational features for a comprehensive training of the system.

Supplemental training is conducted after the operators have had time to work with their system and may have additional follow-up questions or additional materials they wish to cover. This will typically be conducted *after* the Initial training sessions and after 30 to 90 days of system operation or when requested by the Owner. It is the intention of this session to be an open exchange of information in a question and answer format based on the particulars of the operators. This training shall be coordinated with the Owner to coincide with a time that is acceptable to the Owner and the operators.

- A.

3,07 RECORD DRAWINGS AND DOCUMENTATION

- B. The Contractor shall furnish and keep on the job at all times, one (1) complete separate set of redline drawings, elementary diagrams and wiring diagrams of the systems on which shall be clearly, neatly and accurately noted, promptly as the work progresses, all owner' representative and electrical/electronic changes, revisions and additions to the work. Wherever work is installed otherwise than as shown on the contract drawings, such changes shall be noted.
- C.

No approval of requisition for work installed will be given unless supported by record prints as required above.

At the conclusion of the work and prior to the commissioning of the system, prepare ALL record drawings, configuration documentation, and board level system manuals, in accordance with the submittal requirements and submit these prior to the final commissioning walk through.

1. The riser diagram shall accurately represent the true number of all major components. For example, the number of network switches and cameras connected to each.
2. At each panel, enclosure and equipment rack location, a copy of the configuration documents, board level manuals and record drawings shall be included for all equipment supported and installed at the panel and enclosure location. Each equipment rack shall have a full complement of system documentation. Drawings shall be large enough so that all device call outs and notes relative to the ACS are legible to the naked eye. Standardization of one size of drawing shall be carried throughout the ACS for this

Requirement. This documentation shall be housed in the print pocket as required in this specification.

D. Record Documentation Submission Formats:

1. Submit to the Owner, two complete, color, printed sets of record drawings, system documentation, product data sheets and manuals.
2. System documentation shall be provided in D-Ring type 3-ring binders. Binders shall be either black or white.
3. Binders shall have a clear full cover pocket and a clear spine pocket, both of which shall be molded into the binder as part of the binder manufacturing process.
4. The cover pocket and spine pocket shall have titles appropriately documenting the following:
 - a) Owner/Client
 - b) Facility name and address
 - c) Type of documentation
 - d) Date of production
 - e) Name of Contractor responsible for the system at the time of completion
5. Data sheets and manuals shall be printed double sided on 8 ½" x 11" paper.
6. Record Drawings for the 3-ring binders shall be printed single sided on 11" x 17" paper, 3-ring holed punched on the left 11" edge with the remainder of the drawing 'Z' folded to fit properly within the binder.
7. The following sections shall be Tabbed out to delineate the following section types:
 - a) Operations Manuals
 - b) Installation Manuals
 - c) Maintenance Instructions
 - d) Record Drawings
 - e) Data Sheets
 - f) Warranty Information
8. The Tabbed sections noted above shall, where applicable, further be sub-sectioned by each individual device or component.
9. Submit to the Owner two additional sets of complete record drawings.
 - a) Additional record drawings shall be printed on D size paper
 - b) Additional record drawing sets shall be edge bound with a binding strip.

E. Record Documentation Submission Types Required:

1. Operations and Installation Manuals
 - a. Final copies of each of the manufacturer's commercial manuals arranged as specified bound in hardback three ring loose-leaf binders shall be delivered to the owner. Final copies shall be printed doubled sided and in full color. The start of a new device's cut sheet shall not be on the back of any page. The draft copy used during site testing shall be updated prior to final delivery of the manuals. Each manual's contents shall be identified on the cover.

- b. The manual shall include names, addresses, and telephone numbers of each Sub-Contractor installing equipment and systems, and nearest service representatives for each item of equipment for each system.
 - c. The manuals shall have a table of contents and tab sheets. Tab sheets shall be placed at the beginning of each chapter or section and at the beginning of each appendix. The final copies delivered after completion of the performance verification test shall include all modifications made during installation, checkout, and acceptance.
 - d. Two (2) hard copies of each manual and One (1) electronic copy (complete with an organized file structure) shall be delivered to the owner. All documents listed in this section shall be provided in an commonly used electronic format (*.xis, *.doc, *.dwg or *.pdf) on a USB connected storage device.
2. Operations Manuals
- a. Operation manuals shall contain all instructions required for operation of the system from the end user's perspective.
3. Installation Manuals
- a. Installation manuals shall contain all information required for the installation of the device(s) as they pertain to the installation of this scope of work.
4. Maintenance instructions and manuals
- a. Provide an instructional document detailing first line troubleshooting protocols for the Owner to identify potential problems and the threshold for making a service call to the integrator of record:
 - (1) During business hours
 - (7) After business hours
 - b. The maintenance manuals shall describe maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
 - c. System maintenance information shall describe maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
5. Record Drawings
- a. In addition to the above requirements, provide the Owner with two (2) sets of Record Drawings. Record drawings delivered to the Owner shall be, plotted in "D" size format and show the current system configuration and layout without mark up's and cross outs.
 - b. Record drawings for inclusion in system enclosures maybe printed in smaller formats to accommodate available space as long as all text is legible to the naked eye. In no case shall the printed format be small than "B" size.
 - c. The quantity and type of drawings shall be no fewer than the quantity and type provide with the bid package. If additional drawings are required to fulfill additional requirements of this specification, they shall also be provided.
 - d. Drawing grammar shall be brought current by removing words such as proposed, potential, preliminary, to be, etc. All wording shall be in a factual stated manner.

- e. All revision clouds and revision delta or other revision notations shall be removed from the drawings. The revision section of the title block shall indicate an "O" zero, with the description of "AS-BUILT" along with the date the set is updated for this requirement. There shall be no other revision notations in this section of the title block.
- f. Drawings shall be created in illustrator or similar software and submitted for this requirement in PDF format.
- g. ALL drawings shall be provided in a landscape format with the same title block.
- h. Provide a title sheet and legends that indicate device types, symbols abbreviations and manufacturers' model numbers. The title sheet shall be provided as the front page of the Shop Drawing package. This shall include the project title, owner's company name, Security Contractor's company name, system designer's company name, legends and notes as applicable. If an additional page for legends and notes is desired it may be on the second page of the Shop Drawing package
- i. Drawing sheet numbers shall be identical to the bid set of drawings. Where additional sheets are added in addition to what was provided in the bid set, the sheet numbers shall follow the same format and be incremented in a logical fashion.
- j. ALL devices requiring IP addresses shall have their IP and MAC address noted on the floor plans and riser diagrams next to the device, as well as within the device schedule.
- k. Provide updated drawings, which illustrate final field conditions; these drawings shall incorporate all changes to the construction documents.
- l. Wire and cable run drawings including cable identification numbers and terminal strip designations.
- m. Functional block diagrams for all subsystems. Schematic diagrams for all custom circuitry and interfaces to work not-in contract.
- n. A complete one-line riser for each system/site correctly depicting all system devices and their interconnections, showing the specific wire for each. Device counts must be accurate and identified by either location in the site, or with respect to the device numbers established on the RFP documents
- o. Wiring schematics.
- p. Line drawings of the elevations and equipment layout within enclosures for equipment and/or riser closets, which show the exact configuration and physical installation of related equipment, interface panels, power supplies, junction boxes and equipment cabinetry. Each location shall have its own elevation detail,
 - (1) *Note: If pictures of the panel elevations are provided as part of this requirement, it shall not eliminate the requirement for line drawings of the elevations and panel layouts.*
- q. Drawings to be provided by the Contractor shall be modified versions of the provided files. Recreations of the original drawings shall not be permitted, unless they truly and accurately represent the originals in all aspects.
- r. All additions shall be on a separate layer, so as to preserve the integrity of the original drawing.

- s. All drawing modifications shall be attributed in the revisions block of the drawing.
6. Additional Record Documents and Files
- a. Data Sheets - Provide final color copies of all equipment data sheets that have been installed under this contract. Marking and identification provisions applied at the time of bid shall apply here as well.
 - b. Warranty - Provide an updated matrix of the manufacturers' warranty for all products proposed under this submission.
 - c. Lien release certification on the installed equipment.
 - d. A portable copy of the system database(s) configuration shall be made once all users are programmed and all doors, input and output device settings are complete as part of the record documentation in TDP III. The portable copy shall be written to a USB connected storage device and provided to the owner.
 - (1) The storage device shall have a printed label identifying the site name, contents and saved date. The purpose of the storage device shall be to allow the database to be efficiently restored if the ACS server were to fail.
 - (2) A copy of the system database(s) configuration shall also be uploaded to the project FTP site into the appropriate folder.
 - e. Service Level Agreement (SLA) - a one year SLA documenting the following:
 - (1) Procedures for the complete ACS and VMS tests.
 - f. Pictures - Provide digital pictures documenting the final installation.
 - (1) Provide pictures of interior and exterior panel elevation assemblies. One picture shall be taken with the doors closed and another with the doors open. When there is more than one panel location, pictures for each location shall be provided and identified as to which location they are documenting.
 - (2) Provide pictures of the equipment rack elevations where VMS equipment resides. Pictures shall be taken of the front and back of the enclosure with the doors open and doors closed

3,08 PROJECT CLOSE OUT

3.8.1 GENERAL

3.08.1.1 The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing of the Systems.

3.08.1.1.1 During system demonstration, Contractor shall provide a set of two-way radios with sufficient range to allow two-way communications from any two points on the site.

3.08.1.1.2 Cell phones will be accepted as substitutes for two-way radios, provided that coverage is available in all parts of the spaces and buildings being tested.

3.08.1.2 The Contractor shall calibrate and test all equipment, verify signal/control cable operation, place the integrated system in service, and test the integrated system.

3.08.2 PERFORMANCE VERIFICATION TEST

3.08.2.1 Prior to scheduling an endurance test, the Contractor shall demonstrate that the completed systems comply with the contract requirements.

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3.08.2.2 Using approved test procedures, all physical and functional requirements of the Systems project shall be demonstrated and shown.

3.08.2.3 Original copies of all data produced during performance verification shall be turned over to the owner's representative at the conclusion of this testing.

3.08.3 ENDURANCE TEST

3.08.3.1 The Systems endurance test shall be conducted 24 hours per day for seven consecutive calendar days, including holidays, and the system shall operate under normal conditions as specified.

3.08.3.1.1 The Contractor shall make no repairs during this phase of testing unless authorized by the owner or system designer in the event of a major failure.

3.08.3.1.2 If the system experiences no failures during testing, the Contractor may proceed directly to Acceptance Testing upon receipt of authorization from the architect.

3.08.3.1.3 If the system experiences a major failure(s) during testing, the Endurance Test shall be stopped and rescheduled by the architect after the Contractor has completed necessary repairs and declares to the owner or system designer that the system ready for a second endurance test.

3.08.3.2 The Contractor will not be held responsible for failures in system performance resulting from the following:

3.08.3.2.1 An outage of the main power in excess of the capability of any backup power source, provided that the automatic initiation of all backup sources was accomplished and that automatic shutdown and restart of the Systems performed as specified.

3.08.3.2.2 Failure of furnished communications circuit, provided that the failure was not due to Contractor furnished equipment, installation, or software.

3.08.3.2.3 Failure of existing owned equipment, provided that the failure was not due to Contractor furnished equipment, installation, or software.

3.08.4 COMMISSIONING

3.08.4.1 After all installation and acceptance test requirements specified have been met, the equipment shall be commissioned. After commissioning has been completed, the Owner will take possession of the equipment and utilize it in accordance with the conditions described in the contract documents.

3.08.4.2 Outstanding work items that may exist, such as facility interfaces, and/or in-process change orders, shall be documented and submitted to the owner's representative for review prior to the start of equipment commissioning.

3.08.4.3 Documentation of outstanding work items shall take the form of punch lists of critical action items lists that describe the work, the expected completion schedule, and the impact upon operation.

3.08.4.3.1 Depending upon the nature of the outstanding work items, the Owner may grant a waiver to accomplish partial commissioning of any of the equipment. Completion of waived outstanding work items shall then be assigned to the post-commissioning operations and maintenance.

3.08.4.4 The commissioning procedure will be witnessed by the owner's representatives. The commissioning procedure shall be conducted by the Contractor and shall consist of a detailed inspection, and a physical accounting of each equipment item.

3.08.4.5 An operational demonstration shall then be conducted in which the equipment shall function in the normal operational mode, and shall operate completely error-free in terms of hardware and software performance. The operational demonstration shall be conducted with two individuals from the Contractor's firm. One individual will monitor the workstation to verify that alarms are properly displayed on the workstation and one to work with the owner's representative to review all field device and panel locations.

3.08.5 Record drawings showing the actual locations of all devices and the actual wire paths shall be made available to the owner and/or the owner's representative prior to the commissioning work review. These drawings shall be approved by the Owner's Representative prior to the commissioning and will be utilized to verify the installation.

3.09 A portable copy, written to a USB connected storage device, of the system database configuration shall be made once all users are programmed and all doors, input and output device settings are complete as part of the record documentation.

3.10 The USB storage device shall have a printed label identifying the site name, contents and saved date.

3.11 The purpose of the USB storage device shall be to allow the database to be efficiently restored if the SMS server were to fail.

Occurrence of any equipment failure may terminate the demonstration.

3.09 The demonstration shall restart and run for a period of time designated by the Owner's representative after the failure has been corrected.

3.10 Except for any outstanding work items as previously described, this shall complete the commissioning procedure.

3.11 SYSTEM ACCEPTANCE

3.11.1 The system shall be ready for acceptance one (1) week prior to the system "on-line" date established by the Owner. The Contractor shall coordinate and obtain the date from the Owner.

3.11.1.1 Warranty coverage will not begin until completion of both of the two following conditions: (As long as these two conditions have been satisfied, regardless of the sequence, or whether they overlap, warranty coverage may begin.)

a. When legal ownership of the system has passed to the owner. This will not occur until the all portions of the acceptance testing process have been completed and the system has been deemed as "passed."

b. The point that some devices, or portions of the project, may be powered up for testing, training, burn in, debug or for other purposes, prior to the execution of the acceptance test shall not imply that acceptance or legal ownership has taken place.

c. After thirty (30) consecutive days of trouble free operation. "Trouble free operation" shall be defined as when the system is in full, normal, operation and when no problems or outages of the system occur, which cannot be traced to an outside cause.

(1) The occurrence of an outage or other disruption which cause a failure, or a shutdown of the system, or which requires a service call to restore operability will reset the 30 day clock described in the preceding subsection, and cause it to restart when the system is once again operational.

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3.11.1.2 The warranty coverage inception date will commence as described above. Multiple coverage beginning dates, or initiating coverage on devices as soon as they are installed under the "beneficial use" concept will not be permitted.

3.11.1.3 The Contractor shall provide the following for system acceptance:

- a. All test reports and certification certificate
- b. Warranty certificate
- c. The punch-list cleared and completed and signed off from the architect
- d. Completed and approved Technical Data Packages I, II and III
- e. Service level agreement for operation of the system, service calls, first line troubleshooting, maintenance and service.
- f. Final Record drawings and documentation distributed to all panel locations.

END OF SECTION 28 13 00