

SPECIFICATIONS FOR

**Install an Energy Efficient Air Conditioning
System at Building 618, AASF #2, Hilo, State of
Hawaii, Department of Defense, Hawaii Army
National Guard, Job No. CA-1205-C**

**ISSUED BY:
STATE OF HAWAII
DEPARTMENT OF DEFENSE
3949 DIAMOND HEAD ROAD,
HONOLULU, HAWAII 96816-4495
TELEPHONE: 808-733-4250**

June 2015

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STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

NOTICE TO BIDDERS

SEALED BIDS for furnishing labor, materials, tools and equipment for "Install an Energy Efficient Air Conditioning System at Building 618, AASF #2, Hilo, State of Hawaii, Department of Defense, Hawaii Army National Guard, Job No. CA-1205-C" will be received in the Engineering Office, State of Hawaii, Department of Defense, located in Building 306-A, Room 228, 3949 Diamond Head Road, Honolulu, Hawaii, up to **2:00 P.M. on July 21, 2015** and will then and there be publicly opened and read aloud. Bids may also be mailed to State of Hawaii, Department of Defense, 3949 Diamond Head Road, Honolulu, HI, 96816-4495, **ATTN: HIENG, Room 228**. Bids must be received in the Engineering Office, Room 228, prior to the time and date fixed for opening to be considered. All bids received in the Engineering Office after the time and date fixed for opening will not be considered.

Proposed work consists of, but not limited to the following: furnish and install new variable refrigerant flow (VRF) air conditioning system, replace existing ducted central air conditioning system with VRF system, install direct digital controls, install heat exchanger to service building potable hot water.

The estimated cost is between \$550,000 and \$700,000.

A Pre-Bid meeting/Site Visit will be held on June 26, 2015 at 9:00 am. Contractors are to meet Ms. Marlene Salmo outside of the main gate at AASF #2, 1095 Kekuanaoa Street, Hilo, HI 96720 prior to 9:00am. Contractors are required to call Ms. Salmo at 808-844-6638 before 4:30 pm on June 25, 2015 to register for the meeting/site visit. If no answer, please leave your company information, attendees names and a contact number, you may assume that you are registered for the site visit. All interested bidders and subcontractors are welcome, but not required to attend. No additional site visits will be scheduled.

All requests for substitution, clarification of bidding documents and/or specifications must be received in the office listed above, in writing, prior to 4:30 PM on June 29, 2015. Questions shall be faxed to 808-733-4235 Attn: Cathy.

Bona fide bidders may obtain copies of applicable specifications and bidding documents at the above-named office. Documents may also be downloaded from the State Procurement Office website at <http://spo.hawaii.gov/> and at the State Department of Defense website at <http://dod.hawaii.gov/hieng/>. If prospective bidders obtain copies of the bid documents from sources other than the Contracting and Engineering Office address listed above, then bidders are responsible to register by sending their company name, address, telephone and facsimile number, and email address via facsimile at 808-733-4235.

The Hawaii Products preference pursuant to ACT 175, SLH 2009 may be applicable for numerous items throughout this solicitation. Persons wishing to certify and qualify a product not currently listed as a Hawaii Product shall submit a Certification for Hawaii Product Preference (form SPO-38) by fax to: Department of Defense, Engineering Office, ATTN: Cathy Siu, fax #808-733-4235 or by e-mail to csiu@dod.hawaii.gov prior to 4:30pm 15 days prior to the bid opening date for this project. View the current Hawaii Products List on the State Procurement office (SPO) website at <http://spo.hawaii.gov/>.

For each product, one form shall be completed and submitted (i.e. 3 products should have 3 separate forms completed). The form is available on the SPO webpage at <http://spo.hawaii.gov/>.

Late submittals for this solicitation will not be reviewed by this agency.

An Intent to Bid is NOT required to be submitted for this project.

Bidders are required to register on the Hawaii Compliance Express web site for all tax clearances by going to <http://spo.hawaii.gov/> click on "HCE" and registering there.

Bidders are responsible for checking for any addenda for this project. The addenda will be posted on the State Procurement Office web site under the project name at <http://spo.hawaii.gov/>

CAMPAIGN CONTRIBUTIONS BY STATE AND COUNTY CONTRACTORS PROHIBITED. If awarded a contract in response to this solicitation, offeror agrees to comply with HRS §11-355, which states that campaign contributions are prohibited from a State and County government contractor during the term of the contract if the contractor is paid with funds appropriated by the legislative body between the execution of the contract through the completion of the contract.

REQUIREMENT FOR CONTRACTORS LICENSING CLASSIFICATIONS

Due to the nature of the work contemplated bidder must possess a valid State of Hawaii Contractor's license in the appropriate classification.

General Engineering Contractors holding an 'A' license and General Building Contractors holding a 'B' license are reminded that due to the Hawaii Supreme Court's January 28, 2002 decision in Okada Trucking Co., Ltd. v. Board of Water Supply, et al., 97 Haw. 450 (2002), they are prohibited from undertaking any work, solely or as part of a larger project, which would require the General Contractor to act as a specialty Contractor in any area in which the General Contractor has no license.

Bidders are solely responsible to review the project requirements, determine the appropriate licenses required, and ensure that they possess and that the Subcontractor(s) listed in their OFFER FORM possess the necessary specialty licenses to perform the work for this project.

Arthur J. Logan
Brigadier General
Adjutant General

Posted on: June 10, 2015

Install an Energy Efficient Air Conditioning System at Building 618, AASF #2, Hilo, State of Hawaii, Department of Defense, Hawaii Army National Guard, Job No. CA-1205-C

Adjutant General
State Department of Defense
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Sir:

The undersigned has carefully read and understands the terms and conditions specified in the Specifications and Special Provisions attached hereto, and in the General Conditions, by reference made a part hereof and available upon request; and hereby submits the following offer to perform the work specified herein, all in accordance with the true intent and meaning thereof. The undersigned further understands and agrees that by submitting this offer, 1) he/she is declaring his/her offer is not in violation of Chapter 84, Hawaii Revised Statutes, concerning prohibited State contracts, and 2) he/she is certifying that the price(s) submitted was (were) independently arrived at without collusion.

The undersigned represents: **(Check one only)**

- A **Hawaii business** incorporated or organized under the laws of the State of Hawaii; **OR**
 A **Compliant Non-Hawaii business** not incorporated or organized under the laws of the State of Hawaii. Business shall be registered prior to award at the State of Hawaii Department of Commerce and Consumer Affairs Business Registration Division to do business in the State of Hawaii. State of incorporation: _____

Offeror is:

- Sole Proprietor Partnership Corporation Joint Venture
 Other _____

Federal I.D. No.: _____

Hawaii General Excise Tax License I.D. No.: _____

Payment address (other than street address below): _____

City, State, Zip Code: _____

Business address (street address): _____

City, State, Zip Code: _____

Respectfully submitted:

(x) _____
Authorized (Original) Signature (*1)

Date: _____

Telephone No.: _____

Name and Title (Please Type or Print)

Fax No.: _____

* _____
Exact Legal Name of Company (Offeror) (*2)

(*2) If Offeror is a "dba" or a "division" of a corporation, furnish the exact legal name of the corporation under which the awarded contract will be executed:

E-mail Address:

(*1)

Original signature in ink. If unsigned or the affixed signature is a facsimile or a photocopy, the offer shall be automatically rejected unless accompanied by other material, containing an original signature, indicating the Offeror's intent to be bound.

The undersigned has carefully examined the attached plans and specifications and hereby proposes to furnish at his own expense all labor, materials, tools and equipment necessary to construct all work as shown and called for, in strict accordance with the specifications, schedules and drawings pertaining thereto, all for the LUMP SUM of:

_____ DOLLARS (\$_____).

(Including the cost of delivery, unloading, freight charges, all applicable taxes, and other cost involved) and will fully complete all the work under this contract within 240 consecutive working days from the date of commencement specified by the written order of the Adjutant General including the date of said order.

NOTE:

1. This project falls under the requirement of the "Buy American Act".
2. Davis-Bacon Act prevailing wage rate applies to this contract.
3. Contract will be awarded based on the total lump sum bid.
4. A Pre-Bid meeting/Site Visit will be held on June 26, 2015 at 9:00 am. Contractors are to meet Ms. Marlene Salmo outside of the main gate at AASF #2, 1095 Kekuanaoa Street, Hilo, HI 96720 prior to 9:00am. Contractors are required to call Ms. Salmo at 808-844-6638 before 4:30 pm on June 25, 2015 to register for the meeting/site visit. If no answer, please leave your company information, attendees names and a contact number, you may assume that you are registered for the site visit. All interested bidders and subcontractors are welcome, but not required to attend. No additional site visits will be scheduled.
5. All requests for substitution, clarification of bidding documents and/or specifications must be received in the office listed above, in writing, prior to 4:30 PM on June 29, 2015. Questions shall be faxed to 808-733-4235 Attn: Cathy.
6. The State reserves the right to determine the extent of the contract by selecting and/or omitting bid items (not necessarily in sequence) to the extent required to come within the funds available for the project. The award of the contract shall be made to the responsible bidder whose total bid is the lowest.
7. **CAMPAIGN CONTRIBUTIONS BY STATE AND COUNTY CONTRACTORS PROHIBITED.** If awarded a contract in response to this solicitation, offeror agrees to comply with HRS §11-355, which states that campaign contributions are prohibited

from a State and County government contractor during the term of the contract if the contractor is paid with funds appropriated by the legislative body between the execution of the contract through the completion of the contract.

8. The Surety shall not be held liable beyond two (2) years of the project acceptance date.

In accordance with ACT 175, SLH 2009 the Hawaii Products preference is applicable to this solicitation. Hawaii products may be available for those items noted on the offer form. The Hawaii Products List is available on the State Procurement Office (SPO) website at <http://spo.hawaii.gov/> search for "Hawaii Product Preferences".

Offeror offering a Hawaii Product (HP) shall identify the HP on the solicitation offer pages. Any person desiring a Hawaii product preference shall have the product(s) certified and qualified if not currently on the Hawaii Products list, prior to the deadline for receipt of offer(s) specified in the procurement notice and solicitation. The responsibility for certification and qualification shall rest upon the person requesting the preference.

Persons desiring to qualify their product(s) not currently on the Hawaii Product list shall complete form SPO-38, *Certification for Hawaii Product Preference*, and submit to the Department of Defense, Contracting Officer, and provide all additional information required by the Contracting Officer no later than 4:30pm, fifteen (15) calendar days prior to the bid opening date. For each product, one form shall be completed and submitted (i.e. 3 products should have 3 separate forms completed). The form is available on the SPO webpage at <http://spo.hawaii.gov/> search for "Forms" and select form SPO-38.

Late submittals for this project will not be reviewed by the Department.

Change in Availability of Hawaii Product

In the event of any change that materially alters the offeror's ability to supply Hawaii Products, the offeror shall immediately notify the Contracting Officer in writing and the parties shall enter into discussions for the purposes of revising the contract or terminating the contract for convenience.

Offerors shall indicate in the Hawaii Product Schedule below whether the pre-approved Hawaii Products are offered. Offerors offering a Hawaii Product shall fill-in the quantity, unit measure, unit price and total price for the Hawaii Product they desire to be considered for preference. Products not pre-approved shall not be considered. Hawaii Products not meeting the requirements of the specification shall not be considered.

Offerors selecting the Hawaii Product preference may be required to submit additional information on the cost basis of their selected Hawaii Product preference items when requested after the bid opening to verify cost of the Hawaii Products, including the computations for the estimated quantities, manufacturer's or supplier's quotations, and delivered material cost Free on Board (FOB) at the jobsite. The Hawaii Product Cost shall not include installation costs.

Hawaii Products available for this project are as follows:

Product Description	Class I, II or III	Manufacturer	Cost
			\$
			\$
			\$
			\$
			\$
			\$
			\$

APPRENTICESHIP AGREEMENT PREFERENCE

The estimated value of the public works contract is \$250,000 or more and the apprenticeship agreement preference pursuant to Hawaii Revised Statutes §103-55.6 (Act 17, SLH 2009) **shall apply**.

1. If applicable to this project, any bidder seeking the preference must be a party to an apprenticeship agreement registered with the State Department of Labor and Industrial Relations (DLIR) at the time the bid is submitted for each apprenticeable trade the bidder will employ to construct the project. "Employ" means the employment of a person in an employer-employee relationship.
 - a. The apprenticeship agreement shall be registered with the DLIR and conform to the requirements of Hawaii Revised Statutes Chapter 372.
 - b. Subcontractors do not have to be a party to an apprenticeship agreement for the bidder to obtain the preference.
 - c. The bidder is not required to have apprentices in its employ at the time the bid is submitted to qualify for the preference.

2. A bidder seeking the preference must state the apprenticeable trade the bidder will employ for each trade to be employed to perform the work by submitting a completed **signed original** *Certification of Bidder's Participation – Form 1* verifying participation in an apprenticeship program registered with the DLIR. "Apprenticeable trade" shall have the same meaning as "apprenticeable occupation" pursuant to Hawaii Administrative Rules (HAR) §12-30-5.
 - a. The *Certification of Bidder's Participation – Form 1* shall be authorized by an apprenticeship sponsor listed on the DLIR list of registered apprenticeship

programs. "Sponsor" means an operator of an apprenticeship program and in whose name the program is approved and registered with the DLIR pursuant to HAR §12-30-1.

- b. The authorization shall be an original signature by an authorized official of the apprenticeship sponsor.
 - c. The completed *Certification of Bidder's Participation – Form 1* for each trade must be submitted with the bid. A facsimile or copy is acceptable to be submitted with the bid, however the signed original must be submitted within five (5) working days of the bid open date. If the signed original is not received within this timeframe, the preference may be denied. Previous certifications shall not apply.
 - d. When filling out the *Certification of Bidder's Participation – Form 1*, the name of Apprenticeable Trade and Apprenticeship Sponsor must be the same as recorded in the List of Construction Trades in Registered Apprenticeship Programs that is posted on the State Department of Labor and Industrial Relations website. "Registered apprenticeship program" means a construction trade program approved by and registered with the DLIR pursuant to HAR § 12-30-1 and §12-30-4.
 - e. The *Certification of Bidder's Participation – Form 1* and the List of Construction Trades in Registered Apprenticeship Programs is available on the DLIR website at: <http://hawaii.gov/labor/wdd>
3. Upon receiving the *Certification of Bidder's participation – Form 1*, the Procurement Officer will verify that the apprenticeship program is on the List of Construction Trades in Registered Apprenticeship Programs and that the form is signed by an authorized official of the Apprenticeship Program Sponsor. If the programs and signature are not confirmed by the DLIR, the bidder will not qualify for the preference.
 4. If the bidder is certified to participate in an apprenticeship program for each trade which will be employed by the bidder for the project, a preference will be applied to decrease the bidder's bid amount by five (5) percent for evaluation purposes.
 5. Should the bidder qualify for other preferences (for example, Hawaii Products), all applicable preference shall be applied to the bid price.
 6. If the winning bidder has submitted Form 1 with his bid packet, the Form 2 will be required the first week of each month for the prior month beginning with the month of the start of work.

CHARACTER OF WORKERS OR EQUIPMENT

The Contractor shall perform with his own organization, work amounting to not less than twenty percent (20%) of the total contract cost. The Engineer may require the Contractor to verify the percentage of work he will be providing with his own organization by furnishing pertinent information such as all of the actual subcontractor(s)' quotations he received for the bid. If requested, the Contractor shall provide such verification within 5 working days of the request.

CERTIFICATION FOR SAFETY AND HEALTH PROGRAM FOR BIDS IN EXCESS OF \$100,000

In accordance with HRS 396-18, by submitting this proposal, the undersigned certifies that his company will have a written safety and health plan for this project that will be available and implemented by the Notice to Proceed date of this project. Details of the requirements of this plan may be obtained from the Department of Labor and Industrial Relations, Occupational Safety and Health Division (HIOSH).

TAX CLEARANCES FROM THE STATE DIRECTOR OF TAXATION AND INTERNAL REVENUE SERVICE

Contractors are required to provide a state and federal tax clearance as a prerequisite to entering into a public contract of \$2,500 or more. To meet this requirement, all bidders shall submit valid tax clearances with their bid proposals when the bid is \$2,500 or more.

Failure to submit the required tax clearance may be sufficient grounds for the State to refuse to receive or consider the prospective bidder's proposal.

In accordance with Act 190 Amendment to HRS 103D-310(c), required as a prerequisite to entering into a contract, the contractor shall register on the Hawaii Compliance Express web site for all tax clearances by going to <http://vendors.ehawaii.gov> and registering there.

In all contracts over \$500,000.00 all sub-contractors will be required to be registered on the Hawaii Compliance Express and have a compliant rating prior to issuing the Notice to Proceed.

A Certificate of Vendor Compliance generated from this website shall be included with their bid proposal. A Compliant status is required prior to awarding the contract.

LICENSE

Due to the nature of the work contemplated, bidder and/or sub-contractor must possess a valid State of Hawaii Contractor's license in the appropriate classification. A minimum of C-15, C-44 and C-52 specialty licenses.

ALL JOINT CONTRACTORS & SUBCONTRACTORS TO ENGAGE ON THIS PROJECT

The bidder certifies that the following is a complete listing of all joint contractors or subcontractors covered under Chapter 444, Hawaii Revised Statutes, who will be engaged by the bidder on this project to perform the nature and scope of work indicated pursuant to Section 103D-302, Hawaii Revised Statutes, and understands that failure to comply with this requirement shall be just cause for rejection of the bid.

The bidder further certifies that only those joint contractors or subcontractors listed shall be allowed to perform work on this project and that all other work necessary shall be performed by the bidder with his own employees. If no joint contractor or subcontractor is listed, it shall be construed that all of the work shall be performed by the bidder with his own employees.

All bidders must be sure that they possess and that the subcontractors listed in the proposal possess all the necessary specialty licenses needed to perform the work for this project. The bidder shall be solely responsible for assuring that all of the specialty licenses required to perform the work is covered in his bid.

All subcontractors listed below must be registered on the Hawaii Compliance Express web site and have a compliant rating prior to issuing a Notice to Proceed for all contracts over \$500,000.00.

The bidder shall include the license number of the joint contractors or subcontractors listed below. Failure to provide the correct names and license numbers as registered with the Contractor's Licensing Board may cause rejection of the bid submitted.

Complete Firm Name of Joint Contractor or Subcontractor for Lump Sum Bid	License Number	Nature and Scope of Work to be performed
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Enclosed herewith as required by law:

Surety Bond

Certificate of Deposit

Certified Check

Cashier's Check

Share Certificate

Legal Tender

(Cross Out Those Not Applicable)

_____ DOLLARS (\$ _____).

*Signature

HAWAII GENERAL EXCISE TAX

Title

I.D. NO. _____

Name of Company

Address

LICENSE CLASSIFICATION
AND/OR SUBCLASSIFICATION
NO.

Telephone

Date

(CORPORATE SEAL)

*Please attach to this page evidence of the authority of this officer to submit bids on behalf of the Company, and also the names and residence addresses of all officers of the Company.

NOTE: Fill in all blank spaces with the information asked for or bid may be invalidated. PROPOSAL PAGES MUST BE INTACT; MISSING PAGES MAY INVALIDATE YOUR BID.

FORM 1

CERTIFICATION OF BIDDER'S PARTICIPATION IN APPROVED APPRENTICESHIP PROGRAM UNDER ACT 17

I. Bidder's Identifying Information

A. Legal Business Name: _____

B. Project Bid Title & Reference No.: _____

C. Contact Person's Name: _____

1. Phone No.: _____

2. E-Mail: _____

II. Apprenticeship Trades To Be Employed*

A. (List)	B. Apprenticeship Sponsor* (One Sponsor Per Form)	C. No. Enrolled (# of apprentices currently enrolled as of bidder's request date)	D. No. Completed (# of apprentices who completed the apprenticeship program in the 12 months prior to request date)
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			

III. Bidder's Certification

I certify that the above information is accurate to the best of my knowledge. I understand that my willful misstatement of facts may cause forfeiture of the preference under Act 17 and may result in criminal action. I give permission for outside sources to be contacted and for them to disclose any information necessary to verify the bidder's preference.

A. Name (Type) _____ B. Title _____

C. Signature (original signature required) _____ D. Date _____

IV. Apprenticeship Sponsor's Contact Information

A. Training Coordinator's Name: _____

B. Address: _____

C. Phone No.: _____

D. E-Mail: _____

E. Fax No.: _____

V. Apprenticeship Program Sponsor's Certification

I certify that the above information is accurate to the best of my knowledge. I understand that my willful misstatement of facts may cause forfeiture of the bidder's preference and may result in criminal action. I give permission for outside sources to be contacted and for them to disclose any information necessary to verify the bidder's preference under Act 17.

A. Name of Authorized Official _____ B. Title _____

C. Signature (original signature required) _____ D. Date _____

Name of Apprenticeship Trade and Apprenticeship Sponsor must be the same as recorded in the List of Construction Trades in Registered Apprenticeship Programs that is posted on the State Department of Labor and Industrial Relations website.

(NAME OF CORPORATION)

I, _____, Secretary of _____ Corporation, a _____ corporation, do hereby certify that the following is a full, true and correct copy of a resolution duly adopted by the Board of Directors of said corporation, at its meeting duly called and held at the office of the Corporation _____ Street, _____, _____, on the _____ day of _____, 20 __, at which a quorum was present and acting throughout, and that said resolution has not been modified, amended or rescinded and continues in full force and effect:

"RESOLVED that any individual at the time holding the position of President, Vice President, Secretary or Treasurer be, and each of them hereby is, authorized to execute on behalf of the Corporation any bid, proposal or contract for the sale or rental of the products of the Corporation or for services to be performed by the Corporation, and to execute any bond required by any such bid, proposal or contract with the United States Government or the State of Hawaii or the City and County of Honolulu, or any County or Municipal Government of said State, or any department or subdivision of any of them."

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the corporate seal of said _____ Corporation this _____ day of _____, 20 ____.

Secretary

(Names and Addresses of:)

President:

Vice President:

Secretary:

Treasurer:

SPECIAL NOTICE TO BIDDERS - CONSTRUCTION

QUALIFICATIONS OF BIDDERS - Prospective bidders must be capable of performing the work for which bids are being called.

The Department of Defense no longer requires a submittal of "INTENTION TO BID" unless otherwise stated in the notice to bidders.

If a notice of intent to bid is required, the written notice shall be received no later than TEN calendar days prior to the date designated for opening bids. If the 10th calendar day prior to the day designated for opening bids is a weekend or legal State holiday, then the written notice must be received no later than the last working day immediately prior to said weekend or State holiday. The written notice will be time stamped when received by said office. The time designated by the time stamping device in said office shall be official. If the written notice is hand carried, then the bearer is responsible to ensure that the notice is time stamped by said office.

It is the responsibility of the prospective bidder to ensure that the written notice of intention to bid is received in time and the State assumes no responsibility for failure of timely delivery caused by the prospective bidder or by any method of conveyance chosen by the prospective bidder.

If two (2) or more prospective bidders desire to bid jointly as a joint venture on a single project, they must file an affidavit of joint venture with their notice of intention to bid or if no intent to bid is required, shall submit an affidavit of joint venture prior to bid opening. Such affidavit of joint venture will be valid only for the specific project for which it is filed. No further license is required when all parties to the joint venture possess current and appropriate contractor's licenses. Joint venture are required to be licensed in accordance with Chapter 444 of the Hawaii Revised Statutes, as amended, and the rules and regulations of the Contractor's License Board when any party to the joint venture agreement does not hold a current or appropriate contractor's license.

The Adjutant General or his designated representative may, in accordance with Section 103D-310, Hawaii Revised Statutes, require the prospective bidder to submit answers to questions in the "Standard Questionnaire and Financial Statement for Bidders," on the form provided by the Department, properly executed and notarized, setting forth a complete statement of the experience of such prospective bidder and his organization in performing similar work and a statement of the equipment proposed to be used, together with adequate proof of the availability of such equipment, at least forty-eight (48) hours prior to the time advertised for the opening of bids. If the information in the questionnaire proves satisfactory, the bidder's proposal will be received. All information contained in the answers to the questionnaire shall be kept confidential. The questionnaire will be returned to the bidder after it has served its purpose.

If upon review of the Questionnaire, or otherwise, the bidder appears not fully qualified or able to perform the intended work, the Adjutant General or his designated representative shall, after affording the bidder an opportunity to be heard and if still of the opinion that the bidder is not fully qualified to perform the work, refuse to receive or to consider any bid offered by the prospective bidder.

Failure to complete the prequalification questionnaire, (IF SENT TO YOU), will be sufficient cause for the Department to disqualify a prospective bidder.

INTERPRETATION OF QUANTITIES IN BID SCHEDULE - When quantities for individual items of work are listed in the bid form for which respective unit prices are asked, said quantities are to be considered as approximate and are to be used by the Department only for the purpose of comparing on a uniform basis bids offered for the work. The Department does not, expressly or by implication, agree that the actual quantity of work will correspond therewith. The undersigned agrees that his is satisfied with and will at no time dispute said estimated quantities as a means of comparing the bids.

After determining the low bidder by comparison of bids submitted in accordance with the proposal form, the Adjutant General or his designated representative reserves the right to increase or decrease the scope of the improvement.

On unit price bids, payment will be made only for the actual number of units incorporated into the finished project at the unit price bid.

It is understood and agreed that the contractor will make no claim for anticipated profit or loss of profit due to the Department's right to eliminate entirely portions of the work or to increase or decrease any or all of the quantities shown in the proposal form.

CONTENTS OF PROPOSAL FORMS - Prospective bidders will be furnished with proposal forms giving the location, description, and the contract time of the work contemplated for which a lump sum bid price is asked or containing a schedule of items, together with estimated quantities of work to be performed and materials to be furnished, for which unit bid prices and/or lump sum bid prices are asked.

Proposal forms will also include a listing of joint contractor and/or subcontractors asking the name of each person or firm to be engaged on the project as a joint contractor or subcontractor.

All papers bound with or attached to the proposal form shall be considered a part thereof and shall not be detached or altered when the proposal is submitted.

The plans, specifications and other documents designated in the proposal form, will also be considered a part thereof whether attached or not.

BIDDERS RESPONSIBILITY FOR EXAMINATION OF PLANS, SPECIFICATIONS, SITE OF WORK, ETC.

- The bidder shall examine carefully the site work contemplated and the proposal, plans, specifications, supplemental specifications, special provisions and contract and bond forms therefore. The submission of a bid shall be considered as a warranty that the bidder has made such examination and is satisfied with the conditions to be encountered in performing the work and with the requirements of the plans, specifications, supplemental specifications, special provisions, contract and bond.

No extra compensation will be given by reason of the Contractor's misunderstanding or lack of knowledge of the requirements of the work to be accomplished or the conditions to be encountered in performing the project.

Where an investigation of subsurface conditions has been made by the Department in respect to foundation or other design, the bidders may inspect the records of the Department as to such investigation, including examination of samples, if any. It is understood, however, that any such information furnished is for the bidders' convenience only and no assurance is given that conditions found at the time of subsurface investigation, such as the presence or absence of water, will be conditions that prevail at the time of construction.

When the contract plan includes a log of test borings showing a record of the data obtained by the Department's investigation of subsurface conditions, said log represents only the opinion of the Department as to the character of material encountered by it in its test borings and there is no warranty, either expressed implied, that the conditions indicated are representative of those existing throughout the work or any part of it, or that unforeseen developments may not occur.

Information regarding the site of work given on the drawings or specifications has been obtained by the Department and is believed to be reasonably correct, however, it is the responsibility of the bidder to verify all such information. Any utilities that the Contractor encounters during the progress of the work, such as telephone ducts, electric ducts, water lines, sewer lines, electric lines and drainage pipes, whether shown or not on the contract plans, shall not be disturbed or damaged unless otherwise instructed in the plans and specifications.

In the event the utilities are damaged or disturbed by the Contractor, the Contractor shall be held liable for the damage or disturbed utilities which were:

- A. Shown on the plan.
- B. Located and exposed on the job as it progressed.
- C. Pointed out to the Contractor in the field.

The Contractor shall repair the damaged or disturbed utilities to the existing condition at no cost to the Department or the project. Any damage claims due to the disruption of service caused by the utilities being damaged shall be paid by the Contractor who shall

save harmless the Department from all suits, actions, or claims of any character brought on account of such damages.

In the event utilities which were not shown on the plans and specifications are damaged or disturbed by the Contractor, the Contractor shall not be held liable but shall notify the Engineer. Upon instruction from the Engineer, the Contractor shall repair all damages which shall be considered to be additional work.

Utilities which must be relocated due to construction and not so indicated in the plans and specifications shall also be considered to be additional work. The Contractor shall not in any case, if he encounters underground utilities, proceed with any work until he has notified the Engineer.

No information derived from such inspection of records of subsurface investigations made by the Department or from the Engineer or from his authorized representative or from maps, plans, specifications or drawings will in any way relieve the Contractor from any risk or from properly fulfilling all the terms of the contract. The log tests borings if included in the plans are only for the convenience of the bidder and do not constitute a part of the contract. The Contractor is solely responsible for all assumptions, deductions, or conclusions he may make or derive from the subsurface records furnished.

ADDENDA AND INTERPRETATIONS - Discrepancies, omissions, or doubts as to the meaning of drawings and specifications should be communicated in writing to: Department of Defense, State of Hawaii, ATTN: HIENG, 3949 Diamond Head Road, Honolulu, HI. 96816, for the interpretation and must be received by the Engineering Office, Department of Defense, no later than fifteen (15) calendar days prior to the date fixed for bid opening. Any interpretation, if made, and any supplemental instructions will be in the form of written addenda to the specifications, which will be mailed to all prospective bidders at the respective addresses furnished for such purposes, eight (8) calendar days prior to the date fixed for the opening bids. Failure of any bidder to receive any such addendum or interpretations shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.

PREPARATION OF PROPOSAL - The bidder's proposal must be submitted on the proposal form furnished by the Department. The proposal must be prepared in full accordance with the instructions therein. The bidder must state, both in words and numerals, the lump sum price at which the work contemplated is proposed to be done. These prices must be written in ink or typed. Prices written in pencil are not acceptable. In case of a discrepancy between the prices written in words and those written in figures, the words shall govern over the figures. The bidder shall sign the proposal in the spaces provided with ink.

If the proposal is made by an individual, his name and post office address must be shown in the space provided. If made by a partnership, the name and post office

address of each member of the partnership must be shown and the proposal signed by all partners or evidence in the form of a partnership agreement must be submitted showing the authority of the partner to enter, on behalf of said partnership, into contract with the State. If made by a corporation, the proposal must show the name, titles, and business address of the president, secretary and treasurer and also evidence in the form of a corporate resolution must be submitted showing the authority of the particular corporate representative to enter on behalf of said corporation into contract with the State. (See sample). If made by a joint venture the name and post office address of each member of the individual form, partnership or corporation comprising the joint venture must be shown with other pertinent information required of individuals, partnerships or corporations as the case may be. The proposal must be signed by all parties to the joint venture or evidence in the form of a Joint Venture Agreement must be submitted showing the authority of the Joint Venture's representative to enter on behalf of said Joint Venture into contract with the State.

Pursuant to the requirements of Section 103D-302, Hawaii Revised Statutes, each bidder shall include in his bid the name of each person or firm to be engaged by the bidder on the project as joint contractor or subcontractor indicating also the nature and scope of work to be performed by such joint contractor and/or subcontractor.

BID SECURITY - No proposal totaling \$50,000 or more will be considered unless accompanied by one of the following forms of bidder's security:

A. Surety bond underwritten by a company licensed to issue bonds in this State.

B. Legal Tender.

C. Certificate of Deposit; share certificate; or cashier's, treasurer's, tellers or official check drawn by, or certified check accepted by, and payable on demand to the State by a bank, a savings institution, or credit union insured by the Federal Deposit Insurance Corporation or the National Credit Union Administration.

(1) These instruments may be utilized only to a maximum of \$100,000.

(2) If the required security amount totals over \$100,000, more than one instrument not exceeding \$100,000 each and issued by different financial institutions shall be accepted.

THE BID SECURITY SHALL BE AT LEAST FIVE (5) PERCENT OF THE BID AMOUNT.

If the bidder is a corporation, evidence in the form of a corporate resolution, authorizing the corporate representative to execute the bond must be submitted with the proposal. If the bidder is a partnership, all partners must sign the bond or evidence in the form of a partnership agreement must be submitted showing the authority of the partner.

If the bidder is a joint venture, all parties to the joint venture must sign the bond or evidence in the form of a joint venture agreement must be submitted showing the authority of the bidder to sign the bond on behalf of the joint venture.

In the case where the award will be made on a group or item basis, the amount of proposal guaranty shall be based on the total bid for all groups or items submitted.

Bidders are cautioned that surety bid bonds which place a limit in value to the difference between the bid amount and the next acceptable bid, such value not to exceed the purported amount of the bond, are acceptable. Also, surety bid bonds which place a time limit on the right of the State to make claim other than allowed by statutes or these General Conditions are not acceptable. Bidders are hereby notified that a surety bid bond containing such limitation(s) is not acceptable and a bidder's bid accompanied by such surety bid bond will be automatically rejected.

DELIVERY OF PROPOSALS - The entire proposal shall be placed together with the bid security, in a sealed envelope so marked as to indicate the identity of the project, the project number, the date of bid opening and the name and address of the bidder and then delivered as indicated in the Notice to Bidders. Bids which do not comply with this requirement may not be considered. Proposals will be received up to the time fixed in the public notice for opening of bids and must by that time be in the hands of the officials indicated. The words 'SEALED BID' must be clearly written or typed on the face of the sealed envelope containing the proposal guaranty.

WITHDRAWAL OR REVISION OF PROPOSALS - Any bid may be withdrawn or revised at any time prior to, but not after, the time fixed in the public notice for the opening of bids, provided that a request in writing, executed by the bidder or his duly authorized representative, for the withdrawal or revision of such bid is filed with the Adjutant General before the time set for the opening of bids. The withdrawal of a bid shall not prejudice the right of a bidder to file a new bid. Whether or not bids are opened exactly at the time fixed in the public notice for opening bids, a bid will not be received after that time, nor may any bid be withdrawn after the time fixed in the public notice for the opening of bids.

PUBLIC OPENING OF PROPOSALS - Proposals will be opened and read publicly at the time and place indicated in the Notice to Bidders. Bidders, their authorized agents and other interested parties are invited to be present.

DISQUALIFICATION OF BIDDERS - Any one or more of the following cause will be considered as sufficient for the disqualification of a bidder and the rejection of his proposal or proposals:

- A. Non-compliance with "QUALIFICATION OF BIDDERS".
- B. Evidence of collusion among bidders.

- C. Lack of responsibility and cooperation as shown by past work.
- D. Being in arrears on existing contracts with the State of Hawaii, or having defaulted on a previous contract.
- E. Lack of proper equipment and/or sufficient experience to perform the work contemplated as revealed by the Standard Questionnaire and Financial Statement for Bidders.
- F. No contractor's license or a contractor's license which does not cover type of work contemplated.
- G. More than one proposal for the same work from an individual, firm, partnership, corporation or joint venture under the same or different name.
- H. Delivery of bids after the deadline specified in the advertisement calling for bids.
- I. Failure to pay, or satisfactorily settle, all bids overdue for labor and material on former contracts in force at the time of issuance of proposal forms.

CONSIDERATION OF PROPOSALS - After the proposals are opened and read, the figures will be extended and/or totaled in accordance with the bid prices of the acceptable proposals and the totals will be compared and the results of such comparison shall immediately be made public. In the comparison of bids, words written in the proposals will govern over figures and unit prices will govern over totals. Until the award of the contract, however, the right will be reserved to reject any and all proposals and to waive any defects or technicalities as may be deemed best for the interest of the State.

IRREGULAR PROPOSALS - Proposals will be considered irregular and may be rejected for the following reasons:

- A. If the proposal is unsigned.
- B. Bid security not in accordance with paragraph "BID SECURITY".
- C. If proposal is on a form other than that furnished by the Department or if the form is altered or any part thereof detached.
- D. If the proposal shows any non-compliance with applicable law, alteration of form, additions not called, conditional bids, incomplete bids, uninitiated erasures, other defects, or if the prices are obviously unbalanced, or if sufficient funds are not available to prosecute the work.

E. If the bidder adds any provisions reserving the right to accept or reject an award, or to enter into a contract pursuant to an award.

This does not exclude a proposal limiting the maximum gross amount of awards acceptable to any one bidder at any one bid letting, provided that any selection of awards will be made by the Department.

F. When a proposal is signed by an officer or officers of a corporation and a currently certified corporate resolution authorizing such signer(s) to submit such proposal is not submitted with the proposal or when the proposal is signed by an agent other than the officer or officers of a corporation or a member of a partnership and a Power of Attorney is not submitted with the proposal.

G. Where there is an incomplete or ambiguous listing of joint contractors and/or subcontractors the proposal may be rejected. All work which is not listed as being performed by joint contractor and/or subcontractors must be performed by the bidder with his own employees. Additions to the list of joint contractors or subcontractors will not be allowed. Whenever there is a doubt as to the completeness of the list, the bidder will be required to submit within five (5) working days, written confirmation that the work in question will be performed with his own force. Whenever there is more than one joint contractor and/or subcontractor listed for the same item of work, the bidder will be required to either confirm in writing within five (5) working days that all joint contractors or subcontractors listed will actually be engaged on the project or obtain with five (5) working days, written releases from those joint contractor and/or subcontractors who will not be engaged.

AWARD OF CONTRACT - The award of contract, if it be awarded, will be made within ninety (90) consecutive calendar days after the opening of the proposals to the lowest responsible and responsive bidder (including the alternate or alternates which may be selected by the Adjutant General in the case of alternate bids) whose proposal complies with all the requirements prescribed, but in no case will an award be made until all necessary investigations are made. The successful bidder will be notified, by letter mailed to the address shown on the proposal that his bid has been accepted and that he has been awarded the contract.

No contract will be awarded to any person or firm suspended under the provisions of Chapter 104 and Chapter 444, Hawaii Revised Statutes, as amended.

CANCELLATION OF AWARD - The Adjutant General or his designated representative reserves the right to cancel the award of any contract at any time before the execution of said contract by all parties without any liability to the awardee and to any other bidder.

RETURN OF BID SECURITY (excluding bid bonds) - All bid securities, except those of the four (4) lowest bidders, will be returned immediately following the opening and checking of the proposals. The retained bid securities of the remaining two (2) lowest

bidders will be returned within five (5) working days following the execution of contract. The successful bidder's bid security will be returned after a satisfactory contract bond has been furnished and the contract has been executed.

RETURN OF BID BONDS – The bid bonds will be returned only after receipt of a written request from the contractor.

REQUIREMENT OF PERFORMANCE AND PAYMENT BONDS - Performance and Payment Bonds shall be required for contracts exceeding \$50,000. At the time of the execution of the contract, the successful bidder shall file a good and sufficient performance and payment bonds on the form furnished by the Department or the contractor's Surety, each in an amount equal to one hundred percent (100%) of the amount of the contract price unless otherwise stated in the solicitation of bids. Acceptable performance and payment bonds shall be limited to the following:

- A. Surety bond underwritten by a company licensed to issue bonds in this State; or
- B. Legal Tender; or
- C. A certificate of deposit; share certificate; or cashier's, treasurer's, teller's or official check drawn by, or a certified check accepted by, and payable on demand to the State by a bank, a savings institution, or credit union insured by the Federal Deposit Insurance Corporation or the National Credit Union Administration.

(1) These instruments may be utilized only to a maximum of \$100,000.

(2) If the required security or bond amount totals over \$100,000, more than one instrument not exceeding \$100,000 each and issued by different financial institutions shall be acceptable.

If the contractor fails to deliver the required performance and payment bonds, the contractor's award shall be canceled, its bid security enforced and award of the contract shall be made to the next lowest bidders.

EXECUTION OF THE CONTRACT - The contract shall be signed by the successful bidder and returned, together with a satisfactory performance and payment bonds, within ten (10) consecutive calendar days, after the bidder has received his contract for execution or within such further time as the Adjutant General or his designated representative may allow. No proposal or contract shall be considered binding upon the State until the contract has been fully and properly executed by all parties thereto and the Adjutant General or his designated representative has endorsed therein his certificate, as required by Section 103D-309, Hawaii Revised Statutes, that there is an available unexpended appropriation or balance of an appropriation over and above all outstanding contracts sufficient to cover the State's amount required by such contract.

On any individual award totaling less than \$50,000, the State reserves the right to execute the contract by the issuance of a State Purchase Order. Acceptance shall result in a binding contract between the parties without further action by the State. Executing the contract by Purchase Order shall not be deemed a waiver of these specification requirements.

FAILURE TO EXECUTE THE CONTRACT - If the bidder to whom a contract is awarded shall fail or neglect to enter into the contract and to furnish satisfactory security within ten (10) consecutive calendar days after such award or within such further time as the Adjutant General or his designated representative may allow, the award shall be canceled and the bid security shall be declared forfeited. The bid security shall thereupon become a realization of the State, not as a penalty, but in liquidation of the damages sustained. The Adjutant General may thereupon award the contract to the next lowest responsible bidder or may call for new bids, whichever method he may deem is to the best interest of the State.

NOTICE TO PROCEED - After the contract is fully executed, the Contractor will be sent a formal "Notice to Proceed" advising the Contractor of the date on which he may proceed with the work. The Contractor shall be allowed ten (10) consecutive working days from said date to begin his work. In the event that the Contractor refuses or neglects to start the work, the Adjutant General or his designated representative may terminate the contract.

SPECIAL PROVISIONS FOR CONSTRUCTION CONTRACTS

RESPONSIBILITY OF OFFERORS

Offeror shall furnish proof of compliance in accordance with Act 190 Amendment to HRS 103D-310(c)

Required as a prerequisite to entering into a contract, the contractor shall register on the Hawaii Compliance Express web site for all tax clearances by going to <http://vendors.ehawaii.gov> and registering there.

A Certificate of Vendor Compliance generated from this website should be included with their bid proposal. A Compliant status is required prior to awarding the contract.

COMPREHENSIVE ANNUAL FINANCIAL REPORTING

For any project that involves work on multiple structures, including non-building structures, whether it be new work or renovation work, or when the project involves both site improvements and a structure, the Contractor shall provide the following information to the Project Manager for fixed asset allocation purposes:

1. Within 30 calendar days of award as applicable to the project, the following shall be submitted:
 - a. The total cost of each individual structure;
 - b. The total cost of on-site improvement work; and
 - c. The total cost of off-site improvement work.
2. After all work, including all change order work has been completed, and prior to a request for final payment, the following shall be submitted:
 - a. The total cost of each individual structure including any related change order cost;
 - b. The total cost of on-site improvement work including any related change order cost; and
 - c. The total cost of off-site improvement work including any related change order cost.
3. The sum total cost of each category noted above shall total to the contract amount awarded, plus all change order work issued.
 - a. The cost of each individual structure includes the cost of the structure and any work within five (5) feet of the structure or building line which may include, but is not limited to its foundation, foundation earthwork, and utility improvements within and immediately below the building line.
 - b. The on-site improvement cost includes all site improvement work from

five (5) feet and beyond the building line and up to the project's property line, which may include but is not limited to clearing and grubbing, grading, drainage system, site utility, walkway, parking lot, and landscape improvements.

- c. The off-site improvement cost includes all off-site improvement work outside of the project's property line, which may include but is not limited to walkway, landscape, drainage, utility, and roadway improvements.

LIABILITY INSURANCE

The Contractor shall not commence any work until it obtains, at its own expense, all required liability insurance. Such insurance must have the approval of the State as to limit form and amount and must be maintained with a company acceptable to the State. Such insurance must be maintained for the full period of the contract and shall provide protection from claims arising out of or resulting from the Contractor's operations under the Contract itself Subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.

The contractor shall take out and maintain during the life of this contract broad form public liability (Bodily Injury) and broad form property damage liability insurance in a combined single limit not less than \$1,000,000 and not less than \$2,000,000 in the aggregate to protect such contractor and all his subcontractors from claims for damages for personal injury, accidental death and property damage which may arise from operations under this contract, whether such operations be by himself or anyone directly or indirectly employed by either of them.

The insurance described herein will be maintained by the Contractor for the full period of the Contract and in no event will be terminated or otherwise allowed to lapse prior to final acceptance of the work by the State.

A certificate of insurance acceptable to the State shall be filed with the State prior to commencement of the work. Such certificate shall contain a provision that coverage afforded under the policy will not be canceled or changed until at least thirty days written notice has been given to the State by registered mail at the address denominated for the State in the Contract for official communications to it should any policy be canceled before final acceptance by the State, and the Contractor fails to immediately procure replacement insurance as specified, the State reserves the right to procure such insurance and to deduct the cost thereof from any sum due the Contractor.

BID PREPARATION

Offer Form, Page Of-1. Offeror is requested to submit its offer using Offeror's exact legal name as registered with the Department of Commerce and Consumer Affairs, if

applicable; and to indicate exact legal name in the appropriate space on Offer Form, page OF-1. Failure to do so may delay proper execution of the contract.

The authorized signature on the first page of the Offer Form shall be an original signature in ink. If unsigned or the affixed signature is a facsimile or a photocopy, the offer shall be automatically rejected unless accompanied by other material, containing an original signature, indicating the Offeror's intent to be bound.

Hawaii Business. A business entity referred to as a "Hawaii business", is registered and incorporated or organized under the laws of the State of Hawaii.

Compliant non-Hawaii business. A business entity referred to as a "compliant non-Hawaii business," is not incorporated or organized under the laws of the State of Hawaii, but is registered to do business in the State.

Tax Liability. Work to be performed under this solicitation is a business activity taxable under Chapter 237, Hawaii Revised Statutes (HRS), and vendors are advised that they are liable for the Hawaii GET at the current rate.

4.712% tax rate. All businesses located on Oahu are required to pay the ½% County Surcharge tax on all Oahu transactions for which they pay the 4% GE tax. Neighbor island and out-of-state businesses that deliver goods or services to Oahu and have a 'physical presence' on Oahu, must pay the new ½% County Surcharge tax on their Oahu transactions.

4% tax rate. Neighbor island and out-of-state businesses that do not deliver any goods or services to Oahu are not subject to the new ½% County Surcharge tax.

If, however, an Offeror is a person exempt by the HRS from paying the GET and therefore not liable for the taxes on this solicitation, Offeror shall state its tax exempt status and cite the HRS chapter or section allowing the exemption.

Taxpayer Preference. For evaluation purposes, pursuant to §103D-1008, HRS, the Bidder's tax-exempt price offer submitted in response to an IFB shall be increased by the applicable retail rate of general excise tax and the applicable use tax. Under no circumstance shall the dollar amount of the award include the aforementioned adjustment.

AWARD OF CONTRACT

Method of Award. Award, if made, shall be to the responsive, responsible offeror submitting the lowest Lump Sum Bid unless otherwise noted in the bid documents.

Responsibility of Lowest Responsive Bidder. Reference Responsibility of Offerors in §3-122-112, HAR. If compliance documents have not been submitted to the State

Department of Defense prior to award, the lowest responsive offeror shall produce documents to the procurement officer to demonstrate compliance with this section.

HRS Chapter 237 tax clearance requirement for award and final payment.
Instructions are as follows:

In accordance with Act 190 Amendment to HRS 103D-310(c)

Required as a prerequisite to entering into a contract, the contractor shall register on the Hawaii Compliance Express web site for all tax clearances by going to <http://vendors.ehawaii.gov> and registering there.

A Certificate of Vendor Compliance generated from this website should be included with their bid proposal. A Compliant status is required prior to awarding the contract.

A current Certificate of Vendor Compliance must accompany the invoice for final payment on the contract.

HRS Chapters 383 (Unemployment Insurance), 386 (Workers' Compensation), 392 (Temporary Disability Insurance), and 393 (Prepaid Health Care) requirements for award. Instructions are as follows:

Pursuant to §103D-310(c), HRS, The Certificate of Vendor Compliance must have a "Compliant" rating with the DLIR.

Compliance with Section 103D-310(c)(1) and (2), HRS.

Contractors are required to provide a state and federal tax clearance as a prerequisite to entering into a public contract of \$2,500 or more. To meet this requirement, all bidders shall submit valid tax clearances with their bid proposals when the bid is \$2,500 or more.

In accordance with Act 190 Amendment to HRS 103D-310(c), required as a prerequisite to entering into a contract, the contractor shall register on the Hawaii Compliance Express web site for all tax clearances by going to <http://vendors.ehawaii.gov> and registering there.

A Certificate of Vendor Compliance generated from this website shall be included with their bid proposal. A Compliant status is required prior to awarding the contract.

Failure to submit the required tax clearance will be sufficient grounds for the State to refuse to receive or consider the prospective bidder's proposal.

Timely Submission of all Certificates. The above certificates should be applied for and submitted to the purchasing agency as soon as possible. If a valid certificate is not

submitted on a timely basis for award of a contract, an offer otherwise responsive and responsible may not receive the award.

Final Payment Requirements. A current Certificate of Vendor Compliance will be required for final payment.

SPECIAL PROVISIONS for Act 68, SLH 2010, CONSTRUCTION CONTRACTS

DEFINITIONS FOR TERMS USED IN ACT 68, SLH 2010:

- a. "Contract" means contracts for construction under 103D, HRS.
- b. "Contractor" has the same meaning as in section 103D-104, HRS, provided that "contractor" includes a Subcontractor where applicable.
- c. "Construction" has the same meaning as in section 103D-104, HRS.
- d. "Procurement Officer" has the same meaning as in section 103D-104, HRS.
- e. "Resident" means a person who is physically present in the State of Hawaii at the time the person claims to have established the person's domicile in the State of Hawaii and shows the person's intent is to make Hawaii the person's primary residence.
- f. "Shortage trade" means a construction trade in which there is a shortage of Hawaii residents qualified to work in the trade as determined by the Department of Labor and Industrial Relations.

EMPLOYMENT OF STATE RESIDENTS REQUIREMENTS – ACT 68, SLH 2010:

- a. A Contractor awarded a contract shall ensure that Hawaii residents compose not less than eighty percent of the workforce employed to perform the contract work on the project. The eighty percent requirement shall be determined by dividing the total number of hours worked on the contract by Hawaii residents, by the total number of hours worked on the contract by all employees of the contractor in the performance of the contract. The hours worked by any Subcontractor of the Contractor shall count towards the calculation for this section. The hours worked by employees within shortage trades, as determined by the Department of Labor and Industrial Relations (DLIR), shall not be included in the calculation for this section.

- b. Prior to starting any construction work, the Contractor shall submit the subcontract dollar amount for each of its Subcontractors.
- c. The requirements of this section shall apply to any subcontract of \$50,000 or more in connection with the Contractor, that is, such Subcontractors must also ensure that Hawaii residents compose not less than eighty percent of the Subcontractors workforce used to perform the subcontract.
- d. The Contractor and any Subcontractor whose subcontract is \$50,000 or more shall comply with the requirements of Act 68 for the entire duration of the contract.
 - 1. Certification of Compliance for Employment of State Residents (attached) shall be made on a monthly basis. If no progress payments are made for any month, the Contractor, and any Subcontractor as applicable, shall still be required to submit the certification on a monthly basis to the Contracting Officer Representative. The monthly requirement shall be for the period starting with the Notice to Proceed date and ending with the contract closing date.
 - 2. The Certification of Compliance for Employment of State Residents shall be made under oath by an officer of the company by completing a Certification of Compliance for Employment of State Residents form and executing the Certificate before a licensed notary public.
 - 3. In addition to the monthly certification as indicated above, the Contractor and Subcontractors shall maintain records such as certified payrolls for laborers and mechanics who performed work at the site and time sheets for all other employees who performed work on the project. These records shall include the names, addresses and number of hours worked on the project by all employees of the Contractor and Subcontractor who performed work on the project to validate compliance with Act 68. The Contractor and Subcontractors shall retain these records and provide access to the State for a minimum period of four (4) years after the final payment, except that if any litigation, claim, negotiation, investigation, audit or other action involving the records has been started before the expiration of the four (4) year period, the Contractor and Subcontractors shall retain the records until completion of the action and resolution of all issues that arise from it, or until the end of the four (4) year period, whichever occurs later. Furthermore, it shall be the Contractor's responsibility to enforce compliance with this provision by any Subcontractor.
- e. A Contractor who fails to comply with this section shall be subject to any of the following sanctions:

1. Temporary suspension of work on the project until the Contractor or its Subcontractor complies with Act 68;
2. Withholding of payment on the contract until the Contractor or its Subcontractor complies with Act 68;
3. Permanent termination of the Contractor or Subcontractor from any further work on the project;
4. Recovery by the State, as applicable, of any moneys expended on the contract or subcontract as applicable; or
5. Proceedings for debarment or suspension of the Contractor or Subcontractor under Hawaii Revised Statutes §103D-702.

Conflict with Federal Law:

This section shall not apply if the application of this section is in conflict with any federal law, or if the application of this section will disqualify the State from receiving Federal funds or aid.

**CERTIFICATION OF COMPLIANCE
FOR
EMPLOYMENT OF STATE RESIDENTS
ACT 68, SESSION LAWS OF HAWAII 2010**

Project Title: _____

Agency Project No: _____

Contract No: _____

As required by Act 68, Session Laws of Hawai'i 2010 – Employment of State Residents on Construction Procurement Contracts, I hereby certify under oath, that I am an officer of _____ and for the month of _____, 20____, _____ is in compliance with Act 68, SLH 2010, by employing a workforce of whom not less than eighty percent are Hawai'i residents, as calculated according to the formula in the solicitation, to perform this Contract.

- I am an officer of the Contractor for this contract.
- I am an officer of a Subcontractor for this contract.

CORPORATE SEAL

(Name of Company)

(Signature)

(Print Name)

(Print Title)

Subscribed and sworn to me before this
_____ day of _____, 20____.

Doc. Date: _____ # of pages _____ Circuit

Notary Name: _____

Doc. Description: _____

Notary Public, _____ Circuit, State of Hawaii
My commission expires: _____

Notary Signature Date
NOTARY CERTIFICATION

SURETY BID BOND

Bond No.

KNOW TO ALL BY THESE PRESENTS:

That we, _____

[Full name or legal title of bidder]

as Offeror, hereinafter called Principal, and _____

[Bonding Company]

as Surety, hereinafter called Surety, a corporation authorized to transact business as a Surety in the State of Hawaii, are held and firmly bound unto the State of Hawaii, Department of Defense, as Owner, hereinafter called owner, in the penal sum of _____

Dollars (\$ _____),

[Required amount of bid security]

lawful money of the United States of America, for the payment of which sum well and truly to be made, the said Principal and the said Surety bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS:

The Principal has submitted an offer for _____

[Project number and Title]

NOW, THEREFORE:

The condition of this obligation is such that if the Owner shall reject said offer, or in the alternate, accept the offer of the Principal and the Principal shall enter into a Contract with the Owner in accordance with the terms of such offer, and give such bond or bonds as may be specified in the solicitation or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof as specified in the solicitation then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed this _____ day of _____, 20____.

(Seal)

Name of Principal

Signature

Title _____

(Seal)

Name of Surety

Signature

Title _____

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SAMPLE FORMS

Request for Substitution
Name of Corporation
Weekly Quality Control Report Form

ARTICLE 1 - Definitions

Whenever the following terms or pronouns are used in these Bidding and Execution of Contract Requirements, and General Conditions, or in any contract documents or instruments where these Bidding and Execution of Contract Requirements, and General Conditions govern, the intent and meaning shall be interpreted as follows

- 1.1_ ADDENDUM (plural - Addenda) A written or graphic document, including Drawings and Specifications, issued by the Engineer during the bidding period which modify or interpret the bidding documents, by additions, deletions, clarifications or corrections which shall be considered and made a part of the bid proposal and the contract when executed.
- 1.2_ ADDITION (to the contract sum) Amount added to the contract Sum by Change Order.
- 1.3_ ADMINISTRATIVE RULES - Hawaii Administrative Rules for Chapter 103-D of the Hawaii Revised Statutes.
- 1.4_ ADMINISTRATOR - The Public Works Administrator, Department of Accounting and General Services
- 1.5_ ADVERTISEMENT - A public announcement soliciting bids or offers.
- 1.6_ AMENDMENT - A written document properly executed by the Contractor and DOD issued to amend the existing contract between the State and the Contractor.
- 1.7_ BAD WEATHER DAY - When weather or other conditions prevent a minimum of four hours of work with the Contractor's normal work force on controlling items of work at the site.
- 1.8_ BENEFICIAL OCCUPANCY - The point of project completion when the State can use the constructed facility in whole or in part for its intended purpose even though substantial completion may not be achieved.
- 1.9_ BID See OFFER
- 1.10_ BID SECURITY - The security furnished by the bidder from which the State may recover its damages in the event the bidder breaches its promise to enter into a contract with the State and fails to execute the required bonds covering the work contemplated, if its proposal is accepted.
- 1.11_ BIDDER - See Offeror
- 1.12_ BIDDING DOCUMENTS (or SOLICITATION DOCUMENTS) - The advertisement solicitation notice and instructions, Offer requirements, Offer forms, and the proposed contract documents including all addenda, and clarifications issued prior to receipt of the Offer.
- 1.13_ BULLETIN - A written notice to the Contractor requesting a price and / or time proposal for contemplated changes preparatory to the issuance of a field order or change order.
- 1.14_ BY OR TO THE ENGINEER - To avoid cumbersome and confusing repetition of expressions in these General Conditions, it is provided that whenever the following words or words of like import are used, they shall be understood as if they were followed by the words "by the Engineer" or "to the Engineer", unless the context clearly indicates another meaning: contemplated, required, determined, directed, specified, authorized, ordered, given, designated, indicated, considered necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient, rejected or condemned.
- 1.15_ CALENDAR DAY - Any day shown on the calendar beginning at midnight and ending at midnight the following day. If no designation of calendar or working day is made, "day" shall mean calendar day.
- 1.16_ CHANGE ORDER - A written order signed by the Engineer that establishes the full payment and final settlement of all claims for direct, indirect and consequential costs, including costs of delays, and establishes any adjustments to contract time related to the work covered and affected by one or more field orders, or for change work done or agreed to be done without issuance of a separate field order. A change order signed by all the parties to the contract constitutes a supplemental agreement.
- 1.17_ COMPLETION - See SUBSTANTIAL COMPLETION and FINAL COMPLETION.
- 1.18_ COMPTROLLER - The Comptroller of the State of Hawaii, Department of Accounting and General Services.

- 1.19_ **CONSULTANT** - A person, firm or corporation having a contract with the State to furnish services with respect to the project
- 1.20_ **CONTRACT** - The written agreement between the Contractor and the State of Hawaii by its Adjutant General, by which the Contractor is bound to furnish all labor, equipment, and materials and to perform the specified work within the contract time stipulated, and by which the State of Hawaii is obligated to compensate the Contractor therefore at the prices set forth therein. The contract shall include the Contract Documents and also any and all amendments and change orders which are required to complete the construction in an acceptable manner.
- 1.21_ **CONTRACT COMPLETION DATE** - The calendar day on which all work on the project, required by the contract, must be completed. See **CONTRACT TIME** and **FINAL COMPLETION**.
- 1.22_ **CONTRACT DOCUMENTS** - The Contract, Addenda (which pertain to the Contract Documents, Contractor's Proposal (including Wage Schedule, List of Subcontractors and other documentation accompanying the Bid and any post bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Contract, the Notice to Proceed, the Bonds, these **GENERAL CONDITIONS**, the **SPECIAL CONDITIONS**, the Specifications and the Drawings as the same are more specifically identified in the Contract together with all written Amendments, Change Orders, Field Orders, a written order for minor changes in the work and Engineer's written interpretations and clarifications issued on or after the effective date of the Contract.
- 1.23_ **CONTRACT PRICE** - The amount designated on the face of the contract for the performance of work including allowances for extra if any.
- 1.24_ **CONTRACT TIME (or CONTRACT DURATION)** - The number of calendar (or working) days provided for completion of the contract, inclusive of authorized time extensions. The number of days shall begin running on the effective date in the Notice to Proceed. If in lieu of providing a number of calendar (or working) days, the contract requires completion by a certain date, the work shall be completed by that date.
- 1.25_ **CONTRACTOR** - Any individual, partnership, firm, corporation, joint venture, or other legal entity undertaking the execution of the work under the terms of the contract with the State of Hawaii, and acting directly or through its agents, or employees.
- 1.26_ **DEPARTMENT** - The Department of Defense, State of Hawaii (abbreviated DOD).
- 1.27_ **DRAWINGS (or Plans)** - The contract drawings in graphic or pictorial form, which show the design, location, character, dimensions and details of the Work to be done and which shall be a part of the Contract Documents.
- 1.28_ **ENGINEER** - The Department of Defense Engineer, or the authorized person to act in the Engineer's behalf.
- 1.29_ **EQUAL OR APPROVED EQUAL** - Whenever this term is used in the drawings or specifications, it shall be interpreted to mean a brand or article, prequalified in accordance with Section 6.3 **SUBSTITUTION OF MATERIALS AND EQUIPMENT**, that may be used in place of the one specified.
- 1.30_ **FIELD ORDER** - A written order issued by the Engineer or the Engineer's authorized representative to the Contractor requiring the contract work to be performed in accordance with a change or changes in the work. A field order may (1) establish a price adjustment and/or time adjustment in an amount the Engineer believes is reasonable for the change; or (2) may declare that the Engineer does not intend to adjust contract time or price for the work; or (3) may request the Contractor to submit a proposal for an adjustment to the contract time and/or price by a certain date.
- 1.31_ **FINAL COMPLETION** - The date set by the Engineer that all work required by the contract and any amendments or changes thereto is in full compliance with the contract.
- 1.32_ **FORCE ACCOUNT** - Term used when Work is ordered to be done without prior agreements as to lump sum or unit price cost thereof and is to be billed for at cost of labor, materials and equipment, insurances, taxes, etc., plus an agreed percentage for overhead and profit.
- 1.33_ **GUARANTEE** - Legally enforceable assurance of the duration of satisfactory performance of quality of a product or Work

- 1.34_ GOODS - Materials. §103D-104 prosecution of the Work, which date shall also be the beginning of Contract Time.
- 1.35_ HAZARDOUS MATERIALS - Any and all radioactive materials, asbestos, polychlorinated biphenyls, petroleum, crude oil, chemicals known to cause cancer or reproductive toxicity, pollutants, contaminants, toxic substances or materials cited in Hazardous Material Laws. Abandoned motor vehicles or parts thereof are not hazardous material.
- 1.36_ HOLIDAYS - The days of each year which are set apart and established as State holidays pursuant to Chapter 8, Hawaii Revised Statutes.
- 1.37_ INSPECTOR - The person assigned by the Engineer to make detailed inspections of contract performance and materials supplied for the work.
- 1.38_ LAWS - All Federal, State, City and County Laws, ordinances, rules and regulations, and standard specifications including any amendments thereto effective as of the date of the call for sealed bids.
- 1.39_ PERFORMANCE LIQUIDATED DAMAGES The amount prescribed in the General Conditions, Section 7.26 FAILURE TO COMPLETE THE WORK ON TIME to be paid to the State or to be deducted from any payments due or to become due the Contractor for each working day or calendar day (as applicable) delay in completing the whole or any specified portion of the work beyond the Contract Time.
- 1.40_ LETTER OF AWARD - A written notice from the Engineer to the successful bidder(s) stating that its proposal has been accepted by the State.
- 1.41_ MAJOR UNIT PRICE ITEM - A unit price item which, when extended on its estimated quantities in the proposal form, exceeds five percent (5%) of the total base bid proposal less any allowance and contingent items included in the proposal.
- 1.42_ NON-CONFORMING WORK - Work that does not fulfill the requirements of the Contract Documents.
- 1.43_ NOTICE TO CONTRACTORS - See Solicitation.
- 1.44_ NOTICE TO PROCEED - A written notice from the Contracting Officer to the Contractor advising it of the date on which it is to begin the
- 1.45_ POST CONTRACT DRAWINGS - Drawings issued after the award of the contract for the purpose of clarification and / or changes to the work indicated in the original drawings and which may be made a part of the contract.
- 1.46_ PROJECT ACCEPTANCE DATE - The calendar day on which the Engineer accepts the project as sufficiently completed in compliance with the contract so that the State can occupy or utilize the Work for its intended use. See SUBSTANTIAL COMPLETION.
- 1.47_ PROJECT CONTRACT LIMITS (or Contract Zone) - The portion of the site as delineated on the drawings which define the Contractor's primary area of operation for the prosecution of the work. It does not define the exact limits of all construction that may be required under the contract.
- 1.48_ PROJECT GUARANTEE - A guarantee issued by the Contractor to the State. See GUARANTEE.
- 1.49_ PROPOSAL (Bid) - See Offer (or Bid).
- 1.50_ PROPOSAL FORM - See Offer Form (or Bid Form).
- 1.51_ PUNCH LIST - A list compiled by the Engineer (or Contractor) stating work yet to be completed or corrected by the Contractor in order to substantially complete or finally complete the contract requirements.
- 1.52_ QUESTIONNAIRE - The specified forms on which the bidder shall furnish required information as to its ability to perform and finance the work.
- 1.53_ SHOP DRAWINGS - All drawings, diagrams illustrations, schedules and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
- 1.54_ SPECIAL CONDITIONS - Supplements or modifies the standard clauses of the GENERAL CONDITIONS setting forth conditions or requirements peculiar to the individual project under consideration, which are not thoroughly or

satisfactorily covered, described or explained in these GENERAL CONDITIONS.

project and the execution of all the duties and obligations imposed by the contract.

- 1.55_ SPECIFICATIONS - That portion of the Contract Documents consisting of written descriptions for materials, equipment, construction systems, standards, workmanship, directions, provisions and requirements that pertain to the method and manner of performing the work and certain administrative requirements applicable thereto.
- 1.56_ STATE - The State of Hawaii acting through its authorized representative.
- 1.57_ SUBCONTRACT - Any written agreement between the Contractor and its subcontractors which contains the conditions under which the subcontractor is to perform a portion of the work for the Contractor.
- 1.58_ SUBCONTRACTOR - An individual, partnership, firm, corporation, joint venture or other legal entity, as covered in Chapter 444, Hawaii Revised Statutes, which enters into an agreement with the Contractor to perform a portion of the work for the Contractor.
- 1.59_ SUBSTANTIAL COMPLETION - The status of the project when the Contractor has completed all the work and 1) all utilities and services are connected and working, 2) all equipment is in acceptable working condition, 3) additional activity by the Contractor to correct punch list items as described herein will not prevent or disrupt use of the work or the facility in which the work is located, and 4) the building, structure, improvement or facility can be used for its intended purpose.
- 1.60_ SUPERINTENDENT - The employee of the Contractor who is charged with the responsibility of all the Work.
- 1.61_ SURETY - The qualified individual, firm or corporation other than the Contractor, which executes a bond with and for the Contractor to insure its acceptable performance of the contract.
- 1.62_ UNUSUALLY SEVERE WEATHER - Uncommonly harsh weather including but not limited to hurricanes, tornados, tropical storms and tropical depressions, or as otherwise defined in the SPECIAL CONDITIONS.
- 1.63_ WORK - The furnishing of all labor, materials, equipment, and other incidentals necessary or convenient for the successful completion of the

- 1.64_ WORKING DAY - A calendar day, exclusive of Saturdays, Sundays and State-recognized legal holidays for the month in question.
- 1.65_ OFFER (or Bid) - The executed document submitted by an Offeror in response to a solicitation request, to perform the work required by the proposed contract documents, for the price quoted and within the time allotted.
- 1.66_ OFFEROR (or BIDDER) - Any individual, partnership, firm, corporation, joint venture or other legal entity submitting directly or through a duly authorized representative or agent, an Offer for the work or construction contemplated.
- 1.67_ OFFER FORM (or BID FORM) - The form prepared by the Department on which the Offeror submits the written offer or bid. By submitting an offer or bid, the Offeror adopt the language on the form as its own.
- 1.68_ PROJECT START DATE - The date established in the Notice to Proceed when the Contractor shall begin prosecution of the work and the start of contract time.
- 1.69_ SOLICITATION - An Invitation to Bid or Request for Proposals or any other document issued by the Department to solicit bids or offers to perform a contract. The solicitation may indicate the time and place to receive the bids or offers and the location, nature and character of the work, construction or materials to be provided.

ABBREVIATIONS

- HAR Hawaii Administrative Rules
- HRS Hawaii Revised Statutes
- VECP Value Engineering cost Proposal
- DOTAX State Department of Taxation
- IRS Internal Revenue Service

BIDDING AND EXECUTION OF CONTRACT REQUIREMENTS

ARTICLE 2 - Proposal Requirements and Conditions

2.1 QUALIFICATION OF BIDDERS

Prospective bidders must be capable of performing the work for which bids are invited, and must be capable of entering into a public contract of \$25,000 or more.

2.1.1 Notice of Intention to Bid

2.1.1.1 In accordance with Section 103D-310, Hawaii Revised Statutes, and Section 3-122-111, Hawaii Administrative Rules, a written notice of intention to bid need not be filed for construction of any public building or public work. A written notice of intention to bid need not be filed for mere furnishing and installing of furniture, equipment, appliances, material and any combination of these items when a Contractor's license is not required under Chapter 444 of the Hawaii Revised Statutes, as amended, and the rules and regulations of the Contractor's License Board.

2.1.1.2 If two (2) or more prospective bidders desire to bid jointly as a joint venture on a single project, they must file an affidavit of joint venture. Such affidavit of joint venture will be valid only for the specific project for which it is filed. No further license is required when all parties to the joint venture possess current and appropriate contractor's licenses. Joint ventures are required to be licensed in accordance with Chapter 444 of the Hawaii Revised Statutes, as amended, and the rules and regulations of the Contractor's License Board when any party to the joint venture agreement does not hold a current or appropriate contractor's license. The joint venture must register with the office of the Director of Commerce and Consumer Affairs in accordance with Chapter 425 of the Hawaii Revised Statutes, as amended.

2.1.1.3 No persons, firm or corporation may bid where (1) the person, firm, or corporation, or (2) a corporation owned substantially by the person, firm, or corporation, or (3) a substantial stockholder or an officer of the corporation, or (4) a partner or substantial investor in the firm is in arrears in any payment owed to the State of Hawaii or any of its political subdivisions or is in default of any obligation to the State of Hawaii or to all or to any of its political subdivisions, including default as a surety or failure to perform faithfully and diligently any previous contract with the Department.

2.1.1.4 The Engineer may, in accordance with Section 103D-310 Hawaii Revised Statutes, require the prospective Bidder to submit answers to questions contained in the STANDARD QUALIFICATION QUESTIONNAIRE FOR PROSPECTIVE BIDDERS ON

PUBLIC WORKS CONTRACTS, on the form provided by the Department, properly executed and notarized, setting forth a complete statement of the experience of such prospective Bidder and its organization in performing similar work and a statement of the equipment proposed to be used, together with adequate proof of the availability of such equipment, at least two (2) working days prior to the time advertised for the opening of bids. If the information in the questionnaire proves satisfactory, the Bidder's proposal will be received. All information contained in the answers to the questionnaire shall be kept confidential. The questionnaire will be returned to the Bidder after it has served its purpose.

2.1.1.5 If upon review of the Questionnaire, or otherwise, the Bidder appears not fully qualified or able to perform the intended work, the Engineer shall, after affording the Bidder an opportunity to be heard and if still of the opinion that the Bidder is not fully qualified to perform the work, refuse to receive or to consider any bid offered by the prospective Bidder.

2.1.1.6 Failure to complete and submit the prequalification questionnaire by the designated deadline will be sufficient cause for the Department to disqualify a prospective Bidder.

2.1.2 Compliance Certificate § 103D -310(c) HRS

2.1.2.1 Contractors are required to provide proof of compliance in order to receive a contract of \$25,000 or more. To meet this requirement, Offerors may apply and register at the "Hawaii Compliance Express" website: <http://vendors.chawaii.gov/hce/splash/welcome/html>

2.1.2.2 Tax clearances may be obtained by completing the Tax Clearance Application (Form A-6) and submitting it to the Hawaii State Department of Taxation (DOTAX) or the Internal Revenue Service (IRS). The application may be obtained from the DOTAX, or the IRS. The application may be mailed in or walked in to either the DOTAX or the IRS. Both tax agencies encourage the use of their mail-in process, which should be completed within twenty-one (21) calendar days. Tax clearance certificates will be issued to the applicant upon determination that the applicant has filed all tax returns due, and has paid all amounts owing on such returns, including penalty and interest.

2.1.2.3 Only original tax clearance certificates or certified copies will be accepted for this purpose. Failure to submit the required tax clearance certificates may be sufficient grounds for the Department to refuse to receive or consider the prospective bidder's proposal.

2.1.2.4 Tax clearance certificates are valid for six (6) months. The six-month period will begin with the later approval date stamped on the tax clearance. An original

copy of a tax clearance that bears an original green certified copy stamp will be accepted by the Department for final payment. The period of validity is two months.

2.1.2.5 The tax clearances submitted with the bid proposals must be valid on the solicitation's first legal advertisement date or any date thereafter up to the bid opening date. Valid tax clearances submitted with the proposal will remain valid for the contract award and encumbrance.

2.1.2.6 Any person, firm or corporation that is not presently doing business in the State of Hawaii and submits a Notice of Intention to Bid must submit along with said Notice of Intention to Bid a certified letter stating that said person, firm or corporation is not doing business in the State of Hawaii and is not in default of any obligations due to the State or any of its political subdivisions.

2.1.2.7 If a business cannot obtain a tax clearance certificate because of tax delinquencies, it may submit a "special letter" from DOTAX and/or the IRS. The "special letter" may only be obtained if (1) the business has an existing installment agreement with the tax agency, or (2) the delinquency is the subject of an administrative or judicial appeal. The bidder is cautioned that the "special letter" from the IRS must be certified by DOTAX. All conditions applied to tax clearance certificates for this purpose are applicable to these "special letters". Instructions to obtain the "special letter" are available from each respective tax agency.

2.1.2.8 Various combinations of tax clearance certificates and "special letters" are acceptable for this purpose as follows: Tax clearance certificate signed by both tax agencies;

- (a) Individual tax clearance certificates from each tax agency, respectively;
- (b) Tax clearance certificate from one tax agency and a "special letter" from the other tax agency;
- (c) "Special letters" from both tax agencies.

2.1.3 Wrongful Refusal to Accept a Bid - In the event the Engineer, for any reason, wrongfully refuses to accept what would otherwise be a responsive and responsible lowest bid, the exclusive remedy for such lowest bidder shall be the recovery of the reasonable actual costs of preparing the bid. No other bidder shall have any claim for damages. Refer to 2.13 PROTEST.

2.2 INTERPRETATION OF QUANTITIES IN BID SCHEDULE

2.2.1 When quantities for individual items of work are listed in the proposal form for which respective unit prices are asked, said quantities are estimated or approximate and are to be used by the Department only for the purpose of comparing on a uniform basis bids offered for the work. The Department does not, expressly or by implication, agree that the actual quantity of work will correspond therewith.

2.2.2 After determining the low bidder by comparison of bids submitted in accordance with the proposal form and Section 3.1 CONSIDERATION OF PROPOSALS; CANCELLATION in these specifications, the quantities of unit price items of work may increase or decrease.

2.2.3 On unit price bids, payment will be made only for the actual number of units incorporated into the finished project at the unit price bid, subject to Section 4.7 VARIATIONS IN ESTIMATED QUANTITIES.

2.3 CONTENTS OF PROPOSAL FORMS

2.3.1 Prospective bidders will be furnished with proposal forms giving the location, description, and the contract time of the work contemplated for which a lump sum bid price is asked or containing a schedule of items, together with estimated quantities of work to be performed and materials to be furnished, for which unit bid prices and/or lump sum bid prices are asked.

2.3.2 All papers bound with or attached to the proposal form shall be considered a part thereof and shall not be detached or altered when the proposal is submitted.

2.3.3 The drawings, specifications and other documents designated in the proposal form, will also be considered a part thereof whether attached or not.

2.3.4 By submitting a bid on the proposal form, a bidder accepts the language therein as its own.

2.4 THE SITE AND PROPOSED CONTRACT DOCUMENTS

2.4.1 The Bidder shall examine carefully the Project Site contemplated and the proposal, drawings, specifications, supplemental specifications, SPECIAL CONDITIONS, and any documents or items referenced therein and contract and bond forms therefore. The submission of a bid shall be considered as a warranty that the Bidder has made such examination and is informed of the conditions to be encountered in performing the Work and of the requirements of the drawings, specifications, supplemental specifications, SPECIAL CONDITIONS and any documents and items referenced therein, and contract and bonds.

2.5 ADDENDA AND BID CLARIFICATIONS

2.5.1 The terms and requirements of the bid documents (i.e. drawings, specifications and other bid and contract documents) cannot be changed prior to the bid opening except by a duly issued addenda or bid clarification.

2.5.2 The Department may alter, increase or decrease the scope of the work or the contract time, provisions and conditions by issuing a written addendum which sets forth such alterations, increase or decrease.

2.5.3 Bid Discrepancy - If a bidder discovers what it considers to be a discrepancy, ambiguity, omission or doubt as to the meaning of drawings, specifications and any other bid or contract documents, the bidder shall request in writing no later than 14 days before the bids are opened.

2.5.4 Addenda to the bid documents will be provided to all prospective bidders at the respective offices furnished for such purposes. Each addendum shall be an addition to the Contract Documents.

2.5.5 Upon providing an addenda, all bidders shall be deemed to be on notice of the information therein whether or not the addendum or bid clarification is actually received. All addenda and bid clarifications so issued shall become part of the Contract Documents.

2.5.6 No claim for additional compensation and/or time for performance will be allowed if the Contractor discovered, or in the exercise of reasonable care, should have discovered a discrepancy, ambiguity, omission or doubt for which an interpretation was not requested.

2.6 SUBSTITUTION OF MATERIALS AND EQUIPMENT BEFORE BID OPENING

2.6.1 Brand names of materials or equipment are specified or shown on the drawings to indicate a quality, style, appearance or performance and not to limit competition. The Bidder shall base its bid on one of the specified brand names unless alternate brands are qualified as equal or better in an addendum. Qualifications of such proposed alternate brands shall be submitted in writing and addressed to the Engineer. The face of the envelope containing the request must be clearly marked "SUBSTITUTION REQUEST". The request may be hand carried to the Department of Defense, State of Hawaii, 3949 Diamond Head Road, Honolulu, HI 96816-4495, or mailed. In either case, the written request must be received no later than the time and date specified in the NOTICE TO BIDDERS. The written request will be time stamped by the Department. For the purpose of this section, the time designated by the time stamping device in the Engineering Office shall be

official. If the written request is hand carried, the bearer is responsible to ensure that the request is time stamped by the Engineering Office.

2.6.2 Submit three (3) sets of the written request, technical brochures, and a statement of variances. Refer to the Appendix for the Sample "Request for Substitution."

2.6.3 Statement of Variances - The statement of variances must list all features of the proposed substitution which differ from the drawings, specifications and / or product(s) specified and must further certify that the substitution has no other variant features. The brochure and information submitted shall be clearly marked showing make, model, size, options, etc., and must include sufficient evidence to evaluate each feature listed as a variance. A request will be denied if submitted without sufficient evidence. If after installing the substituted product, an unlisted variance is discovered, Contractor shall immediately replace the product with a specified product all at no cost to the State

2.6.4 Substitution Denial - Any substitution request not complying with the above requirements will be denied. Substitution requests sent to other agencies and received by the Engineering Office after the deadline above will be denied.

2.6.5 An addendum shall be issued to inform all prospective bidders of any accepted substitution in accordance with Section 2.5 ADDENDA AND BID CLARIFICATIONS.

2.6.6 For substitutions of materials and equipment after issuance of the Letter of Award, refer to Section 6.3 SUBSTITUTION OF MATERIALS AND EQUIPMENT AFTER BID OPENING.

2.7 PREPARATION OF PROPOSAL

2.7.1 The Bidder's proposal must be submitted on the proposal form furnished by the Department. The proposal must be prepared in full accordance with the instructions thereon. The Bidder must state, both in words and numerals, the lump sum price or total sum bid at which the work contemplated is proposed to be done. These prices must be written in ink or typed. In case of a discrepancy between the prices written in words and those written in figures, the words shall govern over the figures. The Bidder shall sign the proposal in the spaces provided with ink. By submitting a bid, the Bidder adopts the language of the proposal as its own.

2.7.2 If the proposal is made by an individual, the person's name and post office address must be shown in the space provided. If made by a partnership the name and post office address of each member of the partnership

must be shown and the proposal signed by all partners or evidence in the form of a partnership agreement must be submitted showing the authority of the partner to enter, on behalf of said partnership, into contract with the State. If made by a corporation the proposal must show the name, titles, and business address of the president, secretary and treasurer and also evidence in the form of a corporate resolution must be submitted showing the authority of the particular corporate representative to enter on behalf of said corporation into contract with the State. If made by a joint venture the name and post office address of each member of the individual firm, partnership or corporation comprising the joint-venture must be shown with other pertinent information required of individuals, partnerships or corporations as the case may be. The proposal must be signed by all parties to the joint-venture or evidence in the form of a Joint-Venture Agreement must be submitted showing the authority of the joint-venture's representative to enter on behalf of said joint-venture into contract with the State.

2.7.3 Pursuant to the requirements of Section 103D-302, HRS, each Bidder shall include in its bid the name of each person or firm to be engaged by the Bidder on the project as joint contractor or subcontractor indicating also the nature and scope of work to be performed by such joint contractor and/or subcontractor and their respective contractor's license number. If the Bidder fails to list a joint contractor or subcontractor, the State may accept the bid if it is in the State's best interest and the value of the work to be performed by the joint contractor or subcontractor is equal to or less than one percent of the total bid amount. The Bidder shall be solely responsible for verifying that their joint contractor or subcontractor has the proper license at the time of the submitted bid.

2.8 BID SECURITY §3-122-223(d) HAR

2.8.1 Subject to the exceptions in Section 3-122-223(d) HAR, all lump sum bids of \$25,000 and higher, or lump sum base bids including alternates of \$25,000 and higher, that are not accompanied by bid security are non-responsive. Bid security shall be one of the following: §3-122-222(a) HAR

2.8.1.1 Surety bid bond underwritten by a company licensed to issue bonds in this State which shall be substantially in the form of the Surety Bid Bond form in the Appendix; or

2.8.1.2 Legal Tender; or

2.8.1.3 Certificate of Deposit; Credit Union share certificate; or cashier's, treasurer's, teller's or official check drawn by, or a certified check accepted by, and payable on demand to the State by a bank, a savings institution, or credit union insured by the Federal Deposit

Insurance Corporation or the National Credit Union Administration.

- (a) These instruments may be utilized only to a maximum of \$100,000.
- (b) If the required security or bond amount totals over \$100,000, more than one instrument not exceeding \$100,000 each and issued by different financial institutions shall be accepted.
- (c) **CAUTION** - Bidders are cautioned that certificates of deposit or share certificates with an early withdrawal penalty must have a face value sufficient to cover the maximum penalty amount in addition to the proposal guaranty requirement. If the certificate is made out to two names, the certificate must be assigned unconditionally to the Department of Defense.

2.8.2 Unless otherwise stated, the bid security shall be in an amount equal to at least five percent (5%) of the lump sum bid or lump sum base bid including alternates or in an amount required by the terms of the federal funding, where applicable.

2.8.3 If the Bidder is a corporation, evidence in the form of a corporate resolution, authorizing the corporate representative to execute the bond must be submitted with the proposal. (See sample in Appendix.) If the Bidder is a partnership, all partners must sign the bond or evidence in the form of a partnership agreement must be submitted showing the authority of the partner.

2.8.4 If the Bidder is a joint -venture, all parties to the joint venture must sign the bond; provided, that one party to the joint-venture may sign on behalf of the joint-venture if evidence in the form of a joint-venture agreement or power of attorney, is submitted showing the authority of the signatory to sign the bond on behalf of the joint-venture.

2.8.5 In the case where the award will be made on a group or item basis, the amount of bid security shall be based on the total bid for all groups or items submitted.

2.8.6 Bidders are cautioned that surety bid bonds which place a limit in value to the difference between the bid amount and the next acceptable bid, such value not to exceed the purported amount of the bond, are not acceptable. Also, surety bid bonds which place a time limit on the right of the State to make claim other than allowed by statutes or these GENERAL CONDITIONS are not acceptable. Bidders are hereby notified that a surety bid bond containing such limitation(s) is not acceptable and a bid accompanied by such surety bid bond will be automatically rejected.

2.9 DELIVERY OF PROPOSALS - The entire proposal shall be placed together with the bid security, in a sealed envelope so marked as to indicate the identity of the project, the project number, the date of bid opening and the name and address of the bidder and then delivered as indicated in the Notice to Contractors. Bids which do not comply with this requirement may not be considered. Proposals will be received up to the time fixed in the public notice for opening of bids and must be in the hands of the official by the time indicated. The words "SEALED BID" must be clearly written or typed on the face of the sealed envelope containing the proposal and bid security.

2.10 WITHDRAWAL OR REVISION OF PROPOSAL - may be modified prior to the deadline to submit the offers by any of the following documents.

2.10.1 Withdrawal of Proposals:

2.10.1.1 A signed, written notice received in the office designated in the solicitation; or

2.10.1.2 A written notice faxed to the office designated in the solicitation; or

2.10.1.3 A telegraphic message received by telephone by the office designated in the solicitation from the receiving telegraph company office, provided the telegraph company confirms the telephone message by sending a written copy of the telegram showing that the message was received at such office prior to the time and date set for the opening.

2.10.2 Modification of Proposals:

2.10.2.1 A written notice received in the office designated in the solicitation, stating that a modification to the offer is submitted; and

2.10.2.2 The actual modification sealed securely in a separate envelope or container, accompanying the written notice.

2.11 PUBLIC OPENING OF PROPOSALS - Proposals will be opened and read publicly at the time and place indicated in the Notice to Contractors. Bidders, their authorized agents and other interested parties are invited to be present.

2.12 DISQUALIFICATION OF BIDDERS - Any one or more of the following causes will be considered as sufficient for the disqualification of a Bidder and the rejection of its proposal or proposals:

2.12.1 Non-compliance with Section 2.1
QUALIFICATION OF BIDDERS.

2.12.2 Evidence of collusion among bidders.

2.12.3 Lack of responsibility and cooperation as shown by past work such as failing to complete all of the requirements to close the project within a reasonable time or engaging in a pattern of unreasonable or frivolous claims for extra compensation.

2.12.4 Being in arrears on existing contracts with the State of Hawaii, or having defaulted on a previous contract with the State of Hawaii.

2.12.5 Lack of proper equipment and/or sufficient experience to perform the work contemplated, as revealed by the Standard Questionnaire and Financial Statement for Bidders.

2.12.6 No contractor's license or a contractor's license which does not cover type of work contemplated.

2.12.7 More than one proposal for the same work from an individual, firm, partnership, corporation or joint venture under the same or different name.

2.12.8 Delivery of bids after the deadline specified in the advertisement calling for bids.

2.12.9 Failure to pay, or satisfactorily settle, all bills overdue for labor and materials of former contracts in force at the time of issuance of proposal forms.

2.12.10 Debarment or suspension pursuant to the provisions of Chapters 103D, 104 and 444, Hawaii Revised Statutes, as amended.

2.13 PROTEST

2.13.1 Protests shall be adjudicated in accordance with §103D-701, HRS and as amended.

2.13.2 No Protest based upon the contents of the solicitation shall be considered unless it is submitted in writing to the Engineer, prior to the date set for the receipt of proposals.

2.13.3 A protest of an award or proposed award pursuant to §103D-302 or §103D-303, HRS, shall be submitted in writing to the Engineer within five (5) working days after the posting of the award of the Contract.

2.13.4 In addition to any other relief, when a protest is sustained and the protestor should have been awarded the contract under the solicitation but is not, then the protestor shall be entitled to the actual costs reasonably incurred in connection with the solicitation, including bid or proposal preparation costs but not attorney's fees.

ARTICLE 3 - Award and Execution of Contract

3.1 CONSIDERATION OF PROPOSALS; CANCELLATION - After the proposals are opened and read, the figures will be extended and/or totaled in accordance with the bid prices of the acceptable proposals and the totals will be compared and the results of such comparison shall be made public. In the event of a tie bid, the low bidder shall be determined by lot. In the comparison of bids, words written in the proposals will govern over figures and unit prices will govern over totals. Until the award of the contract, the Department may cancel the solicitation, reject any and all proposals in whole or part and may waive any defects or technicalities whenever such action is deemed to be in the best interest of the State.

3.2 IRREGULAR PROPOSALS - Proposals will be considered irregular and may be rejected for the following reasons:

3.2.1 If the proposal is unsigned.

3.2.2 If bid security is not in accordance with Section 2.8 BID SECURITY.

3.2.3 If proposal is on a form other than that furnished by the Department; or if the form is altered or any part thereof detached.

3.2.4 If the proposal shows any non-compliance with applicable law, alteration of form, additions not called, conditional bids, incomplete bids, non initialed erasures, other defects, or if the prices are obviously unbalanced.

3.2.5 If the Bidder adds any provisions reserving the right to accept or reject an award.

3.2.6 If the Bidder adds any provisions reserving the right to enter into a contract pursuant to an award.

3.2.7 When a proposal is signed by an officer or officers of a corporation and a currently certified corporate resolution authorizing such signer(s) to submit such proposal is not submitted with the proposal or when the proposal is signed by an agent other than the officer or officers of a corporation or a member of a partnership and a power of attorney is not submitted with the proposal.

3.2.8 Where there is an incomplete or ambiguous listing of joint contractors and/or subcontractors the proposal may be rejected. All work which is not listed as being performed by joint contractors and/or subcontractors must be performed by the bidder with its own employees. Additions to the list of joint contractors or subcontractors will not be allowed. Whenever there is a doubt as to the completeness of the list, the Bidder will be required to submit within five (5) working days, a

written confirmation that the work in question will be performed with its own work force. Whenever there is more than one joint contractor and/or subcontractor listed for the same item of work, the Bidder will be required to either confirm in writing within five (5) working days that all joint contractors or subcontractors listed will actually be engaged on the project or obtain within five (5) working days written releases from those joint contractors and/or subcontractors who will not be engaged.

3.2.9 If in the opinion of the Engineer, the Bidder and its listed subcontractors do not have the contractor's licenses or combination of contractor's licenses necessary to complete all of the work.

3.3 CORRECTION OF BIDS AND WITHDRAWAL OF BIDS §3-122-31 HAR

3.3.1 Corrections to bids after bid openings but prior to award may be made under the following conditions:

3.3.1.1 If the mistake is attributable to an arithmetical error, the Engineer shall so correct the mistake. In case of error in extension of bid price, the unit price shall govern.

3.3.1.2 If the mistake is a minor informality which shall not affect price, quantity, quality, delivery, or contractual conditions, the Bidder shall request correction by submitting proof of evidentiary value which demonstrates that a mistake was made. The Engineer shall prepare a written approval or denial in response to this request. Examples of such mistakes include:

(a) Typographical errors;

(b) Transposition errors;

(c) Failure of a Bidder to sign the bid, but only if the unsigned bid is accompanied by other material indicating the Bidder's intent to be bound.

3.3.1.3 For reasons not allowable under paragraphs 3.3.1.1 and 3.3.1.2 when the Engineer determines that the correction or waiver of an obvious mistake is in the best interest of the Department or is warranted for the fair treatment of other bidders.

3.3.2 Withdrawal of bids after bid opening but prior to award may be made when the bid contains a mistake attributable to an obvious error which affects price, quantity, quality, delivery, or contractual conditions, and the bidder requests withdrawal by submitting proof of evidentiary value which demonstrates that a mistake was made. The Contracting Officer shall prepare a written approval or denial in response to this request.

3.3.3 Correction or withdrawal of bids after award is not permissible except in response to a written withdrawal

or correction request by the Contractor, and the Engineer makes a written determination that the Department's procurement practices and policies would not be materially affected by such correction or withdrawal.

3.4 AWARD OF CONTRACT

3.4.1 The award of contract, if it be awarded, will be made within ninety (90) consecutive calendar days after the opening of the proposals to the lowest responsible and responsive Bidder (including the alternate or alternates which may be selected by the Engineer in the case of alternate bids) whose proposal complies with all the requirements prescribed, but in no case will an award be made until all necessary investigations are made. The successful Bidder will be notified, by letter mailed to the address shown on the proposal, that its bid has been accepted and that it has been awarded the contract.

3.4.2 If the contract is not awarded within the ninety (90) days noted in paragraph 3.4.1 above, the Department may request the successful Bidder to extend the time for the acceptance of its bid. The Bidder may reject such a request without penalty; and in such case, the Department may at its sole discretion make a similar offer to the next lowest responsive and responsible bidder and so on until a bid is duly accepted or until the Department elects to stop making such requests.

3.4.3 No contract will be awarded to any person or firm suspended or debarred under the provisions of Chapters 103D, 104 and Chapter 444, Hawaii Revised Statutes as amended.

3.4.4 The contract will be drawn on the forms furnished by the Comptroller. The contract will not be binding upon the Department until all required signatures have been affixed thereto and written certification that funds are available for the work has been made.

3.5 CANCELLATION OF AWARD - The Department reserves the right to cancel the award of any contract at any time before the execution of said contract by all parties. The exclusive remedy to the awardee for such cancellation shall be payment of the reasonable bid preparation costs and the reimbursement of any direct expenses incurred as directed in the Notice of Award. Such cancellation will not incur any liability by the Department to any other Bidder.

3.6 RETURN OF BID SECURITY - All bid securities, except those of the four (4) lowest Bidders, will be returned following the opening and checking of the proposals. The retained bid securities of the four lowest Bidders will be returned within five (5) working days following the complete execution of the contract.

3.7 REQUIREMENT OF PERFORMANCE AND PAYMENT BONDS

3.7.1 Performance and Payment Bonds shall be required for contracts \$25,000 and higher. At the time of the execution of the contract, the successful Bidder shall file good and sufficient performance and payment bonds on the form furnished by the Department (see Appendix), each in an amount equal to one hundred percent (100%) of the amount of the contract price unless otherwise stated in the solicitation of bids. Acceptable performance and payment bonds shall be limited to the following:

3.7.1.2 Surety bonds underwritten by a company licensed to issue bonds in this State; or

3.7.1.3 A certificate of deposit; credit union share certificate; or cashier's, treasurer's, teller's or official check drawn by, or a certified check accepted by, and payable on demand to the State by a bank, a savings institution, or credit union insured by the Federal Deposit Insurance Corporation or the National Credit Union Administration.

(a) These instruments may be utilized only a maximum of \$100,000.

(b) If the required security or bond amount totals over \$100,000, more than one instrument not exceeding \$100,000 each and issued by different financial institutions shall be acceptable.

3.7.2 If the Contractor fails to deliver the required performance and payment bonds, the contractor's award shall be canceled, the Department shall have the remedies provided under Section 3.9 FAILURE TO EXECUTE THE CONTRACT and award of the contract shall be made to the next lowest responsible and responsive bidder.

3.8 CAMPAIGN CONTRIBUTIONS BY STATE AND COUNTY CONTRACTORS

Contractors are hereby notified of the applicability of Section 11-205.5, HRS, which states that campaign contributions are prohibited from specified State or County government contractors during the term of the contract if the contractors are paid with funds appropriated by a legislative body.

3.9 EXECUTION OF THE CONTRACT

3.9.1 Upon acceptance of the successful bidder's offer by the Contracting Officer, the Contractor shall provide satisfactory performance and payments bonds within ten (10) calendar days after the award of the contract or within such further time as granted by the Contracting Officer. No proposal or contract shall be considered binding upon the State until the contract has been fully

and properly executed by all parties thereto and the Comptroller has endorsed thereon its certificate, as required by Section 103D-309, HRS, that there is an available unexpended appropriation or balance of an appropriation over and above all outstanding contracts sufficient to cover the State's amount required by such contract.

3.9.2 On any individual award totaling less than \$25,000, the State reserves the right to execute the contract by the issuance of a State Purchase Order. Issuance of a State Purchase Order shall result in a binding contract between the parties without further action by the State. The issuance of a Purchase Order shall not be deemed a waiver of these General Conditions and Contract Document requirements.

3.10 FAILURE TO EXECUTE THE CONTRACT

3.10.1 Before the Award - If a low Bidder without legal justification withdraws its bid after the opening of bids but before the award of the contract, the State shall be entitled to retain as liquidated damages the amount established as bid security, and may take all appropriate actions to recover the performance liquidated damages sum from the property or third-party obligations deposited as bid security.

3.10.2 After the Award - If the Bidder to whom a contract is awarded shall fail or neglect to furnish security within ten (10) calendar days after such award or within such further time as the Contracting Officer may allow, the State shall be entitled to recover from such Bidder its actual damages, including but not limited to the difference between the bid and the next lowest responsive bid, as well as personnel and administrative costs, consulting and legal fees and other expenses incurred in arranging a contract with the next low responsive bidder or calling for new bids. The State may apply all or part of the amount of the bid security to reduce its damages. If upon determination by the State of the amount of its damages the bid security exceeds that amount, it shall release or return the excess to the person who provided same.

3.10.3 Engineer's Options - Upon a withdrawal of the lowest responsive bid, or upon a refusal or failure of the lowest Bidder to execute the contract, the Engineer may thereupon award the contract to the next lowest responsible and responsive Bidder or may call for new bids, whichever method the Engineer may deem to be in the best interests of the State.

3.11 NOTICE TO PROCEED

3.11.1 After the contract is fully executed and signed by the Department of Defense, the Contractor will be sent a formal Notice to Proceed letter advising the Contractor of

the date on which it may proceed with the work. The Contractor shall be allowed ten (10) consecutive working days from said date to begin its work. In the event that the Contractor refuses or neglects to start the work, the Engineer may terminate the contract in accordance with Section 7.27 TERMINATION OF CONTRACT FOR CAUSE.

3.11.2 The Contractor may commence its operations strictly at its own risk prior to receipt of the formal notice to proceed, provided it makes a written request and has received approval from the Engineer in writing. All work performed shall be conducted in accordance with Section 7.1 PROSECUTION OF THE WORK.

3.11.3 In certain cases, the State, with agreement of the Contractor, may issue a Notice to Proceed before full execution of the contract by the Engineer and it may further issue a Notice to Proceed concurrently with the Notice of Award.

3.11.4 In the event the Notice to Proceed is not issued within one hundred and eighty (180) days after the date of the award of contract the Contractor may submit a claim for increased labor and material costs (but not overhead costs) which are directly attributable to the delay beyond the first 180 days. Such claims shall be accompanied with the necessary documentation to justify the claim. No payment will be made for escalation costs that are not fully justified.

GENERAL CONDITIONS ARTICLE 4 - Scope of Work

4.1 INTENT OF CONTRACT, DUTY OF CONTRACTOR - The intent of the Contract is to provide for the construction, complete in every detail, of the Work described at the accepted bid price and within the time established by the contract. The Contractor has the duty to furnish all labor, materials, equipment, tools, transportation, incidentals and supplies and to determine the means, methods and schedules required to complete the work in accordance with the drawings, specifications and terms of the contract.

4.2 CHANGES - The Engineer may at any time, during the progress of the work, by written order, and without notice to the sureties, make changes in the work as may be found to be necessary or desirable. Such changes shall not invalidate the Contract nor release the Surety, and the Contractor will perform the work as changed, as though it had been a part of the original Contract.

4.2.1 Minor Changes - Minor changes in the work may be directed by the Engineer with no change in contract price or time of performance. Minor changes are consistent with the intent of the Contract Documents and

do not substantially alter the type of work to be performed or involve any adjustment to the contract sum or extension of the contract time.

4.2.2 Oral Orders

4.2.2.1 Any oral order, direction, instruction, interpretation or determination from the Engineer or any other person which in the opinion of the Contractor causes any change, shall be considered as a change only if the Contractor gives the Engineer written notice of its intent to treat such oral order, direction, instruction, interpretation or determination as a change directive. Such written notice must be delivered to the Engineer before the Contractor acts in conformity with the oral order, direction, instruction, interpretation or determination, but not more than five (5) days after delivery of the oral order to the Contractor. The written notice shall state the date, circumstances, whether a time extension will be requested, and source of the order that the Contractor regards as a change. Such written notice may not be waived and shall be a condition precedent to the filing of any claim by the Contractor. Unless the Contractor acts in accordance with this procedure, any such oral order shall not be treated as a change for which the Contractor may make a claim for an increase in the contract time or contract price related to such work.

4.2.2.2 No more than five (5) days after receipt of the written notice from the Contractor, a Field Order shall be issued for the subject work if the State agrees that it constitutes a change. If no Field Order is issued in the time established, it shall be deemed a rejection of Contractor's claim for a change. If the Contractor objects to the failure to issue a Field Order, it shall file a written protest with the Engineer within thirty (30) days after delivery to the Engineer of the Contractor's written notice of its intention to treat the oral order as a change. In all cases, the Contractor shall proceed with the work. The protest shall be determined as provided in Section 7.25 DISPUTES AND CLAIMS.

4.2.3 Field Orders – Upon receipt of a Field Order, the Contractor shall proceed with the changes as ordered. If the Contractor does not agree with any of the terms or conditions or in the adjustment or non-adjustment to the contract time and / or contract price, Contractor shall file a notice of intent to claim within thirty (30) calendar days after receipt of the written Field Order that was not agreed upon by both parties. Failure to file such protest within the time specified shall constitute agreement on the part of the Contractor with the terms, conditions, amounts and adjustment or non-adjustment to contract price and / or contract time set forth in the Field Order. The requirement for timely written notice shall be a condition precedent to the assertion of a claim.

4.2.4 Change Orders

4.2.4.1 The Department will issue sequentially numbered Change Orders at times it deems appropriate during the contract period. A Change Order may contain the adjustment in contract price and / or time for a number of Field Orders. The Change Order will be issued in the format attached (refer to the Appendix). No payment for any change will be made until the change order is issued.

4.2.4.2 The penal sum of the Surety Performance and Payment Bonds will be adjusted by the amount of each and every Change Order.

4.2.4.3 Upon receipt of a change order, that the Contractor does not agree with any of the terms or conditions or the adjustments or non adjustments of the contract price or contract time; the Contractor shall not execute or sign the change order, but shall return the unsigned change order, along with a written notification of the conditions or items that are in dispute.

4.2.4.4 If the Contractor signs or executes the change order, this constitutes an agreement on the part of the Contractor with the terms and conditions of the change order. A change order that is mutually agreed to and signed by the parties of the contract constitutes a contract modification.

4.2.5 Claim Notification – The Contractor shall file a notice of intent to claim for a disputed change order within 30 calendar days after receipt of the written order. Failure to file the protest within the time specified constitutes an agreement on the part of the Contractor within the terms, conditions, amounts and adjustment or non-adjustment to contract price or contract time set forth in the dispute change order. The requirement for timely written notice shall be a condition precedent to the assertion of a claim.

4.2.6 Proceeding with Directed Work – Upon receipt of a contract modification, change order, or field order, the Contractor shall proceed with the directed changes and instructions. The Contractor's right to make a claim for additional compensation or an extension of time for completion is not affected by proceeding with the changes and instructions described in a change order and field order.

4.2.7 Pricing or Negotiating Costs Not Allowed – The Contractor's cost of responding to requests for price or time adjustments is included in the contract price. No additional compensation will be allowed unless authorized by the Contracting Officer.

4.3 DUTY OF CONTRACTOR TO PROVIDE PROPOSAL FOR CHANGES

4.3.1 A Field Order may request the Contractor to supply the Department with a proposal for an adjustment

to the contract time or contract price for the work described therein. Any such request for a proposal shall not affect the duty of the Contractor to proceed as ordered with the work described in the Field Order.

4.3.2 The Engineer from time to time may issue a Bulletin to the Contractor requesting price and / or time adjustment proposals for contemplated changes in the work. A Bulletin is not a directive for the Contractor to perform the work described therein.

4.3.3 Within fifteen (15) days after receipt of a Bulletin or Field Order containing a request for proposal, the Contractor shall submit to the Engineer a detailed written statement in a format similar to the one shown in the Appendix to these General Conditions setting forth all charges the Contractor proposes for the change and the proposed adjustment of the contract time, all properly itemized and supported by sufficient substantiating data to permit evaluation. No time extension will be granted for delays caused by late Contractor pricing of changes or proposed changes. If the project is delayed because Contractor failed to submit the cost proposal within the fifteen (15) days, or as allowed by the Engineer, performance liquidated damages will be assessed in accordance with Section 7.26 FAILURE TO COMPLETE THE WORK ON TIME.

4.3.4 No payment shall be allowed to the Contractor for pricing or negotiating proposed or actual changes.

4.4 PRICE ADJUSTMENT HRS 103D-501

4.4.1 A fully executed change order or other document permitting billing for the adjustment in price under any method listed in paragraphs (4.4.1.1) through (4.4.1.5) shall be issued within ten days after agreement on the price adjustment. Any adjustment in the contract price pursuant to a change or claim in this contract shall be made in one or more of the following ways:

4.4.1.1 By agreement on a fixed price adjustment before commencement of the pertinent performance;

4.4.1.2 By unit prices specified in the contract or subsequently agreed upon before commencement of the pertinent performance;

4.4.1.3 Whenever there is a variation in quantity for any work covered by any line item in the schedule of costs submitted as required by Section 7.2 COMMENCEMENT REQUIREMENTS, by the Department at its discretion, adjusting the lump sum price proportionately;

4.4.1.4 Force Account Method. At the sole option of the Contracting Officer, by the costs attributable to the event or situation covered by the change, plus appropriate profit or fee, all as specified in Section 4.5 ALLOWANCES

FOR OVERHEAD AND PROFIT and the force account provision of Section 8.3 PAYMENT FOR ADDITIONAL WORK before commencement of the pertinent performance;

4.4.1.5 In such other manner as the parties may mutually agree upon before commencement of the pertinent performance; or

4.4.1.6 In the absence of an agreement between the two parties:

4.4.1.6.a For change orders with value not exceeding \$50,000 by documented actual costs of the work, allowing for overhead and profit as set forth in Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT. A change order shall be issued within fifteen days of submission by the contractor of proper documentation of completed force account work, whether periodic (conforming to the applicable billing cycle) or final. The procurement officer shall return any documentation that is defective to the contractor within fifteen days after receipt, with a statement identifying the defect; or

4.4.1.6.b For change orders with value exceeding \$50,000 by a unilateral determination by the Contracting Officer of the reasonable and necessary costs attributable to the event or situation covered by the change, plus appropriate profit or fee, all as computed by the Contracting Officer in accordance with applicable sections of Chapters 3-123 and 3-126 of the Hawaii Administrative Rules, and Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT. When a unilateral determination has been made, a unilateral change order shall be issued within ten days. Upon receipt of the unilateral change order, if the contractor does not agree with any of the terms or conditions, or the adjustment or non-adjustment of the contract time or contract price, the contractor shall file a notice of intent to claim within thirty days after the receipt of the written unilateral change order. Failure to file a protest within the time specified shall constitute agreement on the part of the contractor with the terms, conditions, amounts, and adjustment or non-adjustment of the contract time or the contract price set forth in the unilateral change order.

4.4.1.7 In such other manner as the parties may mutually agree;

4.4.1.8 At the sole option of the Engineer, by the costs attributable to the event or situation covered by the change, plus appropriate profit or fee, all as specified in Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT and the force account provision of Section 8.3 PAYMENT FOR ADDITIONAL WORK; or

4.4.1.9 In the absence of an agreement between the two parties, by a unilateral determination by the Engineer of

the reasonable and necessary costs attributable to the event or situation covered by the change, plus appropriate profit or fee, all as computed by the Engineer in accordance with applicable sections of Chapters 3-123 and 3-126 of the Hawaii Administrative Rules and Regulations, and Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

4.4.2 Cost or Pricing Data – Contractor shall provide and certify cost or pricing data or any price adjustment to a contract involving aggregate increases and decreases in the costs plus applicable profits expected to exceed \$100,000. The certified cost or pricing data shall be subject to the provisions of HAR chapter 3-122, subchapter 15.

4.5 ALLOWANCES FOR OVERHEAD AND PROFIT HRS103D-501

4.5.1 In determining the cost or credit to the Department resulting from a change, the allowances for all overhead, including, extended overhead resulting from adjustments to contract time (including home office, branch office and field overhead, and related delay impact costs) and profit combined, shall not exceed the percentages set forth below:

4.5.1.1 For the Contractor, for any work performed by its own labor forces, twenty percent (20%) of the direct cost;

4.5.1.2 For each subcontractor involved, for any work performed by its own forces, twenty percent (20%) of the direct cost;

4.5.1.3 For the Contractor or any subcontractor, for work performed by their subcontractors, ten percent (10%) of the amount due the performing subcontractor.

4.5.2 Not more than three markup allowance line item additions not exceeding the maximum percentage shown above will be allowed for profit and overhead, regardless of the number of tier subcontractors.

4.5.3 The allowance percentages will be applied to all credits and to the net increase of direct costs where work is added and deleted by the changes.

4.6 PAYMENT FOR DELETED MATERIAL

4.6.1 Cancelled Orders - If acceptable material was ordered by the Contractor for any item deleted by an ordered change in the work prior to the date of notification of such deletion by the Engineer, the Contractor shall use its best efforts to cancel the order. The Department shall pay reasonable cancellation charges required by the supplier excluding any markup for overhead and profit to the Contractor.

4.6.2 Returned Materials - If acceptable deleted material is in the possession of the Contractor or is ultimately received by the Contractor, if such material is returnable to the supplier and the Engineer so directs, the material shall be returned and the Contractor will be paid for the reasonable charges made by the supplier for the return of the material, excluding any markup for overhead and profit to the Contractor. The cost to the Contractor for handling the returned material will be paid for as provided in Section 4.4 PRICE ADJUSTMENT.

4.6.3 Uncancelled Materials - If orders for acceptable deleted material cannot be canceled at a reasonable cost, it will be paid for at the actual cost to the Contractor including an appropriate markup for overhead and profit as set forth in Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT. In such case, the material paid for shall become the property of the State and the cost of further storage and handling shall be paid for as provided in Section 4.4 PRICE ADJUSTMENT.

4.7 VARIATIONS IN ESTIMATED QUANTITIES §3-125-10 HAR

4.7.1 Where the quantity of a major unit price item in this contract is estimated on the proposal form and where the actual quantity of such pay item varies more than fifteen percent (15%) above or below the estimated quantity stated in this contract, an adjustment in the contract price shall be made upon demand of either party. The adjustment shall be based upon any increase or decrease in costs due solely to the variation above one hundred fifteen percent (115%) or below eighty-five percent (85%) of the estimated quantity. The adjustment shall be subject to Section 4.4 PRICE ADJUSTMENT and Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT. If the quantity variation is such as to cause an increase in the time necessary for completion, the Engineer shall, upon receipt of a written request for an extension of time within thirty (30) days of the item's completion, ascertain the facts and make such adjustment to the completion date as the Engineer finds justified.

4.8 VARIATIONS IN BOTTOM ELEVATIONS

The Contractor shall plan and construct to the bottom elevations of footings, piles, drilled shafts, or cofferdams as shown on the drawings. When the bottom of a pile, drilled shaft, or cofferdam is shown as an estimated or approximate elevation, the Contractor shall plan and construct to that elevation or to any deeper elevation required by the drawings or direction of the Engineer. In the event the bottom elevation is lowered, the Contractor shall be entitled to additional payment in accordance with Sections 4.4 PRICE ADJUSTMENT and 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT. In the event the bottom elevation is raised, the State shall be entitled to a credit in accordance with Sections 4.2

CHANGES, 4.4 PRICE ADJUSTMENT and 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

4.9 DIFFERING SITE CONDITIONS §3-125-11 HAR

4.9.1 During the progress of the work, if the Contractor encounters conditions at the site differing materially from those shown in the drawings and specifications, Contractor shall promptly, and before any such conditions are disturbed or damaged (except in an emergency as required by subsection 7.17.8), notify the Engineer in writing of:

4.9.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the contract; or

4.9.1.2 Unknown physical conditions at the site, of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this contract.

4.9.2 After receipt of written notice, the Engineer shall promptly investigate the site, and if it is found that such conditions do materially differ and cause an increase in the Contractor's cost of, or the time required to, perform any part of the Work, whether or not changed as a result of such conditions, an adjustment shall be made and the contract modified accordingly. Any adjustment in contract price made pursuant to this Section 4.9 shall be determined in accordance with Sections 4.4 PRICE ADJUSTMENT and 7.25 DISPUTES AND CLAIMS.

4.9.3 Nothing contained in this Section 4.9 shall be grounds for an adjustment in compensation if the Contractor had actual knowledge or should have known of the existence of such conditions prior to the submission of bids.

4.10 UTILITIES AND SERVICES

4.10.1 The cost of all the following will be included in the contract price and the Contractor shall be fully responsible for:

4.10.1.1 Reviewing and checking all such information and data,

4.10.1.2 Locating all underground and overhead utilities shown or indicated in the contract documents,

4.10.1.3 Coordination of the Work with the Owners of such underground and overhead utilities during construction, and

4.10.1.4 The safety and protection of all such underground and overhead utilities as provided in

Section 7.17 PROTECTION OF PERSONS AND PROPERTY and repairing any damage thereto resulting from the work.

4.10.2 Unknown Utilities - During the progress of the work, if an underground utility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents, or found at a location that is substantially different than shown or indicated in the Contract Documents, Contractor shall promptly, and before any such conditions are disturbed or damaged (except in an emergency as required by subsection 7.17.8), notify the Engineer. Contractor shall be responsible for the safety and protection of the underground utility as provided in Section 7.17 PROTECTION OF PERSONS AND PROPERTY. Refer to subsections 4.9.2 and 4.9.3.

4.10.3 If the Engineer determines a change in the Contract Documents is required, a Field Order or Change Order will be issued. Upon issuance of a duly authorized Field Order or Change Order regarding the disposition of a newly discovered utility, Contractor shall be responsible for damages to the utility, including any damage claims due to the disruption of service caused by the utility being damaged.

4.10.4 Restoration of Damaged Utilities - The Contractor shall repair and restore to pre-damaged condition any utilities or any other property it damaged. The Contractor shall be liable for any resulting damages, to the Work or to the utility owner or property owner and shall pay any claim due to the disruption of service caused by the utilities being damaged. Contractor shall defend and save harmless the State from all suits, actions or claims of any character brought on account of such damages, whether or not the State may have been partially at fault. Contractor shall obtain public liability and property damage insurance pursuant to Article 7 PROSECUTION AND PROGRESS to cover such risk of damage.

4.10.5 In the event the Contractor, simultaneously with the discovery of an unknown utility or other property, damages that utility or other property, the Contractor shall immediately notify the Engineer. If the Contractor is without fault in such a situation, notwithstanding subsection 4.10.4, the Contractor shall not be liable for resulting damages or the defense of the State from claims brought on account of said damages to unknown utilities or other property. Upon instruction from the Engineer, the Contractor shall repair all damages and execute a plan for dealing with the damaged utility or other property. This repair work shall be considered additional work as covered in Section 4.2 CHANGES.

ARTICLE 5 - Control of Work

5.1 AUTHORITY OF THE ENGINEER

5.1.1 The Engineer shall make final and conclusive decisions on all questions which may arise relating to the quality and acceptability of the materials furnished and work performed, the manner of performance and rate of progress of the work, the interpretation of the Contract Documents, the acceptable fulfillment of the contract on the part of the Contractor, the compensation under the Contract and the mutual rights of the parties to the Contract.

5.1.2 The Engineer shall have the authority to enforce and make effective such decisions and orders at the Contractor's expense when the Contractor fails to carry such decisions and orders out promptly and diligently.

5.1.3 The Engineer shall have the authority to suspend the work wholly or in part as provided in Section 7.24 SUSPENSION OF WORK.

5.1.4 The Engineer may delegate specific authority to act for the Engineer to a specific person or persons. Such delegation of authority shall be established in writing to the Contractor.

5.2 AUTHORITY OF THE INSPECTOR

5.2.1 The Inspector shall observe and inspect the contract performance and materials. The Inspector does not have any authority vested in the Engineer unless specifically delegated in writing.

5.2.2 The Inspector may offer advice and recommendations to the Contractor, but any such advice or recommendations are not directives from the Engineer.

5.2.3 The Inspector has no authority to allow deviations from the Contract Documents and may reject any and all work that the Inspector deems is not in conformity with the contract requirements. Failure of an Inspector at any time to reject non-conforming work shall not be considered a waiver of the Department's right to require work in strict conformity with the Contract Documents as a condition of final acceptance.

5.3 AUTHORITY OF CONSULTANT(S) - The Department may engage Consultant(s) for limited or full observation to supplement the inspections performed by the State and respective Counties. Unless otherwise specified in writing to the Contractor, such retained Consultant(s) will have the authority of a Project Inspector.

5.4 SHOP DRAWINGS AND OTHER SUBMITTALS

5.4.1 The following documents shall be submitted where required by the contract documents:

5.4.1.1 Shop Drawings

(1) The Contractor shall prepare, and thoroughly check, approve, all shop drawings, including those prepared by subcontractors or any other persons. The Contractor shall indicate its approval by stamping and signing each drawing. Any shop drawing submitted without being reviewed, stamped and signed will be considered as not having been submitted, and any delay caused thereby shall be the Contractor's responsibility.

(2) Shop drawings shall indicate in detail all parts of an item of work, including erection and setting instructions and engagements with work of other trades or other separate contractors. Shop drawings for structural steel, millwork and pre-cast concrete shall consist of calculations, fabrication details, erection drawings and other working drawings, as necessary, to show the details, dimensions, sizes of members, anchor bolt plans, insert locations and other information necessary for the complete fabrication and erection of the structure to be constructed.

(3) All shop drawings as required by the contract, or as determined by the Engineer to be necessary to illustrate details of the Work shall be submitted to the Engineer with such promptness as to cause no delay in the work or in that of any other Contractor. Delay caused by the failure of the Contractor to submit shop drawings on a timely basis to allow for review, possible resubmittal and acceptance will not be considered as a justifiable reason for a contract time extension. Contractor, at its own risk, may proceed with the work affected by the shop drawings before receiving acceptance; however the Department shall not be liable for any costs or time required for the correction of work done without the benefit of accepted shop drawings.

(4) It is the Contractor's obligation and responsibility to check all of its and its subcontractor's shop drawings and be fully responsible for them and for coordination with connecting and other related work. The Contractor shall prepare, and submit to the Engineer coordination drawings showing the installation locations of all plumbing, piping, duct and electrical work including equipment throughout the project. By approving and submitting shop drawings, the Contractor thereby represents that it has determined and verified all field measurements and field construction criteria, or will do so, and that it has checked and coordinated each shop drawing with the requirements of the work and the contract documents. When shop drawings are prepared and processed before field measurements and field construction criteria can be or have been determined or verified, the Contractor shall make all necessary

adjustments in the work or resubmit further shop drawings, all at no change in contract price or time.

5.4.1.2 Shop Drawing Form - Each drawing and/or series of drawings submitted must be accompanied by a letter of transmittal giving a list of the titles and number of the drawings. Each series shall be numbered consecutively for ready reference and each drawing shall be marked with the following information:

- (1) Date of Submission
- (2) Name of Project
- (3) Project Number
- (4) Location of Project
- (5) Name of submitting Contractor and Subcontractor
- (6) Revision Number

5.4.1.3 The size of the sheets that shop drawings are prepared on shall be as appropriate to suit the drawing being presented so that the information is clearly and legibly depicted. At the determination of the Engineer, for each sheet of drawings, the submittal shall consist of either; one reproducible transparency and five prints, or eight prints.

5.4.1.4 Descriptive Sheets and Other Submittals - When a submittal is required by the contract, the Contractor shall submit to the Engineer eight (8) complete sets of descriptive sheets such as shop drawings, brochures, catalogs, illustrations, calculation, material safety data sheets (MSDS), certificates, reports, warranty, etc., which will completely describe the material, product, equipment, furniture or appliances to be used in the project as shown in the drawings and specifications and how it will be integrated into adjoining construction. When submittals are specified to be submitted under Web Based Construction Management System, the number of complete sets will be as specified or as directed by the Engineer. Prior to the submittal, the Contractor shall review and check all submittal sheets for conformity to the contract requirements and indicate such conformity by marking or stamping and signing each sheet. Where descriptive sheets include materials, systems, options, accessories, etc. that do not apply to this contract, non-relevant items shall be crossed out so that all remaining information will be considered applicable to this contract. It is the responsibility of the Contractor to submit descriptive sheets for review and acceptance by the Engineer as required at the earliest possible date after the date of award in order to meet the construction schedule. Delays caused by the failure of the Contractor to submit descriptive sheets as required will not be considered as justifiable reasons for contract time extension.

5.4.1.5 Material Samples and Color Samples – When material and color sample submittals are required by the contract, the Contractor shall submit to the Engineer no

less than three (3) samples conforming to Section 6.6 MATERIAL SAMPLES. One sample will be retained by the Consultant, one sample will be retained by the State, and the remaining sample(s) will be returned to the contractor. Prior to the material and color submittal, the Contractor shall review and check all samples for conformity to the contract requirements and indicate such conformity by marking or stamping and signing each sample. It is the responsibility of the Contractor to submit samples for review and acceptance by the Engineer as required at the earliest possible date after the date of award in order to meet the construction schedule. Delays caused by the failure of the Contractor to submit material and color samples as required will not be considered as justifiable reasons for contract time extension.

5.4.1.6 Unless the technical sections (Divisions 2 – 16) specifically require the Contractor furnish a greater quantity of shop drawings and other submittals, the Contractor shall furnish the quantities required by this section.

5.4.2 Submittal Variances - The Contractor shall include with the submittal, written notification clearly identifying all deviations or variances from the contract drawings, specifications and other Contract Documents. The notice shall be in a written form separate from the submittal. The variances shall also be clearly indicated on the shop drawing, descriptive sheet, material sample or color sample. Failure to so notify of and identify such variances shall be grounds for the subsequent rejection of the related work or materials, notwithstanding that the submittal was accepted by the Engineer. If the variances are not acceptable to the Engineer, the Contractor will be required to furnish the item as specified or indicated on the contract documents at no additional cost or time.

5.4.3 Review and Acceptance Process - Submittals will be returned to the Contractor within twenty one (21) days (for projects on Oahu) and twenty five (25) days (for projects on the islands of Hawaii, Maui, Kauai, Molokai and Lanai) after receipt by the Engineer unless otherwise agreed between the Contractor and the Engineer or as stated elsewhere in the contract documents.

5.4.3.1 The acceptance by the Engineer of the Contractor's submittal relates only to their sufficiency and compliance with the intention of the contract. Acceptance by the Engineer of the Contractor's submittal does not relieve the Contractor of any responsibility for accuracy of dimensions, details, and proper fit, and for agreement and conformity of submittal with the contract drawings and specifications. Nor will the Engineer's acceptance relieve the Contractor of responsibility for variance from the contract documents unless the Contractor, at the time of submittal, has provided notice and identification of such variances required by this section. Acceptance of a

variance shall not justify a contract price or time adjustment unless the Contractor requests such an adjustment at the time of submittal and the adjustment are explicitly agreed to in writing by the Engineer. Any such request shall include price details and proposed scheduling modifications. Acceptance of a variance is subject to all contract terms, stipulations and covenants, and is without prejudice to any and all rights under the surety bond.

5.4.3.2 If the Engineer returns a submittal to the Contractor that has been rejected, the Contractor, so as not to delay the work, shall promptly make a resubmittal conforming to the requirements of the contract documents and indicating in writing on the transmittal and the subject submittal what portions of the resubmittal has been altered in order to meet the acceptance of the Engineer. Any other differences between the resubmittal and the prior submittal shall also be specifically described in the transmittal.

5.4.3.3 No mark or notation made by the Engineer on or accompanying the return of any submittal to the Contractor shall be considered a request or order for a change in work. If the Contractor believes any such mark or notation constitutes a request for a change in the work for which it is entitled to an adjustment in contract price and/or time, the Contractor must follow the same procedures established in Section 4.2 CHANGES for oral orders, directions, instructions, interpretations or determinations from the Engineer or else lose its right to claim for an adjustment.

5.5 COORDINATION OF CONTRACT DOCUMENTS - It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. The Contract Documents are complementary: any requirement occurring in one document is as binding as though occurring in all. In the event of conflict or discrepancy the priorities stated in the following subparagraphs shall govern:

5.5.1 Addenda shall govern over all other Contract Documents. Subsequent addenda issued shall govern over prior addenda only to the extent specified.

5.5.2 SPECIAL CONDITIONS and Proposal shall govern over the GENERAL CONDITIONS and Specifications.

5.5.3 Specifications shall govern over drawings.

5.5.4 Specification Error - Should an error or conflict appear within the specification, the Contractor shall immediately notify the Engineer. The Engineer shall promptly issue instructions as to procedure. Any requirement occurring in one or more parts of the

specification is as binding as though occurring in all applicable parts.

5.5.4.1 Should an error or conflict appear within a specification section, between a listed manufacturer / product and the performance requirements of the specification section, the performance requirements shall govern.

5.5.5 Drawings:

5.5.5.1 Schedules shall govern over all other notes and drawings.

5.5.5.2 Bottom elevations of footings shown on drawings shall govern over a general note such as: "All footings shall rest on firm, undisturbed soil and extend a minimum of a certain number of feet into natural or finish grade, whichever is lower."

5.5.5.3 Except for drawing schedules and bottom elevations as noted above, general notes shall govern over all other portions of the drawings:

5.5.5.4 Larger scale drawings shall govern over smaller scale drawings.

5.5.5.5 Figured or numerical dimensions shall govern over dimensions obtained by scaling. Measurements from the drawings when scaled shall be subject to the approval of the Engineer.

5.5.5.6 In cases of discrepancies in the figures or drawings, the discrepancies shall be immediately referred to the Engineer without whose decision said discrepancy shall not be corrected by the Contractor save at its own risk and in the settlement of any complications arising from such adjustment without the knowledge and consent of the Engineer, the Contractor shall bear all extra expense involved.

5.5.5.7 Items shown on the drawings that are completely void in terms of description, details, quality and / or performance standards in both the drawings and specifications to make a price determination shall be considered an omission and the Contractor shall immediately refer same to the Engineer for a decision.

5.5.5.8 Where there is a conflict between the architectural sheets and the civil or landscaping or electrical sheets, etc., the conflict shall be considered a discrepancy and the Contractor shall immediately refer same to the Engineer for a decision.

5.5.5.9 Any requirement occurring in one or more of the sheets is as binding as though occurring in all applicable sheets.

5.6 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

The Contractor shall carefully study and compare the Contract Documents with each other, with field conditions and with the information furnished by the State and shall at once report to the Engineer errors, conflicts, ambiguities, inconsistencies or omissions discovered. Should an item not be sufficiently detailed or explained in the Contract Documents, Contractor shall report and request the Engineer' clarification and interpretation. The Engineer will issue a clarification or interpretation that is consistent with the intent of and reasonably inferred from Contract Documents.

5.7 EXAMINATION OF DRAWINGS, SPECIFICATIONS, PROJECT SITE

5.7.1 The Contractor shall examine carefully the Project Site to become familiar with the conditions to be encountered in performing the Work and the requirements of the Contact Documents.

5.7.1.1 No extra compensation will be given by reason of the Contractor's misunderstanding or lack of knowledge of the requirements of the Work to be accomplished or the conditions to be encountered in performing the project.

5.7.1.2 No extra compensation will be given by reason of the Contractor's misunderstanding or lack of knowledge when the existence of differing site, subsurface or physical conditions could have been reasonably discovered or revealed as a result of any examination, investigation, exploration, test or study of the site and contiguous areas required by the Bidding requirements or Contract Documents to be conducted by or for the Contractor.

5.7.2 When the Contract Drawings include a log of test borings showing a record of the data obtained by the Department's investigation of subsurface conditions, said log represents only the opinion of the Department as to the character of material encountered in its test borings and at only the location of each boring. The Contractor acknowledges that underground site conditions in Hawaii vary widely. There is no warranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the work or any part of it, or that other conditions may not occur.

5.7.3 Reference is made to the SPECIAL CONDITIONS for identification of subsurface investigations, reports, explorations and tests utilized by the State in preparation the Contract Documents. Such reports, drawings, boring logs etc. are not part of the Contract Documents.

5.8 COOPERATION BETWEEN THE CONTRACTOR AND THE DEPARTMENT

5.8.1 Furnishing Drawings and Specifications - Contractor to supply copies of the Contract Drawings and Specifications. Contractor shall have and maintain at least one copy of the Contract Drawings and Specifications on the work site, at all times. Contractor shall cooperate with the Engineer, the Inspector(s), and other contractors in every possible way.

5.8.2 Superintendent - The Contractor shall have a competent superintendent or agent on the work site while work is being performed under the contract. The superintendent or agent shall be experienced in the type of project being undertaken and the work being performed. The superintendent or agent shall represent the Contractor and shall have the authority to act on behalf of the Contractor. Communications given to the superintendent or agent shall be as binding as if given to the Contractor.

5.8.2.1 If the superintendent or agent is not present at the work site, the Engineer shall have the right to suspend the work as described under Section 7.24 SUSPENSION OF WORK.

5.8.2.2 The Contractor shall file with the Engineer a written statement giving the name of the superintendent or agent assigned to the project. The Contractor shall be responsible for notifying the Engineer in writing of any change in the superintendent or agent.

5.8.2.3 The requirements of this subsection 5.8.2 may be waived by the Engineer.

5.8.3 Engineering Work - The Contractor shall properly and accurately lay out the work, perform all engineering work, and furnish all engineering materials and equipment required to establish and maintain all lines, grades, dimensions and elevations called for in the drawings or required in the progress of construction, unless otherwise noted in the contract documents. The Contractor will be held definitely and absolutely responsible for any errors in lines, grades, dimensions and elevations and shall at once, on instruction from the Engineer, correct and make good such errors or any errors, or faults in the work resulting from errors in engineering performed under the requirements of its contract to the entire satisfaction of the Engineer. Full compensation for the work shall be included in the prices paid for contract items of work. No additional allowance will be made for the correction of incorrect engineering work.

5.8.3.1 The Engineer shall furnish the requisite bench elevations.

5.8.3.2 The Contractor shall locate and verify all lines, grades, dimensions and elevations indicated on the drawings before any excavation, or construction begins. Any discrepancy shall be immediately brought to the attention of the Engineer, any change shall be made in accordance with the Engineer's instruction.

5.8.3.3 The Contractor shall verify all street survey monuments (horizontal and vertical alignment) prior to final acceptance by the Engineer in accordance with any governmental requirements.

5.8.3.4 The Contractor shall provide a surveyor or Civil Engineer licensed in the State of Hawaii to verify and establish all lines, grades, dimensions and elevations.

5.8.4 Use of Structure or Improvement - The Department shall have the right, at any time during construction of the structure or improvements, to enter same for the purpose of installing by government labor or by any other Contractor or utility any necessary work in connection with the installation of facilities, it being mutually understood and agreed, however, that the Contractors, utilities and the Department will, so far as possible work to the mutual advantage of all, where their several works in the above mentioned or in unforeseen instances touch upon or interfere with each other.

As a convenience to those involved, the Engineer shall allocate the work and designate the sequence of construction in case of controversy between Contractors on separate projects under State jurisdiction.

5.8.4.1 The Department shall also have the right to use the structure, equipment, improvement or any part thereof, at any time after it is considered by the Engineer as available. In the event that the structure, equipment or any part thereof is so used, the Department shall be responsible for all expenses incidental to such use and any damages resulting from the Department's use.

5.8.4.2 Equipment warranty will commence to run before the work is complete when and if the Department begins actual use of the equipment for the purpose for which the equipment was designed and installed.

5.8.4.3 If the Department enters the structure for construction and / or occupancy and the Contractor is delayed because of interference by the Department or by extra work resulting from damage which the Contractor is not responsible for, or by extraordinary measures the Contractor must take to accommodate the Department, the Contractor shall be granted an extension of time in accordance with Section 7.21 CONTRACT TIME. However, if such use increases the cost or delays the completion of the remaining portions of work, the Contractor shall be entitled to such extra compensation or extension of time or both, as the State may determine to

be proper. Any additional work necessary will be paid in accordance with Section 8.3 PAYMENT FOR ADDITIONAL WORK.

5.9 INSPECTION - The Engineer, the Department's consultants, Inspectors employed by the Department and other representatives duly authorized by the Department shall at all times have access to the work during its construction and shall be furnished with every reasonable facility for ascertaining at any time that the materials and the workmanship are in accordance with the requirements and intentions of the contract. All work done and all materials furnished shall be subject to inspection and acceptance.

5.9.1 Such inspection and approval may extend to all or part of the work, and to the preparation, fabrication or manufacture of the materials to be used. By entering into a contract for the supply of materials, equipment or performance of labor in connection with the Work, such Material and Equipment Supplier or Labor Contractor consents to and is subject to the terms of this Section 5.9 to the same extent as the Contractor.

5.9.2 Authority to Suspend Operations - The Inspector shall have the authority to suspend operations of any work being improperly performed by issuing a written order giving the reason for shutting down the work. Should the Contractor disregard such written order, the work done thereafter will not be accepted nor paid for.

5.9.3 The inspection of the work shall not relieve the Contractor of any of its obligations to fulfill the contract as prescribed. Notwithstanding prior payment and acceptance by the Engineer, defective and nonconforming work shall be corrected to comply with the contract requirements. Unsuitable, unspecified or unapproved materials may be rejected.

5.9.4 Federal Agency Inspection - Projects financed in whole or in part with Federal funds shall be subject to inspection and corrective requirements at all times by the Federal Agency involved at no cost to the State.

5.10 REMOVAL OF DEFECTIVE, NON-CONFORMING AND UNAUTHORIZED WORK

5.10.1 All work which has been rejected as not conforming to the requirements of the Contract shall be remedied or removed and replaced by the Contractor in an acceptable manner and no compensation will be allowed for such removal or replacement. Any work done beyond the work limits shown on the drawings and specifications or established by the Engineer or any additional work done without written authority will be considered as unauthorized and will not be paid for. Work so done may be ordered removed at the Contractor expense.

5.10.2 Scheduling Corrective Work - The Contractor shall perform its corrective or remedial work at the convenience of the State and shall obtain the Engineer's approval of its schedule.

5.10.3 Failure to Correct Work - Upon failure on the part of the Contractor to comply promptly with any order of the Engineer made under the provisions of this Section 5.10, the Engineer shall have authority to cause defective work to be remedied or removed and replaced, and unauthorized work to be removed, at the Contractor's expense, and to deduct the costs from any monies due or to become due the Contractor.

5.11 VALUE ENGINEERING INCENTIVE

§3-132 HAR amended by Act 149 SLH 1999 - On projects with contract amounts in excess of \$250,000, the following Value Engineering Incentive Clause shall apply to allow the Contractor to share in cost savings that ensue from cost reduction proposals it submits.

5.11.1 The Value Engineering Incentive Clause applies to all Value Engineering Change Proposals (cost reduction proposals, hereinafter referred to as (VECP) initiated and developed by the Contractor for changing the drawings, designs, specifications or other requirements of this contract. This clause does not, however apply to any VECP unless it is identified as such by the Contractor at the time of its submission to the Engineer.

5.11.2 Value Engineering Change Proposal - All VECP must:

5.11.2.1 Result in a savings to the State of at least four thousand dollars (\$4,000) by providing less costly items than without impairing any essential functions and characteristics such as service life, reliability, economy of operation, ease of maintenance and all necessary features of the completed work.

5.11.2.2 Require, in order to be applied to this contract, a change order to this contract.

5.11.2.3 Not adversely impact on the schedule of performance or the contract completion date.

5.11.3 VECP Required Information - The VECP will be processed expeditiously and in the same manner as prescribed for any other change order proposal. As a minimum, the following information will be submitted by the Contractor with each proposal:

5.11.3.1 A description of the difference between the existing contract requirements and the VECP, and the comparative advantages and disadvantages of each including durability, service life, reliability, economy of operation, ease of maintenance, design safety standards,

desired appearance, impacts due to construction and other essential or desirable functions and characteristics as appropriate;

5.11.3.2 An itemization of the requirements of the contract which must be changed if the VECP is adopted and a recommendation as to how to make each such change;

5.11.3.3 An estimate of the reduction in performance costs that will result from adoption of the VECP taking into account the costs of implementation by the Contractor, including any amounts attributable to subcontracts, and the basis for the estimate;

5.11.3.4 A prediction of any effects the VECP would have on other costs to the State, such as State furnished property costs, costs of related items, and costs of maintenance and operation over the anticipated life of the material, equipment, or facilities as appropriate; the construction schedule, sequence and time; and bid item totals used for evaluation and payment purposes;

5.11.3.5 A statement of the time by which a change order adopting the VECP must be issued so as to obtain the maximum cost reduction during the remainder of this contract noting any effect on the contract time; and

5.11.3.6 The dates of any previous submissions of the VECP, the numbers of any Government contracts under which submitted and the previous actions by the Government, if known.

5.11.4 Required Use of Licensed Architect or Engineer - When, in the judgment of the Engineer, a VECP alters the design prepared by a registered professional architect or engineer, the Contractor shall ensure the changes to be prepared are by or under the supervision of a licensed professional architect or engineer, and stamped and so certified.

5.11.5 Unless and until a change order applies a VECP to a contract, the Contractor shall remain obligated to perform in accordance with the terms of the contract and the Department shall not be liable for delays incurred by the Contractor resulting from the time required for the Department's determination of the acceptability of the VECP.

5.11.5.1 The determination of the Engineer as to the acceptance of any VECP under a contract shall be final.

5.11.6 Acceptance of VECP - The Engineer may accept in whole or in part any VECP submitted pursuant to this section by issuing a change order to the contract. Prior to issuance of the change order, the Contractor shall submit complete final contract documents similar to those of the

original contract showing the accepted changes and the new design and features as well as the following:

5.11.6.1 Design calculations;

5.11.6.2 The design criteria used; and

5.11.6.3 A detailed breakdown of costs and expenses to construct or implement such revisions.

5.11.6.4 The change order will identify the final VECP on which it is based.

5.11.7 VECP Price Adjustments - When a VECP is accepted under a contract, an adjustment in the contract price shall be made in accordance with Section 4.4 PRICE ADJUSTMENT. The adjustment shall first be established by determining the effect on the Contractor's cost of implementing the change, including any amount attributable to subcontractors and to the Department's charges to the Contractor for architectural, engineering, or other consultant services, and the staff time required to examine and review the proposal. The contract price shall then be reduced by fifty percent (50%) of the net estimated decrease in the cost of performance.

5.11.8 The Contractor may restrict the Department's right to use the data or information or both, on any sheet of a VECP or of the supporting data, submitted pursuant to this paragraph, if it is stated on that sheet as follows:

5.11.8.1 "This data or information or both shall not be disclosed outside the Department or be duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate this VECP. This restriction shall not limit the Department's right to use this data or information or both if obtained from another source, or is otherwise available, without limitations. If this VECP is accepted by the Department by issuance of a change order after the use of this data or information or both in such an evaluation, the Department shall have the right to duplicate, use and disclose any data or information or both pertinent to the proposal as accepted in any manner and for any purpose whatsoever and have others so do."

5.11.9 In the event of acceptance of a VECP, the Department shall have all rights to use, duplicate or disclose in whole or in part in any manner and for any purpose whatsoever, and to have or permit others to do so, any data or information or both reasonably necessary to fully utilize such proposal.

5.11.10 The Contractor shall submit with each VECP all required information and provide all additional information as may be required by the Engineer to evaluate and implement the VECP. The cost for preparing the VECP shall be the Contractor's responsibility, and any part of the Contractor's cost for

implementing the change shall be due only when the proposal is accepted and a change order is issued.

5.11.11 If the services of the Department's architect, engineer or consultant is necessary to review and evaluate a VECP, the cost therefore shall be paid for by the Contractor.

5.11.12 Each VECP shall be evaluated as applicable to this contract, and past acceptance on another Department project for a similar item shall not be automatic grounds for approval.

5.11.13 The method by which the Contractor will share a portion of the cost savings from an accepted VECP shall be for this contract only, and no consideration shall be made for future acquisition, royalty type payment or collateral savings.

5.11.13.1 The Department may accept the proposed VECP in whole or in part. The Engineer shall issue a contract change order to identify and describe the accepted VECP.

5.12 SUBCONTRACTS - Nothing contained in the contract documents shall create a contractual relationship between the State and any subcontractor. The contractor may subcontract a portion of the work but the contractor shall remain responsible for the work that is subcontracted.

5.12.1 Replacing Subcontractors - Contractors may enter into subcontracts only with subcontractors listed in the offer form. The contractor will be allowed to replace a listed subcontractor if the subcontractor:

5.12.1.1 Fails, refuses or is unable to enter into a subcontract consistent with the terms and conditions of the subcontractor's offer presented to the contractor; or

5.12.1.2 Becomes insolvent; or

5.12.1.3 Has any license or certification necessary for performance of the work suspended or revoked; or

5.12.1.4 Has defaulted or has otherwise breached the subcontract in connection with the subcontracted work; or

5.12.1.5 Agrees to be substituted by providing a written release; or

5.12.1.6 Is unable or refuses to comply with other requirements of law applicable to contractors, subcontractors, and public works projects.

5.12.2 Notice of Replacing Subcontractor - The contractor shall provide a written notice to the Contracting Officer when it wishes to replace a subcontractor,

including in the notice, the reasons for replacement. The contractor agrees to defend, hold harmless and indemnify the State against all claims, liabilities, or damages whatsoever, including attorneys fees arising out of or related to the replacement of a subcontractor. The contractor may not replace the subcontractor until the Contracting Officer approves of the replacement.

5.12.3 Adding Subcontractors – The Contractor may enter into a subcontract with a subcontractor that is not listed in the offer form only after this contract becomes enforceable and only after the Contracting Officer has approved the subcontractor.

5.12.4 Subcontracting - Contractor shall perform with its own organization, work amounting to not less than twenty (20%) of the total contract cost, exclusive of costs for materials and equipment the Contractor purchases for installation by its subcontractors, except that any items designated by the State in the contract as “specialty items” may be performed by a subcontract and the cost of any such specialty items so performed by the subcontract may be deducted from the total contract cost before computing the amount of work required to be performed by the Contractor with its own organization.

ARTICLE 6 - Control of Materials and Equipment

6.1 MATERIALS AND EQUIPMENT -

Contractor shall furnish, pay for and install all material and equipment as called for in the drawings and specifications. Materials and equipment shall be new and the most suitable for the purpose intended unless otherwise specified. The State does not guarantee that the specified or pre-qualified product listed in the drawings and specifications are available at the time of bid or during the contract period.

6.2 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

6.2.1 Only materials conforming to the drawings and specifications and, when required by the contract have been accepted by the Engineer, shall be used. In order to expedite the inspection and testing of materials, at the request of the Engineer, the Contractor shall identify its proposed sources of materials within ten (10) days after notification by the Engineer.

6.2.2 At the option of the Engineer, the materials may be accepted by the Engineer at the source of supply before delivery is started. Representative preliminary samples of the character and quantity prescribed shall be submitted by the Contractor or producer for examination and tested in accordance with the methods referred to under samples and tests.

6.2.3 Engineer’s Authorization to Test Materials - Materials proposed to be used may be inspected and tested whenever the Engineer deems necessary to determine conformance to the specified requirements. The cost of testing shall be borne by the Contractor. However, should test results show that the material(s) is in compliance with the specified requirements, the cost of the testing will be borne by the State.

6.2.4 Unacceptable Materials - In the event material(s) are found to be unacceptable, the Contractor shall cease their use, remove the unacceptable material(s) that have already been installed or applied, and furnish acceptable materials all at no additional cost to the State. No material which is in any way unfit for use shall be used.

6.3 SUBSTITUTION AFTER CONTRACT AWARD

6.3.1 Materials, equipment, articles and systems noted on the drawings and specifications, establish a standard of quality, function, performance or design requirements and shall not be interpreted to limit competition. Should trade names, makes, catalog numbers or brand names be specified, the contractor shall infer that these items indicate the quality, style, appearance or performance of the material, equipment, article, or systems to be used in the project. The contractor is responsible to use materials, equipment, articles or systems that meet the project requirements. Unless specifically provided otherwise in the contract documents, the contractor may, at its option, use any material equipment, article or system that, in the judgment of the Contracting officer, is equal to that required by the contract documents.

6.3.1.1 If after installing a material, equipment, article or system a variance is discovered, the contractor shall immediately replace the material, equipment, article or system with one that meets the requirements of the contract documents.

6.3.2 Substitution After Contract Award - Subject to the Contracting Officer’s determination; material, equipment, article or system with a variant feature(s) may be allowed as a substitution, provided it is in the State’s best interest. The State may deny a substitution; and if a substitution is denied, the contractor is not entitled to any additional compensation or time extension.

6.3.2.1 The contractor shall include with the submittal, a notification that identifies all deviations or variances from the contract documents. The notice shall be in a written form separate from the submittal. The variances shall be clearly shown on the shop drawing, descriptive sheet, and material sample or color sample; and the contractor shall certify that the substitution has no other variant features. Failures to identify the variances are grounds to reject the related work or materials, notwithstanding that the

Contracting Officer accepted the submittal. If the variances are not acceptable to the Contracting Officer, the contractor will be required to furnish the item as specified on the contract documents at no additional cost or time.

6.3.2.2 Acceptance of a variance shall not justify a contract price or time adjustment unless the contractor requests an adjustment at the time of submittal and the adjustments are explicitly agreed to in writing by the Contracting Officer. Any request shall include price details and proposed scheduling modifications. Acceptance of a variance is subject to all contract terms, and is without prejudice to all rights under the surety bond.

6.3.2.3 The contractor can recommend improvements to the project, for materials, equipment, articles, or systems by means of a substitution request, even if the improvements are at an additional cost. The Contracting Officer shall make the final determination to accept or reject contractor's proposed improvements. If the proposal material, equipment, article or system cost less than the specified item, the Department will require a sharing of cost similar to value engineering be implemented. State reserves its right to deny a substitution; and if a substitution is denied, the contractor is not entitled to additional compensation or time extension.

6.3.2.4 If the specified material and / or equipment inadvertently lists only a single manufacturer.

6.3.3 A substitution request after Contract Award shall be fully explained in writing. Contractor shall provide brochures showing that the substitute material and / or equipment is equal or better in essential features and also provide a matrix showing comparison of the essential features. Contractor shall justify its request and include quantities and unit prices involved, respective supplier's price quotations and such other documents necessary to fully support the request. Any savings in cost will be credited to the Department. Contractor shall absorb any additional cost for the substitute item(s) or for its installation. Submitting a substitution request, does not imply that substitutions, for brand name specified materials and equipment, will be allowed. The Engineer may reject and deny any request deemed irregular or not in the best interest of the Department. A request for substitution shall not in any way be grounds for an extension of contract time. At the discretion of the Engineer, a time extension may be granted for an approved substitution.

6.4 ASBESTOS CONTAINING MATERIALS -
The use of materials or equipment containing asbestos is prohibited under this contract. Contractor warrants that

all materials and equipment incorporated in the project are asbestos-free.

6.5 TEST SAMPLES

6.5.1 The Engineer may require any or all materials to be tested by means of samples or otherwise. Contractor shall collect and forward samples requested by the Engineer. Contractor shall not use or incorporate any material represented by the samples until all required tests have been made and the material has been accepted. In all cases, the Contractor shall furnish the required samples without charge. Where samples are required from the completed work, the Contractor shall cut and furnish samples from the completed work. Samples so removed shall be replaced with identical material and refinished. No additional compensation will be allowed for furnishing test samples and their replacement with new materials.

6.5.2 Tests of the material samples will be made in accordance with the latest standards of the American Society for Testing and Materials (ASTM), as amended prior to the contract date unless otherwise provided. In cases where a particular test method is necessary or specifications and serial numbers are stipulated, the test shall be made by the method stated in the above-mentioned publication. Where the test reference is the American Association of State Highway and Transportation Officials (AASHTO), it means the specifications and serial numbers of the latest edition and amendments prior to the bid date.

6.5.3 The Engineer may retest any materials which have been tested and accepted at the source of supply after the same has been delivered to the work site. The Engineer shall reject all materials which, when retested, do not meet the requirements of the contract.

6.6 MATERIAL SAMPLES

6.6.1 The Contractor shall furnish all samples required by the drawings and specifications or that may be requested by the Engineer of any and all materials or equipment it proposes to use. Unless specifically required, samples are not to be submitted with the bid.

6.6.2 No materials or equipment of which samples are required shall be used on the Work until the Engineer has received and accepted the samples. If the Contractor proceeds to use such materials before the Engineer accepts the samples, the Contractor shall bear the risk.

6.6.3 Contractor shall furnish two (2) copies of a transmittal letter with each shipment of samples, The letter shall provide a list of the samples, the name of the building or work for which the materials are intended and the brands of the materials and names of the manufacturers. Also, each sample submitted shall have a

label indicating the material represented, its place of origin, the names of the producer, the Contractor and the building or work for which the material is intended. Samples of finished materials shall be marked to indicate where the materials represented are required by the drawings or specifications.

6.6.4 Acceptance of any sample(s) shall be only for the characteristics or for the uses named in such acceptance and for no other purpose. Acceptance of samples shall not change or modify any contract requirement. All samples will be provided by the Contractor at no extra cost to the Department. See also Section 5.4 SHOP DRAWINGS AND OTHER SUBMITTALS.

6.7 NON-CONFORMING MATERIALS - All materials not conforming to the requirements of these contract documents, whether in place or not, shall be rejected and removed immediately from the site of work unless otherwise permitted by the Engineer in writing. No rejected material which has subsequently been made to conform shall be used unless and until written acceptance has been given by the Engineer. If the Contractor fails to comply forthwith with any order of the Engineer made under the provisions of this Section 6.7, the Engineer shall have the authority to remove and replace non-conforming materials and charge the cost of removal and replacement to the Contractor.

6.8 HANDLING MATERIALS - Contractor shall handle all materials to preserve their quality and fitness for work. Transport aggregates from the source or storage site to the work in tight vehicles to prevent loss or segregation of materials after loading and measuring.

6.9 STORAGE OF MATERIALS - Contractor shall store all materials to preserve their quality and fitness for the work. Unless otherwise provided, any portion of the project site within the Project Contract Limit not required for public travel, may be used for storage purposes and for the Contractor's plant and equipment. Any additional space required shall be provided by the Contractor at its expense subject to the Engineer's acceptance. Contractor shall store materials on wooden platforms or other hard, clean surfaces and covered to protect it from the weather and damage. Stored materials shall be located to allow prompt inspection.

6.10 PROPERTY RIGHTS IN MATERIALS - Nothing in the contract shall be construed to vest in the Contractor any right to any materials and equipment after such materials and equipment have been attached, affixed to, or placed in the work.

6.11 ASSIGNMENT OF ANTITRUST CLAIMS FOR OVERCHARGES FOR GOODS PURCHASED - Contractor (or Vendor) and the Department recognize

that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the Department. Therefore, Contractor hereby assigns to the Department any and all claims for such overcharges as to goods purchased in connection with this order or contract, except as to overcharges which result from antitrust violations commencing after the price is established under this order or contract and any change order. In addition, Contractor warrants and represents that each of its first tier suppliers and subcontractors shall assign any and all such claims to the Department, subject to the aforementioned exception.

ARTICLE 7 - Prosecution and Progress (Including Legal Relations and Responsibility)

7.1 PROSECUTION OF THE WORK

7.1.1 After approval of the contract by the Department of Defense, a Notice to Proceed will be given to the Contractor as described in Section 3.10 NOTICE TO PROCEED. The Notice to Proceed will indicate the date the Contractor is expected to begin the construction and from which date contract time will be charged.

7.1.2 The Contractor shall begin work no later than ten (10) working days from the date in the Notice to Proceed and shall diligently prosecute the same to completion within the contract time allowed. The Contractor shall notify the Engineer at least three (3) working days before beginning work.

7.1.3 If any subsequent suspension and resumption of work occurs, the Contractor shall notify the Engineer at least twenty-four (24) hours before stopping or restarting actual field operations.

7.1.4 Working Prior to Notice to Proceed - The Contractor shall not begin work before the date in the Notice to Proceed. Should the Contractor begin work before receiving the Notice to Proceed, any work performed in advance of the specified date will be considered as having been done at the Contractor's risk and as a volunteer and subject to the following conditions:

7.1.4.1 Under no circumstances shall the Contractor commence work on site until it has notified the Engineer of its intentions and has been advised by the Engineer in writing that the project site is available to the Contractor. The project site will not be made available until the Contractor has complied with commencement requirements under Section 7.2 COMMENCEMENT REQUIREMENTS.

7.1.4.2 In the event the contract is not executed, the Contractor shall, at its own expense, do such work as is necessary to leave the site in a neat condition to the

satisfaction of the Engineer. The Contractor shall not be reimbursed for any work performed.

7.1.4.3 All work done prior to the Notice to Proceed shall be performed in accordance with the contract documents, but will only be considered authorized work and be paid for as provided in the contract after the Notice to Proceed is issued.

7.1.5 For repairs and/or renovations of existing buildings, unless otherwise permitted by the Engineer, the Contractor shall not commence with the physical construction unless all or sufficient amount of materials are available for either continuous construction or completion of a specified portion of the work. When construction is started, the Contractor shall work expeditiously and pursue the work diligently until it is complete. If only a portion of the work is to be done in stages, the Contractor shall leave the area safe and usable for the user agency at the end of each stage.

7.2 COMMENCEMENT REQUIREMENTS -

Prior to beginning work on site, the Contractor shall submit the following to the Engineer:

7.2.1 Identification of the Superintendent or authorized representative on the job site. Refer to Section 5.8 COOPERATION BETWEEN THE CONTRACTOR AND THE DEPARTMENT.

7.2.2 Proposed Working Hours on the job. Refer to Section 7.5 NORMAL WORKING HOURS.

7.2.3 Permits and Licenses. Refer to Section 7.4 PERMITS AND LICENSES.

7.2.4 Schedule of Prices to be accepted for the agreed Monthly Payment Application. Unless the proposal provides unit price bids on all items in this project, the successful Bidder will be required, after the award of contract, to submit a schedule of prices for the various items of construction included in the contract. For projects involving more than a single building and / or facility, the breakdown cost shall reflect a separate schedule of prices for the various items of work for each building and/or facility. The sum of the prices submitted for the various items must equal the lump sum bid in the Bidder's proposal. This schedule will be subject to acceptance by the Engineer who may reject same and require the bidder to submit another or several other schedules if in the Engineer's opinion the prices are unbalanced or not sufficiently detailed. This schedule of prices shall be used for the purpose of determining the value of monthly payments due the Contractor for work installed complete in place; and may be used as the basis for determining cost and credit of added or deleted items of work, respectively.

7.2.4.1 The Contractor shall estimate at the close of each month the percentage of work completed under each of the various construction items during such month and submit the Monthly Payment Application to the Engineer for review and approval. The Contractor shall be paid the approved percentage of the price established for each item less the retention provided in Section 8.4 PROGRESS PAYMENTS.

7.2.5 Proof of Insurance Coverage. Certificate of Insurance or other documentary evidence satisfactory to the Contracting Officer that the Contractor has in place all insurance coverage required by the contract. The Certificate of Insurance shall contain wording which identifies the Project number and Project title for which the certificate of insurance is issued. Refer to Section 7.3 INSURANCE REQUIREMENTS.

7.2.6 Until such time as the above items are processed and approved, the Contractor shall not be allowed to commence on any operations unless authorized by the Engineer.

7.3 INSURANCE REQUIREMENTS

7.3.1 Obligation of Contractor - Contractor shall not commence any work until it obtains, at its own expense, all required herein insurance. Such insurance shall be provided by an insurance company authorized by the laws of the State to issue such insurance in the State of Hawaii. Coverage by a "Non-Admitted" carrier is permissible provided the carrier has a Best's Rating of "A-VII" or better.

7.3.2 All insurance described herein will be maintained by the Contractor for the full period of the contract and in no event will be terminated or otherwise allowed to lapse prior to written certification of final acceptance of the work by the State.

7.3.3 Certificate(s) of Insurance acceptable to the State shall be filed with the Engineer prior to commencement of the work. Certificates shall identify if the insurance company is a "captive" insurance company or a "Non-Admitted" carrier to the State of Hawaii. The best's rating must be stated for the "Non-Admitted" carrier. Certificates shall contain a provision that coverage's being certified will not be cancelled or materially changes without giving the Engineer at least thirty (30) days prior written notice. If the State is to be an Additional Insured on any of the required insurance, it shall be so noted on the certificate. Should any policy be canceled before final acceptance of the work by the State, and the Contractor fails to immediately procure replacement insurance as specified, the State, in addition to all other remedies it may have for such breach, reserves the right to procure such insurance and deduct the cost thereof from any money due to the Contractor.

7.3.4 Nothing contained in these insurance requirements is to be construed as limiting the extent of Contractor's responsibility for payment of damages resulting from its operations under this contract, including the Contractor's obligation to pay performance liquidated damages, nor shall it affect the Contractor's separate and independent duty to defend, indemnify and hold the State harmless pursuant to other provisions of this contract. In no instance will the State's exercise of an option to occupy and use completed portions of the work relieve the Contractor of its obligation to maintain the required insurance until the date of final acceptance of the work.

7.3.5 All insurance described herein shall be primary and cover the insured for all work to be performed under the contract, all work performed incidental thereto or directly or indirectly connected therewith, including traffic detour work or other work performed outside the work area and all change order work.

7.3.6 The Contractor shall, from time to time, furnish the Engineer, when requested, satisfactory proof of coverage of each type of insurance required covering the work. Failure to comply with the Engineer's request may result in suspension of the work, and shall be sufficient grounds to withhold future payments due the Contractor and to terminate the contract for Contractor's default.

7.3.7 Types of Insurance - Contractor shall purchase and maintain insurance described below which shall provide coverage against claims arising out of the Contractor's operations under the contract, whether such operations be by the Contractor itself or by any subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.

7.3.7.1 Worker's Compensation -The Contractor shall obtain worker's compensation insurance for all persons whom they employ in carrying out the work under this contract. This insurance shall be in strict conformity with the requirements of the most current and applicable State of Hawaii Worker's Compensation Insurance laws in effect on the date of the execution of this contract and as modified during the duration of the contract.

7.3.7.2 General Liability - The Contractor shall obtain General Liability insurance with a limit of not less than \$2,000,000 per occurrence and in the Aggregates. The General liability insurance shall include the State as an Additional Insured. The required limit of insurance may be provided by a single policy or with a combination of primary and excess policies. Refer to SPECIAL CONDITIONS for any additional requirements.

7.3.7.3 Auto Liability - The Contractor shall obtain Auto Liability Insurance covering all owned, non-owned and

hired autos with a combined single Limit of not less than \$1,000,000 per occurrence. The required limit of insurance may be provided by a single policy or with a combination of primary and excess policies. Refer to SPECIAL CONDITIONS for any additional requirements.

7.3.7.4 Property Insurance (Builders Risk)

(1) New Building(s) - The Contractor shall obtain Property Insurance covering building(s) being constructed under this Contract. The limit shall be equal to the completed value of the building(s) and shall insure against all-loss excluding earthquakes and floods. The coverage shall be provided by a company authorized to write insurance in the State of Hawaii as an insurer.

(2) Building Renovation and / or Installation Contract - The Contractor shall obtain Property Insurance with a limit equal to the completed value of the work or property being installed and shall insure against all-loss excluding earthquakes and floods. The coverage shall be provided by a company authorized to write insurance in the State of Hawaii as an insurer. Refer to SPECIAL CONDITIONS for any additional requirements.

(3) The Contractor is not required to obtain property insurance for contracts limited to site development

7.4 PERMITS AND LICENSES

7.4.1 The State or its representative may process Federal (e.g. Corps of Engineers), State and County Permit applications. The Contractor shall pick up the pre-processed Permits at the appropriate governmental agency and pay the required fees. Other permits necessary for the proper execution of the work such as utility connection permits, elevator installation permits etc., unless processed by the State and paid for by the Contractor, shall be obtained and paid for by the Contractor.

7.4.2 Until such time as the above permits are approved, the Contractor shall not be allowed to commence any operations without written approval of the Engineer.

7.4.3 The Engineer reserves the right to waive application and processing of the building permit.

7.5 NORMAL WORKING HOURS - Prior to beginning operations, unless otherwise established by the State, the Contractor shall notify the Engineer in writing of the time in hours and minutes, A.M. and P.M. respectively, at which it desires to begin and end the day's work. If the Contractor desires to change the working

hours, it shall request the Engineer's approval three (3) consecutive working days prior to the date of the change.

7.6 HOURS OF LABOR (Section 104-2 Hawaii Revised Statutes)

7.6.1 No laborer or mechanic employed on the job site of any public work of the Department or any political subdivision thereof shall be permitted or required to work on Saturday, Sunday or a legal holiday of the State or in excess of eight hours on any other day unless the laborer or mechanic receives overtime compensation for all hours worked on Saturday, Sunday and a legal holiday of the State or in excess of eight hours on any other day. For the purposes of determining overtime compensation under this Section 7.6, the basic hourly rate of any laborer or mechanic shall not be less than the basic hourly rate determined by the Department of Labor and Industrial Relations to be the prevailing basic hourly rate for corresponding classes of laborers and mechanics on projects of similar character in the Department.

7.6.2 Overtime compensation means, compensation based on one and one-half times the laborers or mechanics basic hourly rate of pay plus the cost to an employer of furnishing a laborer or mechanic with fringe benefits.

7.7 PREVAILING WAGES - (§ 104-2 HRS)

7.7.1 The Contractor shall at all times observe and comply with all provisions of Chapter 104, HRS, the significant requirements of which are emphasized in the Department of Labor and Industrial Relations Publication No. H104-3 entitled 'Requirements of Chapter 104, HRS Wages and Hours of Employees on Public Works Law'.

7.7.2 Wage Rate Schedule - The wage rate schedule is not physically enclosed in the bid documents. However, the wage rate schedule is incorporated herein by reference and made a part of the Bid and Contract Documents. Said wage rate schedule may be obtained from the Contracts Office, Department of Accounting and General Services, 1151 Punchbowl Street, Room 422, Honolulu, Hawaii or, via the FAX-ON-DEMAND system of the Department of Labor and Industrial Relations, phone number (808) 586-8695. When the bid documents are made available on respective neighbor islands, copies of the wage rate schedule may also be obtained from the office of the respective neighbor island DAGS District Office.

7.7.3 The Contractor or its subcontractor(s) shall pay all laborers and mechanics employed on the job site, unconditionally and not less often than once a week, and without deduction or rebate on any account except as allowed by law, the full amounts of their wages including overtime, accrued to not more than five (5) working days prior to the time of payment, at wage rates not less than those stated in the contract, regardless of any contractual

relationship which may be alleged to exist between the Contractor and subcontractor and such laborers and mechanics. The wages stated in the contract shall not be less than the minimum prevailing wages (basic hourly rate plus fringe benefits), as determined by the Director of Labor and Industrial Relations and published in wage rate schedules. Any increase in wage rates, as determined by the Director of Labor and Industrial Relations and issued in the wage rate schedule, shall be applicable during the performance of the contract, in accordance with section 104-2(a) and (b), Hawaii Revised Statutes. Notwithstanding the provisions of the original contract, if the Director of Labor and Industrial Relations determines that prevailing wages have increased during the performance of the contract, the rate of pay of laborers and mechanics shall be raised accordingly.

7.7.4 Posting Wage Rate Schedule - The rates of wages to be paid shall be posted by the Contractor in a prominent and easily accessible place at the job site and a copy of such wages required to be posted shall be given to each laborer and mechanic employed under the contract by the Contractor at the time the person is employed thereunder, provided that where there is a collective bargaining agreement, the Contractor does not have to provide its employees the wage rate schedules. Any revisions to the schedule of wages issued by the Director of Labor and Industrial Relations during the course of the contract shall also be posted by the Contractor and a copy provided to each laborer and mechanic employed under the contract as required above.

7.7.5 The Engineer may withhold from the Contractor so much of the accrued payments as the Engineer may consider necessary to pay to laborers and mechanics employed by the Contractor or any subcontractor on the job site. The accrued payments withheld shall be the difference between the wages required by this contract and the wages actually received by such laborers or mechanics.

7.8 FAILURE TO PAY REQUIRED WAGES (§ 104-4, HRS) - If the Department finds that any laborer or mechanic employed on the job site by the Contractor or any subcontractor has been or is being paid wages at a rate less than the required rate by the contract, or has not received their full overtime compensation, the Department may, by written notice to the Contractor, terminate its right, or the right of any subcontractor, to proceed with the work or with the part of the work on which the required wages or overtime compensation have not been paid and may complete such work or part by contract or otherwise, and the Contractor and its sureties shall be liable to the Department for any excess costs occasioned thereby.

7.9 PAYROLLS AND PAYROLL RECORDS

(§ 104-3 HRS)

7.9.1 A certified copy of each weekly payroll shall be submitted to the Engineer within seven (7) calendar days after the end of each weekly payroll period. Failure to do so on a timely basis shall be cause for disqualification from bidding in accordance with the provisions of Section 2.12 DISQUALIFICATION OF BIDDERS. The Contractor shall be responsible for the timely submission of certified copies of payrolls of all subcontractors. The certification shall affirm that payrolls are correct and complete, that the wage rates contained therein are not less than the applicable rates contained in the wage determination decision, any amendments thereto during the period of the contract, and that the classifications set forth for each laborer and mechanic conform with the work they performed.

7.9.2 Payroll records for all laborers and mechanics working at the site of the work shall be maintained by the General Contractor and its subcontractors, if any, during the course of the work and preserved for a period of four (4) years thereafter. Such records shall contain the name of each employee, their correct classification, rate of pay, daily and weekly number of hours worked, itemized deductions made and actual wages paid. Such records shall be made available for inspection at a place designated by the Engineer, the Director of Labor and any authorized persons who may also interview employees during working hours on the job site.

7.9.3 Note that the falsification of certifications noted in this Section 7.9 may subject the Contractor or subcontractor to penalties and debarment under the laws referenced in Section 7.14 LAWS TO BE OBSERVED and / or criminal prosecution.

7.9A APPRENTICESHIP AGREEMENT CERTIFICATION (HRS §103-55.6)

7.9A.1 For the duration of a contract awarded and executed utilizing the apprenticeship agreement preference, the Contractor shall certify for each month that work is being conducted on the project, that it continues to be a participant in the relevant registered apprenticeship program for each trade it employs.

7.9A.2 Monthly certification shall be made by completing the *Monthly Report of Contractor's Participation – Form 2* made available by the State Department of Labor and Industrial Relations, the original to be signed by the respective apprenticeship program sponsors authorized official, and submitted by the Contractor to the Engineer with its monthly payment requests. The *Monthly Report of Contractor's Participation – Form 2* is available on the DLIR website at: <http://hawaii.gov/labor/wdd>.

7.9A.3 Should the Contractor fail or refuse to submit its *Monthly Report of Contractor's Participation – Form 2*, or at any time during the duration of the contract, cease to be a party to a registered apprenticeship agreement for any of the apprenticeable trades the Contractor employs, or will employ, the Contractor will be subject to the following sanctions:

7.9A.3.1 Withholding of the requested payment until all of the required *Monthly Report of Contractor's Participation – Form 2s* are properly completed and submitted.

7.9A.3.2 Temporary or permanent cessation of work on the project, without recourse to breach of contract claims by the Contractor; provided the Department shall be entitled to restitution for nonperformance or liquidated damages claims; or

7.9A.3.3 Proceedings to debar or suspend pursuant to HRS §103D-702.

7.9A.4 If events such as "acts of God", acts of public enemy, acts of the State or any other governmental body in its sovereign or contractual capacity, fires, floods, epidemics, freight embargoes, unusually severe weather, or strikes or other labor disputes prevent the Contractor from submitting the *Monthly Report of Contractor's Participation – Form 2*, the Contractor shall not be penalized as provided herein, provided the Contractor completely and expeditiously complies with the certification process when the event is over.

7.10 OVERTIME AND NIGHT WORK

7.10.1 Overtime work shall be considered as work performed in excess of eight (8) hours in any one day or work performed on Saturday, Sunday or legal holiday of the State. Overtime and night work are permissible when approved by the Engineer in writing, or as called for elsewhere within these GENERAL CONDITIONS.

7.10.2 Overtime Notification - Contractor shall notify the Engineer in writing at least two (2) working days prior to doing overtime and night work, to insure proper inspection will be available. The notification shall address the specific work to be done. A notification is not required when overtime work and night work are included as normal working hours in the contract and in the contractor's construction schedule.

7.10.3 In the event that work other than that contained in the above notification is performed and for which the Engineer determines State inspection services were necessary but not available because of the lack of notification, the Contractor may be required to remove all such work and perform the work over again in the presence of State inspection personnel.

7.10.4 Any hours worked in excess of the normal eight (8) working hours per day or on Saturdays, Sundays or legal State holidays will not be considered a working day.

7.10.5 The State hereby reserves the right to cancel the overtime, night, Saturday, Sunday or legal State holiday work when it is found that work during these periods is detrimental to the public welfare or the user agency.

7.11 OVERTIME AND NIGHT PAYMENT FOR STATE INSPECTION SERVICE

7.11.1 The Department is responsible for overtime or night time payments for Department's inspection services, including Department's Inspector, State staff personnel and the Department's Consultant(s) engaged on the project, when overtime and night work are included as normal working hours in the contract and in the contractor's construction schedule.

7.11.2 Whenever the Contractor's operations require the State's inspection and staff personnel to work overtime or at night, the Contractor shall reimburse the State for the cost of such services unless otherwise instructed in the Contract. The Engineer will notify the Contractor of the minimum number of required Department employees and other personnel engaged by the Department prior to the start of any such work. The costs chargeable to the Contractor shall include but not be limited to the following:

7.11.2.1 The cost of salaries which are determined by the State and includes overtime and night time differential for the Department's staff and inspection personnel. In addition to the cost of the salaries, the Contractor shall reimburse the State's share of contributions to the employee's retirement, medical plan, social security, vacation, sick leave, worker's compensation funds, per diem, and other applicable fringe benefits and overhead expenses.

7.11.2.2 The transportation cost incurred by the Department's staff and inspection personnel which are based on established rental rates or mileage allowance in use by the Department for the particular equipment or vehicle.

7.11.2.3 Fees and other costs billed the State by Consultants engaged on the project for overtime and/or night time work.

7.11.3 Payment for Inspection Services - The monies due the Department for staff and inspection work and use of vehicles and equipment as determined in subsection 7.11.2 shall be deducted from the monies due or to become due the Contractor. In any and all events, the

Contractor shall not pay the Department's employees directly.

7.12 LIMITATIONS OF OPERATIONS

7.12.1 Contractor shall at all times conduct the work in such manner and in such sequence as will insure the least practicable interference with pedestrian and motor traffic passageways. The Contractor shall furnish convenient detours and provide and plan all other appropriate signs, flashers, personnel, warnings, barricades and other devices for handling pedestrian and motor traffic.

7.12.2 In the event that other contractors are also employed on the job site, the Contractor shall arrange its work and dispose of materials so as not to interfere with the operations of the other contractors engaged upon adjacent work. The Contractor shall join its work to that of others and existing buildings in a proper manner, and in accordance with the drawings and specifications, and perform its work in the proper sequence in relation to that of others, all as may be directed by the Engineer.

7.12.3 Each Contractor shall be responsible for any damage done by it to work performed by another contractor. Each Contractor shall so conduct its operations and maintain the work in such condition that adequate drainage shall be in effect at all times.

7.12.4 In the event that the Contractor fails to prosecute its work as provided in this Section 7.12 or disregards the directions of the Engineer, the Engineer may suspend the work until such time as the Contractor provides for the prosecution of the work with minimum interference to traffic and passageways or other contractors, adequate drainage, the repair of damage and complies with the direction of the Engineer. No payment will be made for the costs of such suspension.

7.13 ASSIGNMENT OR CHANGE OF NAME §3-125-14 HAR

7.13.1 Assignment - The Contractor shall not sublet, sell, transfer, assign or otherwise dispose of this contract or any part hereof or any right, title or interest herein or any monies due or to become due hereunder without the prior written consent of the Engineer.

7.13.2 The Contractor may assign money due or to become due it under the contract and such assignment will be recognized by the Department, if given proper notice thereof, to the extent permitted by law; but any assignment of monies shall be subject to all proper set-offs in favor of the State and to all deductions provided in the contract and particularly all monies withheld or unpaid, whether assigned or not, shall be to use by the Department for the completion of the work in the event that the Contractors should be in default therein.

7.13.3 Recognition of a Successor in Interest; Assignment - When in the best interest of the State, a successor in interest may be recognized in an assignment agreement in which the transferor and the transferee and the State shall agree that:

7.13.3.1 The transferee assumes all of the transferor's obligations;

7.13.3.2 Transferor remains liable for all obligations under the contract but waives all rights under the contract against the State; and

7.13.3.3 The transferor shall continue to furnish, and the transferee shall also furnish, all required bonds.

7.13.4 Change of Name - When a Contractor requests to change the name in which it holds a contract with the State, the Engineer shall, upon receipt of a document indicating such change of name (for example: an amendment to the articles of incorporation of the corporation), enter into an agreement with the requesting Contractor to effect such a change of name. The agreement changing the name shall specifically indicate that no other terms and conditions of the contract are thereby changed.

7.13.5 All change of name or novation agreements effected hereunder other than by the Engineer shall be reported to the Engineer within thirty (30) days of the date that the agreement becomes effective.

7.13.6 Notwithstanding the provisions of paragraphs 7.13.3.1 through 7.13.3.3 above, when a Contractor holds contracts with more than one purchasing agency of the State, the novation or change of name agreements herein authorized shall be processed only through the Department of Defense, State of Hawaii.

7.14 LAWS TO BE OBSERVED

7.14.1 The Contractor at all times shall observe and comply with all Federal, State and local laws or ordinances, rules and regulations which in any manner affect those engaged or employed in the work, the materials used in the work, and the conduct of the work. The Contractor shall also comply with all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the work. Any reference to such laws, ordinances, rules and regulations shall include any amendments thereto before and after the date of this contract.

7.14.2 The Contractor shall defend, protect, hold harmless and indemnify the State and its Departments and Agencies and all their officers, representatives, employees or agents against any claim or liability arising from or

based on the violation of any such laws, ordinances, rules and regulations, orders or decrees, whether such violation is committed by the Contractor or its Subcontractor(s) or any employee of either or both. If any discrepancy or inconsistency is discovered in the contract for the work in relation to any such laws, ordinances, rules and regulations, orders or decrees, the Contractor shall forthwith report the same to the Engineer in writing.

7.14.3 While the Contractor must comply with all applicable laws, attention is directed to: Wage and Hours of Employees on Public Works, Chapter 104, Hawaii Revised Statutes (HRS); Hawaii Public Procurement Code, Authority to debar or suspend, Section 103D-702, HRS; Hawaii Employment Relations Act, Chapter 377, HRS; Hawaii Employment Security Law, Chapter 383, HRS; Worker's Compensation Law, Chapter 386, HRS; Wage and Hour Law, Chapter 387, HRS; Occupational Safety and Health, Chapter 396, HRS; and Authority to Debar or Suspend, Chapter 126, subchapter 2, Hawaii Administrative Rules (HAR).

7.15 PATENTED DEVICES, MATERIALS AND PROCESSES - If the Contractor desires to use any design, device, material, or process covered by letters of patent or copyright, the right for such use shall be procured by the Contractor from the patentee or owner. The Contractor shall defend, protect, indemnify and hold harmless the State and its Departments and Agencies, any affected third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright in connection with the work to be performed under the contract, shall defend, protect, indemnify and hold harmless the State and its Departments and Agencies for any costs, expenses and damages which it may be obligated to pay by reason of any such infringement at any time during the prosecution or after the completion of the work. This section shall not apply to any design, device, material or process covered by letters of patent or copyright, which the Contractor is required to use by the drawings or specifications.

7.16 SANITARY, HEALTH AND SAFETY PROVISIONS

7.16.1 The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of its employees as may be necessary to comply with the requirements of the State and local Boards of Health, or other bodies or tribunals having jurisdiction. Unless otherwise stated in the drawings or specifications, the Contractor shall install toilet facilities conveniently located at the job site and maintain same in a neat and sanitary condition for the use of the employees on the job site for the duration of the contract. The toilet facilities shall conform to the requirements of the State Department of Health. The cost of installing, maintaining and

removing the toilet facilities shall be considered incidental to and paid for under various contract pay items for work or under the lump sum bids as the case may be, and no additional compensation will be made therefore. These requirements shall not modify or abrogate in any way the requirements or regulations of the State Department of Health.

7.16.2 Attention is directed to Federal, State and local laws, rules and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to their health or safety.

7.17 PROTECTION OF PERSONS AND PROPERTY

7.17.1 Safety Precautions and Programs - The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

7.17.1.1 All persons on the Work site or who may be affected by the Work;

7.17.1.2 All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor and its subcontractors; and

7.17.1.3 Other property at the site or adjacent thereto, including trees, shrubs lawns walks pavement, roadways structures, and utilities not designated for removal, relocation or replacement in the course of construction.

7.17.2 Contractor shall give notices and comply with applicable laws, ordinances, regulations, rules, and lawful orders of any public body having jurisdiction for the safety of persons or property or their protection from damage, injury or loss; and the Contractor shall erect and maintain reasonable safeguards for safety and protection, including posting danger signs, or other warnings against hazards.

7.17.3 The Contractor shall notify Owners of adjacent properties and of underground (or overhead) utilities when performing work, which may affect the Owners; and shall cooperate with the Owners in the protection, removal and replacement of their property.

7.17.4 All damage, injury or loss to any property referred to in paragraphs 7.17.1.2 and 7.17.1.3 caused by the fault or negligence or damage or loss attributable to acts or omissions directly or indirectly in whole or part by

the Contractor a subcontractor or any one directly or indirectly employed by them, or by anyone for whose acts they might be liable, shall be remedied promptly by the Contractor.

7.17.5 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the protection of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor

7.17.6 The Contractor shall not load or permit any part of the construction to be loaded so as to endanger its safety. The Contractor shall not injure or destroy trees or shrubs nor remove or cut them without permission of the Engineer. Contractor shall protect all land monuments and property marks until an authorized agent has witnessed or otherwise referenced their location and shall not remove them until directed.

7.17.7 In the event the Contractor encounters on the site, material reasonably believed to be asbestos or other hazard material that has not been rendered harmless, the Contractor shall stop work in the area and notify the Engineer promptly. The work in the affected area shall be resumed in the absence of hazard materials or when the hazard has been rendered harmless.

7.17.8 Emergencies - In an emergency affecting the safety and protection of persons or the Work or property at the site or adjacent thereto, Contractor without special instructions or authorization from the Engineer, shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Contractor shall give the Engineer prompt written notice of the emergency and actions taken. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined under the provisions of Section 7.25 DISPUTES AND CLAIMS.

7.18 ARCHAEOLOGICAL SITES

7.18.1 Should historic sites such as walls, platforms, pavements and mounds, or remains such as artifacts, burials, concentration of charcoal or shells be encountered during construction, work shall cease in the immediate vicinity of the find and the find shall be protected from further damage. The Contractor shall immediately notify the Engineer and contact the State Historic Preservation Division which will assess the significance of the find and recommend the appropriate mitigation measures, if necessary.

7.18.2 When required, the Contractor shall provide and install any temporary fencing as shown on the drawings to protect archaeological sites within the project. The fencing shall be installed prior to any construction activity and shall be maintained by the Contractor for the duration

of the project. Fence installation and maintenance shall be to the satisfaction of the Engineer. The Contractor shall remove the fencing upon completion of construction, or as directed by the Engineer.

7.18.3 No work shall be done within the temporary fencing area. If any construction work is done within the temporary fencing, the Contractor shall notify the Engineer immediately; and if the Contractor entered the archaeological site area without permission, it shall stop work in this area immediately. The Engineer shall notify the archaeologist to assess any damage to the area. The Contractor shall allow the archaeologist sufficient time to perform the field investigation.

7.18.4 Any site requiring data recovery within the project shall not be disturbed until data recovery is completed.

7.19 RESPONSIBILITY FOR DAMAGE CLAIMS; INDEMNITY

7.19.1 The Contractor shall indemnify the State and the Department against all loss of or damage to the State's or the Department's existing property and facilities arising out of any act or omission committed in the performance of the work by the Contractor, any subcontractor or their employees and agents. Contractor shall defend, hold harmless and indemnify the Department and the State, their employees, officers and agents against all losses, claims, suits, liability and expense, including but not limited to attorneys' fees, arising out of injury to or death of persons (including employees of the State and the Department, the Contractor or any subcontractor) or damage to property resulting from or in connection with performance of the work and not caused solely by the negligence of the State or the Department, their agents, officers and employees. The State or the Department may participate in the defense of any claim or suit without relieving the Contractor of any obligation hereunder. The purchase of liability insurance shall not relieve the Contractor of the obligations described herein.

7.19.2 The Contractor agrees that it will not attempt to hold the State and its Departments and Agencies and their officers, representatives, employees or agents, liable or responsible for any losses or damages to third parties from the action of the elements, the nature of the work to be done under these GENERAL CONDITIONS or from any unforeseen obstructions, acts of God, vandalism, fires or encumbrances which may be encountered in the prosecution of the work.

7.19.3 The Contractor shall pay all just claims for materials, supplies, tools, labor and other just claims against the Contractor or any subcontractor in connection with this contract and the surety bond will not be released

by final acceptance and payment by the Department unless all such claims are paid or released. The Department may, but is not obligated to, withhold or retain as much of the monies due or to become due the Contractor under this contract considered necessary by the Engineer to cover such just claims until satisfactory proof of payment or the establishment of a payment plan is presented.

7.19.4 The Contractor shall defend, indemnify and hold harmless the State and its Departments and Agencies and their officers, representatives, employees or agents from all suits, actions or claims of any character brought on account of any claims or amounts arising out of or recovered under the Workers' Compensation Laws or violation of any other law, by-law, ordinance, order or decree.

7.20 CHARACTER OF WORKERS OR EQUIPMENT

7.20.1 The Contractor shall at all times provide adequate supervision and sufficient labor and equipment for prosecuting the work to full completion in the manner and within the time required by the contract.

7.20.2 Character and Proficiency of Workers - All workers shall possess the proper license and / or certification, job classification, skill and experience necessary to properly perform the work assigned to them. All workmen engaged in special work or skilled work such as bituminous courses or mixtures, concrete pavement or structures, electrical installation, plumbing installation, or in any trade shall have sufficient experience in such work and in the operation of the equipment required to properly and satisfactorily perform all work. All workers shall make due and proper effort to execute the work in the manner prescribed in these GENERAL CONDITIONS, otherwise, the Engineer may take action as prescribed herein.

7.20.2.1 Any worker employed on the project by the Contractor or by any subcontractor who, in the opinion of the Engineer, is not careful and competent, does not perform its work in a proper and skillful manner or is disrespectful, intemperate, disorderly or neglects or refuses to comply with directions given, or is otherwise objectionable shall at the written request of the Engineer, be removed forthwith by the Contractor or subcontractor employing such worker and shall not be employed again in any portion of the work without the written consent of the Engineer. Should the Contractor or subcontractor continue to employ, or again employ such person or persons on the project, the Engineer may withhold all payments which are or may become due, or the Engineer may suspend the work until the Engineer's orders are followed, or both.

7.20.3 Insufficient Workers - A sufficient number of workers shall be present to ensure the work is accomplished at an acceptable rate. In addition, the proper ratio of apprentice to journey worker shall be maintained to ensure the work is properly supervised and performed. In the event that the Engineer finds insufficient workers are present to accomplish the work at an acceptable rate of progress or if a adequate number of journey workers are not present and no corrective action is taken by the Contractor after being informed in writing, the Engineer may terminate the contract as provided for under Section 7.27 TERMINATION OF CONTRACT FOR CAUSE.

7.20.4 Equipment Requirements - All equipment furnished by the Contractor and used on the work shall be of such size and of such mechanical condition that the work can be performed in an acceptable manner at a satisfactory rate of progress and the quality of work produced will be satisfactory.

7.20.4.1 Equipment used on any portion of the project shall be such that no injury to the work, persons at or near the site, adjacent property or other objects will result from its use.

7.20.4.2 If the Contractor fails to provide adequate equipment for the work, the contract may be terminated as provided under Section 7.27 TERMINATION OF CONTRACT FOR CAUSE.

7.20.4.3 In the event that the Contractor furnishes and operates equipment on a force-account basis, it shall be operated to obtain maximum production under the prevailing conditions.

7.21 CONTRACT TIME

7.21.1 Time is of the essence for this contract.

7.21.2 Calculation of Contract Time - When the contract time is on a working day basis, the total contract time allowed for the performance of the work shall be the number of working days shown in the contract plus any additional working days authorized in writing as provided hereinafter. Refer to Article 1 DEFINITIONS for the definition of Working Day. The count of elapsed working days to be charged against contract time shall begin from the date of Notice to Proceed and shall continue consecutively to the date of Project Acceptance determined by the Engineer. When the contract completion time is a fixed calendar date, it shall be the date on which all work on the project shall be completed. Maintenance periods are not included within the contract time unless specifically noted in the Contract Documents.

7.21.3 Modifications of Contract Time
§3-125-4 HAR

7.21.3.1 Extensions - For increases in the scope for work caused by alterations and additional work made under Section 4.2 CHANGES, the Contractor will be granted a time extension only if the changes increase the time of performance for the Contract. If the Contractor believes that an extension of time is justified and is not adequately provided for in a Field Order, it must request the additional time sought in writing when the detailed cost breakdown required by Section 4.2 CHANGES, is submitted. The Contractor must show how the time of performance for the critical path will be affected and must also support the time extension request with schedules and statements from its subcontractors, suppliers, and/or manufacturers. Compensation for any altered or additional work will be paid as provided in Section 4.2 CHANGES.

7.21.3.2 The Department may direct changes to the work at any time until the work is finally accepted. The issuance of a Field Order at any time may alter or modify the contract duration only by the days specified therein; or if not specified therein, for the days the critical path must be extended for the change. Additional time to perform the extra work will be added to the time allowed in the contract without regard to the date the change directive was issued, even if the contract completion date has passed. A change requiring time will not constitute a waiver of pre-existing Contractor delay.

7.21.4 Delay for Permits - For delays beyond the control of the Contractor in obtaining necessary permits, one day extension for each day delay may be granted by the Engineer, provided the Contractor notifies the Engineer that the permits are not available, as soon as the delay occurs. Time extensions shall be the exclusive relief granted on account of such delays. No additional compensation will be paid for these time extensions.

7.21.5 Delays Beyond Contractor's Control §3-125-18(4) - For delays affecting the critical path caused by acts of God, or the public enemy, fire, unusually severe weather, earthquakes, floods, epidemics, quarantine restrictions, labor disputes, freight embargoes and other reasons beyond the Contractor's control, the Contractor may be granted an extension of time provided that:

7.21.5.1 The Contractor notifies the Engineer in writing within five (5) work days after the occurrence of the circumstances described above and states the possible effects on the completion date of the contract.

7.21.5.2 No time extension will be granted for weather conditions other than unusually severe weather occurrences, and floods.

7.21.5.3 The Contractor, if requested, submits to the Engineer within ten (10) work days after the request, a

written statement describing the delay to the project. The extent of delay must be substantiated as follows:

- (a) State specifically the reason or reasons for the delay and fully explain in a detailed chronology the effect of this delay to the work and/or the completion date.
- (b) Submit copies of purchase order, delivery tag, and any other pertinent documentation to support the time extension request.
- (c) Cite the period of delay and the time extension requested.
- (d) A statement either that the above circumstances have been cleared and normal working conditions restored as of a certain day or that the above circumstances will continue to prevent completion of the project.

7.21.5.4 Time extensions shall be the exclusive relief granted and no additional compensation will be paid the Contractor for such delays.

7.21.6 Delays in Delivery of Materials - For delays in delivery of materials and / or equipment which occur as a result of unforeseeable causes beyond the control and without fault or negligence of both the Contractor, its subcontractor(s) or supplier(s), the Contractor may be granted an extension of time provided that it complies with the following procedures.

7.21.6.1 The Contractor must notify the Engineer in writing within five (5) consecutive working days after it first has any knowledge of delays or anticipated delays and state the effects such delays may have on the completion date of the contract.

7.21.6.2 The Contractor, if requested, must submit to the Engineer within ten (10) working days after a firm delivery date for the material and equipment is established, a written statement as to the delay to the progress of the project. The delay must be substantiated as follows:

- (a) State specifically the reason or reasons for the delay. Explain in a detailed chronology the effect of this delay to the other work and / or the completion date.
- (b) Submit copies of purchase order(s), factory invoice(s), bill(s) of lading, shipping manifest(s), delivery tag(s) and any other pertinent correspondence to support the time extension request.
- (c) Cite the start and end date of the delay and the days requested therefore. The delay shall not exceed the difference between the originally scheduled delivery date versus the actual delivery date.

7.21.6.3 Time extensions shall be the exclusive relief granted and no additional compensation will be paid the Contractor on account of such delay.

7.21.7 Delays For Suspension of Work - Delay during periods of suspension of the work by the Engineer shall be computed as follows:

7.21.7.1 When the performance of the work is totally suspended for one or more days (calendar or working days, as appropriate) by order of the Engineer in accordance with paragraphs 7.24.1.1, 7.24.1.2, 7.24.1.4 or 7.24.1.6 the number of days from the effective date of the Engineer's order to suspend operations to the effective date of the Engineer's order to resume operations shall not be counted as contract time and the contract completion date will be adjusted. Should the Contractor claim for additional days in excess of the suspension period, Contractor shall provide evidence justifying the additional time. During periods of partial suspensions of the work, the Contractor will be granted a time extension only if the partial suspension affects the critical path. If the Contractor believes that an extension of time is justified for a partial suspension of work, it must request the extension in writing at least five (5) working days before the partial suspension will affect the critical operation(s) in progress. The Contractor must show how the critical path was increased based on the status of the work and must also support its claim, if requested, with statements from its subcontractors. A suspension of work will not constitute a waiver of pre-existing Contractor delay.

7.21.8 Contractor Caused Delays - No time extension will be considered for the following:

7.21.8.1 Delays in performing the work caused by the Contractor, subcontractor and / or supplier.

7.21.8.2 Delays in arrival of materials and equipment caused by the Contractor, subcontractor and / or supplier in ordering, fabricating, delivery, etc.

7.21.8.3 Delays requested for changes which the Engineer determines unjustifiable due to the lack of supporting evidence or because the change is not on the critical path.

7.21.8.4 Delays caused by the failure of the Contractor to submit for review and acceptance by the Engineer, on a timely basis, shop drawings, descriptive sheets, material samples, color samples, etc. except as covered in subsection 7.21.5 and 7.21.6.

7.21.8.5 Failure to follow the procedure within the time allowed to qualify for a time extension.

7.21.8.6 Days the Contractor is unable to work due to normal rainfall or other normal bad weather day conditions.

7.21.9 Reduction in Time - If the Department deletes any portion of the work, an appropriate reduction of contract time may be made in accordance with Section 4.2 CHANGES.

7.22 CONSTRUCTION SCHEDULE

7.22.1 The Contractor shall submit its detailed construction schedule to the Engineer prior to the start of the work. The purpose of the schedule is to allow the Engineer to monitor the Contractor's progress on the work. The schedule shall account for normal inclement weather, unusual soil or other conditions that may influence the progress of the work, schedules and coordination required by any utility, off or on site fabrications, and all other pertinent factors that relate to progress.

7.22.2 Submittal of and the Engineer's receipt of the construction schedule shall not imply the Department's approval of the schedule's breakdown, its individual elements, and any critical path that may be shown. Any acceptance or approval of the schedule 1) shall be for general format only and not for sequences or durations thereon, and 2) shall not be deemed an agreement by the Department that the construction means, methods and resources shown on the schedule will result in work that conforms to the contract requirements. The Contractor has the risk of all elements (whether or not shown) of the schedule and its execution. Additional compensation shall not be due the Contractor in the event that deviations from the Contractor's schedule, caused by any design revisions required to resolve site conditions or State, County, or utility requirements, affect the efficiency of its operations.

7.22.3 In the event the Contractor submits and the Department receives an accelerated schedule (shorter than the contract time), such will not constitute an agreement to modify the contract time or completion date, nor will the receipt, acceptance or approval of such a schedule incur any obligation by the Department.

7.22.4 Caution - The Department will not be responsible if the Contractor does not meet its accelerated schedule.

7.22.5 The requirements of this Section 7.22 CONSTRUCTION SCHEDULE may be waived by the Engineer.

7.23 STATEMENT OF WORKING DAYS - For all contracts on a working day basis, the Contractor will submit a statement of the number of working days for

each month together with the Monthly Payment Application. The Monthly Payment Application will not be processed without the statement of working days.

7.24 SUSPENSION OF WORK §3-125-7 HAR

7.24.1 Procedure to be followed - The Engineer may, by written order, suspend the performance of the Work up to thirty (30) days and the Engineer, for an unlimited number of days, either in whole or in part for any cause, including but not limited to:

7.24.1.1 Weather or excess bad weather days, considered unsuitable by the Engineer for prosecution of the work; or

7.24.1.2 Soil Conditions considered unsuitable by the Engineer for prosecution of the work; or

7.24.1.3 Failure of the Contractor to:

(1) Correct conditions unsafe for the general public or for the workers;

(2) Carry out orders given by the Engineer;

(3) Perform the work in strict compliance with the provisions of the contract; or

(4) Provide a qualified Superintendent on the jobsite as described under Section 5.8 COOPERATION BETWEEN THE CONTRACTOR AND THE DEPARTMENT.

7.24.1.4 When any redesign is deemed necessary by the Engineer; or

7.24.1.5 Disturbance due to noise, odors or dust arising from the construction even if such disturbance does not violate the section on Environmental Protection contained in the specifications; or

7.24.1.6 The convenience of the State.

7.24.2 Partial, Total Suspension of Work - Suspension of work on some but not all items of work shall be considered a partial suspension. Suspension of work on the entire work at the job site shall be considered total suspension. The period of suspension shall be computed as set forth in subsection 7.21.7 -Delays for Suspension of Work.

7.24.3 Payment §3-125-7 HAR

7.24.3.1 In the event that the Contractor is ordered by the Engineer in writing as provided herein to suspend all work under the contract in accordance with paragraphs 7.24.1.4 or 7.24.1.6, the Contractor may be reimbursed for actual direct costs incurred on work at the jobsite, as authorized

in writing by the Engineer, including costs expended for the protection of the work. Payment for equipment which must standby during such suspension of work shall be made as described in clause 8.3.4.5. (c). No payment will be made for profit on any suspension costs. An allowance of five percent (5%) will be paid on any reimbursed actual costs for indirect categories of delay costs, including extended branch and home-office overhead and delay impact costs.

7.24.3.2 However, no adjustment to the contract amount or time shall be made under this Section 7.24 for any suspension, delay, or interruption:

(a) To the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor; or

(b) For which an adjustment is provided for or excluded under any other provision of this Contract.

7.24.3.3 Any adjustment in contract price made pursuant to this subsection shall be determined in accordance with this Section 7.24 and Section 4.2 CHANGES.

7.24.3.4 Claims for such compensation shall be filed with the Engineer within ten (10) calendar days after the date of the order to resume work or such claims will be waived by the Contractor. Together with the claim, the Contractor shall submit substantiating documents supporting the entire amount shown on the claim. The Engineer may make such investigations as are deemed necessary and shall be the sole judge of the claim and the Engineer's decision shall be final.

7.24.4 Claims Not Allowed - No claim under this Section 7.24 shall be allowed:

7.24.4.1 For any direct costs incurred more than twenty (20) days before the Contractor shall have notified the Engineer in writing of any suspension that the Contractor considered compensable. This requirement shall not apply as to a claim resulting from a suspension order under paragraphs 7.24.1.4 or 7.24.1.6, and

7.24.4.2 Unless the claim is asserted in writing within ten (10) calendar days after the termination of such suspension, delay, or interruption, but in no case not later than the date of final payment under the contract.

7.24.4.3 No provision of this Section 7.24 shall be construed as entitling the Contractor to compensation for delays due to failure of surety, for suspensions made at the request of the Contractor, for any delay required under the Contract, for partial suspension of work or for suspensions made by the Engineer under the provisions of paragraphs 7.24.1.1, 7.24.1.2, 7.24.1.3 and 7.24.1.5.

7.25 DISPUTES AND CLAIMS §3-126-31 HAR

7.25.1 Required Notification - As a condition precedent for any claim, the Contractor must give notice in writing to the Engineer in the manner and within the time periods stated in Section 4.2 CHANGES for claims for extra compensation, damages, or an extension of time due for one or more of the following reasons:

7.25.1.1 Requirements not clearly covered in the contract, or not ordered by the Engineer as an extra;

7.25.1.2 Failure by the State and Contractor to agree to an Oral Order or an adjustment in price or contract time for a Field Order or a Change Order issued by the State;

7.25.1.3 An action or omission by the Engineer requiring performance changes beyond the scope of the contract;

7.25.1.4 Failure of the State to issue a Field Order for controversies within the scope of Section 4.2 CHANGES.

7.25.1.5 For any other type of claim, the Contractor shall give notice within the time periods set forth in contract provisions pertaining to that event. If no specific contract provisions pertain to the claim, then the written notice of claim must be submitted within fifteen (15) days of the event giving rise to the claim.

7.25.2 Continued Performance of Work - The Contractor shall at all times continue with performance of the contract in full compliance with the directions of the Engineer. Continued performance by the Contractor shall not be deemed a waiver of any claim for additional compensation, damages, or an extension of time for completion, provided that the written notice of claim is submitted in accordance with subsection 7.25.1

7.25.3 The requirement for timely written notice shall be a condition precedent to the assertion of a claim.

7.25.4 Requirements for Notice of Claim - The notice of claim shall clearly state the Contractor's intention to make claim and the reasons why the Contractor believes that additional compensation, changes or an extension of time may be remedies to which it is entitled. At a minimum, it shall provide the following:

7.25.4.1 Date of the protested order, decision or action;

7.25.4.2 The nature and circumstances which caused the claim;

7.25.4.3 The contract provision that support the claim;

7.25.4.4 The estimated dollar cost, if any, of the protested work and how that estimate was determined; and

7.25.4.5 An analysis of the progress schedule showing the schedule change or disruption if the Contractor is asserting a schedule change or disruption.

7.25.5 If the protest or claim is continuing, the information required in subsection 7.25.4 above shall be supplemented as requested by the Engineer.

7.25.6 Final Statement for Claim - The Contractor shall provide a final written statement of the actual adjustment in contract price and/or contract time requested for each notice of claim. Such statement shall clearly set forth that it is the final statement for that notice of claim. All such final statements shall be submitted within thirty (30) days after completion of the work that is the subject of the claim, but in no event no later than thirty (30) days after the Project Acceptance Date or the date of termination of the Contractor, whichever comes first.

7.25.7 All claims of any nature are barred if asserted after final payment under this contract has been made, except as provided under Section 8.9 CLAIMS ARISING OUT OF PAYMENT FOR REQUIRED WORK.

7.25.8 Contractor may protest the assessment or determination by the Engineer of amounts due the State from the Contractor by providing a written notice to the Engineer within thirty (30) days of the date of the Engineer's written assessment or determination. Said notice shall comply with all requirements of subsections 7.25.4 and 7.25.6 above. The requirement of such notice cannot be waived and it is a condition precedent to any claim by the Contractor. Failure to comply with these notice provisions constitutes a waiver of any claim.

7.25.9 In addition to the requirements of subsections 7.25.4, 7.25.6, and 7.25.8, all final written statements of claim shall be certified. This certification requirement applies to the Contractor without exception, including, but not limited to, situations involving "pass through" claims of subcontractors or suppliers. The certification must be executed by a person duly authorized to bind the Contractor with respect to the claim. The certification shall state as follows:

7.25.9.1 "I certify that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the State is liable; and that I am duly authorized to certify the claim on behalf of the Contractor."

7.25.10 Decision on Claim / Appeal - The Contracting Officer shall decide all controversies between the State and the contractor which arise under, or are by virtue of, this contract and which are not resolved by mutual agreement. The decision of the Contracting Officer on the

claim shall be final and conclusive, unless fraudulent or unless the contractor delivers to the Adjutant General a written appeal of the Contracting Officer's decision no later than 30 days after the date of the Contracting Officer's decision. The Adjutant General's decision shall be final and conclusive, unless fraudulent or unless the contractor brings an action seeking judicial review of the Adjutant General's decision in an appropriate circuit court of this State within six months from the date of the Adjutant General's decision.

7.25.10.1 If the contractor delivers a written request for a final decision concerning the controversy, the Adjutant General shall issue a final decision within 90 days after receipt of such a request; provided that if the Adjutant General does not issue a written decision within 90 days or within such longer period as may be agreed upon by the parties, then the contractor may proceed as if an adverse decision had been received. Both parties to this contract agree that the period of up to 30 days to appeal the Contracting Officer's decision to the Adjutant General shall not be included in the 90 day period to issue a final decision.

7.25.11 Payment and Interest - The amount determined payable pursuant to the decision, less any portion already paid, normally should be paid without awaiting Contractor action concerning appeal. Such payments shall be without prejudice to the rights of either party. Interest on amounts ultimately determined to be due to a Contractor shall be payable at the Statutory rate applicable to judgments against the State under Chapter 662, HRS from the date of receipt of a properly certified final written statement of actual adjustment required until the date of decision; except, however, that if an action is initiated in circuit court, interest under this Section 7.25 shall only be calculated until the time such action is initiated. Interest on amounts due the State from the Contractor shall be payable at the same rate from the date of issuance of the Engineer's notice to the Contractor. Where such payments are required to be returned by a subsequent decision, interest on such payments shall be paid at the statutory rate from the date of payment.

7.25.12 Contractor shall comply with any decision of the Engineer and proceed diligently with performance of this contract pending final resolution by a circuit court of this State of any controversy arising under, or by virtue of, this contract, except where there has been a material breach of contract by the State; provided that in any event the Contractor shall proceed diligently with the performance of the contract where the Engineer has made a written determination that continuation of work under the contract is essential to the public health and safety.

7.26 FAILURE TO COMPLETE THE WORK ON TIME

7.26.1 Completion of the work within the required time is important because delay in the prosecution of the work will inconvenience the public and interfere with the State's business. In addition, the State will be damaged by the inability to obtain full use of the completed work and by increased engineering, inspection, superintendence, and administrative services in connection with the work. Furthermore, delay may detrimentally impact the financing, planning, or completion of other State projects because of the need to devote State resources to the project after the required completion date. The monetary amount of such public inconvenience, interference with State business, and damages, is difficult, if not impossible, to accurately determine and precisely prove. Therefore, it is hereby agreed that the amount of such damages shall be the appropriate sum of performance liquidated damages as set forth below.

7.26.1.1 When the Contractor fails to complete the Work or any portion of the Work within the time or times fixed in the contract or any extension thereof, it is agreed the Contractor shall pay a penalty fee of \$100 a day until all work is completed.

7.26.1.2 If the Contractor fails to correct Punch list deficiencies as required by Section 7.32 PROJECT ACCEPTANCE DATE, the State will be inconvenienced and damaged, therefore, it is agreed that the Contractor shall pay a penalty fee of \$100 a day until the date the Punch list items are corrected and accepted by the Engineer.

7.26.1.3 If the Contractor fails to submit final documents as required by Section 7.33 FINAL SETTLEMENT OF THE CONTRACT, the State will be inconvenienced and damaged, therefore, it is agreed that the Contractor shall pay a penalty fee of \$100 a day for all days after the Contract Completion Date or any extension thereof, until the date the final documents are received by the Engineer.

7.26.1.4 The Engineer shall assess the total amount of penalty fees for each in accordance with the amount stated in the Specification Section 00800 SPECIAL CONDITIONS and provide written notice of such assessment to the Contractor.

7.26.2 Acceptance of Liquidated Damages -The assessment of performance liquidated damages by the Engineer shall be accepted by the parties hereto as final, unless the Contractor delivers a written appeal of the Engineer's decision in accordance with subsection 7.25.10 requirements. Any allowance of time or remission of charges or performance liquidated damages shall in no other manner affect the rights or obligations of the parties under this contract nor be construed to prevent action under Section 7.27 TERMINATION OF CONTRACT

FOR CAUSE. If the Department terminates the Contractor's right to proceed, the resulting damage will include such performance liquidated damages for such time as may be required for final completion of the work after the required contract completion date.

7.26.3 Payments for Performance Liquidated Damages - Liquidated damages shall be deducted from monies due or that may become due to the Contractor under the contract or from other monies that may be due or become due to the Contractor from the State.

7.27 TERMINATION OF CONTRACT FOR CAUSE §3-125-18 HAR

7.27.1 Default - If the Contractor refuses or fails to perform the work, or any separable part thereof, with such diligence as will assure its completion within the time specified in this contract, or any extension thereof, fails to complete the work within such time, or commits any other material breach of this contract, and further fails within seven (7) days after receipt of written notice from the Engineer to commence and continue correction of the refusal or failure with diligence and promptness, the Engineer may, by written notice to the Contractor, declare the Contractor in breach and terminate the Contractor's right to proceed with the work or the part of the work as to which there has been delay or other breach of contract. In such event, the Department may take over the work and perform the same to completion, by contract or otherwise, and may take possession of, and utilize in completing the work, the materials, appliances, and plant as may be on the site of the work and necessary therefore. Whether or not the Contractor's right to proceed with the work is terminated, the Contractor and the Contractor's sureties shall be liable for any damage to the Department resulting from the Contractor's refusal or failure to complete the work within the specified time.

7.27.2 Additional Rights and Remedies - The rights and remedies of the Department provided in this contract are in addition to any other rights and remedies provided by law.

7.27.3 Costs and Charges

7.27.3.1 All costs and charges incurred by the Department, together with the cost of completing the work under contract, will be deducted from any monies due or which would or might have become due to the Contractor had it been allowed to complete the work under the contract. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay the Department the amount of the excess.

7.27.3.2 In case of termination, the Engineer shall limit any payment to the Contractor to the part of the contract satisfactorily completed at the time of termination. Payment will not be made until the work has satisfactorily been completed and the tax clearance required by Section 8.8 FINAL PAYMENT is submitted by the Contractor. Termination shall not relieve the Contractor or Surety from liability for performance liquidated damages.

7.27.4 Erroneous Termination for Cause - If, after notice of termination of the Contractor's right to proceed under this Section 7.27, it is determined for any reason that good cause did not exist to allow the Department to terminate as provided herein, the rights and obligations of the parties shall be the same as, and the relief afforded the Contractor shall be limited to, the provisions contained in Section 7.28 TERMINATION FOR CONVENIENCE.

7.28 TERMINATION FOR CONVENIENCE §3-125-22 HAR

7.28.1 Termination - The Engineer may, when the interests of the State so require, terminate this contract in whole or in part, for the convenience of the State. The Engineer shall give written notice of the termination to the Contractor specifying the part of the contract terminated and when termination becomes effective.

7.28.2 Contractor's Obligations - The Contractor shall incur no further obligations in connection with the terminated work and on the date set in the notice of termination the Contractor will stop work to the extent specified. The Contractor shall also terminate outstanding orders and subcontracts as they relate to the terminated work. The Contractor shall settle the liabilities and claims arising out of the termination of subcontracts and orders connected with the terminated work subject to the State's approval. The Engineer may direct the Contractor to assign the Contractor's right, title, and interest under terminated orders or subcontracts to the State. The Contractor must still complete the work not terminated by the notice of termination.

7.28.3 Right to Construction and Goods - The Engineer may require the Contractor to transfer title and delivery to the State in the manner and to the extent directed by the Engineer, the following:

7.28.3.1 Any completed work; and

7.28.3.2 Any partially completed construction, goods, materials, parts, tools, dies, jigs, fixtures, drawings, information, and contract rights (hereinafter called "construction material") that the Contractor has specifically produced or specially acquired for the performance of the terminated part of this contract.

7.28.3.3 The Contractor shall protect and preserve all property in the possession of the Contractor in which the State has an interest. If the Engineer does not elect to retain any such property, the Contractor shall use its best efforts to sell such property and construction material for the Department's account in accordance with the standards of section 490:2-706, HRS.

7.28.4 Compensation

7.28.4.1 Contractor shall submit a termination claim specifying the amounts due because of the termination for convenience together with cost or pricing data, submitted to the extent required by subchapter 15, chapter 3-122, HAR. If the Contractor fails to file a termination claim within one year from the effective date of termination, the Engineer may pay the Contractor, if at all, an amount set in accordance with paragraph 7.28.4.3.

7.28.4.2 The Engineer and the Contractor may agree to a settlement provided the Contractor has filed a termination claim supported by cost or pricing data submitted as required and that the settlement does not exceed the total contract price plus settlement costs reduced by payments previously made by the State, the proceeds of any sales of construction, supplies, and construction materials under paragraph 7.28.3.3 of this Section, and the contract price of the work not terminated.

7.28.4.3 Absent complete agreement, the Engineer shall pay the Contractor the following amounts, less any payments previously made under the contract.

(a) The cost of all contract work performed prior to the effective date of the notice of termination work plus a five percent (5%) markup on the actual direct costs, including amounts paid to subcontractor, less amounts previously paid or to be paid for completed portions of such work; provided, however, that if it appears that the Contractor would have sustained a loss if the entire contract would have been completed, no markup shall be allowed or included and the amount of compensation shall be reduced to reflect the anticipated rate of loss. No anticipated profit or consequential damage will be due or paid.

(b) Subcontractors shall be paid a markup of ten percent (10%) on their direct job costs incurred to the date of termination. No anticipated profit or consequential damage will be due or paid to any subcontractor. These costs must not include payments made to the Contractor for subcontract work during the contract period.

(c) In any case, the total sum to be paid the Contractor shall not exceed the total contract price reduced by the amount of any sales of construction supplies, and construction materials.

7.28.4.4 Costs claimed, agreed to, or established by the State shall be in accordance with chapter 3-123, HAR.

7.29 CORRECTING DEFECTS - If the Contractor fails to commence to correct any defects of any nature, within ten (10) working days after the correction thereof has been requested in writing by the State, and thereafter to expeditiously complete the correction of said defects, the Engineer may without further notice to the Contractor or surety and without termination of contract, correct the defects and deduct the cost thereof from the contract price.

7.30 FINAL CLEANING - Before final inspection of the work, the Contractor shall clean all ground occupied by the Contractor in connection with the Work of all rubbish, excess materials, temporary structures and equipment, and all parts of the work must be left in a neat and presentable condition to the satisfaction of the Engineer. However, the Contractor shall not remove any warning and directional signs prior to the formal acceptance by the Engineer. Full compensation for final cleaning will be included in the prices paid for the various items of work or lump sum bid, as the case may be, and no separate payment will be made therefore.

7.31 SUBSTANTIAL COMPLETION, AND FINAL INSPECTION - Before the Department accepts the project as being completed, unless otherwise stipulated by the Engineer, the following procedure shall be followed:

7.31.1 Substantial Completion:

7.31.1.1 The Contractor and its subcontractors shall inspect the project to confirm whether the Project is Substantially Complete. This inspection effort shall include the testing of all equipment and providing a Punch list that identifies deficiencies which must be corrected. Contractor shall make the corrections and if required repeat the procedure. Also, the Contractor shall schedule final Building, Plumbing, Electrical, Elevator, Fire and other required inspections and obtain final approvals.

(a) When in compliance with the above requirements, the Contractor shall notify the Engineer in writing that project is Substantially Complete and ready for a Final Inspection. Along with the Substantial Completion notification, the Contractor shall provide its Punch list(s) with the status of the deficiencies and dates when the deficiencies were corrected. The Project Inspector and / or the Engineer shall make a preliminary determination whether project is Substantially Complete.

(b) If the Project is not Substantially Complete, the Engineer shall inform the Contractor. The Contractor shall identify deficiencies which must be corrected, update

its Punch list, make the necessary corrections and repeat the previous step. After completing the necessary work, the Contractor shall notify the Engineer in writing that Punch list deficiencies have been corrected and the project is ready for a Final Inspection.

(c) If the Project is Substantially Complete, the Engineer shall schedule a Final Inspection within fifteen (15) days of the Contractor's notification letter or as otherwise determined by the Engineer.

7.31.1.2 In addition, and to facilitate closing of the project, the Contractor shall also proceed to obtain the following closing documents (where applicable) prior to the Final Inspection:

- (1) Field-Posted As-Built Drawings.
- (2) Maintenance Service Contract and two (2) copies of a list of all equipment.
- (3) Operating and maintenance manuals.
- (4) Air conditioning test and balance reports.
- (5) Any other final submittal required by the technical sections of the contract.

7.31.2 Final Inspection: If at the Final Inspection the Engineer determines that all work is completed, the Engineer shall notify the Contractor in accordance with Section 7.32 PROJECT ACCEPTANCE DATE. Should there be remaining deficiencies which must be corrected, the Contractor shall provide an updated Punch list to the Engineer, within five (5) days from the Final Inspection Date. The Contractor shall make the necessary corrections.

7.31.2.1 The Engineer shall confirm the list of deficiencies noted by the Contractor's punch list(s) and will notify the Contractor of any other deficiencies that must be corrected before final settlement.

7.31.3 The Engineer may add to or otherwise modify the Punch list from time to time. The Contractor shall take immediate action to correct the deficiencies.

7.31.4 Revoking Substantial Completion - At any time before final Project Acceptance is issued, the Engineer may revoke the determination of Substantial Completion if the Engineer finds it was not warranted. The Engineer shall notify the Contractor in writing with the reasons and outstanding deficiencies negating the declaration. Once notified, the Contractor shall make the necessary corrections and repeat the required steps noted in subsections 7.31.1 and 7.31.2.

7.32 PROJECT ACCEPTANCE DATE

7.32.1 If upon Final Inspection, the Engineer finds that the project has been satisfactorily completed in compliance with the contract, the Engineer shall declare the project completed and accepted and will notify the Contractor in writing of the acceptance by way of the Project Acceptance Notice.

7.32.2 Protection and Maintenance - After the Project Acceptance Date, the Contractor shall be relieved of maintaining and protecting the work EXCEPT that this does not hold true for those portions of the work which have not been accepted, including Punch list deficiencies. The State shall be responsible for the protection and maintenance of the accepted facility.

7.32.3 The date of Project Acceptance shall determine:

7.32.3.1 End of Contract Time.

7.32.3.2 Commencement of all guaranty periods except as noted in Section 7.34 CONTRACTOR'S RESPONSIBILITY FOR WORK: RISK OF LOSS.

7.32.3.3 Commencement of all maintenance services except as noted in Section 7.34 CONTRACTOR'S RESPONSIBILITY FOR WORK: RISK OF LOSS.

7.32.4 Punch list Requirements - If a Punch list is required under Section 7.31 SUBSTANTIAL COMPLETION AND FINAL INSPECTION, the Project Acceptance Notice will include the Engineer's Punch list and the date when correction of the deficiencies must be completed.

7.32.4.1 Punch list corrective work shall be completed prior to Contract Completion Date, or extension thereof.

7.32.5 Upon receiving the Punch list, the Contractor shall promptly devote the required time, labor, equipment, materials and incidentals necessary to correct the deficiencies expeditiously.

7.32.6 For those items of work that cannot be completed by the established date, the Contractor shall submit a schedule in writing to the Engineer for approval along with documentation to justify the time required, no later than five (5) working days before the date stipulated for completion of the Punch list work. A Proposed schedule submitted after the five (5) day period will not be considered.

7.32.7 Failure to Correct Deficiencies - If the Contractor fails to correct the deficiencies within the time established in paragraph 7.32.4.1, the Contracting Officer shall assess liquidated damages as required by Section 7.26 - FAILURE TO COMPLETE THE WORK ON TIME.

7.32.8 If the Contractor fails to correct the deficiencies and complete the work by the established or agreed to date, the State also reserves the right to correct the deficiencies by whatever method it deems necessary and deduct the cost from the final payment due the contractor.

7.32.9 The Contractor may further be prohibited from bidding in accordance with Section 2.12 - DISQUALIFICATION OF BIDDERS. In addition, assessment of damages shall not prevent action under Section 7.27 - TERMINATION OF CONTRACT FOR CAUSE.

7.33 FINAL SETTLEMENT OF CONTRACT - The contract will be considered settled after the project acceptance date and when the following items have been satisfactorily submitted, where applicable:

7.33.1 Necessary Submissions in addition to the items noted under paragraph 7.31.1.2.

7.33.1.1 All written guarantees required by the contract.

7.33.1.2 Complete and certified weekly payrolls for the Contractor and its Subcontractor(s).

7.33.1.3 Certificate of Plumbing and Electrical Inspection.

7.33.1.4 Certificate of Building Occupancy.

7.33.1.5 Certificates for Soil Treatment and Wood Treatment.

7.33.1.6 Certificate of Water System Chlorination.

7.33.1.7 Certificate of Elevator Inspection, Boiler and Pressure Pipe installation.

7.33.1.8 All other documents required by the Contract.

7.33.2 Failure to Submit Closing Documents - The Contractor shall submit the final Payment Application and the above applicable closing documents within sixty (60) days from the date of Project Acceptance or the agreed to Punch list completion date. Should the Contractor fail to comply with these requirements, the Engineer may terminate the Contract for cause. The pertinent provisions of Section 7.27 TERMINATION OF CONTRACT FOR CAUSE shall be applicable.

7.33.3 In addition, should the Contractor fail to furnish final closing documents within the required time period, the Engineer shall assess performance liquidated damages as required by Section 7.26 FAILURE TO COMPLETE THE WORK ON TIME.

7.34 CONTRACTOR'S RESPONSIBILITY FOR WORK; RISK OF LOSS

7.34.1 Until the establishment of the Project Acceptance Date or Beneficial Occupancy whichever is sooner, the Contractor shall take every necessary precaution against injury or damage to any part of the work caused by the perils insured by an All Risk policy excluding earthquakes and floods, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore and make good all injuries or damage to any portion of the work occasioned by the perils insured by an All Risk policy before the date of final acceptance and shall bear the risk and expense thereof.

7.34.2 After the Project Acceptance Date or Beneficial Occupancy whichever is sooner, the Contractor shall be relieved of maintaining and protecting the work except for those portions of the work which have not been accepted including Punch list deficiencies.

7.34.3 The risk of damage to the work from any hazard or occurrence that may be covered by a required Property Insurance policy is that of the Contractor, unless such risk of loss is placed elsewhere by express language in the contract documents. No claims for any loss or damage shall be recognized by the Department, nor will any such loss or damage excuse the complete and satisfactory performance of the contract by the Contractor.

7.35 GUARANTEE OF WORK

7.35.1 In addition to any required manufacturers warranties, all work and equipment shall be guaranteed by the Contractor against defects in materials, equipment or workmanship for one year from the Project Acceptance Date or as otherwise specified in the Contract Documents, whichever is earlier.

7.35.2 Repair of Work - If, within any guarantee period, repairs or changes are required in connection with the guaranteed work, which in the opinion of the Engineer is necessary due to materials, equipment or workmanship which are inferior, defective or not in accordance with the terms of the Contract, the Contractor shall within five (5) working days and without expense to the Department commence to:

7.35.2.1 Place in satisfactory condition in every instance all such guaranteed work and correct all defects therein; and

7.35.2.2 Make good and repair or replace to new or pre-existing condition all damages to the building, facility, work or equipment or contents thereof, resulting from such defective materials, equipment or installation thereof.

7.35.3 Manufacturer's and Installer's Guarantee-Whenever a manufacturer's or installer's guarantee on any

product specified in the respective Specification sections, exceeds one year, this guarantee shall become part of this contract in addition to the Contractor's guarantee. Contractor shall complete the guarantee forms in the name of the Department and submit such forms to the manufacturer within such time required to validate the guarantee. Contractor shall submit to the Department a photocopy of the completed guarantee form for the Department's record as evidence that such guarantee form was executed by the manufacturer.

7.35.4 If a defect is discovered during a guarantee period, all repairs and corrections to the defective items when corrected shall again be guaranteed for the original full guarantee period. The guarantee period shall be tolled and suspended for all work affected by the defect. The guarantee period for work affected by the defect shall restart for its remaining duration upon confirmation by the Engineer that the deficiencies have been repaired or remedied.

7.35.5 If guarantee is specified for greater than two (2) years, two (2) years shall prevail except for manufacturer's warranties. Manufacturer's warranties shall remain as specified in their respective Specification sections.

7.35.5.1 However, the number of years specified in the technical specifications shall prevail only if it is stated that the number of years for guarantee supersedes this provision.

7.36 WORK OF AND CHARGES BY UTILITIES

7.36.1 The Contractor shall be responsible for scheduling and coordinating the work with the utility companies and applicable Governmental agencies for permanent service installation and connections or modifications to existing utilities. The Contractor shall make available all portions of the work necessary for the Utility companies to do their work. The Department shall not bear the risk of any damage to the contract work caused by any utility company, and work of repairing such damage and delay costs must be resolved between the Contractor and the utility company and their insurers.

7.36.2 Unless stated as an allowance item to be paid by the Contractor, the Department will pay the utility companies and applicable governmental agencies directly for necessary modifications and connections. Contractor charges for overhead, supervision, coordination, profit, insurance and any other incidental expenses shall be included in the Contractor's Bid whether the utility is paid directly by the Department or by an allowance item in the Contract.

7.37 RIGHT TO AUDIT RECORDS

7.37.1 Pursuant to Section 103D-317 HRS the State, at reasonable times and places, may audit the books and records of a Contractor, prospective contractor, subcontractor and prospective subcontractor relating to the Contractor's or subcontractor's cost or pricing data. The books and records shall be maintained by the Contractor and subcontractor(s) for a period of four (4) years from the date of final payment under the contract.

7.37.2 The Contractor shall insure that its subcontractors comply with this requirement and shall bear all costs (including attorney's fees) of enforcement in the event of its subcontractor's failure or refusal to fully cooperate.

7.37.3 Additionally, Sections 231-7, 235-108, 237-39 and other HRS chapters through reference, authorizes the Department of Taxation to audit all taxpayers conducting business within the State. Contractors must make available to the Department of Taxation all books and records necessary to verify compliance with the tax laws.

7.38 RECORDS MAINTENANCE, RETENTION AND ACCESS

7.38.1 The Contractor and any subcontractor whose contract for services is valued at \$25,000 or more shall, in accordance with generally acceptable accounting practices, maintain fiscal records and supporting documents and related files, papers, and reports that adequately reflect all direct and indirect expenditures and management and fiscal practices related to the Contractor and subcontractor's performance of services under this Agreement.

7.38.2 The representative of the Department, the Adjutant General of the State of Hawaii, the Attorney General, (the Federal granting agency, the Comptroller General of the United States, and any of their authorized representatives when federal funds are utilized), and the Legislative Auditor of the State of Hawaii shall have the right of access to any book, document, paper, file, or other record of the Contractor and any subcontractor that is related to the performance of services under this Agreement in order to conduct an audit or other examination and / or to make copies, excerpts and transcripts for the purposes of monitoring and evaluating the Contractor and subcontractor's performance of services and the Contractor and subcontractor's program, management, and fiscal practices to assure the proper and effective expenditure of funds and to verify all costs associated with any claims made under this Agreement.

7.38.3 The right of access shall not be limited to the required retention period but shall last as long as the records are retained. The Contractor and subcontractor shall retain all records related to the Contractor and subcontractor's performance of services under this

Agreement for four (4) years from the date of final payment, except that if any litigation, claim, negotiation, investigation, audit or other action involving the records has been started before the expiration of the four (4) year period, the Contractor and subcontractors shall retain the records until completion of the action and resolution of all issues that arise from it, or until the end of the four (4) year retention period, whichever occurs later. Furthermore, it shall be the Contractor's responsibility to enforce compliance with this provision by any subcontractor.

ARTICLE 8 - Measurement and Payment

8.1 MEASUREMENT OF QUANTITIES

8.1.1 All work completed under the Contract shall be measured by the Engineer according to United States standard measures, or as stated in this Contract. The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract shall conform to good engineering practice. These measurements shall be considered correct and final unless the Contractor has protested same to the Engineer and has demonstrated the existence of an error by actual physical measurement before the work has progressed in a manner which would prohibit a proper check.

8.1.2 All measurements of the area of the various surface, pavement and base courses will be made in the horizontal projection of the actual surface and no deductions will be made for fixtures or structures having an area of nine (9) square feet or less. All measurements of headers, curbs, fences and any other type of construction which is to be paid for by its length, will be made in the horizontal projection of the actual driven length from toe to top of cutoff, except where slope exceeds ten percent (10%) and for piles, which will be by actual length. All materials which are specified for measurement by the cubic yard "Loose Measurement" or "Measured in the Vehicle" shall be hauled in approved vehicles and measured therein at the point of delivery. Approved vehicles for this purpose may be of any type or size satisfactory to the Engineer, provided that the body is of such type that the actual contents may be readily and accurately determined. Unless all approved vehicles on a job are of a uniform capacity each approved vehicle must bear a plainly legible identification mark indicating the specific approved capacity. The Inspector may reject all loads not hauled in such approved vehicles.

8.2 NO WAIVER OF LEGAL RIGHTS - The Engineer shall not be precluded or estopped by any measurements, estimate or certificate made either before or after the completion and acceptance of the work and payment therefore, from showing the true amount and character of the work performed and materials furnished

by the Contractor, or from showing that any such measurement estimate or certificate is untrue or incorrectly made, or rejecting the work or materials that do not conform in fact to the contract. The Engineer shall not be precluded or estopped, notwithstanding any such measurement, estimate, or certificate and payment in accordance therewith, from recovering from the Contractor and its sureties such damages as the Department may sustain by reason of the Contractor's failure to comply with the terms of the contract. Neither the acceptance by the Engineer or any representative of the Engineer, nor any payment for or acceptance of the whole or any part of the work, nor any extension of time, or any possession taken by the Engineer, shall operate as a waiver of any portion of the contract, or of any power herein reserved, or any right to damage herein provided. A waiver of any notice requirement or breach of the contract shall not be held to be a waiver of any other notice requirement or subsequent breach.

8.3 PAYMENT FOR ADDITIONAL WORK

8.3.1 Payment for Changed Conditions – A contract modification or change order complying with section 4.4 PRICE ADJUSTMENT and section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT shall be issued for all changes that are directed under Section 4.2 CHANGES. No payment for any change including work performed under the force account provisions will be made until a change order is issued or contract modification is executed.

8.3.1.1 At the completion of the force account work or at an intermediate interval approved by the Engineer, the contractor shall submit its force account cost proposal, including; approved daily force account records with any attached invoices or receipt, to the Engineer for processing a contract modification or change order.

8.3.2 On credit proposals and proposals covering both increases and decreases, the application of overhead and profit shall be on the net change in direct costs for the performance of the work.

8.3.3 When payment is to be made for additional work directed by a field order, the total price adjustment as specified in the field order or if not specified therein for the work contained in the related change order shall be considered full compensation for all materials, labor, insurance, taxes, equipment use or rental and overheads, both field and home office including extended home and branch office overhead and other related delay impact costs.

8.3.4 Force Account Method - When, for the convenience of the Department, payment is to be made by the Force Account method, all work performed or labor and materials and equipment furnished shall be paid for as

described below. Payment by the Force Account method will not alter any rights, duties and obligations under the contract.

8.3.4.1 Labor - For all hourly workers, the Contractor will receive the rate of wage including fringe benefits when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work, which shall be agreed upon in writing before beginning work for each and every hour that said labor is actually engaged in said work.

(a) All markups for overhead and profit shall be added subject to limitations established in Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

(b) No allowance for overtime compensation will be given without the written approval of the Engineer prior to performance of such work.

8.3.4.2 Insurance and Taxes - The Contractor and subcontractor(s) will also receive the actual additional costs paid for property damage, liability, workers compensation insurance premiums, State unemployment contributions, Federal unemployment taxes, social security and Medicare taxes to which a markup of up to six percent (6%) may be added.

8.3.4.3 Materials - For materials accepted by the Engineer and used, the Contractor and subcontractor(s) shall receive the actual cost of such materials delivered and incorporated into work, plus a markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

8.3.4.4 Subcontractors - Subcontractor costs shall be the actual costs of the subcontractor marked up as defined in this Section 8.3 plus a markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

8.3.4.5 Equipment

(1) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5.(h) owned or leased by the Contractor or a related entity, the use of which has been authorized by the Engineer:

(a.) The Contractor will be paid at the per-hour rental rates based on the monthly rate established for said machinery or equipment in the then-current edition of the Rental Rate Blue Book for Construction Equipment including the estimated operating cost per hour and regional correction provided therein.

- (b.) If no rate is listed for a particular kind, type or size of machinery or equipment, then the monthly, hourly rates shall be as agreed upon in writing by the Contractor and the Engineer prior to the use of said machinery or equipment. If there is no agreement, the Engineer will set a rate. The Contractor may contest the rate pursuant to Section 7.25 DISPUTES AND CLAIMS.
- (c.) Rental rates which are higher than those specified in the aforesaid Rental Rate Blue Book publication may be allowed where such higher rates can be justified by job conditions such as work in water and work on lava, etc. Request for such higher rates shall be submitted in writing to the Engineer for approval prior to the use of the machinery or equipment in question.
- (2) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5.(h) rented by the Contractor or a related entity specifically for the Force Account work, the use of which has been authorized by the Engineer; The Contractor will be paid the actual rental cost for the machinery or equipment, including mobilization and demobilization costs. A receipt from the equipment supplier shall be submitted to the Engineer.
- (3) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5. (h) rented by the Contractor or a related entity for use in the project, but which will also be used for the Force Account work, the use of which has been authorized by the Engineer; The Contractor will be paid the actual rental cost for the machinery or equipment. No additional mobilization and demobilization costs will be paid. A receipt from the equipment supplier shall be submitted to the Engineer.
- (4) The rental rate for trucks not owned by the Contractor shall be those as established under the Hawaii State Public Utilities Commission, which will be paid for as an equipment item pursuant to paragraph 8.3.4.5. Rental rates for Contractor-owned trucks not listed in the Rental Rate Blue Book shall be agreed upon in writing by the Contractor and Engineer prior to the use of said trucks. If there is no agreement, the Engineer shall set the rate. The Contractor may contest the rate pursuant to Section 7.25 DISPUTES AND CLAIMS.
- (5) The rental period shall begin at the time equipment reaches the site of work, shall include each day that the machinery or equipment is at the site of the work and shall terminate at the end of the day on which the equipment is no longer needed. In the event the equipment must standby due to work being delayed or halted by reason of design, traffic, or other related problems uncontrollable by the Contractor, excluding Saturdays, Sundays and Legal Holidays, unless the equipment is used to perform work on such days, the rental shall be two hours per day until the equipment is no longer needed.
- (5.1) The rental time to be paid will be for the time actually used. Any hours or operation in excess of 8 hours in any one day must be approved by the Engineer prior to the performance of such work.
- (5.2) Rental time will not be allowed or credited for any day on which machinery or equipment is inoperative due to its breakdown. On such days, the Contractor will be paid only for the actual hours, if any, that the machinery or equipment was in operation.
- (5.3) In the event the Force Account work is completed in less than 8 hours, equipment rental shall nevertheless be paid for a minimum 8 hours.
- (5.4) For the purpose of determining the rental period the continuous and consecutive days shall be the normal 8-hour shift work day, Monday through Friday excluding legal holidays. Any work day to be paid less than 8 hours shall not be considered as continuous, except for equipment removed from rental for fuel and lubrication.
- (5.5) No additional premium beyond the normal rates used will be paid for equipment over 8 hours per day or 40 hours per week.
- (6) All rental rates for machinery and equipment shall include the cost of fuel, oil, lubricants, supplies, small tools, necessary attachments, repairs, maintenance, tire wear, depreciation, storage, and all other incidentals.
- (7) All machinery and equipment shall be in good working condition and suitable for the purpose for which the machinery and equipment is to be used.
- (8) Individual pieces of equipment or tools having a replacement value of one thousand dollars (\$1,000) or less, whether or not consumed by use, shall be considered to be small tools and included in the allowed markup for overhead and profit and no separate payment will be made therefore.

(9) The total of all Force Account rental charges accrued over the duration of the contract for a specific item of equipment shall not exceed the replacement cost of that equipment.

(9.1) The Contractor shall provide the cost of replacement to the Engineer prior to using the equipment. If the Engineer does not agree with the replacement cost, the Engineer shall set the replacement cost. The Contractor may contest the replacement cost pursuant to Section 7.25 DISPUTES AND CLAIMS.

(10) Should the item of equipment be rented from an unrelated entity, the rental cost will be treated as an equipment cost under paragraph 8.3.4.5.

(11) Transportation and/or Mobilization: The following provisions shall govern in determining the compensation to be paid to the Contractor for use of equipment or machinery on the Force Account method:

(11.1) The location from which the equipment is to be moved or transported shall be approved by the Engineer.

(11.2) Where the equipment must be transported to the site of the force account work, the Department will pay the reasonable cost of mobilizing and transporting the equipment, including its loading and unloading, from its original location to the site of force account work. Upon completion of the work the Department will pay the reasonable cost of mobilizing and transporting the equipment back to its original location or to another location, whichever cost is less.

(11.3) The cost of transporting the equipment shall not exceed the rates established by the Hawaii State Public Utilities Commission. If such rates are nonexistent, then the rates will be determined by the Engineer based upon the prevailing rates charged by established haulers within the locale.

(11.4) Where the equipment is self-propelled, the Department will pay the cost of moving the equipment by its own power from its original location to the site of the force account work. Upon completion of the work the Department will pay the reasonable cost of moving of the Equipment back to its original or another location, whichever cost is less.

(11.5) At the discretion of the Engineer, when the Contractor desires to use such equipment for other than Force Account work, the costs of mobilization and transportation shall be prorated between the Force Account and non Force Account work.

(12) Pickup trucks, vans, storage trailers, unless specifically rented for the Force Account work, shall be considered incidental to the Force Account work and the costs therefore are included in the markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

8.3.4.6 State Excise (Gross Income) Tax and Bond - A sum equal to the current percentage rate for the State excise (Gross Income) tax on the total sum determined in paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3 and 8.3.4.4 above, and the bond premium shall be added as compensation to the Contractor. The actual bond premium not to exceed one percent (1%) shall be added to items covered by paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3 and 8.3.4.4 when applicable.

The compensation as determined in paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3, 8.3.4.4 and 8.3.4.5 above shall be deemed to be payment in full for work paid on a force account basis.

8.3.4.7 Records - The Contractor and the Engineer shall compare records of the labor, materials and equipment rentals paid by the Force Account basis at the end of each day. These daily records, if signed by both parties, shall thereafter be the basis for the quantities to be paid for by the Force Account method. The Contractor shall not be entitled to payment for Force Account records not signed by the Engineer.

8.3.4.8 Statements - No payment will be made for work on a Force Account basis until the Contractor has submitted to the Engineer, duplicate itemized statements of the cost of such Force Account work detailed as follows:

(a) Laborers - Name, classification, date, daily hours, total hours, rate, and extension for each laborer and foreman and also the amount of fringe benefits payable if any.

(b) Equipment - Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.

(c) Materials

(c.1) Quantities of materials, prices and extensions

(c.2) Costs of transporting materials, if such cost is not reflected in the prices of the materials.

(c.3) Statements shall be accompanied and supported by receipted invoices for all materials used and transportation charges. However, if materials used on the Force Account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices the Contractors shall submit an affidavit certifying that such materials were taken from stock and that the amount claimed represents the actual cost to the Contractor.

(d) Insurance - Cost of property damage, liability and worker's compensation insurance premiums, unemployment insurance contributions, and social security tax.

8.4 PROGRESS AND / OR PARTIAL PAYMENTS

8.4.1 Progress Payments - The Contractor will be allowed progress payments on a monthly basis upon preparing the Monthly Payment Application forms and submitting them to the Engineer. The monthly payment shall be based on the items of work satisfactorily completed and the value thereof at unit prices and/or lump sum prices set forth in the contract as determined by the Engineer and will be subject to compliance with Section 7.9 PAYROLLS AND PAYROLL RECORDS.

8.4.2 In the event the Contractor or any Subcontractor fails to submit certified copies of payrolls in accordance with the requirements of Section 7.9 PAYROLLS AND PAYROLL RECORDS, the Engineer may retain the amount due for items of work for which payroll affidavits have not been submitted on a timely basis notwithstanding satisfactory completion of the work until such records have been duly submitted. The Contractor shall not be due any interest payment for any amount thus withheld.

8.4.3 Payment for Materials - The Contractor will also be allowed payments of the manufacturer's, supplier's, distributor's or fabricator's invoice cost of accepted materials to be incorporated in the work on the following conditions:

8.4.3.1 The materials are delivered and properly stored at the site of Work; or

8.4.3.2 For special items of materials accepted by the Engineer, the materials are delivered to the Contractor or subcontractor(s) and properly stored in an acceptable location within a reasonable distance to the site of Work.

8.4.4 Partial payments shall be made only if the Engineer finds that:

8.4.4.1 The Contractor has submitted bills of sale for the materials or otherwise demonstrates clear title to such materials.

8.4.4.2 The materials are insured for their full replacement value to the benefit of the Department against theft, fire, damages incurred in transportation to the site, and other hazards.

8.4.4.3 The materials are not subject to deterioration.

8.4.4.4 In case of materials stored off the project site, the materials are not commingled with other materials not to be incorporated into the project.

8.5 PROMPT PAYMENT §3-125-23 HAR

8.5.1 Any money paid to a Contractor for work performed by a subcontractor shall be disbursed to such subcontractor within ten (10) days after receipt of the money in accordance with the terms of the subcontract; provided that the subcontractor has met all the terms and conditions of the subcontract and there are no bona fide disputes on which the Engineer has withheld payment.

8.5.2 Upon final payment to the Contractor, full payment to all subcontractors shall be made within ten (10) days after receipt of the money, provided there are no bona fide disputes over the subcontractor's performance under the subcontract.

8.5.3 All sums retained or withheld from a subcontractor and otherwise due to the subcontractor for satisfactory performance under the subcontract shall be paid by the contracting officer to the contractor and subsequently, upon receipt from the contracting officer, by the contractor to the subcontractor within the applicable time periods specified in subsection 8.5.2 and section 103-10 HRS.

8.5.3.1 Where a subcontractor has provided evidence to the contractor of satisfactorily completing all work under their subcontract and has provided a properly documented final payment request as described in subsection (8.5.5) of this section, and;

8.5.3.1.a Has provided to the contractor an acceptable performance and payment bond for the project executed by a surety company authorized to do business in the State, as provided in section 8.6 RETAINAGE; or

8.5.3.1.b The following has occurred:

8.5.3.1.b.1 A period of ninety days after the day on which the last of the labor was done or performed and the

last of the material was furnished or supplied has elapsed without written notice of a claim given to contractor and the surety, as provided for in section 103D-324 HRS; and

8.5.3.1.b.2 The subcontractor has provided to the contractor:

8.5.3.1.b.2.1 An acceptable release of retainage bond, executed by a surety company authorized to do business in the State, in an amount of not more than two times the amount being retained or withheld by the contractor.

8.5.3.1.b.2.2 Any other bond acceptable to the contractor; or

8.5.3.1.b.2.3 Any other form of mutually acceptable collateral.

8.5.4 If the contracting officer or the contractor fails to pay in accordance with this section, a penalty of one and one-half per cent per month shall be imposed upon the outstanding amounts due that were not timely paid by the responsible party. The penalty may be withheld from future payment due to the contractor, if the contractor was the responsible party. If a contractor has violated subsection 8.5.2 three or more times within two years of the first violation, the contractor shall be referred by the contracting officer to the contractor license board for action under section 444-17(14) HRS.

8.5.5 Final Payment Request. A properly documented final payment request from a subcontractor, as required by subsection 8.5.3, shall include:

8.5.5.1 Substantiation of the amounts requested;

8.5.5.2 A certification by the subcontractor, to the best of the subcontractor's knowledge and belief, that:

8.5.5.2.a The amounts requested are only for performance in accordance with the specification, terms, and conditions of the subcontract;

8.5.5.2.b The subcontractor has made payments due to its subcontractors and suppliers from previous payments received under the subcontract and will make timely payments from the proceeds of the payment covered by the certification, in accordance with their subcontract agreements and the requirements of this section; and

8.5.5.2.c The payment request does not include any amounts that the subcontractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of their subcontract; and

8.5.5.2.d The submission of documentation confirming that all other terms and conditions required under the subcontract agreement have been fully satisfied.

8.5.6 The Engineer shall return any final payment request that is defective to the contractor within seven days after receipt, with a statement identifying the defect.

8.5.7 A payment request made by a contractor to the Engineer that includes a request for sums that were withheld or retained from a subcontractor and are due to a subcontractor may not be approved under subsection 8.5.3 unless the payment request includes:

8.5.7.1 Substantiation of the amounts requested; and

8.5.7.2 A certification by the contractor, to the best of the contractor's knowledge and belief, that:

8.5.7.2.a The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;

8.5.7.2.b The subcontractor has made payments due to its subcontractors and suppliers from previous payments received under the contract and will make timely payments from the proceeds of the payment covered by the certification, in accordance with their subcontract agreements and the requirements of this section; and

8.5.7.2.c The payment request does not include any amounts that the contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of their subcontract.

8.5.8 The Engineer shall return any final payment request that is defective to the contractor within seven days after receipt, with a statement identifying the defect.

8.5.9 This section shall not be construed to impair the right of a contractor or a subcontractor at any tier to negotiate and to include in their respective subcontracts provisions that provide for additional terms and conditions that are requested to be met before the subcontractor shall be entitled to receive final payment under subsection 8.5.3 of this section; provided that any such payments withheld shall be withheld by the Engineer.

8.6 RETAINAGE – The Department will retain a portion of the amount due under the contract to the contractor, to ensure the proper performance of the contract.

8.6.1 The sum withheld by the Department from the contractor shall not exceed five percent (5%) of the total amount due the contractor and that after fifty percent (50%) of the contract is completed and progress is satisfactory, no additional sum shall be withheld; provided further that if progress is not satisfactory, the Engineer may continue to withhold as retainage, sums not exceeding five percent (5%) of the amount due the contractor.

8.6.2 The retainage shall not include sums deducted as liquidated damages from moneys due or that may become due the contractor under the contract.

8.6.3 General Obligation Bonds – The contractor may withdraw retainage monies in whole or in part by providing a general obligation bond of the State or its political subdivisions suitable to the Department. The contractor shall endorse over to the Department and deposit with the Department any general obligation bond suitable to the Department, but in no case with a face value less than the value established by law, of the amount to be withdrawn. The Department may sell the bond and use the proceeds in the same way as it may use monies directly retained from progress payments or the final payment.

8.6.4 Any retainage provided for in this section or requested to be withheld by the contractor shall be held by the Engineer.

8.6.5 A dispute between a contractor and subcontractor of any tier shall not constitute a dispute to which the State or any county is a party, and there is no right of action against the State or any county. The State and a county may not be interpleaded in any judicial or administrative proceeding involving such a dispute.

8.6.6 The retention amount withheld by the contractor from its subcontractor shall be not more than the same percentage of retainage as that of the contractor (also applies to subcontractors who subcontract work to other subcontractors) where a subcontractor has provided evidence to the contractor of:

8.6.6.1 A valid performance and a payment bond for the project that is acceptable to the contractor and executed by a surety company authorized to do business in this State;

8.6.6.2 Any other bond acceptable to the contractor; or

8.6.6.3 Any other form of collateral acceptable to the contractor.

8.6.7 A written notice of any withholding shall be issued to a subcontractor, with a copy to the procurement officer, specifying the following:

8.6.7.1 The amount to be withheld;

8.6.7.2 The specific causes for the withholding under the terms of the subcontract; and

8.6.7.3 The remedial actions to be taken by the subcontractor to receive payment of the amounts withheld.

8.6.8 The provisions of this section shall not be construed to require payment to subcontractors of retainage released to a contractor pursuant to an agreement entered into with the contracting officer meeting the requirements of subsection 8.6.3.

8.7 WARRANTY OF CLEAR TITLE - The Contractor warrants and guarantees that all work and materials covered by progress payments made thereon shall be free and clear of all liens, claims, security interests or encumbrances, and shall become the sole property of the Department. This provision shall not, however, be construed as an acceptance of the work nor shall it be construed as relieving the Contractor from the sole responsibility for all materials and work upon which payments have been made or the restoration of any damaged work, or as waiving the right of the Department to require the fulfillment of all the items of the contract.

8.8 FINAL PAYMENT

8.8.1 Upon final settlement, the final payment amount, less all previous payments and less any sums that may have been deducted in accordance with the provisions of the contract, will be paid to the Contractor, provided the Contractor has submitted a Tax Clearance Certificate from the Department of Taxation and the Internal Revenue Service to the effect that all taxes levied or accrued under Federal and State Statutes against the contractor have been paid.

8.8.2 Sums necessary to meet any claims of any kind by the State may be retained from the sums due the Contractor until said claims have been fully and completely discharged or otherwise satisfied.

8.9 CLAIMS ARISING OUT OF PAYMENT FOR REQUIRED WORK - If the Contractor disputes any determination made by the Engineer regarding the amount of work satisfactorily completed, or the value thereof, or the manner in which payment therefore is made or calculated, it shall notify the Engineer in writing of the specific facts supporting the Contractor's position. Such notice shall be delivered to the Engineer no later than thirty (30) days after the Contractor has been tendered payment for the subject work, or, if no payment has been tendered, not later than fifty (50) days after it has submitted the Monthly Payment Application required under Section 8.4 PROGRESS PAYMENTS herein to the Engineer for the work that is the subject of the dispute. The delivery of the written notice cannot be waived and shall be a condition precedent to the filing of the claim. No claim for additional compensation for extra work or change work shall be allowed under this provision, unless the notice requirements of Article 4 SCOPE OF WORK have been followed. Acceptance of partial payment of a Monthly Payment Application amount shall not be deemed a waiver of the right to make a claim described

herein provided the notice provisions are followed. The existence of or filing of a payment claim herein shall not relieve the Contractor of its duty to continue with the performance of the contract in full compliance with the directions of the Engineer. Any notice of claim disputing the final payment made pursuant to Section 8.8 FINAL PAYMENT must be submitted in writing not later than thirty (30) days after final payment that is identified as such has been tendered to the Contractor.

ARTICLE 9 - CONFIDENTIALITY OF PERSONAL INFORMATION

9.1 Definitions. "Personal information" means an individual's first name or first initial and last name in combination with any one or more of the following data elements, when either name or data elements are not encrypted:

1. Social Security number,
2. Driver's license number or Hawaii identification card number; or
3. Account number, credit or debit card number, access code, or password that would permit access to an individual's financial information.

Personal information does not include publicly available information that is lawfully made available to the general public from federal, state or local government records.

"Technological safeguards" means the technology and the policy and procedures for use of the technology to protect and control access to personal information.

9.2 Confidentiality of Material.

- (1) All material given to or made available to the CONTRACTOR by the STATE by virtue of this Contract which is identified as personal information shall be safeguarded by the CONTRACTOR and shall not be disclosed without the prior written approval of the STATE.
- (2) CONTRACTOR agrees not to retain, use, or disclose personal information for any purpose other than as permitted or required by this Contract.
- (3) CONTRACTOR agrees to implement appropriate "technological safeguards" that are acceptable to the STATE to reduce the risk of unauthorized access to personal information.
- (4) CONTRACTOR shall report to the STATE in a prompt and complete manner any security breaches involving personal information.

(5) CONTRACTOR agrees to mitigate, to the extent practicable, any harmful effect that is known to CONTRACTOR because of a use or disclosure of personal information by CONTRACTOR in violation of the requirements of this paragraph.

(6) CONTRACTOR shall complete and retain a log of all disclosures made of personal information received from the STATE, or personal information created or received by CONTRACTOR on behalf of the STATE.

9.3 Security Awareness Training and Confidentiality Agreements.

(1) CONTRACTOR certifies that all of its employees who will have access to the personal information have completed training on security awareness topics relating to protecting personal information.

(2) CONTRACTOR certifies that confidentiality agreements have been signed by all of its employees who will have access to the personal information acknowledging that:

(a) The personal information collected, used or maintained by the CONTRACTOR will be treated as confidential;

(b) Access to the personal information will be allowed only as necessary to perform the Contract; and

(c) Use of the personal information will be restricted to uses consistent with the services subject to this Contract.

9.4 Termination for Cause. In addition to any other remedies provided for by this Contract, if the STATE learns of a material breach by CONTRACTOR of this paragraph by CONTRACTOR, the State may at its sole discretion:

(1) Provide an opportunity for the CONTRACTOR to cure the breach or end the violation; or

(2) Immediately terminate this Contract.

9.5 Records Retention.

(1) Upon any termination of this Contract, CONTRACTOR shall pursuant to chapter 487R, HRS, destroy all copies (paper or electronic form) of personal information received from the STATE.

(2) The CONTRACTOR and any subcontractors shall maintain the files, books, and records that relate to

the Contract, including any personal information created or received by the CONTRACTOR on behalf of the STATE, and any cost or pricing data, for three (3) years after the date of final payment under the Contract. The personal information shall continue to be confidential and shall not be disclosed without the prior written approval of the STATE. After the three (3) year retention period has ended, the files, books, and records that contain personal information shall be destroyed pursuant to chapter 487R, HRS.

ADDITIONAL GENERAL CONDITIONS FOR
CONSTRUCTION CONTRACTS

The following sections of the Hawaii Administrative Rules, Chapter 3-125 are amended as shown below.

CHANGES FOR CONSTRUCTION CONTRACTS - HAR 3-125-4

1. Change Order. The procurement officer, at any time, and without notice to any surety in a signed writing designated or indicated to be a change order, may make changes in the work within the scope of the contract as may be found to be necessary or desirable. Such changes shall not invalidate the contract or release the sureties, and the contractor will perform the work as changed, as though it had been part of the original contract. Minor changes in the work may be directed by the procurement officer with no change in contract price or time or performance.
2. Adjustments of price or time for performance. If any change order increases or decreases the contractor's cost of, or the time required for performance of any part of the work under this contract, whether or not changed by the order, an adjustment may be made and the contract modified in writing accordingly. Any adjustment in contract price made pursuant to this clause shall be determined in accordance with the price adjustment clause of this contract. Failure of the parties to agree to an adjustment shall not excuse a contractor from proceeding with the contract as changed, provided that the State promptly and duly makes such provisional adjustments in payment or time for the direct costs of the work as changed as the State deems reasonable. The right of the contractor to dispute the contract price or time required for performance or both shall not be waived by its performing the work, provided however, that it follows the notice requirements for disputes and claims established by the contract or these rules.
3. Time Period for Claim. Within thirty days after receipt of a written change order under paragraph (1), unless such period is extended by the procurement officer in writing, the contractor shall file a notice of intent to assert claim for an adjustment. The requirement for timely written notice cannot be waived and shall be a condition precedent to the assertion of a claim.
4. Claim barred after final payment. No claim by the contractor for an adjustment hereunder shall be allowed if written notice is not given prior to final payment under this contract.
5. Claims not barred. In the absence of such a change order, nothing in this clause shall restrict the contractor's right to pursue a claim under the contract or for breach of contract.

PRICE ADJUSTMENT FOR CONSTRUCTION CONTRACTS - HAR 3-125-13.

1. Price adjustment. Any adjustment in contract price pursuant to a clause in this contract shall be made in one or more of the following ways;

- a. By agreement on a fixed price adjustment before commencement of the pertinent performance or as soon thereafter as practicable;
 - b. By unit prices specified in the contract or subsequently agree upon;
 - c. Whenever there is a variation in quantity for any work covered by any line item in breakdown costs provided by the contractor pursuant to contractual pre-work submittal requirements, by the procurement officer, at the procurement officer's discretion, adjusting the lump sum price proportionately;
 - d. In such other manner as the parties may mutually agree;
 - e. At the sole option of the procurement officer, by the costs attributable to the event or situation covered by the change, plus appropriate profit or fee; or
 - f. In the absence of agreement between the parties, by a unilateral determination by the procurement officer of the costs attributable to the event or situation covered by the clause, plus appropriate profit or fee, all as computed by the procurement officer in accordance with generally accepted accounting principles and applicable sections of chapters 3-123 and 3-126 of the Hawaii Administrative Rules.
2. Determining the cost or credit. In determining the cost or credit to the State resulting from a change, the allowances for all overhead, extended overhead resulting from adjustments to contract time (including home office and field overhead) and profit combined, shall not exceed the percentages set forth below:
- a. For the contractor, for any work performed by its own labor forces, fifteen per cent of the cost;
 - b. For each subcontractor involved, for any work performed by its own forces, fifteen per cent of the cost;
 - c. For the contractor or any subcontractor, for work performed by their subcontractors, seven per cent of the amount due the performing subcontractor.
3. Percentages for fee and overhead. Not more than three line item percentages for fee and overhead, not to exceed the maximum percentages shown above, will be allowed regardless of the number of tier subcontractors.

PROMPT PAYMENT BY CONTRACTORS TO SUBCONTRACTORS – HAR 3-125-23

1. Prompt payment clause. Any money, other than retainage, paid to a contractor shall be dispersed to subcontractors within ten days after receipt of the money in accordance with the terms of the subcontract; provided that the subcontractor has met all the terms and conditions of the subcontract and there are no bona fide disputes; and, upon final payment to the contractor, full payment to the subcontractor, including retainage, shall be made within ten days after receipt of the money; provided that there are no bona fide disputes over the subcontractor's performance under the subcontract.

(SAMPLE)

Date: _____

Engineering Officer
Department of Defense
State of Hawaii
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Sir:

Subject: REQUEST FOR SUBSTITUTION

PROJECT TITLE: _____

JOB NO. _____

In accordance with the requirements of the Special Provisions, we hereby submit for substitution, three (3) sets of technical brochures and statement of variances for your review and approval for the item(s) shown below.

<u>SECTION/ ITEM</u>	<u>SPECIFIED BRAND</u>	<u>SUBSTITUTE OR ALTERNATE BRAND</u>	<u>VARIANT 3/ FEATURES</u>
--------------------------	----------------------------	--	--------------------------------

I further certify that my request for substitution of the above item(s) has no other variant features.

SIGNATURE

NAME OF COMPANY AND TITLE

- NOTE:
1. Use own letterhead
 2. Submit one (1) original and two (2) copies
 3. If no variant feature indicate "None".

WEEKLY QUALITY CONTROL REPORT FORM

PROJECT: _____

PROJECT NO: _____

WEEK OF: _____

WORK PERFORMED: _____

INSPECTION REPORT: _____

ATTACH ANY ADDITIONAL INFORMATION

DATE PREPARED: _____

INSPECTOR: _____

VERIFIED BY PRIME CONTRACTOR: _____

STATEMENT OF WORK
Air Conditioning System Replacement
at Building 618 AASF#2, Hilo, State of Hawaii, Department of Defense,
Hawaii Army National Guard, Job No. CA-1205-C

1. GENERAL

Scope of Work: PN#15120006, CA-1205-C, Hawaii Army National Guard, Building 618 AASF#2.

Contractor to furnish and install Variable Refrigerant Flow (VRF) Air Conditioning System replacement items per drawings and specifications. Replace existing ducted central air conditioning system with VRF system, install direct-digital-controls (DDC). Install heat exchanger to service building potable hot water. New DDC devices will tie into existing HIARNG Statewide Energy Management Controls System. Test and balance air conditioning system.

Proposed bid amount (total lump sum bid price).

See attached Drawings and Specifications for Air Conditioning System requirements and warranty requirements.

Prime contractor to have completed a minimum of three (3) air conditioning projects for Federal, State and/or County department. Prime and/or sub-contractor shall have a minimum of 5 years experience installing heating, ventilation and air-conditioning systems.

Davis-Bacon prevailing wage standards apply to all federally funded projects. Certified payrolls must be submitted, and verified with each invoice.

Drawings: pdfs of site are available.

2. SPECIFICATIONS

- a. See attached Drawings and Specifications for construction project requirements.
 - i. All references to "Contracting Officer" shall be replaced/reflected with "Project Manager".
 - ii. The HIARNG Project Manager will serve point-of-contact for State of Hawaii DOD.
 - iii. State of Hawaii DOD General Conditions provided shall supersede DAGS General Conditions in specifications.
- b. Equipment and material specified by catalog numbers and names: In case of obsolescence, supersede, or error in identification, the intent implied by the description, application, required performance and the features of competitive brands. Models and brands listed are for reference only. All substitute equipment and material must be equal or better that specified models and brands listed.
- c. All equipment and materials shall be suitable for intended location and use and include all accessories for proper installation and operation.

State Licenses

- i. Prime and/or sub-contractor must be licensed to include: State of Hawaii C-15, C-44 and C-52 specialty licenses. Favorable reputation with City and County, BBB and DCCA License board rating.
- d. Energy Management Controls System
 - i. All digital controls equipment in the building should be designed to be part of a single networked system, which is designed to be connected to the existing State of Hawaii, Dept of Defense, Energy Management Controls System (EMCS). The building's EMCS will be user-friendly functionality utilize a web-based user

interface, accessible by any standard web browser. The web page files to support the user interface will reside on the existing State DOD central server.

- ii. The primary building controllers that connect to the EMCS must be fully compatible BACnet interface with owner's central server. All controls components must be fully compatible and able to communicate with each other and central server, and provide single web-based, uniform user interface at all buildings.
- iii. BACnet
All controllers connected to the primary controller should communicate using BACnet communication protocol, unless specifically approved in advance by the building owner. BACnet is an open communication protocol systems whose functional profiles conform the guidelines of the BACnet Manufacturers Association, and are certified compliant by that organization.
- iv. Third party control systems should be avoided as much as possible, and if used, must be COMPLETELY integrated into the building EMCS system, with all points and control parameters fully accessible from the EMCS system. Owner's representative shall verify that specifications for any third party control systems used, and the control systems of all mechanical equipment controlled by the building EMCS system, specify controls and equipment that will be fully compatible with the EMCS.
- v. Advanced Metering
Electric, water and gas (if applicable), shall be metered by equipment connected to the EMCS system. Remote meter reading; maximize use of remote metering capability or Automatic Meter Reading (AMR).
- vi. Specifications are to include a concise statement of work for the project, briefly describing the principal features of work to be performed. Include a consolidated list of material submittals (actual materials, shop drawings, brochures, "cut-sheets", etc.) which are to be submitted to the Project Manager for approval for acceptance prior to the actual construction of the project. All references to material approvals shall state the Project Manager is the acceptance authority.
CSI Section 23 09 00: Instrumentation and Control for HVAC
CSI Section 23 09 23: Direct-Digital Control System for HVAC
CSI Section 23 09 93: Sequence of Operations for HVAC Controls
ASHRAE 135.1: BACnet: Data Communication Protocol for Building Automation and Control Networks
- vii. Controllers must be provided with an open license, open system design to include:

	Property	Value
Station Compatibility	In	All
Station Compatibility	Out	All
Tool Compatibility	In	All
Tool Compatibility	Out	All
- viii. Points of Interest for each VAV (3 analog, 2 digital, if applicable)
 - Zone temp
 - Thermostat setpoint
 - Static pressure
 - VAV actuator open
 - VAV actuator closePoints of Interest for each Exhaust Fan (1 analog input/ 1 digital output, if applicable)

- Current sensing
- On/off

Points of Interest for each Split System (2 analog inputs, if applicable)

- Zone temperature
- Supply air temperature

Furnish and install replacement VFD (if applicable)

- Duct static pressure sensor
- DDC controller
- 3 contactor bypass
- 3% AC line reactors

In the future, we would also like to have the ability to monitor the condensing units for operability with the following data points:

- Saturated liquid refrigerant temperature
- Superheated refrigerant vapors
- High & low pressure sensing (both analog)
- Oil pressure sensing (can be I/O or analog transducer)
- Compressor amps

viii. Criteria

- 1) Web-based system (internet access available). Bldg XX shall be interfaced to State DOD computer server and software.
- 2) System security protection will include area dependant access. Access for each user will be Bldg XX only, RTI only, or Bldg XX & RTI access, etc.
- 3) Browser interface to system, additional or special workstation (HMI) software will not be accepted. System must be web-based and compatible with existing State DOD website.
- 4) Distributed process shall be used. Each major piece of equipment or equipment plant will have a dedicated direct digital controller with battery back-up. Residing in each controller shall be, at minimum, time schedules (including all holidays for the year), system program, and trend logs for a minimum of one day. Major equipment shall include: one control module for the chilled water plant with outdoor rated NEMA enclosure, one control module per AHU, one control module per FCU and one control module per VAV box. Use of multiple modules for any of this equipment shall not be acceptable.
- 5) Room Sensors (thermostats) shall have digital displays, setpoint adjustment and local (after-hours occupancy) occupancy override.
- 6) All direct digital controllers shall be native BACnet.
- 7) Communication cabling shall be high speed ARCnet (156k) using low-capacitance cable.
- 8) Provide communication output from meters. Provide cabling to existing HIARNG network switch.
- 9) Provide mapping to existing State DOD statewide BACnet server. (Note: Mapping must be performed by an authorized Automated Logic vendor).
- 10) The programming language shall be graphical programming, line programming is not acceptable. The system HMI shall include a LOGIC page for every system. This logic page shall allow the operator to view the program logic with the live data display throughout the logic. Authorized operators shall have the capability to change parameters on-line. Programming changes shall be in background mode only.

- 11) Provide Energy Report software as an integral part of the EMCS.
- 12) Provide Environmental Index software.
- 13) Color graphics shall follow the DoD EMCS Graphic Standard.
- 14) Color computer Graphics shall be provided for each piece of equipment.
- 15) Color computer Graphic floor plans shall be provided with thermal graphs.

Thermal graphs will indicate each AHU, FCU or VAV Box zone within the floor plan with room numbers and changing colors to indicate the following:

- a. If the space is unoccupied the color will be GRAY
- b. If the space is occupied:
 - i. GREEN shall indicate the zone is at set-point.
 - ii. YELLOW shall indicate the zone is slightly warmer than set-point.
 - iii. ORANGE shall indicate the zone is well above set-point.
 - iv. LIGHT BLUE shall indicate the zone is slightly cooler than set-point.
 - v. DARK BLUE shall indicate the zone is well below set-point.
 - vi. RED shall indicate the zone is in alarm.
 - vii. CHARTRUSSE shall indicate that there is not communications to the DDC module.
- 16) Trending shall be required for every point in the system. Every trend shall be

historically trended and saved in the hard drive data base. Exporting of trends shall be included, trends shall be exported to an Excel spreadsheet without the use of any specialty software.

- 17) All software tools shall be provided and installed on the system computer server.

Software tools shall include at minimum:

- a. Data base configuration software and tools.
- b. Graphic programming software.
- c. Graphic designing software.
- d. All implementation software tools required to build this system from scratch.

3. SOLID WASTE

- a. Submit solid waste report for all demolition material. Report to reflect tonnage of recycled, debris and/or disposal of demolition material. Waste Collection log .xlsx to be provided.

4. HIARNG ENVIRONMENTAL CONTRACTOR REQUIREMENTS

In order to facilitate Emergency Planning and Community Right-to-Know Act (EPCRA) reporting requirements, prior to project start and within 30 days of completion of the project, contractor shall submit to HIARNG-ENV a Hazardous Material Inventory Log of chemical products to be used in the project, and provide an update no later than 31 January of each calendar year. The log shall include the product name and manufacturer ID number, container size, amount used, and maximum number of containers to be stored on site at any given day during the project. HIARNG-ENV may waive this requirement based upon contractor request. (Sample inventory log attached). Safety Data Sheets (SDSs) shall be provided or made available to the government COR/project manager and HIARNG-ENV upon request.

Prior to project start, Contractor will provide to HIARNG-ENV and the COR/project manager an estimate of the maximum amount of hazardous waste, universal waste, and other regulated waste (e.g., asbestos, lead paint chips, fluorescent lamps, PCB ballasts) expected to be generated per month, and the total amount anticipated to be stored on-site at any given time. All waste will be stored in a secured area pending removal for disposal, with signage indicating contact information, and shall be managed in accordance with all applicable federal, state, and local regulations. Monthly waste generation reports shall be provided to

HIARNG-ENV and the COR/project manager by the 5th of the month after the end of the month being reported. The reports shall indicate the type of waste and the number of pounds of each type generated in each container each month. (Sample container waste collection log and waste generation report attached).

Contractor shall be responsible for all costs for disposal of waste generated from this project and shall provide copies of all waste disposal documentation (including any required lab analyses, waste profiles, and any other supporting documentation) to the HIARNG-ENV and the COR/project manager, along with draft copies of the waste manifests for review prior to waste shipment off-site for disposal. The applicable HIARNG EPA ID Number shall be used on waste manifests, and manifests will only be signed by individuals authorized by HIARNG-ENV.

All construction sites are subject to the regulations of 40 CFR 112 Oil Pollution Prevention and are required to prepare a site specific Spill Prevention, Control and Countermeasure (SPCC) plan if storing more than 1320 gallons (G) of POL on site. A copy of the SPCC plan must be submitted to HIARNG-ENV before start of the project and kept readily available on site. If the site is storing less than 1320 G of POL no SPCC plan is required, however, the contractor shall implement the applicable HIARNG SPCC plan.

All projects that disturb more than 1 acre of soil are required to obtain an applicable National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit from the Hawaii Department of Health (HDOH) and implement all permit requirements, plans, and inspections. Sites less than 1 acre are required to implement best management practices (BMP's) to prevent contaminated stormwater from leaving the site.

Contractors shall be responsible for obtaining the following permits as applicable: underground injection control well (UIC), oil water separator, grease trap, and individual waste water system. The ENV office shall be copied on all permit correspondence, and shall be provided the original copy of all permits.

Contractor shall post emergency contact sign indicating the name and phone number for the government COR/project manager, the contractor emergency contact, police/fire department 911, and HIARNG ENV 672-1013. (Sample sign attached). Contractor shall report spills immediately to the COR and HIARNG-ENV and complete the HIARNG Spill Incident Report Form as required. Contractor shall immediately clean up all spills IAW federal and state guidelines and to the satisfaction of HIARNG-ENV. Contractor shall maintain adequate spill supplies commensurate with the potential for spills, and will contract out spill cleanup beyond their capabilities. Contractor shall accomplish all regulatory verbal and written notifications to the State Emergency Response Commission, Local Emergency Planning Committee (LEPC), National Response Center (NRC), Environmental Protection Agency (EPA), as applicable, and provide HIARNG-ENV copies of all spill reports submitted.

State of Hawaii
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
CONTRACTING AND ENGINEERING OFFICE
Honolulu, Hawaii

DEPARTMENT OF DEFENSE

Arthur J. Logan
Brigadier General
Adjutant General

CONTRACT SPECIFICATIONS AND PLANS

PN15120006 Job No. CA-1205-C
Energy Efficient Air Conditioning System for Building 618, AASF #2
Hilo, State of Hawaii

Electrical Engineer: Douglas Engineering Pacific, Inc.
Mechanical Engineer: Douglas Engineering Pacific, Inc.

March 2014

State of Hawaii

DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
CONTRACTING AND ENGINEERING OFFICE
Honolulu, Hawaii

CONTRACT SPECIFICATIONS AND PLANS

PN15120006 Job No. CA-1205-C
Energy Efficient Air Conditioning System for Building 618, AASF #2
Hilo, State of Hawaii

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E-1	Electrical General Notes and Legend
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END OF SECTION

SECTION 01000 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Description of Work: Upgrade of existing air-conditioning systems including new pumps, new air-cooled condensing units, new fan coil units, new heat exchangers, new air distribution devices and control equipment; power equipment and power distribution equipment, and repairs and modifications to existing ducts.
- B. Materials and Methods: As indicated in the Construction Documents and referenced herein.
- C. Construction Operations: Limited to areas noted in the Construction Documents.
- D. Time restrictions for performing Work limited to normal work hours 0730-1645 M-Fri, unless other arrangements with program manager are made.
- E. The building may be occupied at all times and air conditioning must be maintained during construction unless otherwise directed. Sequencing of construction work must be followed to minimize the impact on operations within the facility.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Shop drawings: Present in a clear and thorough manner, accurately and at a scale sufficient to show pertinent aspects. Indicate fabrication, layout, anchorage and installation details.
- B. Submit and obtain written approval of all shop drawings and product information prior to the start of any Work.
- C. Submit a comprehensive schedule of construction, including ordering materials and delivery milestones for all construction materials at least three weeks prior to start of construction.
- D. Submit proof of ordering for all construction materials within 30 days of start of construction.
- E. Schedule of construction shall be updated with each payment request.

1.3 QUALITY REQUIREMENTS

- A. Verify that existing site conditions are acceptable before commencing any new phase of Work. Beginning new Work means acceptance of existing conditions including responsibility for any defects or improperly prepared Work.
- B. Verify that existing surfaces are capable of structural attachment of new Work being applied or attached.

1.4 TEMPORARY FACILITIES AND CONTROLS

- A. Barriers and Enclosures
 - 1. Provide barriers to prevent unauthorized entry to construction areas, and to protect existing facilities and adjacent properties from damage from construction operations and demolition. Construction barriers will be placed to

ensure safety of workers and minimize impact to users of the facility.

B. Temporary Control and Cleaning

1. Comply with applicable federal, state, and local laws, regulations, and ordinances for environmental pollution control and abatement in performing construction activities.
2. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
3. Rubbish disposal: Haul away unusable debris and waste materials to an appropriate off-site dump area daily.
4. Dust: Keep dust within acceptable levels at all times, including non-working hours, weekends and holidays, in conformance with Chapter 31 - Air Pollution of the State Department of Health, Public Health Regulations, latest edition.
5. Air pollution: Do not permit or cause air pollution from mist, smoke, vapor, gas, odorous substances, particulate matter, or any combination thereof.
6. Comply with applicable local laws, regulations and ordinances for controlling and containing all drainage and/or erosion within limits of Project Site.

1.5 DIVISION OF WORK

- A. The Divisions and Sections into which these Specifications and accompanying Construction Documents are divided shall not be considered as accurate or complete segregation of Work by trades. This also applies to all Work specified within each section. All trades shall be responsible to familiarize themselves with the entire Work.

1.6 SPECIFICATION LANGUAGE

- A. These Specifications and accompanying Construction Documents are written in imperative and abbreviated form. This imperative language of the technical Sections of these Specifications is directed at the Contractor, unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall", "the Contractor shall" and "shall be", and similar mandatory phrases by inference in the same manner as they are applied to notes on the drawings. The words "shall" shall be supplied by inference where a colon (:) is used within sentences or phrases. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated imperatively or otherwise.

1.7 EXISTING CONDITIONS

- A. Examine Project Site and determine existing conditions and extent of Work required for this Project.
- B. Obvious conditions existing on the Project Site shall be part of the Work, even though they may not be clearly indicated or completely defined in the Construction Documents and/or specified in these Specifications, or may vary therefrom.
- C. All questions pertaining to these Specifications and accompanying Contract Documents shall be directed in writing to Douglas Engineering Pacific Inc.

1.8 WORK RESPONSIBILITIES

- A. Contractor responsibilities shall include general supervision, management and

control of Work of this Project, and in addition to other items more specifically noted throughout these Specifications and accompanying Contract Documents.

- B. Contractor shall provide a competent Superintendent on the Project at all times during the progress of Work with authority to act. Provide adequate support staff to coordinate and expedite all Work properly and orderly in compliance with these Specifications and accompanying Contract Documents. In addition, all workers at the Project Site shall dress appropriately and conduct themselves properly at all times; loud abusive behavior, sexual harassment and unacceptable conduct will not be tolerated. Workers found in violation of the above shall be removed from the Project Site as directed by the State.

1.9 CONTRACTOR GUARANTEE

- A. All Work shall be guaranteed by the Contractor against all deficiencies in construction and materials for a minimum of one (1) year after the date of Substantial Completion and acceptance. Longer guarantees may be required as specified within each Section of these Specifications.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Products specified by reference standards or by description only: Any product meeting those standards or description. Product submittals need to be approved by the Project Engineer before ordering.
- B. Products specified by naming one or more manufacturers: Products of manufacturers named and meeting Specifications, no options or substitutions allowed.
- C. Products specified by naming one or more manufacturers with a provision for substitutions: Submit a request for substitution for any manufacturer not named.
- D. Document each substitution request with complete data on Architect's standard form. Do not order product until substitution request has been approved

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

- A. Employ skilled and experienced installer to perform cutting and patching. Request approval in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of the State or separate contractor(s).
- B. Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

- C. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- D. Maintain integrity of existing construction; completely seal voids.
- E. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- F. Identify any hazardous substance or condition exposed during the Work to the State for decision or remedy.
- G. Quality Assurance - Control of Installation
 - 1. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce quality Work.
 - 2. Comply with manufacturers' instructions, including each step in sequence.
 - 3. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
 - 4. Perform Work by persons qualified to produce workmanship of specified quality.
- H. Final Cleaning and Adjusting
 - 1. Execute final cleaning prior to final inspection.
 - 2. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
 - 3. Replace filters of operating equipment.
 - 4. Remove waste and surplus materials, rubbish, and construction facilities from the site.
 - 5. Adjust operating products and equipment to ensure smooth and unhindered operation.
- I. Project Record Documents
 - 1. Maintain on site at all times, one (1) set of Record Documents; record actual revisions to all in-progress Work:
 - a. Drawings.
 - b. Addenda.
 - c. Change orders and other modifications to the contract.
 - d. Reviewed shop drawings, product data, and samples.
 - 2. Ensure entries are complete and accurate, enabling future reference by the State and Engineer.
 - 3. Record information concurrent with construction progress.
 - 4. Record documents and shop drawings: Legibly mark each item to record actual construction.
 - 5. Submit all items prior to application for final payment.
- J. Operation and Maintenance Data, Warranties
 - 1. Submit data bound in 8-1/2 x 11 inch text pages, three-side ring binders with

durable plastic covers.

2. Provide duplicate copies of warranties.
3. Submit prior to final application for payment.

END OF SECTION

SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: General summary of the Work.
- B. Related Sections.
 - 1. Division 1 Sections.
- C. Project Summary: As per section 01000, unless otherwise indicated in these Specifications or the accompanying Construction Documents.
- D. Contract Documents Identification: See 00010 Project Manual Index.
- E. Related Provisions: The following applies to all the Work:
 - 1. Conditions of the Contract.
 - 2. Contract Drawings.
 - 3. Division 1 Specification Sections.
 - 4. As applicable to each Entity, the appropriate Specification Sections and related Specification Sections of other Installers as necessary for the proper coordination of the Work.
 - 5. Addendum and Modifications to the Contract, if any.

1.2 QUALITY ASSURANCE

- A. Regulations: Comply with all laws, ordinances, rules, and regulations, by any governmental Authority, which in any manner apply to or affect those employed in the Work, the materials used in the Work, and the conduct of the Work. Contractor shall also comply with all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the Work and which are or have the effect of law.
- B. Industry Standards: Industry standards apply to the Work whether indicated or not. When not indicated, the industry accepted quality applicable to the class (grade) of Work intended shall apply.
- C. Completeness of Work: Whether specified or not, provide all materials necessary to ensure each Work is complete and functional for each use intended.
- D. Project Manual Language: Imperative language is intended and specified requirements are to be executed.
- E. Authority Changes: Where Authority directs changes in the Work, immediately notify Engineer in writing; prior to execution of such changes, to ensure such changes are not in conflict with any original approvals made by Authorities.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TIMES AVAILABLE FOR CONDUCTING WORK: UNLESS OTHERWISE DIRECTED BY THE STATE IN WRITING, FOLLOWING TO APPLY

- A. Daily: 7:30 am– 4:45pm; Monday thru Friday, unless approved otherwise by project manager.
- B. Restriction: Noise producing operations to be limited as follows:
 - 1. Within Allowable Noise Limits: Not allowed prior to 6:45 am.
 - 2. Not Within Allowable Noise Limits: Not allowed prior to 7:00 am.

3.2 OPERATIONAL RESTRICTIONS

- A. General: Refer to Division 1 - Temporary Facilities & Controls.

3.3 USE OF SITE

- A. Physical Limits: Limit primary Work to immediate Project Site. Work required on property outside of Project Site, to be done in accordance with the State's written agreement(s) with adjacent property owner(s) and/or any Authority having ownership interests in any adjacent property or jurisdiction thereof.

END OF SECTION

SECTION 01120 – ARCHAEOLOGICAL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Archaeological Protection.
- B. Related Sections.
 - 1. Division 1 Sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

- A. Representative of the State will from time to time examine the area as work proceeds. If historical values are noted, the State may order a halt to the work in the vicinity of the historical values until the State can examine further.
- B. The Contractor shall notify the State if he finds anything he suspects to be of historic significance, and shall discontinue further work in the vicinity of the find until the State can examine the area.
- C. In all cases, further work in the vicinity of historical or suspected historical values may proceed only upon approval by the State. Such approval can normally be expected within one week and shall in no case require more than one month.

END OF SECTION

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Alternates.
- B. Related Sections:
 - 1. Division 1 Sections.
 - 2. As indicated in the State's scheduled Alternate descriptions, if any.

1.2 DEFINITIONS

- A. Option: State's term for construction components, products and/or equipment options for which alternates prices are provided by Bidders.
- B. Effective Date: Date through which price for Alternate is guaranteed not to increase.

1.3 SUBMITTALS

- A. General:
 - 1. Intent: Prior to acceptance of any Alternate by State, Engineer is to be provided with detailed submittals to show the full scope of work to be provided.
 - 2. Types Required: Submit Project related product data with tested characteristics and performances, each manufacturer's warranty for required products, standard published drawings applicable to each work, detailed specifications tailored for Project and covering materials and installation requirements, Project related samples, and such other submittals as may be required by Engineer to fully evaluate compliance with Project requirements.
- B. Quality Assurance Submittals: Refer to "Quality Assurance" paragraphs herein.

1.4 QUALITY ASSURANCE

- A. Cost Proposal: Proposed lump sum cost for each Alternate to include all costs necessary to fully incorporate the Alternate. Proposed costs are to be held without change up through proposed Effective Date.
- B. Design Intent: Alternates require that proposed costs, in addition to primary added or deleted work, include costs necessary for coordination, adjustment, modification, and finishing of all adjacent impacted work.
- C. Schedule:
 - 1. Project Progress Schedule: Indicate when decisions for each Alternate must be made to ensure that Alternates, if accepted, do not negatively impact Project's Contract schedule.
 - 2. Notifications: Notify Engineer and all other parties affected by Alternates as to

SECTION 01310 - PROJECT MANAGEMENT & COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Administrative requirements.

- B. Related Sections:
1. Division 1 Sections.

1.2 SUBMITTALS

- A. Progress Schedule:
1. Initial Submittal: Submit prior to signing Contract for the Work.
 2. Updates: Submit with each Application for Payment.
- B. Progress Meeting Submittals:
1. Agenda: Prepare and distribute at each meeting.
 2. Minutes: Prepare and submit minutes to each Entity affected by information contained in minutes.

1.3 QUALITY ASSURANCE

- A. Superintendent:
1. Requirement: Each Entity (Contractor and Subcontractors) to secure a full time Superintendent to manage and coordinate responsibilities for the Project.
 2. Experience: Not less than six (6) years minimum experience in supervising projects of types, complexity, and scope as required by this Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PROGRESS SCHEDULE

- A. Schedule Type: Contractor to schedule Project using CPM. Microsoft Project is the preferred software.

3.2 MEETINGS

- A. Progress Meetings:
1. Contractor's Meetings: As required for proper coordination of the Work.
 2. Construction Meetings: One meeting each working week on regularly scheduled day agreed to by Architect and Contractor.
- B. Pre-installation Conferences: Conduct as required or specified.

3.3 CONSTRUCTION ACTIVITIES

- A. General: Coordinate to assure efficient and orderly installation of each part of the Work.

END OF SECTION

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative Submittals; Work Related Submittals; Closeout Submittals; Submittal Format.
- B. Related Sections:
 - 1. Division 1 Sections.
 - 2. Each Section specifying submittals.

1.2 SUBMITTALS

- A. Administrative Submittals:
 - 1. Permits.
 - 2. Applications for Payment.
 - 3. Schedules of Value.
 - 4. Purchase Orders, Shipping Confirmations, etc., related to schedule milestones.
 - 5. Certificates of Insurance.
 - 6. Personnel Data.
 - 7. Progress Schedule.
 - 8. List of Products.
 - 9. List of all Entities (i.e. suppliers, subcontractors, etc.)
- B. Work Related Submittals:
 - 1. Product Data.
 - 2. Shop Drawings.
 - 3. Samples.
 - 4. As-Built Drawings.
- C. Closeout Submittals:
 - 1. Closeout Project Record Documents.
 - 2. State's extra stock.
- D. Other: As required in individual Specification Sections.

1.3 QUALITY ASSURANCE

- A. Specification Section Requirements: Specified requirements herein are base requirements and are in addition to other submittals and other submittal requirements required in the accompanying Contract Documents.
- B. Scheduling Submission Times:

1. Contractor Responsibility: Schedule submissions so that submittals can be reviewed within a reasonable time by Engineer; based upon his assigned manpower, available manpower time, and the size, number, and review complexity of each submittal and quantity of submittals made. Engineer will expedite and assist Contractor to ensure an efficient flow of the submittal review process; but is not responsible for submissions which are incomplete or not properly scheduled.
 2. Engineer Review Period: 10 working days each submittal, unless Contractor is notified in writing to the contrary.
- C. Marking of Data: Submittals to be clearly identified for all Project specific requirements. Highlight, underline, or mark in some manner to clearly designate Project requirements. Materials not properly identified may be returned for re-submittal.
- D. Partial Submittals: Where any submittal package represents only part of all the submittals required for a particular Specification Section, transmittals to indicate outstanding submittals.
- E. Engineer's Review:
1. Contractor's Responsibility: From time to time, the Engineer may include review information that is the Contractor's responsibility. Such review information is provided solely to assist the Contractor as part of the review process. The Engineer makes no claim to the accuracy of information provided, nor is it to be construed as an infringement of what is the Contractor's responsibility as defined by the Conditions of the Contract. The Contractor is solely responsible for all construction means, methods, techniques, sequences and procedures, and therefore shall be responsible for determining the accuracy of such information provided by the Engineer and for the use in the Work.
 2. Review of Component vs. Complete Assembly: Engineer's review of single component of a larger assembly does not constitute approval of the entire assembly, unless otherwise indicated.
 3. Engineer's Review limitations and review stamp are as follows:

DOUGLAS ENGINEERING PACIFIC INC

SHOP DRAWING REVIEW

This submittal has been reviewed for general compliance with the Plans and Specifications. This review does not relieve the contractor of responsibility for errors, omissions or non-compliance with the Contract Documents.

NO EXCEPTIONS TAKEN

EXCEPTIONS NOTED

REVISE AND RESUBMIT

By: _____ Date: _____

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SUBMITTAL FORMAT - GENERAL

A. Organization:

1. Data Groups: Logically group related data.
2. Enclosure Types: Each submittal set to include all submittals required for each Specification Section.
3. Transmittal: Accompany each submittal with Company Transmittal. Information on transmittals to include not less than following:
 - a. Letterhead.
 - b. Project Numbers: Engineer's and Contractor's numbers.
 - c. Project Name: Engineer's official Project name.
 - d. Entity Descriptions: Name of primary contact, address, phone/fax/e-mail numbers of Contractor, Subcontractor, Manufacturer, and Supplier.
 - e. Affected Contract Documents: Identify pertinent drawings and each affected Specification Section.
 - f. List of Enclosures: Detailed list of submittals.
4. Review Stamp: Each document in each submittal to be marked and signed with Contractor's Review Stamp indicating that submitted data fully reviewed by Contractor and that certifies that submitted data complies with Project requirements.

B. Number of Submittals: Four (4) sets minimum, but not less than required by following Entities:

1. Product Data and Samples:
 - a. Engineer's File Copies: One (1) set for every submittal required for Project.
 - b. State: One (1) set for every submittal required for Project.
 - c. Contractor, supplier and contractor's subcontractors: Quantity required for complete and thorough coordination between multiple entities affected by each individual submittal.
2. Drawings:
 - a. Engineer: One (1) blueprint set.
 - b. State: One (1) set for every submittal required for Project.
 - c. Contractor, supplier and contractor's subcontractors: Quantity required for complete and thorough coordination between multiple entities affected by each individual submittal.
3. Contractor: For any required submittal, furnish one (1) submittal set for job site file, additional sets as required for Contractor's Work, and for Closeout submittals.
4. State: One (1) additional set; as may be required under Contract or when otherwise requested by the State.

3.2 WORK RELATED SUBMITTALS

- #### A. Product Data: Submit all standard publications available and applicable to Project requirements, including but not limited to, generic material data, installation

instructions, tested characteristics, standard detail drawings, and color charts. Where standard data not complete, submit other written recommendations necessary to assure that Project data is complete.

B. Shop Drawings:

1. Scale of Drawings: Not less than scale of similar drawn Work on Contract Documents.
2. References: Use similar references to Contract Drawings so drawn information can be readily identified with affected information on Contract Drawings.

C. Samples:

1. Materials/Finishes: Submitted final samples to be actual materials and finishes as required for Project.
2. Sizes: Initial Engineer's selections may be of other sizes as acceptable to him as he feels is necessary to accomplish his reasonable review.

D. As-Built Drawings: Refer to Section 01785 Project record Documents.

END OF SECTION

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Use of Standards.
 - 2. Abbreviation use and format.
 - 3. Definitions.
- B. Related Sections:
 - 1. Division 1 Sections.

1.2 REFERENCES

- A. Standards:
 - 1. Requirement: Each type of Work provided for this Project is required to comply with recognized Industry standards (also may be referred to as "references") that are applicable to the class of Work intended by the Contract Documents. Compliance is required whether such standards are indicated or not and whether such standards are in published form or an unwritten but accepted practice in the Industry for the class of Work.
 - 2. Use:
 - a. General: Where a specific standard is indicated, this is to be interpreted as a method for conveying the design intent and its use expands on or clarifies the requirements and its use is not intended to limit, or to negate the specific Industry Standards intended to apply to the class of Work to be provided.
 - b. Conflict: Where conflict occurs between any Industry Standards that apply to the Work, it is intended that the standard producing the higher quality Work is to apply.
- B. Abbreviations:
 - 1. Industry Acronyms: Industry accepted acronyms are used throughout the Contract Documents. If any acronym is not understood, the Contractor should obtain verification from the State or Engineer.
 - 2. Product Identification Format: Where used in Contract Documents the following format is used:
 - a. Format: Abbreviation of one or several letters, followed by a hyphen, followed by an identification number, e.g. WD-1 for wood type number one or WPM-1 for waterproof membrane type number one.
 - b. Number Sequence and Related Sections: Designations may be used between related specification sections where primary product is similar and therefore numbers are not necessarily sequential within a specific specification section, although the numbering will be sequential between

all related sections where similar designations are used.

1.3 DEFINITIONS

- A. Related Sections: The listed specification sections under the "Related Sections" paragraphs indicates some of the primary related Work which is impacted by the Work of the specific specification section in which the list appears. It is not intended as a complete list (which in many cases would otherwise be enormous) but has been provided to assist the Contractor.
- B. Exposure Definitions: Unless otherwise redefined elsewhere, the following applies:
1. Exterior Surfaces: Exposed on the outside envelope of structure or surfaces of other constructed elements and equipment that are exposed to the "outside air". Covered or protected areas "open to the (outside) air" and not fully enclosed by walls, floors, roofs, windows, and doors, are to be considered as part of the exterior and surfaces occurring in such spaces are to be considered exterior surfaces.
 2. Interior Surfaces: Surfaces interior to the fully enclosed envelope of a structure or within the fully enclosed envelope of other constructed elements and equipment. These surfaces are not exposed to the "outside air".
 3. Exposed: Surfaces which are exposed to view from most vantage points, which are not concealed from view due to permanent inaccessible construction or earth, and which is not defined as semi-exposed.
 4. Semi-Exposed: Surfaces not readily visible but are accessible and viewable from selected vantage points. These surfaces include those hidden by and hidden on removable or openable doors, panels, and drawers, and surfaces of undersides of shelves, counters, desks, and toe spaces, surfaces that are hidden by moveable equipment/furnishings, and other similar surfaces.
 5. Concealed: Surfaces not exposed to view from any vantage point and which is concealed by permanent inaccessible construction, earth, and equipment/furnishings. Such concealed surfaces include those surfaces permanently concealed within walls, above ceilings, within floor construction, within shafts, and those buried underground in earth. Include within this definition, surfaces above otherwise semi-exposed accessible suspended acoustical ceilings, if any.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01450 - QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Quality control testing/inspection requirements.
- B. Related Sections:
 - 1. Division 1 Sections.

1.2 SUBMITTALS

- A. Schedule: Indicate on project schedule when the State is scheduled to be ready for each type of testing/inspection required.
- B. Quality Assurance Submittals: Refer to "Quality Assurance" paragraphs herein.

1.3 QUALITY ASSURANCE

- A. State Requirements: In addition to any specified testing and/or inspection, the State reserves right to test/inspect any and all Work of Project.
- B. Coordination of Testing Services:
 - 1. Contractor Responsibility: Contractor to schedule in writing every individual test and inspection, including those of the State, a minimum of two (2) weeks in advance of any testing or inspection required for Project.
 - 2. Submittal: Contractor to secure Engineer's acceptance of contractor's written project schedule for any testing prior to commencement of any on-site construction activities. Submit proposed project schedule for review in timely manner. Do not use any Testing Service not acceptable to State or Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 INSPECTIONS/TESTING, GENERAL

- A. General: Comply with requirements of the Contract and requirements specified herein. State's use of any special testing/inspection service shall in no way relieve Contractor of his obligation to perform the Work in accordance with the Contract.

3.2 LABORATORY & INSPECTOR DUTIES

- A. Coordination of Service: Coordinate required inspections, sampling, and testing of materials and methods of construction. Ascertain compliance with requirements of Contract Documents as measured by standards required by these Specifications, Authorities, by State, and by recognized ASTM and other applicable industry standards.
- B. Notifications: Promptly notify Engineer of irregularities or deficiencies of the inspected or tested Work. Submit written responses to State's field reports and test reports for any noted irregularities or deficiencies.

3.3 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor Confirmation Notifications: Notify the State not less than five (5) working days prior to when Work is ready for inspection/testing to allow for assignment of personnel and scheduling of testing/inspection service.
- B. Cooperation: Cooperate with testing service personnel. Provide appropriate access to Work where inspections, sampling, and testing required. Furnish labor as necessary to provide access to Work to be tested, to assist in obtaining and handling of samples at the site, and to otherwise facilitate the inspection and testing process.
- C. Protection and Repair: Protect Work exposed by or for testing service. Upon completion of inspection, testing, and sampling, repair damaged Work and restore finishes to match the adjacent finishes.
- D. Contractor Arranged Tests: Contractor may arrange and pay for additional inspections, sampling, and testing from State.
- E. Non-Complying Work: Where non-complying Work is evidenced by field reports, tests or laboratory reports, the Contractor to comply with following:
 - 1. In the event that Contractor fails to correct defective Work identified in writing by an Inspector, and the Inspector must visit project site more than one (1) follow-up site visit to confirm that defective Work was corrected, Contractor shall bear all additional costs associated with additional inspections/testing.
 - 2. Correction of Work: Provide all Work necessary to correct defective Work to comply with specified requirements.
 - 3. Time Impact to Work: Requests for additional time will not be considered when resulting from installation of defective Work, or when Inspectors were not provided with sufficient advance notice.

END OF SECTION

SECTION 01500 - TEMPORARY FACILITIES & CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for construction facilities and temporary controls.
- B. Related Sections:
 - 1. Division 1 Sections.

1.2 SUBMITTALS

- A. Reports and Permits:
 - 1. During Progress of Work: Submit copies of reports and permits required by governing Authorities.
 - 2. Closeout Submittals: Refer to Section 01785 Project Record Documents.
- B. Quality Assurance Submittals: Refer to "Quality Assurance" paragraphs herein.

1.3 QUALITY ASSURANCE

- A. Use Charges: No additional cost or use charges for temporary facilities or services are chargeable to Owner, unless otherwise agreed to by Owner.
- B. Permits: Secure permits required to carry out the Work.
- C. Regulations:
 - 1. General: Comply with Authorities having jurisdiction over Project.
 - 2. Safety: Temporary Work to comply with OSHA as applicable to each Trade.
- D. Owner's Facilities and Services:
 - 1. Use: Use of any of the designated Owner's available facilities and services, such as existing power, water, staging areas, and sanitary facilities, are to be considered a privilege as no costs are being assessed for its use to accomplish the Work. These privileges are provided under the condition that it be used reasonably for Project purposes. Such facilities shall be maintained, kept clean, and not be misused in any manner. Damaged property shall be repaired to its original condition.
 - 2. Abuses: If any abuses should occur, the Owner may after fair and reasonable warning, remove any such privilege which he deems is being abused, and/or may assess such fair compensation for damages where damages has occurred and where Contractor has not made an acceptable offer to rectify such damages.
 - 3. Privilege Removal: The removal of any privilege shall terminate immediately upon written notice from the Owner. The loss of any privilege shall not prevent the Contractor from accomplishing the Work in conformance with the Contract and the Contractor shall at his own expense find alternate means and methods to compensate for the loss of any such privilege.

4. Verification: Verify from the Owner, the conditions of use, extent, location, and times Owner's facilities and services is to be made available, prior to the start of the Project. Arrange and pay for any additional facilities and services that may be needed to accomplish the Work.
- E. Pollution Related Submittals:
1. Conditions of Use: Generally any legal toxic, hazardous, or noxious operations, equipment, and materials may be used on the Project when used in strict accordance with the law, except Owner reserves the right to deny use of any such operations, equipment, and materials where in its opinion the use of such operations, equipment, and materials may negatively impact personnel or the surrounding community.
 2. Submittal: Submit a list of such operations, equipment, and materials, their intended scheduled time of use, and related product data and MSDS sheets prior to expending any moneys for such operations, equipment, and materials; for approval by Owner.
 3. Progress Schedule: Incorporate pollution related operations into Progress Schedules.
 4. Costs: Where use of any operations, equipment, and materials are denied by Owner and for which there are no prior approval by Owner prior to spending any moneys for such operations, equipment, and materials, then any additional costs which may result from Owner acceptable alternative means for accomplishing the Work in accordance with Contract requirements are to be borne solely by Contractor.
- F. Shut Down of Utility Services or Systems:
1. Intent: All shut downs to be done only with Owner's prior approval. Accomplish at the convenience of the Owner and in strict accordance with approved methods and timetables.
 2. Progress Schedule: Incorporate into Progress Schedule.
 3. Notifications: Notify Owner's designated Project Representative in at least one full workweek in advance of each time shut down is required.
 4. Execution: Execute Work by personnel with requisite skills and experience; unless Work is to be accomplished by Owner's own designated personnel.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Quality, Maintenance, Suitability: Used materials and equipment that are undamaged and in serviceable condition may be used. Provide appropriate maintenance schedule to ensure materials and equipment properly perform during time of service required. Provide only materials and equipment suitable for the intended use.

2.2 TEMPORARY SERVICES

- A. Power: Owner to allow use of Owner designated existing available facilities.
- B. Water: Owner to allow use of Owner designated existing available facilities.
- C. Telephones: Contractor to pay for their own telephones and service as they may require for the Work.

2.3 TEMPORARY CONSTRUCTION & SUPPORT FACILITIES

- A. On Site Restrictions:
 - 1. Enter from designated entries. No crossing curbs and sidewalks.
 - 2. Maintain speed limits posted in the area.
 - 3. Parking as directed by Contractor's Superintendent.
 - 4. At no time shall parking be allowed on paved driveways, walks or in garages.
 - 5. Use of plumbing fixtures in buildings is prohibited.
 - 6. Eating in buildings is prohibited.
- B. Deliveries: Deliver materials and equipment only to Contractor's designated zone(s). Schedule to be coordinated with Contractor.
- C. Staging Areas: Work to be performed within limits of Work areas designated on Drawings and such other areas as may be allowed by Contractor.
- D. Materials and Equipment: Materials and equipment to be restricted within limits of Work areas, unless otherwise approved by Owner.
- E. Toilet Facilities: Contractor will allow use of his designated existing portable facilities complying with Health Authorities and provide regular maintenance of units.
- F. Temporary Controls: Provide equipment and facilities necessary to properly implement temporary controls specified herein.
- G. Waste/Refuse Removal: Contractor shall provide the necessary equipment for his waste and refuse removal from the Project site.

PART 3 - EXECUTION

3.1 PROCEDURAL REQUIREMENTS

- A. General: Provide each temporary facility and utility ready for use at each location when it is first needed, to avoid delay in performance of the Work. Provide facilities that can be properly maintained throughout their use at the Project site. Adjust service capacity of temporary services and facilities as needed throughout the progress of the Work. Do not remove until services or facilities are no longer required.
- B. Inspections and Testing: Inspect and test each service before placing temporary services in use.
- C. Conditions of Use: Operate temporary services and facilities in a safe and efficient manner. Do not overload temporary services or facilities, and do not permit them to interfere with the progress of the Work. Do not allow unsanitary conditions, public nuisances, or hazardous conditions to develop or persist on the site.

3.2 TEMPORARY CONTROLS

- A. General: Maintain temporary controls whenever required and for periods as long as necessary; to control conditions for which temporary controls are required during the Contract Period.
- B. Construction Fencing: Provide if required by Authorities.
- C. Protection and Security Facilities: Provide temporary protective structures, including enclosures, supports, barricades, partitions, warning signs, warning lights, and other forms of protection as created by ongoing operations and required by working areas and conditions; including, but not necessarily limited to, the following.
 - 1. To protect all persons and property from hazards of ongoing operations.
 - 2. To provide security from access by unauthorized persons.
 - 3. To protect exposed Work from damage from the weather.
 - 4. To efficiently route vehicular and pedestrian traffic around obstructing Work.
- D. Fire Protection Requirements: If any Project areas are secured, maintain security and exit requirements in compliance with Authorities. Provide portable fire extinguishers, if required, by Authorities. Instruct all personnel on use of fire extinguishing equipment and exiting procedures prior to start of Work.
- E. Construction Cleaning: Comply with requirements specified in Division 1 - Cleaning.
- F. Waste Disposal: Dispose of all waste material in a legal manner off site. Do not burn or bury any wastes on Project site. Do not dispose of any wastes into the storm or sanitary sewers.
- G. Pollution Controls:
 - 1. Intent: Limit pollution and any possible resulting contamination of the site and surrounding areas to avoid creating hazardous or unreasonable nuisance conditions from the ongoing operations.
 - 2. Authority Requirements: Comply with applicable requirements of Authorities having jurisdiction over the Project, as required by law or provided for protection of Contractor.
 - a. Federal Government, including Environmental Protection Agency.
 - b. State Government, including State Department of Health and its "Public Health Regulations".
 - 3. Types of Controls: Include, but not be limited to, the following.
 - a. Dust Control: Use appropriate containment methods as required to limit dust contamination.
 - b. Noise Control: Minimize noise produced by ongoing operations. Secure and pay for "Community Noise Permit" as required by the State of Hawaii Health Department.
 - c. Air Pollution: Limit mist, smoke, vapor, gases, odorous substances, particulate matter, and other similar pollutants to acceptable levels.
 - d. Chemical Control: Limit use of hazardous and toxic chemicals in strict accordance with lawful regulations and Authorities. Prevent contamination by chemicals to the environment. Prevent nuisance

conditions which could arise from use of the chemicals.

- e. Hazardous Waste Disposal: Volatile, toxic, and other hazardous wastes are to be removed daily, except as otherwise allowed and accepted by Authorities having jurisdiction over the Project. Refer to "Waste Disposal" paragraphs herein for additional requirements.

H. Vehicle Controls:

1. Public or Private Road Blockage:
 - a. Intent: Avoid blocking to greatest extent possible.
 - b. Full Blockage: No Work to fully block passage around such Work for more than 5 minutes; regardless of alternate routes.
 - c. Partial Blockage: Minimize length of time required.
 - d. Controls: Erect temporary traffic safety devices, e.g. signs, cones, personnel directing traffic, etc. as mandated by Authorities and as required to ensure passage of public safely around ongoing operations.
2. Spillage: Vehicles to fully contain materials being transported. Where materials are dropped on public ways and properties, full and immediate removal is required.
3. Mud Tracking: Any mud tracking onto public ways and property to be removed on daily basis by washing. Removal of wastewater to conform to what is allowed by Authorities.
4. Maintenance: Maintenance and fueling to be done only in Owner designated areas. Set up safety program for use of such areas. Comply with all Government regulations in this regard.
5. Washing of Equipment: Hopper, chute, and wheel cleaning allowed as long as washing operations not detrimental to Site, ongoing operations or adjacent roadways. Full vehicle cleaning and other washing operations, if required, to be approved in advance by Owner and when allowed, performed in accordance with Owner's requirements. No cleaning or servicing of Contractor's personnel's private vehicles shall be allowed at any time.

3.3 INSTALLATION

- A. General: Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire Project adequately and result in minimum interference with the performance of the Work. Adjust services and facilities as required during the course of Work so as to accommodate the entire Work of the Project.

3.4 OPERATIONS

- A. General: Establish regular programs for personnel health, fire protection, security, maintenance, and cleaning of Project site and temporary facilities.
- B. Supervision: Enforce strict discipline in use of temporary services and facilities at the site. Limit availability of temporary services and facilities to essential and intended uses to minimize waste and abuse. Do not permit temporary installations to be abused or endangered. Do not allow hazardous, dangerous, or unsanitary conditions to develop or persist on the Project site.
- C. Maintenance: Operate and maintain temporary services and facilities in good

operating condition throughout the time of use and until removal is authorized.
Protect from damage by dust, rain, and similar elements.

- D. Termination and Removal: Upon completion of each activity remove all unnecessary equipment, materials, and facilities. Upon completion of Work remove all equipment, materials, and facilities and remove from site in expeditious manner. Re-establish Work areas to clean condition. Repair, restore, or replace any damaged Work. Completely clean site of evidence of Contractor's operations.

3.5 DAMAGES

- A. General: If any damages result from Contractor's operations, such damages are to be remedied to satisfaction of Owner. The costs of such remedies shall be borne entirely by the Contractor, including adjacent properties, roadways and utilities.

END OF SECTION

SECTION 01580 – PROJECT SIGN

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Project sign.
- B. Related Sections.
 - 1. Division 1 Sections.

1.2 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Shop Drawings: Indicate graphics, materials and methods of construction including mounting.

1.3 LETTER STYLE

- A. Center copy, and set in Adobe Type Futura Heavy.
 - 1. Futura Demi Bold may be substituted if specified type is not available.
- B. Copy shall be set and placed by a professional typesetter and enlarged photographically for photo stencil screen process.

1.4 ART WORK

- A. Constant elements of the sign layout – frame, outline, stripe and official state information – may be duplicated following drawing measurements, or be reproduced and enlarged photographically using a layout template if provided.
- B. The State of Hawaii masthead shall be reproduced and enlarged as specified, using the artwork provided.

1.5 TITLES

- A. Use 3-3/4" type, all capitals, for specific major work of the project.
- B. Use 2-1/4" type, all capitals, for secondary information such as location or buildings.
- C. Use letter heights, upper and lower case, as indicated on drawing for other information.

PART 2 - PRODUCTS

2.1 LUMBER

- A. Panel: 3/4" exterior grade high density overlaid plywood, with resin-bonded surfaces on both sides.
- B. Posts: 4"x4" Douglas Fir No 1 or better.

2.2 PAINTS AND INKS

- A. Screen print inks: matte finish.
- B. Paints: satin finish, exterior grade.
- C. References are to Ameritone Color Key Paint for color match:
 - 1. 1BL10A – Bohemian Blue (blue)
 - 2. 2H16P – Softly (white)
 - 3. 2VR2A – Hot Tango (red)
 - 4. 1M52E – Tokay (gray)

2.3 CONCRETE

- A. Class B with 2,500 psi 28-day strength.

PART 3 - EXECUTION

3.1 GENERAL

- A. Construct sign using materials specified and as shown on Drawings.
- B. Install at location indicated on Drawings or as directed by Engineer.

END OF SECTION

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for products.
- B. Related Sections:
 - 1. Division 1 Sections.

1.2 DEFINITIONS

- A. Defects: Anything about the Project products that would make it less in quality than the intended Contract requirements, e.g., manufacturing defects, damages, abnormal deterioration, etc., that occur in product prior to end of any warranties in effect.

1.3 SYSTEM DESCRIPTION

- A. Performance: Each product provided shall perform to the Contract requirements under the anticipated conditions of use and installation. Performance evaluation of any product to include the performance of the product by itself and its performance relative to the total assembly for which it is a part as exposed to actual installed Project environmental and use conditions.

1.4 SUBMITTALS

- A. List of Products: Submit a list of primary products to be used for the Work. Submit within 10 working days from date Notice to Proceed is given. List products under each related Specification number. List of Products to indicate product, Manufacturer, Installer, Supplier, and projected date of delivery to Job Site.
- B. Work Related Submittals:
 - 1. Specified: Refer to individual Specification Sections:
 - 2. Unspecified: Including substitutions, submit any and all documentation required by Engineer in order to determine compliance with intent of Project.

1.5 QUALITY ASSURANCE

- A. Manufacturer, Supplier, Fabricator, Installer Qualifications:
 - 1. Experience: Current and continuous experience with the specific required products and services being provided or equivalent experience acceptable to Product Manufacturer and Engineer.
 - 2. Certification:
 - a. Requirement: Where Manufacturer has a certification or licensing program for installation of products, Installer to possess current certification or licensing.
 - b. Submittal: Submit written documentation of such certification when

specified or requested by Engineer.

- B. Fire Rated Assemblies and Waterproofing Assemblies: If any fire rated assemblies or waterproofing assemblies are required to be altered, verify with Manufacturer in writing that alteration does not adversely affect waterproofing integrity of assembly.
- C. Manufacturer's Packaging and Labels:
 - 1. General: Keep intact and unopened until just prior to each installation. Packaging may be opened when required by Manufacturer to protect products from damages due to environmental conditions, e.g. condensation, humidity, etc., and only to extent as required by them. When required, maintain protections of products.
 - 2. Label Descriptions: Labels to identify Project products. Specified special performances and Authority required information to appear on labels.
- D. Options: Owner offers Purchasers optional materials and equipment that can be incorporated into his Projects. Where not provided for, each installer to verify and include costs for Owner's Options in their Bid.

1.6 WARRANTY

- A. Standard Warrantees: Whether specified or not, submit standard available warrantees for products.
- B. Special Warrantees: Refer to individual Specification Sections.

1.7 MAINTENANCE

- A. Maintenance & Servicing Instructions: Whether specified or not, submit standard published maintenance and service instructions for Project materials and equipment.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. Single Source Responsibility: Secure each primary product from single Manufacturer.
- B. Primary Product: Unless otherwise specified or acceptable to Engineer, products to comply with following.
 - 1. Experience: Used for a minimum period of years acceptable to Owner in projects of similar type and scope, under similar environmental conditions, and under similar installation conditions.
 - 2. Compatibility: Compatible with related products required to complete each of its installation and compatible with each interfacing product in each assembly.
- C. Related Products: Approved for use by the Primary Product Manufacturer specifically for Project conditions of each installation and assembly.
- D. Completeness: Provide all materials necessary to provide a complete and fully functional assembly, completely warranted by manufacturer, for each product required for Project.

- E. Finishes: For exposed finishes, related products to be finished same as required for primary product; unless otherwise acceptable to Engineer.

PART 3 - EXECUTION

3.1 GENERAL EXECUTION REQUIREMENTS

- A. Intent: Comply with Manufacturer's Project specific requirements, conforming to Contract intent; as fully submitted and reviewed by Engineer in writing.

3.2 DELIVERY, STORAGE, & HANDLING

A. Delivery:

1. Arrival at Site: Immediately upon arrival at Site, inspect products for defects. Replace defective products in timely manner; without affecting Project Progress Schedule. Distribute to Trades as appropriate, when and as required.
2. Site Distribution: Distribute and inventory materials so that materials are stored into organized groups for each area for which it is scheduled.

B. Storage:

1. Manufacturer's Requirements: Comply with each Manufacturer's Project specific requirements. Ensure storage methods do not cause defects to occur.
2. Location of Stored Materials: Plan strategic storage locations at the project site that is approved by the State and to minimize obstruction of ongoing Work. If required, move stored products, materials and assemblies when Work obstructs other Trades.
3. Loads: No matter what temporary loads are, do not overload building structures at any time. Propose loading areas and verify with Structural Engineer of Record maximum allowed loading when not known.
4. Protect stored material from the weather and damage. Any stored material that shows rust or damage to cadmium plating will not be used on the project.

- C. Handling: Use methods and equipment approved by each Product Manufacturer for types of handling required for Project to prevent damage to products.

3.3 PROJECT SITE CONDITIONS

- A. Environmental Conditions: Do not proceed with any Work under any adverse conditions that would cause defects in products.

B. Acclimation:

1. General: Acclimate products prior to each installation under Manufacturer's recommended environmental conditions to ensure success of each installation.
2. Interior Products: Install when each space fully enclosed and when temperature and humidity stabilized.

3.4 SEQUENCING & SCHEDULING

- A. Coordination: Each Installer to coordinate Work with other Trades, e.g., schedules, sequence of operations, dimensions, tolerances, finish, embedded items, templates, etc., to ensure Work by other Trades are constructed in manner to ensure success of their installations.

3.5 EXAMINATION

- A. Existing Conditions: Prior to start of each Work, verify existing conditions for conformance with requirements necessary to ensure success of each installation. Start of Work indicates acceptance of conditions and confirms its conformance.

3.6 PREPARATION

- A. Responsibility: Each Installer to verify and coordinate following responsibilities; otherwise Installer requiring preparation is required to provide required Work necessary to assure success of its installation.
 - 1. Support Work.
 - 2. Substrate preparation, location, plump, level alignment, etc.

3.7 INSTALLATION

- A. General: Refer to "General Execution Requirements" paragraph herein.
- B. Color, Pattern, Texture Variation: Install products in manner to assure uniform visual appearance acceptable to the Engineer. Methods for insuring uniformity may include utilizing materials in sequence as manufactured from same lots where singular lot may be used for single contiguous area or may require the hand selection of materials between several lots for larger areas.
- C. Ferrous Products: Where not specified, ferrous products to be hot dipped galvanized. Galvanizing to conform to Division 5 - Metal Fabrications Section.
- D. Defective Work:
 - 1. General: Replace defective Work with Contract complying Work.
 - 2. Minor Defects: Very minor damage, deterioration, and other very minor defects may be restored when acceptable to the Engineer.
 - 3. Restoration Intent: In addition to any other requirements, restoration when allowed by Engineer shall meet following minimum criteria:
 - a. After fully finished, no evidence of restoration Work to be visible where on any exposed surfaces.
 - b. Workmanship of restoration Work on concealed surfaces may be less rigorous than Work for exposed surfaces, but to be generally flush and neat.
 - c. The existing defect and any restoration Work is not to reduce the long-term performance or warranty of the materials and components of the Work in any way.
 - d. The method and materials used to restore any defect to be such that it can perform as well or better than the original materials.
 - e. Restoration is to be accomplished at no cost to Owner.

3.8 PROTECTION

- A. Intent: Provide protection as necessary so that all Work is clean, without

contamination, without defects, abnormal deterioration, without damage, and properly functioning at the time of Final Acceptance by the Owner.

3.9 CLEANING

- A. Intent: Refer to Division 1 - Cleaning.

END OF SECTION

SECTION 01620 - PRODUCT OPTIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for substitution proposals.
 - 2. Requirements for "Value Engineering" proposals.
- B. Related Sections:
 - 1. Division 1 Sections.
 - 2. Division 1 - Product Requirements.

1.2 DEFINITIONS

- A. Substitution Proposal: A proposal offered by the Contractor of a product(s) to be used in lieu of the specified product(s); which is generically similar to the specified product(s).
- B. Value Engineering (VE) Proposal: A proposal offered by the Contractor of a product(s) to be used in lieu of the specified product(s); which is generically different than the specified product(s) and which offers a significant advantage or advantages to the Owner relative to cost, scheduling, and/or performance.
- C. Products: Use of words such as "products", "materials", "assemblies", "systems", are to be used interchangeably and unless the proposal is specifically for only a single most basic (cannot be broken down any further) material unit or material component, the proposal shall mean and be measured in terms of all the materials required for each use in the Project as a final in-place assembly or system.
- D. Comparable Product: Where term is used or such any other similar terms, e.g. "or equal"; with reference to a product, such term is to mean a "generically similar" product.
- E. Generically Similar: When compared with the specified product, a "generically similar" product is to, in general, to comply with following.
 - 1. Material Composition: Except for enhancements, be constructed, formulated, and made up quantitatively and qualitatively of the same or better grade of primary materials and/or chemicals.
 - 2. Manufacture: Uses the same manufacturing process.
 - 3. Size and Configuration: Maintains same or very similar size, configuration, and tolerances acceptable to the Engineer.
 - 4. Performances: Has same or qualitatively better performances based on same laboratory tests.
 - 5. Available Characteristics: Maintains same or provides greater range of available manufactured characteristics, e.g. color, pattern, texture, size, configurability, customizability, etc.

F. Product Limitations: Anything that would be detrimental to the product.

1.3 SUBMITTALS

A. Substitution or VE Proposals: Submit following:

1. Substitution/VE One-Time Review: Engineer Review Fee: Check made payable to Douglas Engineering Pacific, Inc. in the amount of Three-Hundred Dollars (\$300.00) to be submitted with each proposed individual product substitution/VE request.
2. General: Complete, readable, and organized information, with all proposal data applicable to Project highlight marked.
3. Substitution/VE Proposal Form: Execute and fully complete in conformance with Engineer's form and contractor's standard change proposal form.
4. Product Data: Available published data.
5. Comparison of Products:
 - a. Requirement: Submit a detailed comparison of significant generic qualities of the proposed substitution with those of the Work originally specified.
 - b. Characteristics: List significant qualities where applicable to project including, but not necessarily limited to following:
 - (1) Material composition.
 - (2) Sizes.
 - (3) Weight/density.
 - (4) Color, textures, patterns available.
 - (5) Qualities critical to performances, including tests performed.
 - (6) Limitations of product.
 - (7) Age of oldest installation in locale; in U.S.
 - (8) Current market share in locale and in U.S. based upon all competitive materials serving same function.
 - c. Format: Submit in a typewritten table format in which characteristics are compared side by side.
6. Samples: Submit Project representative samples.
7. Project Modifications: Where standard published drawings are not adequate, submit other drawings or legible sketches drawn to scale to show each of following where applicable to Project:
 - a. Where Project dimensions would be affected, indicate with some typical examples how product affects Project dimensions.
 - b. Show custom modifications of product which are required for Project.
 - c. Show changes to Work of other Installers which are not otherwise shown.
 - d. If any, penetrations are required through Work, show how penetrations through Work is to be accomplished, including any multiple penetrations.
8. Cost Proposal: Indicate the overall net change, if any, in the Contract Sum and contract period and submit cost proposal. Separately list cost of proposed Work, cost of changes to other Work, Contractor's cost, cost for

Engineer's review fee and other miscellaneous costs.

9. Certifications: Certify that substitutions or VE request, if approved, will meet the design intent of the contract documents.
10. Schedule: Indicate impact to schedule if project request is approved. Indicate date approval would be needed to realize any proposed advantage.

1.4 QUALITY ASSURANCE

- A. Objective: It is up to those making the proposal to prove to the Engineer that the proposed products will meet the Project requirements. To the extent that the Proposer wishes to pursue the Work, the Engineer reserves the right to request any information and samples necessary for him to make a decision.
- B. Quality of the Proposals: It is intended that the physical appearance and dimensions of the Project and the quality of the specified products required by the Contract Documents be maintained, unless otherwise specifically requested by and acceptable to Engineer. Generally, submit proposals that would result in installations of equivalent quality to that specified.
- C. Conditions for Consideration of a Proposal: The Contractor's proposals will be received and considered when extensive revisions to the Contract Documents are not required, when the proposed changes are in keeping with the primary intent of the Contract Documents, when the requests are timely, fully documented and properly submitted, and when one or more of the following conditions are satisfied.
 1. Where the proposal is directly related to an "or equal" or "comparable product" clause or similar language in the Contract Documents.
 2. Where the specified product or method cannot be provided within the Contract Time. Do not submit proposals which have resulted from the Contractor's failure to pursue the Work promptly or to coordinate the various activities properly.
 3. Where the specified requirements cannot receive necessary approval by a governing Authority, and the requested proposal can be approved.
 4. Where a substantial advantage is offered the Owner, in terms of cost, time, energy conservation, or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Engineer for redesign and evaluation services, the increased cost of other Work by the Owner or separate contractors, and similar considerations.
 5. When the specified products or methods cannot be provided in a manner which is compatible with other materials of the Work, and where the Contractor certifies that the substitution will overcome the incompatibility.
 6. When the specified products or methods cannot be properly coordinated with other materials in the Work, and where the Contractor certifies that the proposed substitution can be properly coordinated.
 7. When the specified products or methods cannot receive a warranty as required by the Contract Documents and where the Contractor certifies that the proposed substitution can be given the required warranty.

D. Factors Affecting Acceptance of Proposals:

1. Review Intent: It is intended to give all responsible proposals a fair review, however, the Engineer and Owner reserves the right to deny acceptance of any proposal for any reason. Irresponsible use of proposal process may result in termination of the review process in its entirety by Engineer and Owner.
2. During Bidding Period: Time period allotted to Engineer for review of submittals is short. It is critical full documentation be received and that documentation complies strictly with requirements specified in "Documentation" paragraphs herein.
3. Post Bidding Period:
 - a. Value Engineering: Only when Owner has directed Engineer that value engineering proposals be considered. Engineer will determine kinds of proposals acceptable during the review process.
 - b. Post Contract: No proposals will be considered, unless significant disadvantage to Contractor or significant advantage to Owner can be shown.
4. Documentation:
 - a. Intent, Information Access: Competitors should be fully aware of the advantages and disadvantages of their products and of their competitor's products. Should any knowledge be lacking, each competitor should be fully capable of accessing and securing accurate information. Where this is not possible, and unless the product is proprietary, these competitors should not offer proposals for this Project.
 - b. Quality of Information in Proposal: The Engineer should be able to fully and accurately evaluate the difference between the specified product(s) and the proposed product(s) from each proposal. Do not submit proposals with only a minimum amount of information, as Engineer will base his opinion on the information in the proposal only and will not reconsider any proposal that has been "not accepted" for any reason, including one that is not adequately documented as defined herein. Accordingly, proposals that are rejected for being incomplete will not receive any refund of the Review Fee. In addition, the resubmittal of previously incomplete submittal shall require an Additional Review Fee. It is suggested that a complete and accurate "comparison chart" accompany each proposal, unless otherwise acceptable to Engineer.
 - c. Reduction of Information Provided: When acceptable to the Engineer, the extent of the submittals may be reduced when approved by Engineer prior to the submission of each proposal. The purpose of reducing the submittal requirement shall be on a case-by-case basis, and as a courtesy to the Contractor. Generally, these will be for obvious products which are and fall into generic categories very familiar to the Engineer. Where the Engineer agrees to reduce the amount of information to be provided, the Engineer reserves the right to expand the requirement again where, and if, the Engineer feels that the proposal "objective" was not achieved.
 - d. Comparison of Products: In addition to the other required submittals,

- the "Comparison of Products" table is a key submittal to the whole proposal and is a requisite to acceptance. This submittal is not to be deleted.
- e. As Part of Work-Related Submittals: Submission of unspecified products or methods as part of "work-related" submittals, does not constitute an acceptable or valid method for processing substitution or value engineering proposals. Successfully reviewed "work related" submittals does not indicate approval of unspecified products or methods.
 - f. Engineer's Requirements: Verify prior to submission of any proposal, the Engineer's requirements necessary to fully conform proposal to Contract requirements. Request for additional costs after acceptance of any proposals will be denied.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PROPOSAL PROCESS

- A. Proposals Offered During Bidding Period:
 - 1. Acceptable Proposals: Engineer to send written notification to each eligible Bidder of acceptance of the proposal with copies of the accepted proposal. Eligible Bidders may incorporate the substitutions in accordance with the accepted proposal.
 - 2. Proposals Not Accepted: Engineer to send each proposal that is not accepted back to the Bidder who originated the proposal. Engineer to have marked the proposal "Not Accepted". Bidder may resubmit proposal, where specified time period allowed for review of proposals is not exceeded and where resubmission is acceptable to Engineer. Refer to Engineer's "Comments" for additional requirements suggested for compliance, if any.
- B. Post Bidding Period Proposals:
 - 1. Submission: As directed by Engineer.
 - 2. Acceptable Proposals:
 - a. Preliminary Acceptance: Where marked "Acceptable, Preliminary" on form, indicates that further information may be required before a decision is made. Comply with "Comments" on form and where not indicated verify additional requirements from Engineer, and resubmit a complete proposal conforming to new requirements. Adjust costs if required by Engineer to include additional design and engineering fees that would result if the Engineer issues a Final Acceptance. Use of proposed products are not allowed, until "Acceptable, Final" is marked on the proposal.
 - b. Final Acceptance: Where marked "Acceptable, Final" on form, indicate acceptance of proposals and may become basis of Contract upon execution of forms required for changes in the Work.

3. Proposals Not Accepted: Where marked "Not Accepted", resubmission may be allowed when Engineer indicates "Resubmission Acceptable" and resubmission will be denied when Engineer indicates "Resubmission Denied" on form. Where remarks are indicated under "Comments", comply with any further requests which may be indicated.

3.2 INCORPORATION

- A. Incorporation: Coordinate Work with other affected Installers of other Work. Comply in strict accordance accepted proposal which forms basis of Engineer's official Change Order for the Work and which is a representation of Manufacturer's specific Project requirements.

END OF SECTION

SECTION 01735 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Cutting and patching requirements.
- B. Related Sections:
 - 1. Division 1 Sections

1.2 DEFINITION

- A. "Cutting and Patching": The phrase as used herein is defined as follows.
 - 1. Cutting and patching includes cutting into existing construction to provide for the installation or performance of new Work and subsequent fitting and patching required to restore surfaces to their original condition.
 - 2. Cutting and patching is performed for coordination of the Work, to uncover Work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.
 - 3. Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".
 - 4. "Demolition" is recognized as related-but-separate category of Work, which may or may not require cutting and patching as defined in this Section. Cutting and patching Work required by demolition to comply with requirements of this Section.

1.3 QUALITY ASSURANCE

- A. Structural Work:
 - 1. General: Do not cut and patch any Work in a manner that would result in a reduction of its load-carrying capacity or of its load-deflection ratio.
 - 2. Reinforced Concrete Structures: Do not damage any rebars, post tension strands, or similar reinforcing components part of reinforced concrete structures, by drilling, coring, cutting, or other similar operations; including, but not limited for, penetrations, expansion bolts, dowels, etc. Locate reinforcing components with pachometer or other reliable detecting device prior to initiating any potentially damaging operations. Where existing reinforcing components prevent Work to be accomplished, notify and secure direction from Engineer prior to conducting any operation.
- B. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life, or decreased safety.

- C. Matching of Exposed-to-View Surfaces: Flush with finished surfaces and blended such that patching is not readily evident.
- D. Concealed Surfaces: Concealed Work may be less rigorous in finishing and final appearance, but should be finished flush with adjacent surface with some attempt to smoothly transition the patching materials with adjacent surface.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Except as otherwise indicated or as directed by the Engineer, use materials for patching that are identical in appearance to existing materials (unless otherwise acceptable to Engineer), result in equal or better performance characteristics than material being patched, and attain bond strengths acceptable to Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Personnel: Employ skilled workmen to perform cutting and patching Work.
- B. Cutting: Cut the Work using least destructive but effective methods. In general, it is intended that finish cut surfaces to be clean, straight, and smooth. Method of cutting should minimize damage to adjacent finished surfaces.
- C. Patching: Patch and blend Work with adjacent surfaces to obscure evidence of Work to greatest extent possible by methods approved by Engineer.

END OF SECTION

SECTION 01740 - CLEANING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Cleaning during construction; final cleaning; waste control.
- B. Related Sections:
 - 1. Division 1 Sections.

1.2 QUALITY ASSURANCE

- A. Trash Removal: Refer to Section 01500 - Temporary Facilities & Controls.
- B. Exterior Concrete Surfaces: Prevent stains from dirt, tires, oil, or other unwanted staining materials. Completely remove as soon as necessary to prevent staining. Power wash, when necessary. Method of washing not to damage washed slab and adjacent Work. Excessive water to be removed safely and properly drained from each area.

PART 2 - PRODUCTS

2.1 MATERIALS, METHODS, & EQUIPMENT

- A. Materials used should not be detrimental to the cleaned surface.

PART 3 - EXECUTION

3.1 EXTENT OF CLEANING

- A. Concealed Surfaces: Remove rubbish and debris from fully enclosed cavities.
- B. Semi-Exposed and Exposed Surfaces: Fully clean such surfaces.

3.2 DURING CONSTRUCTION

- A. Clean premises daily. Cleaning during construction may be less rigorous when acceptable to Owner; but in no case shall be less than following:
 - 1. Broom clean each Work area.
 - 2. Remove dirt, stain, mars, and other materials from any surfaces contaminated by the Work; as soon as necessary to prevent permanent staining of, and damage to, any surface.
 - 3. At end of each work day, put equipment away and neatly place materials aside.
- B. Remove trash offsite daily to prevent obstructions and hazards, e.g., fire hazards.
- C. Hazardous materials not properly contained to be removed off the premises.
- D. When work by others depends on cleaning of Work of this contract, coordinate to ensure that Work is left in condition acceptable to the next worker.

3.3 AT TIME OF SUBSTANTIAL COMPLETION

- A. Schedule cleaning so that Work can be inspected in clean condition.

3.4 AT TIME OF FINAL ACCEPTANCE

- A. Provide cleaning complying with same requirements of "Substantial Completion" Inspection.

END OF SECTION

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative requirements for Contract Closeout.
- B. Related Sections:
 - 1. Division 1 - Sections.
 - 2. Division 1 - Cleaning.
 - 3. Division 1 - Project Record Documents.

1.2 SUBMITTALS

- A. At Time of Request for Substantial Completion Observation:
 - 1. Request for Observation.
 - 2. Application for Payment.
 - 3. List of Incomplete Work.
 - 4. Lien Waivers.
 - 5. Final adjustment of accounts for change orders.
 - 6. Insurance changeover requirements.
 - 7. Final Authority releases for full use of project.
 - 8. Project Record Documents.
 - 9. Owner paid for additional material/equipment.
- B. After Substantial Completion Observation:
 - 1. Punch list, if any.
- C. At Time of Request for Final Observation:
 - 1. Request for Final Observation.
 - 2. Final Application for Payment.
 - 3. Consent of Surety for Final Payment.
 - 4. Final lien releases.
 - 5. Substantial Completion Punch List: Indicate 100% completion.
 - 6. Record Documents.
- D. Other: Refer to each Specification Section.

1.3 QUALITY ASSURANCE

- A. Number of Engineer's Observations: As decided by Engineer. Additional site visits as requested by Contractor.
- B. Number: Engineer has scheduled one (1) observation at Substantial Completion

and one (1) at Final Completion. All others are considered additional observations.

- C. Punch List Records: Contractor to record and submit written record to Engineer. Revise as requested by Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION - SYSTEMS TESTING

- A. Owner Instruction: Complete systems testing and complete on-site instructions of Owner's personnel prior to request for observation.

3.2 SUBSTANTIAL COMPLETION OBSERVATION

- A. Procedure: Conduct observation after successful completion of submittals and their acceptance by Engineer. Contractor to record punch list items. Engineer to acknowledge successful observations or schedule additional observations.

3.3 FINAL OBSERVATION

- A. Procedure: Conduct inspection after complete submission of all required submittals and their acceptance by Engineer. Engineer to acknowledge successful observation or re-schedule observation.

3.4 ADDITIONAL OBSERVATIONS

- A. Procedure: Conduct observations.

END OF SECTION

SECTION 01785 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Closeout Project Record Documents; As-Built Project Record Documents.
- B. Related Sections:
 - 1. Division 1 Sections.
 - 2. Division 1 - Closeout Procedures.

1.2 DEFINITIONS

- A. Closeout Project Record Documents - Owner's Documents: Contractor produced documents for Owner's records; representing an accurate recording of the Work provided during the Contract Period that varies from that indicated in the original Contract Documents. Documents include Owner's Documents and Purchaser Manuals.
- B. Closeout Project Record Documents - Purchaser's Manuals: Contractor produced documents representing a record of primary installed materials and warranties.
- C. As-Built Project Record Documents: Contractor produced Drawings, required during course of the Work, representing an accurate recording of built structures, and used where Contractor requires clarification with regard to Engineer's intent for subsequent Work affecting the drawn conditions.

1.3 SUBMITTALS

- A. Closeout Project Record Documents:
 - 1. Owner's Documents:
 - a. Contract Drawings: One (1) bound record set.
 - b. Project Manual: One (1) bound record set.
 - c. Support Data: One (1) bound record set, if any.
 - d. Operation & Maintenance Manual: One (1) bound record set.
- B. As-Built Project Record Documents: One (1) drawing set.

1.4 QUALITY ASSURANCE

- A. Closeout Project Record Documents:
 - 1. Up-to-Date Records: Maintain up-to-date documents. Record data within five (5) working days after installation of each specific portion of Work requiring recording, except no record data to be recorded after concealment of any Work.
 - 2. Availability: Documents are to be made available to the Engineer at any time for review.
 - 3. Out-of-Date Records: If in the Engineer's assessment the Records are not being kept reasonably up to date, the Engineer may withhold payment

requests until Record Documents are satisfactorily updated.

4. Manuals, General: Organization and included materials to be approved by Engineer prior to final submission.
- B. As-Built Project Record Documents:
1. Basis for Drawn Contract Conditions: The Engineer has designed his Work around the available documented information provided by the Owner and such additional information as could be reasonably made from field surveys of the existing Work.
 2. Clarifications: Where field installed Work would adversely affect the outcome of the Work as intended by the Contract Documents, the Contractor shall immediately notify the Engineer of such variation prior to proceeding with any further Work and expeditiously Work with the Engineer in conforming the Work satisfactorily to the design intent of the Contract Documents.
- C. Maintenance of Documents: Maintain documents in clean, dry and undamaged condition. Use documents only as necessary to record required information. Do not use as working Construction Documents.
- D. Availability: Make documents available to the Engineer upon request.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CLOSEOUT PROJECT RECORD DOCUMENTS - OWNER'S DOCUMENTS

- A. Time of Submission: Refer to Division 1 - Contract Closeout Section.
- B. Record Drawings and Project Manual:
 1. Information Required: Record installed Work ("field conditions"), which varies from the Work as originally indicated on Contract Documents. Record concealed Work which is dimensionally referenced to exposed-to-view features. Drawn data to be to similar scale to those for similarly drawn information in the Contract Drawings.
 2. Documents Required: Record initial data to clean working full size set of Drawings and to clean working set of specifications. Transfer recorded data from each working set to final submittal set of erasable Xerox vellums of Contract Documents and final submittal set of Project Manual. Transferred data to be reorganized to best show each changed data.
 3. Method of Recording:
 - a. Record Set: Legibly mark with erasable red pencils or other contrasting colored pencils when more than one color may more clearly delineate the recorded information.
 - b. Erasable Xerox Reproducible Set: F or HB pencil drawn and written information.
 - c. Scale: Drawn data to be recorded to same scale as similar drawn data on Contract Drawings.

4. Primary Label: Stamp, the words, "RECORD DOCUMENTS", in bold capital letters, approximately 1" high; without obscuring any important information, and on each page of each submitted document.
- C. Record Supporting Documents:
1. Availability: Changes may be recorded to other documents only where the intended record data cannot be adequately recorded on Record Drawings or Record Project Manual and if they significantly indicate the required information more clearly than the Drawings or Project Manual.
 2. Restriction: Minimize use of such documents and, where proposed, use of such documents shall be acceptable to the Engineer, prior to its use. Reference such documents appropriately to the Drawings and Specifications in a manner acceptable to the Engineer.
 3. Format: Logically organized and bound sets; in manner approved by the Engineer.
- D. Operating & Maintenance Manuals: Format and data as follows.
1. Binders: Assemble data in hard covered 3 ring, D-ring binders with clear plastic pockets at front, back, and spine. Provide number of binders as required for each set to comfortably house enclosed data.
 2. Cover Sheet: Insert cover sheet, for front and spine, with Project and other information as required by Engineer. Data to be computer generated text and graphics. Where more than one volume submitted, indicate "volume of volumes" applicable to each volume in set provided.
 3. Indexed Data: Index groups of related data. Provide type written identification on each index tab.
 4. Data Groups: Group data in following broad categories and order. Data within each group to be also logically organized; as acceptable to Engineer.
 - a. Table of Contents: Detailed listing of contents of each manual.
 - b. Contractor's Project Warranty: Original executed warranty, warranting all Work against defects in materials and workmanship for period of one (1) year from date certified for Final Completion.
 - c. Closeout Project Record Documents List:
 - (1) List of all Record Drawings.
 - (2) List of Sections in Record Project Manual.
 - (3) List of Supporting Record Data, if any.
 - d. Permits: Signed copies of Authority required permits.
 - e. Division 2 - 16 Specification Sections: For each Project Manual listed Specification Section, include following.
 - (1) Intent: Provide information on primary installed products of each Specification Section as a record for Owner; with enough information that he knows exactly which materials were installed into the Project.
 - (2) Manufacturer, Installer and Supplier Documentation: List each Installer and Manufacturer Company Name, Project contact, full address, phone/fax/e-mail numbers.
 - (3) Product Data: Primary published data. All need not be provided.

Include model numbers or other data which identifies each product specifically.

- (4) Operational & Maintenance Data: Insert operational and maintenance data applicable for each product and equipment including, but not limited to, maintenance materials, methods, and equipment, precautions, Service Centers, Maintenance Contracts, servicing diagrams, spare parts listing, test data, etc.; specified and available from each Manufacturer and as required for Owner's for proper maintenance of installed products and equipment.
- (5) Standard Warrantees: Insert all standard warrantees available from each Manufacturer; applicable to each product. Execute in behalf of Owner, if execution required by Manufacturer. Submit executed warrantees.
- (6) Special Warrantees: Insert executed, special warrantees, when required for each product.
- (7) Life Safety, Tested, Engineered Requirements: Include for each product, data affecting regulatory life safety issues, e.g. fire and structural performances, hazardous materials precautions, and any other regulatory and specified testing and engineering required for performances.

3.2 CLOSEOUT PROJECT RECORD DOCUMENTS - PURCHASER'S MANUALS

- A. Format and Data: Same as "Closeout Project Record Documents - Owner's Manuals", except do not include data required for "Closeout Project Record Documents List" and "Permits" data.

3.3 AS-BUILT PROJECT RECORD DOCUMENTS

- A. Submittal: Under the conditions related to in the "Quality Assurance" paragraphs herein, submit Drawings as necessary; in a legible format, showing the existing conditions that would impact the Work as drawn in the Contract Documents. When acceptable to Engineer, the drawings may be in sketch format as long as the dimensional information is provided and the depiction shown can be correlated with the drawn information in the Contract Documents.

END OF SECTION

SECTION 07840 - FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Tested and listed firestop systems; tested and listed firestop materials.

1.2 RELATED SECTIONS:

- A. Division 1 Sections

1.3 REFERENCES

- A. ANSI/NFPA 70 – National Electrical Code
- B. ASTM E 84 – Surface Burning Characteristics of Building Materials
- C. ASTM E 814 – Fire Tests of Through-Penetration Fire Stops
- D. FM AS 4991 – Approval of Firestop Contractors
- E. FM P7825a – Approval Guide Fire Protection
- F. UL - Fire Resistance Directory
- G. UL 723 - Surface Burning Characteristics of Building Materials
- H. UL 1479 - Fire Tests of Through-Penetration Fire Stops

1.4 QUALITY ASSURANCE

- I. Workmanship: Engage an experienced Installer who is:
 - 1. FM Research approved in accordance with FM AS 4991, or
 - 2. Certified, licensed or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer. The Installer shall have been trained by a direct representative of the manufacturer in the proper selection and installation techniques.
- J. Regulatory Requirements:
 - 1. Firestop systems shall be installed in all openings and around all penetrating elements or devices as required by these Contract Documents, and as required by applicable design, building and construction Codes, subject to the interpretation of the Authority having Jurisdiction.
 - 2. Firestop materials shall have the approval of the Authority having Jurisdiction.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground to protect from damage and exposure to elements. Remove damaged and deteriorated materials from site.
- B. All firestop materials shall be installed prior to expiration of shelf life.

PART 2 - PRODUCTS

2.1 FIRESTOPPING

- A. Materials: UL/FM P7825a; Asbestos-free firestopping materials capable of maintaining an effective barrier against flame, gasses and temperature; non-combustible and non-toxic to human beings during installation or during fire conditions.
- B. Fire Hazard Classification: ASTM E 84/UL 723; Material shall have a flame spread of 25 or less, a smoke developed rating of 50 or less, and a fuel contribution of 50 or less.
- C. Fire Resistance and Hose Stream Tests: ASTM E 814/UL 1479; rated "F" and "T".

PART 3 - EXECUTION

3.1 FIRESTOPPING LOCATIONS

- A. Provide firestopping around conduit, piping and their supports that penetrate through time rated assemblies.

3.2 PREPARATION

- A. Coordination: Coordinate work with other trades.
- B. Surface preparation: Remove dirt, grease, oil, loose materials, rust, or other substances that may affect proper fitting or the required fire resistance.
- C. Verify that conditions are safe and suitable for installation of firestopping products.
- D. Verify that all pipe, conduit, cable and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestopping.

3.3 INSTALLATION

- A. Insulated Pipes: Thermal insulation shall be removed where pipes pass through firestopping unless insulation meets requirements for firestopping. Thermal insulation shall be replaced with a material having equal thermal and firestopping characteristics.
- B. Electrical Conduits: Firestopping at penetrations shall comply with requirements of NFPA 70.

3.4 CLEAN UP

- A. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.
- B. Leave finished work in neat, clean condition with no evidence of spill-overs or damage to adjacent surfaces.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work includes painting and finishing of exterior and interior items and surfaces throughout the project, whether scheduled or not, except as otherwise indicated. Painting shall include new work and existing surfaces and surfaces made bare or damaged during construction. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of the work and is included in this Section.
- B. The work includes field painting of exposed bare and covered pipes and conduits and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under the electrical work, such as junction boxes, raceways and cabinets, except as otherwise indicated.
- C. "Paint" as used herein means all coating systems materials, including primers, enamels, sealers, varnish, and fillers, and other applied materials whether used as prime, intermediate or finish coats, except as specifically noted herein.
- D. Paint all exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color or finish is not designated, the Engineer will select these from standard colors available for the materials systems specified.

1.2 RELATED SECTIONS

- A. Division 1 Sections

1.3 PAINTING NOT INCLUDED

- A. The following categories of work are not included as part of the field-applied finish work, or are included in other sections of these specifications.
 - 1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for miscellaneous metal, and similar items. Also, for fabricated components such as shop-fabricated or factory-built mechanical and electrical equipment or accessories
 - 2. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets.
 - 3. Concealed Surfaces (Present and Future): Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, and pipe spaces.

4. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper and similar finished materials will not require finish painting, unless otherwise indicated.
5. Labels: Do not paint over any code-required labels, such as Underwriters' Laboratories, or any equipment identification, performance rating, name, or nomenclature plates.
6. Lava rock veneer.

1.4 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Schedule of Finishes: Submit 8 sets of the proposed painting finish schedule to the Engineer for acceptance. The schedule shall indicate the wet film thickness (mils) at which the proposed paints/coatings will be applied.
- C. Color Samples: Submit the following to the Engineer for acceptance:
 1. 8 sets of each color finish sample.
 2. After the color finish sample has been accepted, one set of color finish samples painted onto 8-1/2 inch x 11-inch cardboard shall be submitted. The cardboard shall be divided into three horizontal strips and pointed as follows:
 - a. Federal Government, including Environmental Protection Agency.
 - b. First coat bottom 2 strips.
 - c. Second coat bottom strip.
- D. Schedule of Operations: Before work on the project is commenced, 4 complete sets of a work schedule showing Contractor's sequence of operations and dates shall be submitted to the Engineer.
- E. Warranty: 8 copies of a written warranty shall be submitted to the Engineer.
- F. Certifications: Copies of asbestos-free, lead-free, zinc-chromate-free, strontium-chromate-free, cadmium-free, and mercury-free paint certificates shall be submitted to the Engineer.
- G. Manufacturer's Product Data Sheets: 8 copies of the Manufacturer's Product Data Sheets for the primers, paints, coatings, solvents, sealing and patching materials, sealants and caulking, and other materials being used shall be submitted to the Engineer. Data sheets shall indicate thinning and mixing instructions, required film thickness (mil) and application instructions.
- H. Manufacturer's Material Safety Data Sheets: 8 copies of the Manufacturer's Material Safety Data Sheets for coatings, solvents, and other hazardous materials shall be submitted to the Engineer.
- I. Standards: 8 copies of the Surface Preparation Standards referenced in this Section.
- J. Comprehensive Spray Plan: Where the Contractor proposes to employ airless spraying, a Comprehensive Spray Plan including the following information shall be submitted to the Engineer:

1. Documentation that the individual spray applicator(s) on the project have completed an approved "Spray Applicator Certification" Program.
 2. The overspray protection measured proposed.
 3. The spray application instructions and recommendations of the paint manufacturer he proposes to use.
 4. Proposed scheduling of existing air conditioning and ventilation equipment shut-down and/or covering of existing air intake, return and diffuser grilles.
- K. Certificate of Public Liability and Property Damage Insurance.

1.5 ANALYZING AND TESTING

- A. All paints and their applied thickness shall be subject to testing whenever the Engineer deems necessary to determine conformation to the requirements of these specifications. Should testing by a laboratory be required, the laboratory shall be selected by the Engineer and the cost of testing shall be borne by the Contractor.
- B. All rejected materials shall be removed from the job site immediately. Surfaces painted with the rejected material shall be redone at no additional cost to the State.
- C. Where the required paint thickness is deficient, the affected surface(s) shall be recoated as necessary to provide the required paint thickness at no additional cost to the State.

1.6 QUALITY ASSURANCE

- A. Painting Terminology: Refer to ASTM D 16, "Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products".
- B. Gloss/Sheen Levels: ASTM D 523, "Specular Gloss", as follows:
 1. Matte or Flat: 0-5 units at 60 degrees; 10 max units at 85 degrees
 2. Velvet: 0-10 units at 60 degrees; 10-35 units at 85 degrees
 3. Eggshell: 10-25 units at 60 degrees; 10-35 units at 85 degrees.
 4. Satin: 20-35 units at 60 degrees; 35 min units at 85 degrees
 5. Semi-gloss: 35-70 units at 60 degrees
 6. Gloss: 70-85 units at 60 degrees
 7. High gloss: >85 units at 60 degrees
- C. Airless Spraying: Where the Contractor proposes to employ airless spraying, the applicator(s) shall have completed an approved "Spray Applicator Certification Program" conducted by the painting Industry of Hawaii.
 1. As a minimum, the certification shall include material and equipment selection, use and maintenance, hands-on application and safety training.

1.7 WARRANTY

- A. The Contractor shall warrant that the work performed under this section conforms to the contract requirements and is free of any defect in the materials used and workmanship performed by the Contractor. Such warrant shall continue for a period of two years from the project acceptance date and the Contractor shall remedy any such defect which is discovered during that period at no cost to the State.
- B. The State will notify the Contractor in writing within a reasonable time after discovery of any failure or defect.
- C. Should the Contractor fail to remedy any failure or defect described in Paragraph A above within 10 working days after receipt of notice thereof, the State shall have the right to repair or otherwise remedy such failure or defect and charge the Contractor for the cost of same.

1.8 SPECIAL REQUIREMENTS

- A. Codes: The Contractor shall comply with the State OSHL (Occupational Safety and Health Law) and all pollution control regulations of the State Department of Health.
- B. Safety methods used during coating application shall comply with SSPC-PA Guide 3.
- C. Protection:
 1. Persons:
 - a. The Contractor shall take all necessary precautions to protect public pedestrians including tenants from injury.
 - b. The Contractor shall provide, erect and maintain safety barricades around scaffolds, hoists, and wherever Contractor's operation create hazardous conditions in order to properly protect the public and workmen.
 2. Completed Work: The Contractor shall provide all necessary protection for wet paint surfaces.
 3. Protected Coverings: The Contractor shall provide and install protective covering over equipment, floor and other areas that are not scheduled for treatment. Protective covering shall be clean, sanitary drop cloth or plastic sheets. Paint applied to surfaces not scheduled for treatment shall be completely removed and surfaces shall be returned to original condition. Where paint application will be performed by use of airless spraying, the Contractor shall ensure that protective enclosures are erected to prevent the escape of overspray from the work area.
 4. Safeguarding of Property: The Contractor shall take whatever steps may be necessary to safeguard his work and also the property of the State and other individuals in the vicinity of the work area during the execution of this Contract. Contractor shall be responsible for and make good on any and all damages and for losses to work or property caused by his or his employee's negligence.

Where the damaged property cannot be cleaned and restored to its original condition (i.e. prior to being damaged) it shall be replaced with a new product of equal quality. No proration or use of "used" products will be permitted.

- a. The Contractor shall assume that cars will not be temporarily relocated from parking areas during spray painting work.
 - b. Paint overspray shall not carry more than 5 linear feet beyond the building eave line nor within 10 linear feet of pedestrians or property and surfaces not scheduled to be painted.
 - c. Spray painting shall immediately cease when overspray carries beyond these specified limits and will not continue until protective barriers are erected to properly contain the overspray and damages caused by the overspray have been corrected.
 - d. The Contractor shall be assessed \$300.00 for each incidence of property or personal damage caused by overspray until such time that a satisfactory settlement has been agreed upon by the damaged party and corrective action has been completed. All corrective action shall be settled within 24 hours from the time the damage is discovered.
 - e. Should the Contractor fail to take corrective action in a timely and expeditious manner, the Engineer will contact the Contractor's Insurance Company to seek resolution on the matter.
 - f. The Engineer will withhold payment due the Contractor until damages have been corrected or damage claims resolved. The amount of payment withheld shall be equal to a minimum of \$2,000.00 plus the estimated cost of corrective action as determined by the Engineer.
5. Fire Safety: The Contractor shall direct his employees not to smoke in the vicinity and to exercise precautions against fire at all times. Waste rags, plastic (polyester sheets), empty cans, etc., shall be removed from the site at the end of each day.
- D. Right of Rejection: The Engineer will have the right to reject all work which is not in compliance with the plans and specifications. Rejected work will be redone at no additional cost to the State. In addition, the Engineer will have the right to require the immediate removal of any paint applicator who demonstrates negligence, lack of competence or repeated non-compliance with the contract requirements
- E. Sequence of Operations: The sequence of operations shall divide the surfaces into work areas and present a schedule for:
1. Surface preparation and spot prime.
 2. Prime coat.
 3. First finish coat.
 4. Second finish coat.
- F. Inspection and Acceptance: The Contractor shall obtain written acceptance from the Engineer upon completion of each phase of work (phases of work are: surface preparation and spot prime; prime; first finish coat; second finish coat) before proceeding into the next phase of work. The Contractor shall give the Engineer one

day (24 hours minimum) advance notice of completion of any phase of work for a work area only when he deviates from the previously submitted work schedule. The Contractor shall provide necessary access to areas to be inspected. Failure to obtain approval of any phase of work for a work area may result in redoing the operation at no cost to the State.

- G. Sample Panels: Prior to commencing with the work, the Contractor shall prepare a sample panel(s) of approximately 10 square feet indicative of the specified surface preparation and required number of paint coats to be applied for acceptance by the Engineer. The intent of this requirement is to ensure adequate coverage/thickness and/or hiding value of the paint and proper hue. The location where the sample panel(s) is to be prepared will be selected by the Engineer.
- H. Ventilation of Interior Spaces Following Painting: Following the completion of interior painting and prior to final acceptance, the interior spaces shall be ventilated and allowed to "air-out" to remove paint odors such that no odors exist at State's occupancy date. Where necessary and as deemed by the Engineer, the Contractor shall provide fans to mechanically ventilate the space(s).
- I. Shrubbery and plants shall be trimmed to a minimum of 6 inches back from surfaces to be painted.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint materials to the job site in original unopened containers with original labels intact.
- B. No paint material, empty cans and paint brushes and rollers, drop cloths and rags, may be stored in buildings, but shall be stored in separate storage facilities away from the buildings. Receiving, opening, and mixing of painting materials shall be done in this area.
- C. The Contractor may furnish a job site storage facility. Such facility shall comply with requirements of the local Fire Department. The storage area shall be kept clean and facility shall be locked when not in use or when no visual supervision is possible.
- D. Ensure the safe storage and use of paint materials and the safe storage or disposal of waste, at the end of each work day.
- E. Handle manufactured materials as recommended by the manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Asbestos Prohibition: All paint shall be asbestos-free.
- B. Lead Prohibition: All paint shall be lead-free.
- C. Mercury Prohibition: All paint shall be mercury-free.
- D. Chromate Prohibition: All paint shall be free of zinc-chromate and/or strontium-chromate.
- E. Cadmium Prohibition: All paint shall be cadmium-free.

- F. Material shall be equal in quality to that specified under the Schedule of Finishes and any given finish shall be as labeled by one manufacturer.
- G. All materials shall be delivered to the job site in undamaged original containers bearing the manufacturer's label and shall be stored in such a manner as to prevent damage. All rejected materials shall be removed from the job site immediately.
- H. Paints shall be as manufactured by Ameron Protective Coating Division, Benjamin Moore, Cabot's, Carboline, Dupont, Dutch Boy, ICI Ameritone, ICI Decratrend, ICI Devoe, ICI Dulux, ICI Fuller-O'Brien, ICI Glidden, ICI Sinclair, Olympic Stain, Parker & Amchem, Pervo, Pittsburg, Pratt & Lambert, Sherwin-Williams, Smiland (Styletone), Spectra-Tone, Thoro Systems, Tnemec, or accepted equivalent.
- I. Thinning of paint shall be done using material recommended by the manufacturer. Mix proprietary products according to manufacturer's printed specifications. Compound thinner, mineral oil, kerosene, refined linseed oil, or gasoline shall not be used for thinning.
- J. Except for metal primers, all paint shall contain maximum amount of mildewcide per gallon of paint permitted by the mildewcide manufacturer without adversely affecting the quality of the paint.
- K. The supplier shall submit a signed certificate indicating the amounts of mildewcide added by both the paint manufacturer and the paint supplier. Mercurial fungicide shall not be used.

2.2 SCHEDULE OF FINISHES

- A. Refer to Finish Schedule for various finishes. Provide additional systems for surfaces to be painted not listed.
- B. Treatments shall be applied on exposed surfaces of designated materials, in conformity with instructions of the paint product used.
- C. All paint systems shall include primer and 2 finish coats except primer may be omitted on factory primed items in good condition as recommended by the finish coat manufacturer.
- D. Exterior Painting
 - 1. Wood, concrete, masonry and plaster:
 - a. Prime coat: 3030 Glidden Professional Concrete Coatings
 - (1) Bond-Prep Pigmented Bonding Primer
 - (2) 1.5 mils DFT @ 375 sf/gal

- b. 1st and 2nd coats: 2406V Glidden Professional FORTIS 350
 - (1) Exterior Semi-Gloss Paint
 - (2) 1.5 mils DFT @374 sf/gal per coat
- 2. Metals
 - a. Prime coat: 4020 Devco Coatings DEVFLEX Waterborne DTM
 - (1) Primer and Flat Finish
 - (2) 2.2 mils DFT @320 sf/gal
 - b. 1st and 2nd coats: 2406V Glidden Professional FORTIS 350
 - (1) Exterior Semi-Gloss Paint
 - (2) 1.5 mils DFT @374 sf/gal per coat
- E. Interior Painting
 - 1. Wood, concrete, masonry and gypsum board:
 - a. Prime coat: 3210 Glidden Professional GRIPPER
 - (1) Interior/Exterior Primer Sealer
 - (2) 1.5 mils DFT @ 500 sf/gal
 - b. 1st and 2nd coats: 1406N Glidden Professional ULTRA-HIDE 250
 - (1) Interior Semi-Gloss Paint
 - (2) 1.5 mils DFT @ 400 sf/gal per coat

2.3 COMPATIBILITY OF PAINTING SYSTEMS AND SUBSTRATES

- A. The Contractor shall ensure that painting systems specified are compatible with existing painting surfaces. Alkyd paints shall not be applied over existing latex coating. Alkyd paints shall not be used over cementitious surfaces. Latex paints shall not be applied directly over alkyd paints without proper conditioner and accepted by the Engineer.
- B. Field Tests for Alkyd or Latex Paints: The Contractor shall perform the following field tests for compatibility of substrates to new paint systems prior to ordering paint:
 - 1. Latex films will dissolve when wiped with rubbing alcohol; alkyd films will not.
 - 2. When sanded, latex films will "clog" sandpaper, alkyd films will sand clean.
 - 3. Alkyds will soften after applying a 10 percent solution of Drano in water; latex films will not soften.
 - 4. Alkyds will burn when exposed to a flame; latex film will not burn.
 - 5. Paints which do not respond to two or more of these tests are probably epoxy, urethane, or other type of coating.
 - 6. Provide packaged swab test in accordance with the package directions.
 - 7. Existing paint identified or suspect of having lead-containing paint shall be tested in a manner that does not produce airborne or uncontrolled lead debris.
- C. Should there be any discrepancies between the specified Schedule of Finishes and the existing paint systems, the Contractor shall notify the Engineer in writing of any

incompatible systems specified and submit a revised Schedule of Finishes for acceptance when necessary. With the acceptance of the revised Schedule of Finishes, the Contractor shall make any corrections and/or revisions necessary to resolve the discrepancies and/or inconsistencies. The Contractor shall not proceed with any painting systems that are incompatible, although specified otherwise, until all incompatible conditions detrimental for the proper application and performance of the painting systems have been corrected. The failures due to the application of the incompatible paint systems shall be corrected at no additional cost to the State. Proceeding with the work shall imply acceptance of the specified Schedule of Finishes and the compatibility with the existing painted surfaces by the Contractor.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. General:

1. Surface preparation shall be in accordance with the Painting and Decorating Contractors of America, "Architectural Specification Manual", methods are applicable to all substrates.
2. Scrub surfaces with stiff nylon bristle brush and T.S.P. solution at rate of $\frac{3}{4}$ cup T.S.P. per gallon of warm water to remove accumulated film of wax, oil, grease, smoke, dust, dirt, chalky, or other foreign matter which would impair bond or bleeding through new finish. Thoroughly sponge-wipe surfaces with clean water. Allow surfaces to thoroughly dry before priming, painting, caulking, or sealing.
 - a. Following sponge wiping, the surfaces shall be allowed to dry for a minimum of 24 hours.
 - b. Wood surfaces shall have a maximum moisture content of 12 percent when measured with an electronic moisture meter.
3. Cracks and openings found at joints and where different materials abut each other shall be sealed with a caulking compound compatible with the substrate and primer/paint. The caulking shall be applied and allowed to set in accordance with the manufacturer's recommendations and instructions.

B. The painting contractor shall be wholly responsible for the finish of his work and shall not commence any part of it until surfaces are in proper condition. If painting contractor considers any surfaces unsuitable for proper finish of his work, he shall notify the Engineer of this fact in writing and he shall not apply any material until the unsuitable surfaces have been made satisfactory, or until the Engineer has instructed him to proceed. Major defects shall be restored by the proper trades. In general, follow paint manufacturer's directions for surface preparation for the paint to be applied.

C. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following

completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.

- D. All necessary puttying of nail holes, cracks and blemishes shall be done after priming coat has become hard and dry and before second coat is applied.
- E. Top, bottom, and side edges of doors to be finished the same as face of doors after they are fitted by the carpenter.
- F. All surfaces adjacent to areas being finished shall be protected and left clean of paints, stains, etc. Clean drop cloths shall be used until completion of job.
- G. Unprimed galvanized metal shall be washed with a solution of chemical phosphoric metal etch and allowed to dry.
- H. All metal surfaces shall be made clean and free of any defects of condition that may produce unsatisfactory finish. Touch-up any chipped or abraded places on surfaces that have been shop coated with the proper primer.
- I. Gypsum Board Surfaces:
 - 1. Surface Cleaning: Surfaces shall be dry. Remove loose dirt and dust by brushing with a soft brush or rubbing with a dry cloth prior to application of the first coat material.
 - 2. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.
- J. Wood Surfaces:
 - 1. Surface Cleaning: Surfaces shall be free from dust and other deleterious substances and in a condition accepted by the Engineer prior to receiving paint or other finish. Do not use water to clean uncoated wood.
 - 2. Open Joints and Other Openings: Fill with whiting putty. Sand smooth after putty has dried.
 - 3. Checking: Where checking of the wood is present, sand the surface, wipe, and apply a coat of pigmented orange shellac. Allow to dry before paint is applied.
- K. PVC Trims and Accessories: Paint to match adjoining surfaces unless specifically indicated to remain unpainted.
- L. Existing Surfaces: Prepare existing surfaces as stipulated below except where surfaces are identified or suspect of having lead-containing paint.
 - 1. General:
 - a. Remove from surfaces to be repainted all foreign matter such as nails, screws staples, tape, and gum.
 - b. Remove all loose, blistered, scaled, crazed, or chalky finish to an existing tight and firm finish.
 - c. Remove all mildew as specified under surface preparation above.

- d. Where the existing finish remains tight and firm, prepare the surface by lightly sanding. Where paint has been removed, sand the edges of scarred areas to a smooth feathered edge.
 - e. Wash all surfaces with a solution of T.S.P. and water or other appropriate solution to remove any accumulated film of wax, oil, grease, smoke, dust, dirt, chalking or other foreign matter which would impair the bond of, or bleed through the new paint finish. After washing, rinse with potable water and allow to thoroughly dry for a minimum of 24 hours. Any lifting of the paint or scarring caused by this rinsing operation shall be resanded to a feathered edge.
 - f. Adhesion Test Requirements for Previously Painted Surfaces: The Contractor is required to perform an adhesion test on all previously painted surfaces adjacent to finishes which exhibit delamination or peeling. The purpose of these tests is to verify or quantify the amount of stripping that will need to be performed prior to paint application. Tests performed shall conform to ASTM D 3359. Previously painted areas tested and classified as 2B or less shall be stripped bare prior to application of primers and finishes. The Contractor must continue testing (extending in a radial manner) until a sound substrate (3B or better) is detected.
2. Concrete and Masonry to be Repainted:
- a. Seal all hairline cracks to 1/8-inch in width with concrete patching compound. All cracks over 1/8-inch in width shall be sealed with Tuff Patch (Fibre-Glass Cloth System) or equal method before paint application. All patching shall be done in accordance with the manufacturer's recommendations and instructions.
 - b. Holes 1/4-inch in diameter or greater shall be sealed with Tuff Patch (Fibre-Glass Cloth System) or equal method before paint application. All patching shall be done in accordance with the manufacturer's recommendations and instructions.
 - c. Spot prime areas where bare concrete or masonry, seal or patch material is exposed with the specified primer and feather out onto adjacent paint.
3. Ferrous Metal and Galvanized Metal to be Repainted:
- a. Remove all rust, loose mill scale, and loose and blistering paint by power tool chipping, de-scaling, sanding, wire brushing, and grinding down to bare metal (with only tightly adhering surface rust, mill scale, and paint which cannot be removed with a dull putty knife remaining) in accordance with Steel Structures Painting Council (SSPC) Standard SP6, "Commercial Blast Cleaning". Care shall be taken so that the surface is not burnished during cleaning.
 - b. Completely wipe all surfaces with mineral spirits or other appropriate solution as required to remove accumulated film of wax, oil, grease, smoke, dust, dirt, chalky or other foreign matter, which would impair the bond of, or bleed through the new paint finish.

- c. Allow the surfaces to thoroughly dry and immediately spot prime bare metal areas with the specified primer and feather out onto adjacent paint.

- 4. Gypsum Wallboard and Plaster to be Repainted:
 - a. Fill and repair defects to existing gypsum wallboard and plaster with patching compound. All patching shall be done in accordance with the manufacturer's recommendations and instructions.
 - b. Spot prime areas where substrate or fill material is exposed with the specified primer and feather out onto adjacent paint.

- 5. Wood to be Repainted:
 - a. After cleaning and/or washing of the surface with water, the wood shall be primed, painted or sealed unless it has been allowed to thoroughly dry for a minimum of 24 hours and until the moisture content of the wood is less than 15% when measured with an electronic moisture meter.
 - b. Fill holes (nail, tack, staple, etc.), cracks, open joints, and other imperfections with appropriate compound and allow to set (door and trim included). Seal and caulk all openings which will permit the entrance of water. Sealing and caulking compounds shall be compatible with the substrate and primer/paint and shall be applied and allowed to set in accordance with the manufacturer's recommendations and instructions.
 - c. Spot prime areas where bare wood or fill material is exposed with the specified primer and feather out onto adjacent paint.

- M. High Pressure Water Washing:
 - 1. High pressure water washing may be used in lieu of brush washing to remove loose paint material, chalking, dirt, and debris from exterior surfaces to be painted. It shall be performed by skilled mechanics experienced in the use and operation of the sprayer equipment.
 - 2. High pressure water washing does not replace proper preparatory work such as sanding of the substrate prior to painting. Surface contaminants and loose paint material remaining after the surface has been pressure washing shall be removed by other means as necessary to properly prepare the surface.
 - 3. The pressure rating of the sprayer equipments in addition o the nozzle type and size shall be of the proper type to clean the surface without damaging the substrate. Any damage shall be repaired and/or restored to its original condition at no cost to the State.
 - 4. Proper precautions shall be taken to prevent over-spray and water infiltration into the building through doors, windows, vents, louvers, and other building openings. Water and debris entering the building shall be cleaned up immediately and any damaged area resulting therefrom shall be repaired and/or restored to its original condition at no cost to the State.

5. In removing mildew, high pressure water washing shall only be used to wash the surface after it has been sterilized with a mildew treatment solution as specified above.
6. High pressure water washing shall not be used for interior surfaces or exterior wood. High pressure water washing of exterior porous surfaces such as masonry will not be permitted except where cracks and openings have been sealed to prevent water infiltration.

3.2 PAINT APPLICATION

A. General:

1. Apply coating materials in accordance with SSPC-PA 1. SSPA-PA 1 methods are applicable to all substrates, except as modified herein. Thoroughly work coating materials into joints, crevices, and open spaces. Touch-up damaged coatings before applying subsequent coats.
2. All work shall be done in a workmanlike manner by skilled and experienced mechanics and shall conform to the best painting practices.
3. All materials shall be applied in accordance with the manufacturer's specifications and the finished surfaces shall be free from runs, sages, drips, ridges, waves, laps, streaks, brush marks and variations in color, texture and finish (glossy or dull). The coverage shall be complete and each coat shall be so applied as to produce a film of uniform thickness. No paint, varnish or enamel shall be applied until the preceding coat is thoroughly dry and approved.
4. No exterior painting of unprotected surfaces shall be done in rainy, damp weather. Coats shall be applied only to surfaces that are thoroughly dry.
5. Interior areas shall be broom clean and dust free before and during the application of coating material.
6. Any mixing shall be done outside the building.

B. Application:

1. Paint application shall be by brush, roller, airless spray painting or combination thereof or as required by manufacturer.
2. Where airless spraying is provided, a nozzle of the proper size in accordance with the paint manufacturer's recommendations to properly apply the paint shall be used.
3. Spray painting method shall be used only under accepted conditions. Spraying shall be done only when there is no wind, or under very low wind velocity. When wind velocity increases, all spraying operation shall be stopped. Before start of spraying, all surfaces that do not require painting shall be completely masked and protected. Adequate drop cloths shall be provided over floors, adjacent sidewalks, and over all cars parked nearby that may be stained or damaged from the spray work.

4. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying. Provide each coat in specified condition to receive the next coat.
 5. Primers and Intermediate Coats: Do not allow primers or intermediate coat to dry more than 30 days, or longer than recommended by the manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover the surface of the preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.
 6. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in selected colors.
- C. Colors (PT-#): Each coat shall be tinted a different shade from the preceding coat. Colors shall be in accordance with the color schedule on the drawings or as selected by the Engineer.
- D. Finish Film Thickness: Apply primer, intermediate, and finish coats to not less than 1.5 mils dry film thickness, 4 mils wet unless recommended otherwise in writing by the manufacturer, for each coat and in accordance with the manufacturer's recommendations. Verify mil thickness by use of a suitable wet film gauge. Use a Tooke or other dry film gauge to test for total dry film thickness.

3.3 MECHANICAL AND ELECTRICAL WORK

- A. Paint visible surfaces of ductwork or plenum spaces, and interior surfaces visible through grilles.
- B. Paint shop primed metal surfaces of mechanical and electrical equipment with two finish coats of paint to match adjoining wall or ceiling surfaces. Prime unprimed bare metal surfaces with specified prime coat.

3.4 MISCELLANEOUS

- A. Installation of Removed Items: After completion of final paint coat, removed items shall be reinstalled.
- B. At the completion of other trades, touch up damaged surfaces.

3.5 CLEAN UP

- A. During the progress of the work, all debris, empty crates, waste, drippings, etc., shall be removed by the Contractor and the grounds about the areas to be painted shall be left clean and orderly at the end of each work day.
- B. Upon completion of the work, staging, scaffolding, containers and all other debris shall be removed from the site. All paint, shellac, oil or stains splashed or spilled upon adjacent surfaces not requiring treatment (hardware, fixture, floors) shall be removed and the entire job left clean and acceptable.

END OF SECTION

SECTION 15050 – MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Mechanical General Provisions specifically applicable to Division 15 Sections.
- B. These specifications and the accompanying Drawings are intended to comprise the furnishing of all labor, and the furnishing and installing of all materials, equipment and supplies as specified herein and required for the satisfactory completion by the Contractor of all work pertaining to mechanical trades.

1.3 SCOPE OF WORK

- A. The drawings and these specifications are complementary to each other in that all apparatus, materials and equipment outlined in the Drawings and/or specified herein shall be considered essential to the contract.
- B. Should there be any question as to the scope of the work for which the Contractor is responsible, he shall ask the State for an interpretation before submitting his bid. In the event that the Contractor finds discrepancies or omissions, or is in doubt as to the exact meaning of the plans and/or specifications, he shall, before submitting bid, contact the State and Mechanical Engineer for clarification.
- C. The Contractor shall study all drawings and specifications to determine any conflict with ordinances and statutes. Any errors or omissions shall be reported, and any changes shall be shown in the as-built drawings and the additional work performed at no cost to the Owner.
- D. The specifications are intended to describe the quality and character of the materials and equipment and methods of installation. All miscellaneous items of work and materials necessary for the completion of the installation shall be provided, whether or not mentioned in the specifications or shown on the drawings.
- E. For purposes of clearness and legibility, drawings are essentially diagrammatic and, although size and location of equipment are drawn to scale wherever possible, the Contractor shall make use of all data in all the contract documents and shall verify this information before submitting bid.
- F. The submittal of bid shall indicate that the Contractor has examined the site and the drawings and has included all required allowances in his bid. He shall also determine in advance and make allowances for the methods of installing and connecting the equipment, the means of getting equipment in to place and he shall

make himself familiar with all the requirements of the contract. No allowance will be made for any error resulting from the Contractor's failure to visit job site and to review drawings. Bid shall include costs for all required drawings and changes as outlined above.

1.4 DEFINITIONS

- A. "Provide" shall mean "provide complete in place," that is, "furnish and install."
- B. "Piping" shall mean pipes, fittings, supports, valves and all like pipe accessories connected thereto.
- C. Pressure ratings specified, such as for valves and the like, is the design working pressure and is for and with reference to the fluid which the device will serve.
- D. "Ductwork" shall mean ducts, plenums, compartments, supports, casings or any like devices, including the building structure, which is used to convey or contain air.
- E. "Building Boundary" shall mean exterior building walls.
- F. "Mechanical Work" shall mean all work specified and shown in the Division 15, "Mechanical," categories. Mechanical Work generally includes: Plumbing, Heating, Ventilating, Air Conditioning and Fire Protection systems.
- G. Abbreviations shall include but not limited to:
 - 1. HVAC – Heating, Ventilating, and Air-Conditioning
 - 2. EF – Exhaust Fan
 - 3. HCFC – Hydrochlorofluorocarbon.
 - 4. IR – Infrared.
 - 5. LED – Light-emitting diode.
 - 6. PPM – Parts per million.
 - 7. ACCU – Air Cooled Condensing Unit
 - 8. FCU – Fan Coil Unit
 - 9. VRF – Variable Refrigerant Flow

1.5 REFERENCES AND STANDARDS

- A. AGA - American Gas Association
- B. AMCA - Air Moving and Conditioning Associates
- C. ANSI/NFPA 70 National Electrical Code
- D. ANSI/NFPA 72 – National Fire Code
- E. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning

- F. ASTM - American Society for Testing and Materials
- G. O.S.H.A.
- H. SMACNA HVAC Duct Construction Standards - Metal and Flexible
- I. SMACNA Seismic Restraint Manual
- J. UBC - Uniform Building Code
- K. UFC - Uniform Fire Code
- L. UL - Underwriters' Laboratories, Inc
- M. UPC - Uniform Plumbing Code

1.6 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Unless otherwise specifically directed in the following specifications, the submittals by the Contractor to the State shall be as follows:
 - 1. Submit all items at one time in a neat and orderly manner with index tabs. A partial submittal will not be acceptable.
 - 2. Reference catalog cuts and brochures of products to proper paragraph in specifications. Furnish numerical index by specification article number, listing product name, catalog number and reference to page number of submittal brochure.
 - 3. Cross reference individual catalog numbers of substitute products to number of specified materials.
 - 4. Bind submittal in booklet form.
 - 5. Submit manufacturer's certification that equipment meets or exceeds the minimum requirements as specified.
 - 6. Where materials, equipment and installations are specified to conform with societies or agencies such as ANSI, ASHRAE, SMACNA, etc., submit certification of such compliance.
 - 7. The submittal shall be complete and with catalog data and information properly marked to show, among other things, material capacity and performance to meet capacities or performance as specified or indicated. Arrange the submittals in the same sequence as the specifications and reference in the upper right-hand corner, the particular specification provision for which each submittal is intended. Incomplete submittals will be rejected, unless prior approval for partial submittal has been obtained.

8. The Contractor is responsible for confirmation of code approval of material and equipment. Certification of code conformance by the manufacturer shall be submitted for:
 - a. Heating, Ventilating and Air Conditioning Equipment
 - b. Heat Exchanger Equipment
 - c. Building Management System
 - d. Pumping System
 - e. Potable water system.
9. If the Contractor submits a product that is specified, a complete set of brochures, rating tables, etc., is still required for reference.
10. Review of the submittal is only for general conformance with design concept of project and general compliance with information given in the contract documents. The Contractor is responsible for confirmation and correlation of the dimensions, quantities and sizes, for information that pertains to fabrication methods or construction techniques, and for coordination work of all trades. Deviations from drawings and specifications shall be clearly and completely indicated (by separate letter) in the submittal.
11. For items which are not manufactured and which have to be specifically fabricated including drawings and typical duct construction and complicated portions of ductwork, six copies of shop drawings and detail description shall be submitted. Shop drawings shall be submitted with such promptness as to allow ample time for examination and any resubmittal.

1.7 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01785.
- B. Keep an accurate dimensional record of the as-built locations of all work under this Contract at all times on blue line prints as the job progresses, to be available for inspection at all times.
- C. Record all changes and information contained on the record in an orderly and legible manner.
- D. Submit Record Set for approval. Make such changes and correction as may be required for final approval.
- E. Include test and balance reports.
- F. Final observation will not be made until these approved as-built drawings have been received by the State.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Submit under provisions of Division 1.
 - 1. See individual Division 15 Sections.

1.9 QUALITY ASSURANCE

- A. The Contractor shall include the services of experienced superintendents for each sub-section who shall be constantly in charge of the work, together with the qualified journeymen, helpers, and laborers, required to properly unload, install, connect, adjust, start, operate and test the work involved, including equipment and materials furnished by others.
- B. The work under this section shall be in cooperation with the work of other trades to prevent conflict or interference and to aid rapid completion of the overall project.

1.10 REGULATORY REQUIREMENTS

- A. Conform to REFERENCES AND STANDARDS.
- B. Conform to all Rules, Ordinances and Regulations of the State of Hawaii.
- C. No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. No apparatus, equipment, device or construction shall be installed which will provide a cross connection permitting any backflow or siphonage from any source into the domestic water supply system.
- D. Obtain all permits, patent rights, and licenses that are required for the performing of the work by all laws, ordinances, rules and regulations, or orders of any officer and/or body, give all notices necessary in connection therewith, and pay all fees relating thereto and all costs and expenses incurred on account thereof. No work shall be covered before inspection by the jurisdictional authority and the State.

1.11 PROJECT/SITE CONDITIONS

- A. Separate Sections cover the Site Work, Architectural Work and the Electrical Work. The Contractor shall familiarize himself with the entire set of plans and specifications.
- B. The Contractor shall fully inform himself regarding any and all peculiarities and limitations of the spaces available for the installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible.
- C. If any conflicts occur necessitating departures from the Drawings, details of departures and reasons therefore shall be submitted as soon as practical for written approval, and the piping, ductwork, fixtures or equipment affected shall not be installed until approval is received.
- D. It is intended that all apparatus be located symmetrical with architectural elements. Refer to architectural details in completing the correlating work.

- E. The Drawings indicate the extent, the general locations and arrangement of equipment, piping, ductwork, etc. Equipment, piping and ductwork shall be located to avoid interference with electrical, plumbing and structural features. All locations for mechanical work shall be checked and coordinated with the building, civil, structural, and electrical work.
- F. Space allotted, clearances, access, electrical data, structural supports, etc., on drawings, is for equipment models and sizes as listed in schedules on plans. The Contractor shall assume the responsibility for the coordination with other trades required in the use of equal or substitute equipment or materials and pay all differences in cost arising from such substitutions, regardless of approval.
- G. The drawings indicate required size and points of termination of pipes, and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of the Contractor to make the installation in such a manner as to conform to structure, avoid obstruction, preserve headroom and keep openings and passageways clear.

1.12 COORDINATION

- A. The Contractor shall be responsible for providing and coordinating all information, drawings or layouts of equipment or work under this section which affect the work of the other trades.
- B. In case changes in the indicated locations or arrangements are necessary due to developed conditions in the construction, or rearrangement of furnishings, or equipment, these changes shall be made without extra cost to the Owner, provided the change is ordered before work directly connected is installed, and no extra materials are required.

1.13 PROJECT SITE VISIT

- A. Periodic visits to the project site by the Engineer are for the express purpose of verifying compliance with the contract documents. Such site visits shall not be construed as construction supervision, i.e., the Engineer assumes no responsibility for providing a safe place for the performance of the work by the Contractor or the Contractor's employees or the safety of the supplies of the Contractor. Neither shall such site visits relieve the Contractor of the responsibility for the discovery of his own errors and the correction of them, nor of the responsibility of properly performing the work.

1.14 GUARANTEE

- A. In addition to the guarantees required elsewhere, all work, materials and equipment provided under the mechanical sections shall be guaranteed for a minimum period of one year from the date of acceptance of the work by the Owner. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall immediately furnish all necessary labor and materials to correct the trouble without cost to the Owner. The Contractor, under this guarantee, shall be

responsible for all damage to any part of the premises caused by equipment furnished under this section.

- B. Furnish written certified guarantee, in acceptable form, to the Owner, against defective workmanship, materials and operating equipment. Further guarantee to re-balance and adjust entire system, or any part thereof as required for perfect operation for a period of at least one year after acceptance. Compressors shall have five year warranty. Repair, replace and make satisfactorily operative any and all defective items and work, holding the Owner free from any cost and liability in connection therewith, for the term of the guarantee.

1.15 EXISTING UTILITIES

- A. The location of utilities shown on the plans are the best known information available at time of design. The Contractor shall contact the appropriate agencies and confirm the information and make arrangements for connection thereto, prior to excavation and installation of any piping or systems.
- B. Any work requiring added expense which is caused by the Contractor to make such physical verification shall be borne by the Contractor.

1.16 UTILITY SERVICES DURING CONSTRUCTION

- A. All provisions for and use of sewer, water and electric power used for construction shall be paid for by the Contractor

1.17 DAMAGE BY LEAKS

- A. The Contractor shall be responsible for damage to the grounds, walks, roads, buildings, furnishings, piping systems, electrical systems and their equipment and contents, caused by leaks in the piping systems being installed or having been installed herein. He shall repair at his expense all damage so caused.

1.18 EMERGENCY REPAIRS

- A. The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Contractor's guarantee bond nor relieving the Contractor of his responsibilities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. See individual Division 15 Sections.

2.2 MATERIALS

- A. See individual Division 15 Sections.

2.3 SUBSTITUTIONS

- A. Conform to Division 1 requirements. Conformance to construction documents is the responsibility of the substitutor, regardless of approval.
- B. Layout on drawings, including space allotted for clearances, access, etc., is based on the performance and physical attributes of equipment specified and/or scheduled on plans. Coordinate with other systems, subsystems and trades as required when using substituted materials or equipment.
- C. If the use of substitute materials or equipment requires alternate arrangement of equipment, fixtures, devices, wiring or accessories, prepare drawings showing proposed changes. Obtain permission of the Engineer before proceeding.
- D. If the use of substitute materials or equipment results in different performance than that provided by the specified materials or equipment, adjust Work as required to provide parity performance, at no additional cost to the Owner. Obtain permission of the Engineer before proceeding.
- E. If the use of substitute materials or equipment results in an increase in the cost, including changes to the Work of other trades, pay for any said increase in cost.
- F. See Drawings and individual Sections of Division 15 for further specific information required for substitutions.

2.4 REFERENCE TO DRAWINGS SCHEDULES

- A. Refer to equipment schedule for unit identification number and corresponding capacity and design requirements.
- B. Wherever schedules or notes appear on the Drawings or in the specifications in which sizes and capacities of equipment are indicated, the equipment furnished and installed under this contract shall meet the following requirements under operating conditions.
- C. The RPM, the outlet velocities, tip speed and the DB ratings specified are the maximum that will be accepted.
- D. The motor horsepower, the CFM, the static pressure on fans, are the minimum that will be accepted.
- E. The working pressure, the GPM at required pressure, and the BTUH input are the minimums that will be accepted.

PART 3 - EXECUTION

3.1 INSTALLATION INSTRUCTIONS

- A. The requirements of "mechanical" installation is detailed in the individual specification sections of Division 15. In addition the following general requirements shall apply:

1. Obtain Manufacturer's printed installation instruction to aid in properly executing work of installing equipment whenever such instructions are available. Submit three copies of such instructions to the State prior to time of installation for use of supervising the work.
2. Erect equipment in a neat and workmanlike manner. Align, level and adjust for satisfactory operation. Install so that connecting and disconnecting of piping and accessories can be made readily, and so that all parts are easily accessible for inspection, operation, maintenance and repair. Minor deviation from arrangements shown on drawings may be made, as approved by the State.

3.2 PROTECTION OF PIPING SYSTEMS

- A. It shall be the responsibility of the Contractor to install and maintain pipe and equipment which is reasonably clean and free from rust, dirt, scale, etc. Where necessary, the Contractor shall provide temporary airtight covers at all pipe and equipment openings.
- B. Before turning the systems over to the Owner, all piping systems shall be thoroughly flushed of all scale and dirt. Drains shall be installed at the low points to facilitate flushing of the piping systems.

3.3 PROTECTION OF AIR HANDLING SYSTEMS

- A. The Contractor shall continuously maintain adequate protection to keep dirt and foreign matter from getting into the air handling system.
- B. Ductwork shall not be left open for any extended period of time. Open section and open fittings shall be capped wherever they occur until such time as final connections are made to equipment, grilles, register, etc.

3.4 PROTECTION OF ELECTRICAL SYSTEMS

- A. Do not route liquid filled pressure and drain piping over electrical equipment, switchboards, motor control centers and the like. When unavoidable, install galvanized drain pans to prevent liquid from dripping or squirting onto such equipment.

3.5 EXCAVATION AND BACKFILL

- A. The following shall apply:
 1. Execute all excavation to grades to accommodate elevations indicated and where invert elevations are not indicated, provide minimum coverage (above top of pipes) as follows:
 - a. Any piping under building slab (top of pipe to underside of slab) 12 inches.
 - b. Steel, cast iron, and copper in other locations 30 inches.
 - c. Clay and Plastic piping in other locations - 36 inches.

2. Excavation for pipes shall be cut a minimum of six inches below the required grade. A six-inch bed of sand or other approved material shall be then placed and properly compacted to provide an accurate grade and uniform throughout the length of the pipe, except for plastic piping for which sand shall be used.
3. Sand used shall be washed SAND normally used for backfill purposes, free of clods or lumps of clay, rock, debris and rubbish.
4. Backfilling shall not be placed until the work has been inspected, tested and approved.
5. PVC piping excepted, backfill to point 12 inches above top of piping with fine earth (excavated material may be used) free of excessive amounts of clay, debris, rubbish, rocks, or clods, as approved by the State. Backfill above 12 inches from top of piping may be with excavated material. Apply backfill by hand in 6-inch deep layers the full width of the trench. Moisten each layer (do not flood or puddle), and hand tamp to a minimum 90 percent compaction before proceeding with the next layer of backfill. Note: PVC piping shall be backfilled with sand to a point of 12 inches above top of piping, remainder of trench may be backfilled with fine earth as specified above.
6. Clods or lumps one inch in size or larger will not be permitted in the backfill. If the excavated material is not suitable adequate material shall be provided by hauling from other locations.
7. Surplus earth or material remaining after backfilling shall be removed from the site under provisions of Division 2.
8. Do not excavate under or near foundations or footings except in manner permitted and approved by the State. Do not backfill until installed piping has been successfully tested and approved for backfill by the jurisdictional inspector and the State.

3.6 CUTTING AND PATCHING

- A. Perform all cutting and fitting required for work of this Section in rough construction of the building.
- B. All patching of finished construction of building shall be performed under the section of specification covering these materials.
- C. All cutting of concrete work by this Contractor shall be by core drilling or concrete sawing. No cutting or coring shall be done without first obtaining the permission of the State.
- D. Information regarding requirements for openings, recesses, chases in the walls, partitions, framing or openings shall be provided for work under the appropriate sections of the specifications in advance of the work. Should this be neglected, delayed or incorrect and additional cutting is found to be required, this work shall be accomplished at no additional cost to the Owner.

- E. All access panels shall be approved by the State as to location, appearance, color, and finish.

3.7 VIBRATION ELIMINATION AND CONNECTORS

- A. Rotating or reciprocating mechanical equipment shall be mounted on or suspended from vibration isolators to prevent vibration and structural borne noise transmission to the building. Refer to each mechanical trade section of these specifications for specific details. Flexible duct connection shall be used between all fan openings and sheet metal work. Flexible connectors shall be used in piping connections to rotating or reciprocating equipment. See individual mechanical sections for specifications.

3.8 EARTHQUAKE RESTRAINT

A. General:

1. All earthquake resistant designs for mechanical equipment, such as air handling units, water heaters, blowers, motors, ductwork, mechanical and plumbing piping, shall conform to the regulations of the Uniform Building Code, Chapter 16, Div. IV "Earthquake Design".
2. The restraints which are used to prevent disruption of the function of the piece of equipment because of the application of the horizontal force shall be such that the forces are carried to the frame of the structure in such a way that the frame will not be deflected when the apparatus is attached to a mounting base and equipment pad, or to the structure in the normal way, utilizing the attachments provided. Equipment, piping, ductwork, etc., shall be secured to withstand a force in any direction equal to the values shown.

B. Piping:

1. All HVAC and Plumbing piping shall be secured by bracing at every fourth hanger transversely and every eighth hanger longitudinally. Bracing shall be done in accordance with the NFPA Code, and as described in paragraph "Sway Bracing for Protection Against Earthquakes," of that code:
2. As approved by code authority, the SMACNA "Guidelines for Seismic Restraints of Mechanical Systems" may be used as a guide.

- C. As approved by the code authority a bracing system as manufactured by "Unistrut", "Superstrut" or "Pipe Shields Inc." may be used.

3.9 ADJUSTMENTS OF SYSTEMS AND OPERATION TESTS

- A. When the work included in these specifications is complete, and at such time as directed by the State, the Contractor shall adjust all parts of the systems, advising the State when this has been done and the work is ready for their final tests. Refer to Section 15990.
- B. The Owner may require operation of parts or all of the systems prior to final acceptance. If it becomes necessary for temporary use of the systems before all parts are complete, the Contractor shall adjust all parts as far as possible in order to

make such temporary use as effective as possible. After temporary use and before acceptance tests, all systems shall be readjusted to meet permanent operational requirements. This occupancy shall not be construed as final acceptance. Cost of utilities for such operation will be paid by the Owner.

C. Operation Test:

1. At completion, the Contractor shall operate all mechanical systems for a period of at least two eight-hour days to demonstrate fulfillment of the requirements of the contract. During this time all adjustments shall be made to the equipment until the entire system is in satisfactory operating condition acceptance to the State.
2. Final Operation and Instruction: Upon completion of the installation of the equipment and after final acceptance, at a time approved by the Owner, the Contractor shall place a competent man, or men, at the building who shall operate the systems for a period of two eight-hour days instructing the Owner's Representatives in all details of operation and maintenance.
3. Any required instructions from manufacturer's representatives shall be given during this period. The two day specified under "Operation Test" does not substitute for these (this) day(s) of final operation and instruction.
4. All arrangements for operation periods shall be made through the State.

D. For specific requirements see individual Division 15 Sections.

3.10 RUBBISH REMOVAL AND CLEANING

- A. Upon completion of the work under this section, the Contractor shall remove all surplus materials, equipment and debris incidental to his work, and leave the premises clean and orderly.

3.11 SERVICE

- A. Ninety (90) days free service shall be provided after completion of the job including changing of filters. Replacement filters shall be provided by the Contractor and shall be on the job site.

3.12 PAINTING

- A. Painting shall match existing.
- B. Surfaces to be painted shall be cleaned of cement, plaster and other spills.
- C. Factory finishes shall be repaired to original condition when scratched or dented.

3.13 REQUIREMENTS FOR FINAL INSPECTION

- A. All of the following items must be completed prior to final inspections. No exception and no final payment will be made until all items are completed and approved. For specific requirements see the individual sections in Division 15.

1. Cleaning equipment and premises.
2. Test and balance of systems.
3. Test and balance reports are reviewed by the Engineer.
4. Service manual.
5. Pipe and valve identification.
6. Pipe and valve identification schedule.
7. Operation tests.
8. Operating instructions and orientation of operating personnel.
9. As-built drawings.

END OF SECTION

SECTION 15400 – PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Section 15600 – Heating, Ventilating and Air Conditioning
- B. Section 15950 – Building Automation System
- C. Section 15990 – Testing, Adjusting and Balancing
- D. Section 16111 – Conduit
- E. Section 16123 – Building Wire and Cable
- F. Section 16130 – Boxes
- G. Section 16180 – Wiring Connections

1.3 SUMMARY

- A. Section Includes: Pipe materials and fittings; valves, plumbing specialties; plumbing fixtures and trim; plumbing equipment for plumbing systems such as for soil, waste, vent, domestic water, storm water, natural gas, and fuel oil piping systems.

1.4 REFERENCES AND STANDARDS

- A. ANSI/NFPA 70 - National Electrical Code
- B. ANSI/NFPA 72 - National Fire Code
- C. ASME Boiler and Pressure Vessel Code
- D. ASTM - American Society for Testing and Materials
- E. UL - Underwriters' Laboratories, Inc
- F. UBC - Uniform Building Code
- G. UPC - Uniform Plumbing Code

1.5 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 15050.

- B. Note on drawings any deviations from contract plans or specifications. Access for equipment and proper fit for its operation and maintenance shall be Contractor's responsibility.
- C. Product Data:
 - 1. Plumbing fixtures
 - 2. Plumbing pipe and fittings
 - 3. Hot Water Equipment
 - 4. Equipment and Pipe Supports
 - 5. Pipe insulation
- D. Shop Drawings:
 - 1. Piping Plans and Riser Diagrams
 - 2. Drain, Waste, Vent Plan and Piping Diagrams
 - 3. Control Diagrams

1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1 and Section 15050.
- B. Include actual locations and routing of equipment, piping, valves, controllers, accessories.
- C. Include test and balance reports.
- D. Final observation will not be made until these approved as-built drawings have been received by the Architect

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Submit under provisions of Division 1.
- B. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies.
- C. Recommended preventive maintenance procedures for all system components including a schedule of tasks, time between tasks, and task descriptions.

1.8 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum fifteen years documented experience.

- B. Installer: Company specializing in installing the products specified in this section with minimum fifteen years documented experience.

1.9 REGULATORY REQUIREMENTS

- A. Conform to REFERENCES AND STANDARDS.
- B. Conform to all Rules, Ordinances and Regulations of the State of Hawaii, County of Hawaii.
- C. Furnish products listed and classified by UL and FM as suitable for purpose specified and indicated.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Protect all work and material from damage by work or workers.
- B. Be responsible for work and equipment until finally inspected, tested, and accepted. Protect work against theft or damage, and carefully store material and equipment received on site that is not immediately installed. Close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

1.11 PROJECT/SITE CONDITIONS

- A. Drawings show the general arrangement of all piping; however, where local conditions necessitate a rearrangement, Contractor shall prepare and submit for approval, drawings of the proposed rearrangement. Because of the small scale of drawings, it is not possible to indicate all offsets, fittings and accessories which may be required.
- B. Contractor shall carefully investigate the structural and finish conditions affecting all his work and shall arrange such work accordingly, furnishing such fittings, traps, valves and accessories as may be required to meet such conditions.

1.12 WARRANTY

- A. Provide manufacturer's warranty against defective materials and workmanship for a period of one year from date of acceptance of the project by the Owner. This warranty shall include any motor and electrical components for any equipment furnished under this Section. This warranty shall also provide that factory-trained servicemen shall be locally available to perform service on the equipment.
- B. Bidder shall state direct address of this service station. If alternate equipment is proposed and furnished and it does not conform to the detailed specifications, it shall be removed from the job site and be replaced with the specified item at the expense of the Contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. As indicated or scheduled on Drawings, and as specified in this Section.

2.2 SUBSTITUTIONS

- A. Under provisions of Division 1 and Section 15050.

2.3 MATERIALS

- A. **Asbestos and Lead Prohibition:** No asbestos and/or lead containing materials or equipment, other than lead flashing, shall be use under this section. The contractor shall ensure that all materials and equipment incorporated in the project shall be asbestos and lead free.

2.4 ELECTRICAL EQUIPMENT

- A. All electrical equipment provided under this section shall bear the Underwriters' Laboratory seal of approval.

2.5 SOIL, WASTE, DRAIN AND VENT PIPING

- A. All soil, waste, drain and vents shall be of cast iron soil pipe and fittings and shall conform to the requirements of CISPI Standard 301, ASTM A888, or ASTM A74 for all pipe and fittings.
- B. **Cleanouts:** Inside and outside the building, provide cleanouts as indicated on the drawings and in accordance with the Plumbing Code. Wherever a line is enlarged, provide a cleanout of the same size as the larger line. Where cleanouts come through finished floor, provide a round scoriated polished brass access cover and frame set flush with finished floor. Cleanouts in finished walls shall be provided with polished brass round access cover with rough brass plug.
- C. **Joints:** Joints for hubless pipe and fittings shall conform to the manufacturer's installation instructions and local code requirements. Hubless couplings shall be composed of a stainless steel shield, clamp assembly and an elastomeric sealing sleeve conforming to CISPI 310. Hubless coupling gaskets shall conform to ASTM Standard C-564. All joints shall be water-tight. Any leaks found when tested, shall be completely recaulked or rejoined and retested. Threaded joints shall be made up with an approved, non-hardening thread lubricant and screwed tight.
- D. **Vent Flashing:** Vents through roof shall be made water-tight by means of flashing and counter-flashing in a method compatible with the roofing system. Pipes shall extend not less than six inches above roof surface.

- E. Provide valves to isolate each item of equipment or fixture and major branch lines, as indicated on drawings. Valves up to and including two inches shall be all bronze with threaded ends, rough bodies and finished trimmings. Valves 2-1/2 inches and larger in diameter shall have iron bodies, brass mounting and either screw or flange ends. For copper piping, ends shall be sweat type.

2.6 WATER PIPES

- A. Water piping above ground shall be Type "L" copper pipe. Fittings shall be copper or cast bronze. Joints in copper piping shall be sweat soldered with lead-free 95-5 solder or Victaulic grooved system. Grooved couplings shall be angled bolt pad type. No tongue and recess type couplings will be allowed. No flaring of copper tube to IPS will be allowed. All gaskets to be of the prelubricated type. Dielectric unions shall be used where indicated or where copper is connected to ferrous pipe and protected with felt and two layers of electrical tape where copper comes in contact with ferrous material.
- B. Water piping below ground shall be Type "K" copper. Fitting and installation shall be as specified above.
 - 1. Hot water pipes below grade: All portions of the hot water piping below grade shall be type "K" copper, pre-insulated and PVC jacketed as manufactured by Copper-Gard or approved equal.
 - 2. Hot water pipes above grade: Type "L" copper, insulation thickness shall be in accordance with Section 15400, 3.16 with all purpose moisture jacket.

2.7 GAS PIPING

- A. Material: Schedule 40 Steel piping in accordance with standard ASTM A 53; ASTM A 539.
- B. Installation shall be in strict accordance with Chapter 13, Fuel-Gas Piping, of the California Mechanical Code.
- C. Exposed gas piping within the building shall be primed and painted to match surrounding surface color. Exposed gas piping at the building exterior shall be primed and painted with an exterior grade epoxy, color as directed by the Architect.
- D. All gas piping shall be identified with self adhering, polyester markers with UV resistant coating. 'GAS' letters shall be 3/4" tall and black on yellow field. Minimum spacing of markers shall be 5'-0".

2.8 CLEANOUTS

- A. In the following specification, figure numbers are as manufactured by Jay R. Smith Co. Similar units as manufactured by Zurn Co., Josam Co., or Wade, Inc. may be furnished.

- B. Floors: J. R. Smith Figure 4023 cast iron adjustable floor level cleanout assembly with round nickel-bronze top. Where floor cleanouts occur in carpeted areas J.R.Smith Figure 4023-Y with stainless steel carpet marker shall be used.
- C. Wall Cleanouts: J. R. Smith Figure 4472.
- D. Outside Cleanouts: J. R. Smith 4253.

2.9 FLEX. CONNECTORS AT EXPANSION JOINTS

- A. Metraflex 'Metraloop' or equal.

2.10 PLUMBING FIXTURES AND FITTINGS

- A. Set in approved workmanlike manner, edges against the wall neatly pointed up with plaster of paris. Fixtures, trims and fittings shall be thoroughly cleaned and left in perfect operating condition.
- B. Requirements of manufacturer's equipment that is a component of a system provided under this work are included with the system's specifications hereinafter. Capacities and characteristics of the equipment are indicated on the drawings. See electrical drawings for all voltage and phase requirements of all equipment furnished under this work.
- C. Provide chrome plated angle stops, tube risers, chrome plated P-traps, escutcheons and cover plates. Provide connecting fittings, china bolt caps, wall support brackets as required. All water fixtures shall meet applicable ordinances regarding low flow water fixtures and devices. All Accessible plumbing fixtures shall meet the Uniform Federal Accessible Standard Requirements. All ADA lavatories and sinks shall be equipped with Brocar Products, Inc. Trap Wrap model KIT C500 tailpiece, trap, waste arm, and hot and cold angle valve insulated covers. Refer to architectural drawings for sink dimensions.
- D. Schedule: Refer to plumbing schedule on plans and architectural documents for fixture descriptions.

2.11 HOSE BIBB

- A. Woodford Model 65.

2.12 EXPANSION COMPENSATORS

- A. Metraflex Model LPS and HP, or Flexonics Model H, and HB or equal.

2.13 BALL VALVES

- A. Watts B-6080-SS or Victaulic style 608 butterfly valve.

2.14 CHECK VALVES

- A. Watts B-5300.

2.15 BALANCING VALVES

- A. TA Hydronics balancing valves.

2.16 FLOOR DRAINS

- A. FD-1 shall be Jay R. Smith Figure 3510-F11, 06 round strainer, 2" outlet.
- B. Any floor drain connected to the sanitary drain system shall have a trap primer.

2.17 PRESSURE REDUCING VALVE

- A. Cla-Val model 990 approved equal.

2.18 WATER HAMMER ARRESTER

- A. J. R. Smith Figure 5005, 5010 or 5020, size to suit number of fixtures being serviced.

2.19 PRESSURE GAUGES

- A. Ashcroft Type 600B. Provide with thermowell.

2.20 INSULATION

- A. Insulation shall be Owens-Corning Fiberglass 25 AJS/SSL heavy density sectional pipe insulation or Johns Manville Micro-Lok AP-T Plus. Provide aluminum jacket on all insulation exposed to the weather.

2.21 TRAP PRIMER (TP)

- A. TP-1 shall be PPP Inc. 'Prime-Rite' w/ Distribution Units as needed.

2.22 STRAINERS

- A. Strainers shall be Watts 77-FD.

2.23 REDUCED PRESSURE BACKFLOW PREVENTER (RPBP)

- A. 1/2" size - Watts Series 009
- B. 3/4" - 2" - Watts Series 909
- C. 2-1/2" - 4" - Watts Series 909

2.24 MOTOR CONTROLS

- A. Combination type magnetic motor starters: Complete with circuit breaker, one overload relay per phase, 120-volt control circuit and horsepower rating.
- B. Wiring: Conform to requirements of Division 16.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the surfaces and conditions under which work of this section will be performed. Do not proceed until unsatisfactory conditions detrimental to timely and proper completion of the work have been corrected.

3.2 PREPARATION

- A. Investigate the Contract Documents and make proper provisions to avoid interferences or construction delays. Determine the exact route of each pipe. Make off-sets and changes in direction required to maintain proper head room and pitch or to accommodate the structure and the work of other trades. Furnish other trades with information to properly locate and size openings in the structure required for this work. Furnish anchor bolts, sleeves, inserts, and supports required for this work.
- B. Should it appear that any portion of the system has been omitted from the plans, the Contractor shall call the attention of the Architect to such apparent omission one week before date of bid opening so that correction may be made. Otherwise, the Contractor shall furnish and install, in a manner corresponding with the rest of the work, as if the same were specified and specifically provided for.

3.3 COORDINATION

- A. Obtain equipment manufacturer's control wiring diagrams for the equipment furnished. Prepare a control and interlock wiring diagram for the complete system. Indicate terminal connection points to factory wired equipment.
- B. Submit control diagram for review.
- C. Coordinate electrical work under this section with Section 15950 BUILDING MANAGEMENT SYSTEM and with Division 16.

3.4 INSTALLATION AND REQUIREMENTS

- A. Perform work using personnel skilled in the trade involved. Provide competent supervision. Furnish new equipment, fixtures, materials and accessories bearing the manufacturer's identification and conforming to recognized commercial standards. Provide guard around all exposed moving machinery parts and around high-temperature equipment and materials.
- B. When exposed to weather, provide a weather protected enclosure around electrical equipment, controls and other items that are not satisfactorily protected. Provide access panels for concealed items provided under this section that require maintenance, adjustment or inspection

3.5 GENERAL WORKMANSHIP

- A. All workmanship shall be of the highest standard. The plumbing system shall be laid out to insure a neat, systematic and orderly arrangement of all work. Vertical lines shall be plumb and lines that are grouped shall be parallel and as direct as possible. Galvanized sheet metal thimbles shall be provided where pipes pass through masonry and cutting shall be avoided as far as possible. Exposed pipe, where occurring, shall be run parallel with walls.
- B. Plumbing work shall be done correctly and neatly. No tool marks shall be allowed on surfaces of polished fixture, pipe or fitting.
- C. No piping shall be covered or otherwise concealed until tested and inspected by the Engineer.
- D. Horizontal soil lines shall be installed with a minimum grade of 1/4 inch per foot unless otherwise shown on plan.
- E. Provide and install brass square head service stops at all hose bibbs.
- F. Flash vents at roof in a method compatible with the roofing system.

3.6 EXCAVATION, BACKFILL AND CONCRETE WORK

- A. Trenches for all underground pipe lines shall be excavated to the required depths. The bottoms of trenches shall be tamped hard and graded to secure the required fall. Bell holes shall be excavated so that pipe will rest on solid ground for its entire length. Rock, where encountered, shall be excavated to a depth 6 inches below the bottom of the pipe and rock surface shall be filled with sand.
- B. Sewer and water pipes shall be laid in separate trenches, except where otherwise noted on drawings.
- C. After pipe lines have been tested, inspected and approved, prior to backfilling, forms shall be removed and the excavation shall be cleaned of trash and debris. Materials for backfilling shall consist of the excavation except adobe, or borrow of sand, gravel or other materials approved by the Architect, and shall be free of trash, lumber or other debris. Backfill shall be placed in horizontal layers not exceeding 9 inches in thickness, and properly moistened to approximate optimum conditions.
- D. Each layer shall be compacted by hand or machine tampers or by other suitable equipment to a density that will prevent excessive settlement or shrinkage. Backfill shall be brought to a suitable elevation above grade to provide anticipated settlement and shrinkage thereof. The backfill shall be tamped to density equal to the surrounding earth under concrete floor and paving. Concrete work shall conform to Division 2.

3.7 CROSS CONNECTIONS AND INTERCONNECTIONS

- A. No plumbing fixture, device or piping shall provide a cross connection or interconnection between a distributing supply for drinking or domestic purposes and a polluted supply, such as a drainage system or a soil or waste pipe, so as to make possible the backflow of sewage, polluted water, or waste into the water supply system.

3.8 EQUIPMENT INSTALLATION

- A. Install equipment in the space allotted with sufficient clearance for proper operation and maintenance. Where equipment differs in arrangement or connections from those shown, provide all required changes in piping, supports and appurtenances, and cost of work of any other trades affected.
- B. Provide equipment accessories necessary for proper operation and support.
- C. Concrete equipment bases and supports are specified under another section. Direct trade providing concrete in the proper locations, dimensions, load carrying capacity and anchor-bolt locations. Concrete pads shall be not less than four inches above adjacent surfaces, have beveled edges and shall extend at least three inches beyond the base of the equipment.
- D. Where vibration isolation units are specified for equipment, the isolators shall be selected for the load imposed by each support point. Secure floor-mounted isolators to base and to equipment.

3.9 FIXTURE INSTALLATION

- A. Set fixtures in an approved workmanlike manner. Point up all edges against walls and partitions with white grout. Provide adequate supports for wall-mounted fixtures. Provide supplies for all water lines to fixtures, except those using flush valves; compression joint type with chromium plated brass escutcheon and cover tube, loose-key angle stop valve and drawn copper tube riser.
- B. Provide chromium plated brass p-trap, waste fittings and escutcheon as required for fixture. Exposed metal surfaces including pipe shall be polished chromium plated in all areas of restrooms, janitor rooms, sink areas, and break rooms.

3.10 FIXTURE PIPING INSTALLATION

- A. Inspect all pipe inside and outside. Remove interior obstructions and ream out pipe ends. Tool markings on polished fittings are not acceptable. Cut pipe accurately so that it can be worked into place without springing or forcing. Install pipes parallel to the walls of the structure and plumb.
- B. Make changes in direction and size with fittings. Install valves with stems above horizontal. Provide proper support and adequate provisions for expansion, contraction, slope, and anchorage. Provide dielectric unions where copper tubing connects to steel pipe. Wrap pipe or tubing with 1/4-inch thick felt, secured with tape, where they contact other materials. Have piping tested, inspected and

approved before it is furred in, buried or otherwise hidden. Provide standard weight galvanized steel pipe sleeves where water pipes pass through structure, sufficiently large to provide 1/4-inch clearance around pipe.

- C. Wrap pipe with polyethylene tape where it passes through sleeve and when it contacts concrete or masonry. Caulk watertight around pipes passing through sleeves. Grout with fire proof material around all pipe penetrations through slabs and walls full length of penetration.
- D. Provide chrome-plated brass escutcheons, set tight on the pipe and to the wall where pipes are exposed in finished areas. Provide clamping collar or membrane flange where pipe or drains penetrate waterproof membrane. Perform all welding using qualified welders in accordance with American National Standards Institute's Code B31.1.

3.11 PIPE INSTALLATION

- A. No pipe shall be closed up, furred in, butted, or otherwise hidden until it has been inspected, tested and approved by the proper authorities.
- B. Unless specifically noted otherwise, sanitary piping shall slope not less than 1/4 inch per foot of horizontal run.
- C. Drain pipes shall be run with easy bends and long radius turns. Offsets shall be made at an angle of 45-degrees or less, except where cleanouts are provided for shorter turns.
- D. All piping shall be inspected inside and out before installation and no obstructions shall be allowed. Pipe ends shall be taper reamed to full I.D. and all burrs removed.
- E. All exposed piping shall be carefully handled to avoid excessive tool marking and polished fittings shall be handled with extra care using friction wrench so that tool marks do not show. All exposed piping shall be in one length where possible. Fittings shall be in walls under counter cabinets, or in furred pass.
- F. Underground pipes passing through walls to or areas below grade shall be provided with pipe sleeves and made water-tight at the sleeves. Provide sheet metal thimbles where pipes pass through floors or nonstructural members, steel pipe sleeves where pipes pass through structural members and concrete wall. Anchor piping in building with approved clamps or adjustable hangers spaced in accordance with Section 316 of the Plumbing Code.
- G. Hangers and supports shall be placed at each offset or change in direction, at the ends of branches over five feet in length, at riser pipes and along piping as necessary to prevent sags, bends or vibration. Horizontal piping support spacing:
 - 1. Cast Iron Pipe: Where joints occur, five foot maximum interval, 10 foot maximum interval exceeding five feet in length.
 - 2. Screwed Pipe:

- a. 1-inch and larger: 12 feet
 - b. 3/4-inch and smaller: 10 feet
3. Copper Pipe:
- a. 2-inch and larger: 10 feet
 - b. 1-1/2 inch and smaller: 6 feet
- H. Vertical risers passing through more than one floor shall be anchored or clamped to the floor nearest the center of the riser. Manifolds and paralleling runs of piping may be supported on trapeze hangers.

3.12 PIPING SYSTEM SUPPORTS

- A. Pipe supports: Factory-fabricated. Provide concrete inserts, beam clamps, channel framing, hanger rods and accessories required for proper pipe support. Ramset or explosive type anchors may not be used without written permission of the Architect. Support underground piping on firm soil along its entire length. Where rocks are encountered, have trench excavated to a minimum overdepth of four inches and backfilled with granular moist earth, thoroughly tamped. Materials used for backfilling over piping shall be granular earth, free from debris and stones. The Architect's representative may reject any materials which he considers unsuitable for fill.
- B. Provide a minimum of two feet of cover for all pipes. Where sanitary drain and water lines are laid in the same trench, place water line on solid shelf with bottom of water lines twelve inches above top of sanitary drain. Where sanitary drain and water lines cross, encase drain in four-inch thick concrete envelope.
- C. Support steel and copper pipe at maximum spacing of 6-feet for pipes 1-1/2 inches in diameter and smaller, 10-feet for pipes 2-inches through 4-inches in diameter and 15-feet for pipes larger than 4-inches in diameter. Support vertical piping with hanger at base of riser and with pipe clamp at each floor.
- D. Provide expansion loops in water piping where pipe crosses structural expansion joints, consisting of four 90 degree elbows with 10 pipe diameters in between. Provide "No-hub" pipe connection on drainage, waste and vent piping crossing an expansion joint.
- E. Pipe hangers: Steel clevis hanger with adjustable hanger rod; 3/8 inch for pipe 2 inches and smaller, 1/2 inch for pipe 2-1/2 inches through 3-1/2 inches and 5/8 inch for pipe 4 inches and larger. Groups of lines may be supported from steel channel with pipe clamp.

3.13 DRAINAGE, WASTE, AND VENT PIPING SYSTEMS

- A. Slope drain lines at 1/4-inch per foot unless otherwise indicated. Where drains occur above the ground floor, provide clamping device with drain. Provide a four-pound lead flashing sheet extending eight inches out around drain body and secure with clamping device. On vents through roof, vent flashing shall be installed in a method compatible with the roofing system.

3.14 WATER PIPING SYSTEM

- A. Secure each water line where it penetrates partitions to serve fixtures, mop sink faucets, hose bibbs and similar items. Wrap all lines passing through concrete with polyethylene tape. Install unions or flanges at all valves, equipment and system specialties. Set hose bibbs 18 inches above finished grade, unless otherwise indicated.
- B. Provide water hammer arresters as indicated on the plans and on all water lines serving fixtures using flush valve or hose bibbs, sized and located in accordance with the PDI Standard WH-201 for the total number of fixture units connected to the branch line. Provide access door for concealed arresters.
- C. Provide concrete thrust blocks at each change of direction in underground water-piping system.

3.15 INSULATION SYSTEM

- A. Insulation shall be installed in accordance with the manufacturer's recommendations by tradesmen skilled in this trade and approved by the insulation manufacturer. Provide insulation products with a composite (insulation, jacket and adhesive) fire and smoke hazard rating not exceeding a Flame Spread of 25 and Smoke Developed of 50.
- B. Insulation shall be Owens-Corning Fiberglas 25 AJS/SSL heavy density sectional pipe insulation or Johns Manville Micro-Lok AP-T Plus. Provide aluminum jacket on all insulation exposed to the weather. All piping insulation in the accessible areas within 8'-0" of finish floor shall be provided with 'Zeston 2000' PVC pipe and fitting jacket. All other piping insulation shall be provided with ASJ jacketing. Provide rigid, foam-glass insulation sections at all points of support.
- C. Saddles: Provide 16-gauge x 12 long x 180 degree galvanized sheetmetal protective saddle at each hanger or support on insulated piping.
- D. Aluminum Jackets: On pipe insulations exposed to weather, apply 16 mil embossed aluminum jacket with 2" overlap at longitudinal and circumferential joints, secured in place with 3/4" x 0.015 aluminum bands on 18" centers. Apply humped aluminum ells or fabricated 16 mil aluminum to fitting and band in place:

3.16 COLD WATER SUPPLY & HOT WATER SUPPLY / RETURN PIPE INSULATION

- A. Cold Water Pipe (All sizes): 1/2" thick insulation.

B. Hot water Pipe:

1. 1/2 inch through 1-1/2 inch: 1" thick insulation
2. 2 inch through 4 inch: 1-1/2 inch thick insulation.
3. 6 inch through 8 inch: 2" thick insulation.

3.17 CONTROL VALVE INSTALLATION

- A. Valve submittals shall be coordinated for type, quantity, size, and piping configuration to ensure compatibility with pipe design.
- B. All control valves shall be installed so that the stem position is not more than 60 degrees from the vertical up position.
- C. Valves shall be installed in accordance with the manufacturer's recommendations.
- D. Control valves shall be installed so that they are accessible and serviceable, and such that actuators may be serviced and removed without interference from structure or other pipes and/or equipment.
- E. Isolation valves shall be installed such that control valve body may be serviced without draining the supply/return side piping system. {Note to designer: this must also be shown.} Unions shall be installed at all connections to screwed type control valves.
- F. Provide tags for all control valves indicating service and number. Tags shall be brass, 1-1/2" in diameter, with 1/4" high letters. Securely fasten with chain and hook. Match identification numbers as shown on approved controls shop drawings.

3.18 CUTTING AND REPAIRING

- A. The work shall be carefully laid out in advance, and any excess cutting of construction will not be permitted. Cutting shall be carefully done and damage to buildings, piping, wiring, or equipment as a result of cutting for installation shall be repaired by skilled mechanics of the trade involved, at no additional expense to the Owner.

3.19 PROTECTION TO FIXTURES, MATERIALS AND EQUIPMENT

- A. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. Upon completion of all work, the fixtures, materials and equipment shall be thoroughly cleaned, adjusted and operated.

3.20 CHLORINATION

- A. Water lines shall be sterilized with chlorine before acceptance of the work. Dosage of chlorine shall be not less than 50 ppm. Chlorinating material shall be introduced into the water lines in a manner approved by the Architect. After a contact period of

not less than eight hours, the system shall be flushed with clean water until the residual chlorine content is not greater than 0.2 ppm. All valves in the lines being sterilized shall be opened and closed several times during the contact period. A certificate shall be furnished to the Architect evidencing proper performance of sterilization.

3.21 TESTING AND CLEANUP

- A. Sanitary piping: Test in accordance with Section 318 of the Plumbing Code. Water piping shall be tested at 150 psi for 15-minutes without leaking. Furnish all equipment for the tests and pay for all costs of repairing any damage resulting from such tests. Adjust systems until they are approved. Tests shall be performed in the presence of, and to the satisfaction of the Owner's representative and inspector of the official agency involved.
- B. Faulty or defective material discovered shall be replaced at no cost.
- C. Upon completion of work all stains and defects marring or defacing walls, ceilings, fixtures, or floors caused by this work shall be cleaned or replaced with new material. All fixtures shall be washed and polished everything left in "broom clean" condition ready for use.

3.22 CONTROLS

- A. Integrate with Building Automation System provided under Section 15950.
- B. Provide magnetic motor starters for electrically-driven equipment.
- C. Furnish motor starters, equipment data and diagrams for equipment units to Electrical Contractor for installation of starters, and connection to power supply.

3.23 ELECTRICAL

- A. Conform to the requirements of ANSI/NFPA 70 (National Electrical Code), and to the requirements of Division 16.
- B. Obtain equipment manufacturer's control wiring diagrams for the equipment furnished. Refer to the control and interlock wiring diagram for the complete system. Indicate terminal connection points to factory wired equipment.

3.24 OPERATION TEST

- A. At completion, operate all plumbing systems for a period of at least two (2) days of eight hours minimum to demonstrate fulfillment of the requirements. During this time all adjustments shall be made to the equipment until the entire system is in satisfactory operating condition, including the location of main and branch shut-off valves.

3.25 FINAL OPERATION AND INSTRUCTIONS

- A. Upon completion of the installation and after operation test and final acceptance, at a mutually agreed time, the Contractor shall place a competent person, or persons at the building who shall operate the systems for a period of two (2) eight-hour days instructing the Owner's personnel in all details of operation and maintenance, including the location of main and branch shut-off valves.

END OF SECTION

SECTION 15950 – BUILDING MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Division 1 – Owner-Furnished Equipment
- B. Section 15400 – Plumbing
- C. Section 15600 – Heating, Ventilating and Air Conditioning
- D. Section 15990 – Testing, Adjusting and Balancing
- E. Section 16111 – Conduit
- F. Section 16123 – Building Wire and Cable
- G. Section 16130 – Boxes
- H. Section 16180 – Wiring Connections

1.3 SUMMARY

- A. Section Includes:
 - 1. Building Management software; operator workstation; network software and hardware; DDC system controllers; field devices; system tools; input devices; output devices; miscellaneous devices; wiring.

1.4 REFERENCES AND STANDARDS

- A. ANSI - American National Standards Institute
- B. ANSI/EIA 909.1-A-1999 (LonWorks)
- C. ANSI/ASHRAE Standard 135-2004 (BACnet)
- D. ANSI/NFPA 70 - National Electrical Code
- E. ANSI/NFPA 72 – National Fire Code
- F. ANSI/NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems
- G. ANSI/NFPA 92A and 92B Smoke Purge/Control Equipment

- H. ANSI/NFPA 101 - Life Safety Code
- I. ASCII - American Standard Code for Information Interchange
- J. ASTM - American Society for Testing and Materials
- K. EIA - Electronics Industries Association
- L. IBC - International Building Code
- M. IEEE - Institute of Electrical and Electronic Engineers
- N. FM - Factory Mutual
- O. IMC - International Mechanical Code
- P. NEMA - National Electric Manufacturer's Association
- Q. OSHA - Occupational Safety and Health Administration
- R. UL - Underwriters Laboratories, Inc
- S. UL 864 UUKL Smoke Control
- T. UL 268 Smoke Detectors
- U. UL 916 Energy Management
- V. UBC – Uniform Building Code
- W. UPC – Uniform Plumbing Code

1.5 SYSTEMS DESCRIPTION

- A. The Building Management System (BMS) shall be a complete system designed for use with the enterprise IT systems. This functionality shall extend into the equipment rooms. Devices residing on the automation network located in equipment rooms and similar shall be fully IT compatible devices that mount and communicate directly on the IT infrastructure in the facility. Contractor shall be responsible for coordination with the owner's IT staff to ensure that the FMS will perform in the owner's environment without disruption to any of the other activities taking place on that LAN.
- B. All points of user interface shall be on standard PCs that do not require the purchase of any special software from the BMS manufacturer for use as a building operations terminal. The primary point of interface on these PCs will be a standard Web Browser.
- C. The work of the single BMS Contractor shall be as defined individually and collectively in all Sections of this specifications Division together with the associated

- Point Sheets and Drawings and the associated interfacing work as referenced in the related documents.
- D. The BMS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BMS.
 - E. Provide a complete, neat and workmanlike installation. Use only manufacturer employees who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.
 - F. Manage and coordinate the BMS work in a timely manner in consideration of the Project schedules. Coordinate with the associated work of other trades so as to not impede or delay the work of associated trades.
 - G. The BMS as provided shall incorporate, at minimum, the following integrated features, functions and services:
 - 1. Operator information, alarm management and control functions.
 - 2. Enterprise-level information and control access.
 - 3. Information management including monitoring, transmission, archiving, retrieval, and reporting functions.
 - 4. Diagnostic monitoring and reporting of BMS functions.
 - 5. Offsite monitoring and management access.
 - 6. Energy management.
 - 7. Standard applications for terminal HVAC systems.

1.6 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Shop Drawings, Product Data, and Samples.
 - 1. The BMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.

2. Submittals shall be in defined packages. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Architect and Engineer for Contract compliance.
3. Allow 25 working days for the review of each package by the Owner and Engineer in the scheduling of the total BMS work.
4. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the BMS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.
5. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.
6. The BMS Contractor shall correct any errors or omissions noted in the first review.
- 7, At a minimum, submit the following:
 - a. BMS network architecture diagrams including all nodes and interconnections.
 - b. Systems schematics, sequences and flow diagrams.
 - c. Points schedule for each point in the BMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
 - d. Samples of Graphic Display screen types and associated menus.
 - e. Detailed Bill of Material list for each system or application, identifying quantities, part numbers, descriptions, and optional features.
 - f. Control Damper Schedule including a separate line for each damper provided under this section and a column for each of the damper attributes, including: Code Number, Fail Position, Damper Type, Damper Operator, Duct Size, Damper Size, Mounting, and Actuator Type.
 - g. Control Valve Schedules including a separate line for each valve provided under this section and a column for each of the valve attributes: Code Number, Configuration, Fail Position, Pipe Size, Valve Size, Body Configuration, Close off Pressure, Capacity, Valve CV, Design Pressure, and Actuator Type.
 - h. Room Schedule including a separate line for each VAV box and/or terminal unit indicating location and address.
 - i. Details of all BMS interfaces and connections to the work of other trades.

- j. Product data sheets or marked catalog pages including part number, photo and description for all products including software.

1.7 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1.
- B. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Submit under provisions of Division 1.
- B. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media, and include the following for the BMS provided:
 - 1. Table of contents.
 - 2. As-built system record drawings.
 - 3. Manufacturers product data sheets or catalog pages for all products including software.
 - 4. System Operator's manuals.
 - 5. Archive copy of all site-specific databases and sequences.
 - 6. BMS network diagrams.
 - 7. Interfaces to all third-party products and work by other trades.

- C. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.
- D. On-Line documentation: After completion of all tests and adjustments the contractor shall provide a copy of all as-built information and product data to be installed on a customer designated computer workstation or server.

1.9 QUALITY ASSURANCE

A. General

- 1. The Building Management System Contractor shall be a manufacturer authorized office that is regularly engaged in the engineering, programming, installation and service of total integrated Building Management Systems.
- 2. The BMS Contractor shall be a recognized national manufacturer, installer and service provider of BMS.
- 3. The BMS Contractor shall have a branch facility within the State of Hawaii supplying complete maintenance and support services on a 24 hour, 7-day-a-week basis.
- 4. As evidence and assurance of the contractor's ability to support the Owner's system with service and parts, the contractor must have been in the BMS business for at least the last ten (10) years and have successfully completed total projects of at least 10 times the value of this contract in each of the preceding five years.
- 5. The Building Management System architecture shall consist of the products of a manufacturer regularly engaged in the production of Building Management Systems, and shall be the manufacturer's latest standard of design at the time of bid.

B. Workplace Safety and Hazardous Materials.

- 1. Provide a safety program in compliance with the Contract Documents.
- 2. The FMS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.
- 3. The Contractor and its employees and subtrades comply with federal, state and local safety regulations.
- 4. The Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work, and that their employees receive the training required by the OSHA have jurisdiction for at least each topic listed in the Safety Certification Manual.

5. Hazards created by the Contractor or its subcontractors shall be eliminated before any further work proceeds.
6. Hazards observed but not created by the Contractor or its subcontractors shall be reported to either the General Contractor or the Owner within the same day. The Contractor shall be required to avoid the hazard area until the hazard has been eliminated.
7. The Contractor shall sign and date a safety certification form prior to any work being performed, stating that the Contractors' company is in full compliance with the Project safety requirements.
8. The Contractor's safety program shall include written policy and arrangements for the handling, storage and management of all hazardous materials to be used in the work in compliance with the requirements of the AHJ at the Project site.
9. The Contractor's employees and subcontractor's staff shall have received training as applicable in the use of hazardous materials and shall govern their actions accordingly.

C. Quality Management Program.

1. Designate a competent and experienced employee to provide BMS Project Management. The designated Project Manager shall be empowered to make technical, scheduling and related decisions on behalf of the BMS Contractor. At minimum, the Project Manager shall:
 - a. Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
 - b. Manage the financial aspects of the BMS Contract.
 - c. Coordinate as necessary with other trades.
 - d. Be responsible for the work and actions of the BMS workforce on site.

1.10 REGULATORY REQUIREMENTS

- A. Conform to REFERENCES AND STANDARDS.
- B. Conform to all Rules, Ordinances and Regulations of the State of Hawaii, County of Hawaii.
- C. Furnish products listed and classified by UL and FM as suitable for purpose specified and indicated.
- D. Products shall be UL-916-PAZX listed.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Protect all work and material from damage by work or workers.
- B. Be responsible for work and equipment until finally inspected, tested, and accepted. Protect work against theft or damage, and carefully store material and equipment received on site that is not immediately installed. Close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

1.12 WARRANTY

- A. Standard Material and Labor Warranty:
 - 1. Provide a one-year labor and material warranty on the BMS.
 - 2. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at the cost of the BMS Contractor.
 - 3. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during BMS Contractor's normal business hours.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Automated Logic Corp.: WebCTRL
- B. Substitutions: Under provisions of Division 1 and Section 15050.

2.2 GENERAL DESCRIPTION

- A. The Building Management System (BMS) shall use an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the BMS shall support open communication protocol standards and integrate a wide variety of third-party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.
- B. The Building Management System shall consist of the following:
 - 1. Standalone Network Automation Engine(s)
 - 2. Field Equipment Controller(s)
 - 3. Input/Output Module(s)
 - 4. Local Display Device(s)
 - 5. Portable Operator's Terminal(s)

6. Distributed User Interface(s)
 7. Network processing, data storage and communications equipment
 8. Other components required for a complete and working BMS
- C. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.
- D. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

2.3 BMS ARCHITECTURE

A. Automation Network

1. The automation network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.
2. The automation network shall be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication.
3. Network Automation Engines (NAE) shall reside on the automation network.
4. The automation network will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

B. Control Network

1. Network Automation Engines shall provide supervisory control over the control network and shall support all three (3) of the following communication protocols:
 - a. BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9.
 - b. LonWorks enabled devices using the Free Topology Transceiver (FTT-10a).
 - c. The Johnson Controls N2 Field Bus.
2. Control networks shall provide either "Peer-to-Peer," Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.
3. DDC Controllers shall reside on the control network.

4. Control network communication protocol shall be BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135.
5. A BACnet Protocol Implementation Conformance Statement shall be provided for each controller device (master or slave) that will communicate on the BACnet MS/TP Bus.
6. The Conformance Statements shall be submitted 10 day prior to bidding.

C. Integration

1. BACnet Protocol Integration – BACnet
 - a. The neutral protocol used between systems will be BACnet over Ethernet and comply with the ASHRAE BACnet standard 135-2003.
 - b. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.
 - c. The ability to command, share point object data, change of state (COS) data and schedules between the host and BACnet systems shall be provided.

2.4 USER INTERFACE

A. Dedicated Web Based User Interface

1. Where indicated on plans the BMS Contractor shall provide and install a personal computer for command entry, information management, network alarm management, and database management functions. All real-time control functions, including scheduling, history collection and alarming, shall be resident in the BMS Network Automation Engines to facilitate greater fault tolerance and reliability.
2. Dedicated User Interface Architecture – The architecture of the computer shall be implemented to conform to industry standards, so that it can accommodate applications provided by the BMS Contractor and by other third party applications suppliers, including but not limited to Microsoft Office Applications. Specifically it must be implemented to conform to the following interface standards.
 - a. Microsoft Internet Explorer for user interface functions.
 - b. Microsoft Office Professional for creation, modification and maintenance of reports, sequences other necessary building management functions.
 - c. Microsoft Outlook or other e-mail program for supplemental alarm functionality and communication of system events, and reports.

- d. Required network operating system for exchange of data and network functions such as printing of reports, trends and specific system summaries.
3. PC Hardware – The wifi laptop shall be configured as follows:
 - a. Memory – 1 GB (512 MB Minimum)
 - b. CPU– Pentium 4 processor. 2.8 Hz Clock Speed (2.0 GHz minimum)
 - c. Hard Drive – 80 GB free hard drive space (40GB minimum)
 - d. Hard drive backup system – CD/RW, DVD/RW or network backup software provided by IT department
 - e. CD ROM Drive – 32X performance
 - f. Ports – (2) Serial and (1) parallel, (2) USB ports
 - g. Keyboard – 101 Keyboard and 2 Button Mouse
 - h. 17” Flat Panel Display 1280 x 1024 resolution minimum
 - i. 16 bit or higher color resolution
 - j. Display card with multiple monitor support
 - k. LAN communications – Ethernet communications board; 3Comm or equal
 4. Operating System Software
 - a. Windows 7
 - b. Where user interface is not provided via browser, provide complete operator workstation software package, including any hardware or software keys. Include the original installation disks and licenses for all included software, device drivers, and peripherals.
 - c. Provide software registration cards to the Owner for all included software.

B. Distributed Web Based User Interface

1. All features and functions of the dedicated user interface previously defined in this document shall be available on any computer connected directly or via a wide area or virtual private network (WAN/VPN) to the automation network and conforming to the following specifications.

2. The software shall run on the Microsoft Internet Explorer (9.0 or higher) browser.
 3. Minimum hardware requirements:
 - a. 256 MB RAM
 - b. 2.0 GHz Clock Speed Pentium 4 Microprocessor
 - c. 40.0 GB Hard Drive
 - d. 1 Keyboard with 83 keys (minimum)
 - e. SVGA 1024x768 resolution display with 64K colors and 16 bit color depth
 - f. Mouse or other pointing device
- C. User Interface Application Components
1. Operator Interface
 - a. An integrated browser based client application shall be used as the user operator interface program.
 - b. All Inputs, Outputs, Setpoints, and all other parameters as defined within Part 3, shown on the design drawings, or required as part of the system software, shall be displayed for operator viewing and modification from the operator interface software.
 - c. The user interface software shall provide help menus and instructions for each operation and/or application.
 - d. All controller software operating parameters shall be displayed for the operator to view/modify from the user interface. These include: setpoints, alarm limits, time delays, PID tuning constants, run-times, point statistics, schedules, and so forth.
 - e. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:
 - (1) User access for selective information retrieval and control command execution
 - (2) Monitoring and reporting
 - (3) Alarm, non-normal, and return to normal condition annunciation
 - (4) Selective operator override and other control actions
 - (5) Information archiving, manipulation, formatting, display and reporting

- (6) On-line access to user HELP menus
 - (7) On-line access to current FMS as-built records and documentation
 - (8) Means for the controlled re-programming, re-configuration of FMS operation and for the manipulation of FMS database information in compliance with the prevailing codes, approvals and regulations for individual FMS applications.
- f. The operation of the control system shall be independent of the user interface, which shall be used for operator communications only. Systems that rely on an operator workstation to provide supervisory control over controller execution of the sequences of operations or system communications shall not be acceptable
2. Navigation Trees
- a. The system will have the capability to display multiple navigation trees that will aid the operator in navigating throughout all systems and points connected. At minimum provide a tree that identifies all systems on the networks.
 - b. Provide the ability for the operator to add custom trees. The operator will be able to define any logical grouping of systems or points and arrange them on the tree in any order. It shall be possible to nest groups within other groups. Provide at minimum 5 levels of nesting.
 - c. The navigation trees shall be "dockable" to other displays in the user interface such as graphics. This means that the trees will appear as part of the display, but can be detached and then minimized to the Windows task bar or closed altogether. A simple keystroke will reattach the navigation to the primary display of the user interface.
3. Alarms
- a. Alarms shall be routed directly from Network Automation Engines to PCs and servers. It shall be possible for specific alarms from specific points to be routed to specific PCs and servers. The alarm management portion of the user interface shall, at the minimum, provide the following functions:
 - (1) Log date and time of alarm occurrence.
 - (2) Generate a "Pop-Up" window, with audible alarm, informing a user that an alarm has been received.
 - (3) Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
 - (4) Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail

shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.

- (5) Provide the ability to direct alarms to an e-mail address or alphanumeric pager. This must be provided in addition to the pop up window described above. Systems that use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
 - (6) Any attribute of any object in the system may be designated to report an alarm.
- b. The FMS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions.
 - c. The FMS shall annunciate application alarms at minimum, as required by Part 3.
4. Reports and Summaries
- a. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:
 - (1) All points in the BMS
 - (2) All points in each BMS application
 - (3) All points in a specific controller
 - (4) All points in a user-defined group of points
 - (5) All points currently in alarm
 - (6) All points locked out
 - (7) All BMS schedules
 - (8) All user defined and adjustable variables, schedules, interlocks and the like.
 - b. Summaries and Reports shall be accessible via standard UI functions and not dependent upon custom programming or user defined HTML pages.
 - c. Selection of a single menu item, tool bar item, or tool bar button shall print any displayed report or summary on the system printer for use as a building management and diagnostics tool.
 - d. The system shall allow for the creation of custom reports and queries via a standard web services XML interface and commercial off-the-shelf software such as Microsoft Access, Microsoft Excel, or Crystal Reports.

5. Schedules

- a. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:
 - (1) Weekly schedules
 - (2) Exception Schedules
 - (3) Monthly calendars
- b. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.
- c. It shall be possible to define ten or more exception schedules for each schedule including references to calendars.
- d. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days for a minimum of five years in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the exception schedules.
- e. Changes to schedules made from the User Interface shall directly modify the Network Automation Engine schedule database.
- f. Schedules and Calendars shall comply with ASHRAE SP135/2003 BACnet Standard.
- g. Selection of a single menu item or tool bar button shall print any displayed schedule on the system printer for use as a building management and diagnostics tool.

6. Password
 - a. Multiple-level password access protection shall be provided to allow the user/manager to user interface control, display, and database manipulation capabilities deemed appropriate for each user, based on an assigned password.
 - b. Each user shall have the following: a user name (24 characters minimum), a password (12 characters minimum), and access levels.
 - c. The system shall allow each user to change his or her password at will.
 - d. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.
 - e. A minimum of five levels of access shall be supported individually or in any combination as follows:
 - (1) Level 1 = View Data
 - (2) Level 2 = Command
 - (3) Level 3 = Operator Overrides
 - (4) Level 4 = Database Modification
 - (5) Level 5 = Database Configuration
 - (6) Level 6 = All privileges, including Password Add/Modify
 - f. A minimum of 100 unique passwords shall be supported.
 - g. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.
 - h. The system shall automatically generate a report of log-on/log-off and system activity for each user. Any action that results in a change in the operation or configuration of the control system shall be recorded, including: modification of point values, schedules or history collection parameters, and all changes to the alarm management system, including the acknowledgment and deletion of alarms.
7. Screen Manager - The User Interface shall be provided with screen management capabilities that allow the user to activate, close, and simultaneously manipulate a minimum of 4 active display windows plus a network or user defined navigation tree.
8. Dynamic Color Graphics

- a. The graphics application program shall be supplied as an integral part of the User Interface. Browser or Workstation applications that rely only upon HTML pages shall not be acceptable.
- b. The graphics applications shall include a create/edit function and a runtime function. The system architecture shall support an unlimited number of graphics documents (graphic definition files) to be generated and executed. The graphics shall be able to display and provide animation based on real-time data that is acquired, derived, or entered.
- c. Graphics runtime functions – A maximum of 16 graphic applications shall be able to execute at any one time on a user interface or workstation with 4 visible to the user. Each graphic application shall be capable of the following functions:
 - (1) All graphics shall be fully scalable
 - (2) The graphics shall support a maintained aspect ratio
 - (3) Multiple fonts shall be supported
 - (4) Unique background shall be assignable on a per graphic basis
 - (5) The color of all animations and values on displays shall indicate if the status of the object attribute.
- d. Operation from graphics – It shall be possible to change values (setpoints) and states in system controlled equipment by using drop-down windows accessible via the pointing device.
- e. Graphic editing tool – A graphic editing tool shall be provided that allows for the creation and editing of graphic files. The graphic editor shall be capable of performing/defining all animations, and defining all runtime binding.
 - (1) The graphic editing tool shall in general provide for the creation and positioning of point objects by dragging from tool bars or drop-downs and positioning where required.
 - (2) In addition, the graphic editing tool shall be able to add additional content to any graphic by importing backgrounds in the SVG, BMP or JPG file formats.
- f. Aliasing – Many graphic displays representing part of a building and various building components are exact duplicates, with the exception that the various variables are bound to different field values. Consequently, it

shall be possible to bind the value of a graphic display to aliases, as opposed to the physical field tags.

9. Historical Trending and Data Collection

- a. Each Automation Engine shall store trend and point history data for all analog and digital inputs and outputs, as follows:
 - (1) Any point, physical or calculated, may be designated for trending. Three methods of collection shall be allowed: Defined time interval; Upon a change of value.
 - (2) Each Automation Engine shall have the capability to store multiple samples for each physical point and software variable based upon available memory, including an individual sample time/date stamp. Points may be assigned to multiple history trends with different collection parameters.
- b. Trend and change of value data shall be stored within the engine and uploaded to a dedicated trend database or exported in a selectable data format via a provided data export utility. Uploads to a dedicated database shall occur based upon one of the following: user-defined interval, manual command, or when the trend buffers are full. Exports shall be as requested by the user or on a time scheduled basis.
- c. The system shall provide a configurable data storage subsystem for the collection of historical data. Data can be stored in either Microsoft Access or SQL database format.

10. Trend Data Viewing and Analysis

- a. Provide a trend viewing utility that shall have access to all database points.
- b. It shall be possible to retrieve any historical database point for use in displays and reports by specifying the point name and associated trend name.
- c. The trend viewing utility shall have the capability to define trend study displays to include multiple trends.
- d. Displays shall be able to be single or stacked graphs with on-line selectable display characteristics, such as ranging, color, and plot style.
- e. Display magnitude and units shall both be selectable by the operator at any time without reconfiguring the processing or collection of data. This is a zoom capability.
- f. Display magnitude shall automatically be scaled to show full graphic resolution of the data being displayed.

- g. Trend studies shall be capable of calculating and displaying calculated variables including highest value, lowest value and time based accumulation.

2.5 NETWORK AUTOMATION ENGINES (NAE)

A. Network Automation Engine (NAE 85 XX)

1. The Network Integration Engine (NIE) shall be a fully user-programmable, supervisory controller. The NAE shall monitor the network of distributed application-specific controllers on the N1 Network, provide global strategy and direction, and communicate on a peer-to-peer basis with other NAE and NIE controllers.
2. Automation network – The NIE shall reside on the automation network.
3. WebCTRL Network Integration - The NIE shall connect WebCTRL based building automation systems to an Internet Protocol (IP) Ethernet network. The Network Integration Engine shall communicate over the automation network on a peer-to-peer basis with NAE and NIE controllers.
 - a. The NIE shall monitor and control one or more NCM controllers and transfer point data to provide the following features:
 - (1) Alarming and alarm limit management
 - (2) Point history and Trend data collection
 - (3) Totalization of events, run time, and analog rate value
 - (4) Event management and Scheduling
 - (5) Energy management
 - (6) Data sharing
 - b. The NIE shall record the following user actions on the WebCTRL network and include them in an audit log.
 - (1) Logging on and off
 - (2) Commands to equipment
 - (3) Parameter changes
 - (4) Changes to the system configuration
 - c. The following capabilities defined in the webCTRL network shall remain fully operational until deleted at the M5 Workstation/OWS:
 - (1) Totalization

- (2) Scheduling
 - (3) Trend collection capabilities
 - (4) Event messaging
 - (5) Interlocking
 - (6) Control Processes
 - (7) Optimal Start
- d. The NIE shall monitor and control one or more Network Control Modules (NCM) and transfer point data to provide the following features:
- (1) Alarming and alarm limit management
 - (2) Point history and Trend data collection
 - (3) Totalization of events, run time, and analog rate value
 - (4) Event management and Scheduling
 - (5) Energy management
 - (6) Data sharing
- e. The NIE shall record the following user actions on the WebCTRL network and include them in an audit log:
- (1) Logging on and off
 - (2) Commands to equipment
 - (3) Parameter changes
 - (4) Parameter changes
- f. The following capabilities defined in the WebCTRL network shall remain fully operational until deleted at the M5 Workstation/OWS:
- (1) Totalization
 - (2) Scheduling
 - (3) Trend collection capabilities
 - (4) Event messaging
 - (5) Interlocking

(6) Control Processes

(7) Optimal Start

4. User Interface – Each NAE shall have the ability to deliver a web based User Interface (UI) as previously described. All computers connected physically or virtually to the automation network shall have access to the web based UI.
 - a. The web based UI software shall be imbedded in the NIE. Systems that require a local copy of the system database on the user's personal computer are not acceptable.
 - b. The NIE shall support a minimum of two (2) concurrent users.
 - c. The web based user shall have the capability to access all system data through one NIE.
 - d. Remote users connected to the network through an Internet Service Provider (ISP) or telephone dial up shall also have total system access through one NIE.
 - e. Systems that require the user to address more than one NIE to access all system information are not acceptable.
 - f. The NIE shall have the capability of generating web based UI graphics. The graphics capability shall be imbedded in the NIE.
 - g. Systems that support UI Graphics from a central data base or require the graphics to reside on the user's personal computer are not acceptable.
 - h. The web based UI shall support the following functions using a standard version of Microsoft Internet Explorer:
 - (1) Configuration
 - (2) Commissioning
 - (3) Data Archiving
 - (4) Monitoring
 - (5) Commanding
 - (6) System Diagnostics
 - i. Systems that require workstation software or modified web browsers are not acceptable.
 - j. The NIE shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems.

5. Processor – The NIE shall be microprocessor-based with a minimum word size of 32 bits. The NIE shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NIE size and capability shall be sufficient to fully meet the requirements of this Specification.
6. Memory – Each NIE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.
7. Hardware Real Time Clock – The NIE shall include an integrated, hardware-Based, real-time clock.
8. Communications Ports – The NIE shall provide the following ports for operation of operator Input/Output (I/O) devices, such as industry-standard computers, modems, and portable operator's terminals:
 - a. Three (3) USB ports
 - b. Two (2) Ethernet ports
 - (1) One (1) Video Monitor Port
 - (2) One (1) 9 pin Serial Port
9. Diagnostics – The NIE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The NIE shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.
10. Power Failure – In the event of the loss of normal power, The NIAE shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.
 - a. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.
 - b. Upon restoration of normal power and after a minimum off-time delay, the NIE shall automatically resume full operation without manual intervention through a normal soft-start sequence.
11. Certification – The NIE shall be listed by Underwriters Laboratories (UL).

2.6 DDC SYSTEM CONTROLLERS

- A. Field Equipment Controller (FEC X610).

1. The Field Equipment Controller (FEC) shall be a fully user-programmable, digital controller that communicates via BACnet MS/TP protocol.
2. The FEC shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.
3. Controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.
4. The FEC shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
5. The FEC shall include a removable base to allow pre-wiring without the controller.
6. The FEC shall include troubleshooting LED indicators to identify the following conditions:
 - a. Power On
 - b. Power Off
 - c. Download or Startup in progress, not ready for normal operation
 - d. No Faults
 - e. Device Fault
 - f. Field Controller Bus - Normal Data Transmission
 - g. Field Controller Bus - No Data Transmission
 - h. Field Controller Bus - No Communication
 - i. Sensor-Actuator Bus - Normal Data Transmission
 - j. Sensor-Actuator Bus - No Data Transmission
 - k. Sensor-Actuator Bus - No Communication
7. The FEC shall accommodate the direct wiring of analog and binary I/O field points.
8. The FEC shall support the following types of inputs and outputs:
 - a. Universal Inputs - shall be configured to monitor any of the following:

- (1) Analog Input, Voltage Mode
 - (2) Analog Input, Current Mode
 - (3) Analog Input, Resistive Mode
 - (4) Binary Input, Dry Contact Maintained Mode
 - (5) Binary Input, Pulse Counter Mode
 - b. Binary Inputs - shall be configured to monitor either of the following:
 - (1) Dry Contact Maintained Mode
 - (2) Pulse Counter Mode
 - c. Analog Outputs - shall be configured to output either of the following:
 - (1) Analog Output, Voltage Mode
 - (2) Analog Output, current Mode
 - d. Binary Outputs - shall output the following:
 - (1) 24 VAC Triac
 - e. Configurable Outputs - shall be capable of the following:
 - (1) Analog Output, Voltage Mode
 - (2) Binary Output Mode
9. The FEC shall have the ability to reside on a Field Controller Bus (FC Bus).
- a. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
 - b. The FC Bus shall support communications between the FECs and the NAE.
 - c. The FC Bus shall also support Input/Output Module (IOM) communications with the FEC and with the NAE.
 - d. The FC Bus shall support a minimum of 100 IOMs and FEC in any combination.
 - e. The FC Bus shall operate at a maximum distance of 15,000 Ft. between the FEC and the furthest connected device.
10. The FEC shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus).

- a. The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
 - b. The SA Bus shall support a minimum of 10 devices per trunk.
 - c. The SA Bus shall operate at a maximum distance of 1,200 Ft. between the FEC and the furthest connected device.
11. The FEC shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the FC Bus or the SA Bus.
 12. The FEC shall support, but not be limited to, the following.
 - a. Hot water, chilled water/central plant applications
 - b. Built-up air handling units for special applications
 - c. Terminal units
 - d. Special programs as required for systems control

2.7 FIELD DEVICES

A. Input/Output Module (IOM X710)

1. The Input/Output Module (IOM) provides additional inputs and outputs for use in the FEC.
2. The IOM shall communicate with the FEC over either the FC Bus or the SA Bus using BACnet Standard protocol SSPC-135, Clause 9.
3. The IOM shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
4. The IOM shall have a minimum of 4 points to a maximum of 17 points.
5. The IOM shall support the following types of inputs and outputs:
 - a. Universal Inputs - shall be configured to monitor any of the following:
 - (1) Analog Input, Voltage Mode
 - (2) Analog Input, Current Mode
 - (3) Analog Input, Resistive Mode
 - (4) Binary Input, Dry Contact Maintained Mode
 - (5) Binary Input, Pulse Counter Mode
 - b. Binary Inputs - shall be configured to monitor either of the following:

- (1) Dry Contact Maintained Mode
- (2) Pulse Counter Mode
- c. Analog Outputs - shall be configured to output either of the following:
 - (1) Analog Output, Voltage Mode
 - (2) Analog Output, current Mode
- d. Binary Outputs - shall output the following:
 - (1) 24 VAC Triac
- e. Configurable Outputs - shall be capable of the following:
 - (1) Analog Output, Voltage Mode
 - (2) Binary Output Mode

6. The IOM shall include troubleshooting LED indicators to identify the following conditions:
 - a. Power On
 - b. Power Off
 - c. Download or Startup in progress, not ready for normal operation
 - d. No Faults
 - e. Device Fault
 - f. Normal Data Transmission
 - g. No Data Transmission
 - h. No Communication

- B. Networked Thermostat (TEC 26X6)
 1. The Networked Thermostat shall be capable of controlling a two-pipe fan coil system with variable frequency drive.
 2. The Networked Thermostat shall communicate over the Field Controller Bus using BACnet Standard protocol SSPC-135, Clause 9.
 - a. The Networked Thermostat shall support remote read/write and parameter adjustment from the web based User Interfaceable through a Network Automation Engine.
 3. The Networked Thermostat shall include an intuitive User Interface providing plain text messages:
 - a. Two line, 8 character backlit display
 - b. LED indicators for Fan, Heat, and Cool status
 - c. Five (5) User Interface Keys
 - (1) Mode
 - (2) Fan
 - (3) Override
 - (4) Degrees C/F
 - (5) Up/Down
 - d. The display shall continuously scroll through the following parameters:

- (1) Room Temperature
 - (2) System Mode
 - (3) Schedule Status – Occupied/Unoccupied/Override
 - (4) Applicable Alarms
4. The Networked Thermostat shall provide the flexibility to support any one of the following inputs:
 - a. Integral Indoor Air Temperature Sensor
 - b. Duct Mount Air Temperature Sensor
 - c. Remote Indoor Air Temperature Sensor with Occupancy Override and LED Indicator
 - d. Two configurable binary inputs
 5. The Networked Thermostat shall provide the flexibility to support any one of the following outputs.
 - a. Three Speed Fan Control
 - b. Two On/Off
 - c. Two Floating
 - d. Two Proportional (0 to 10V)
 6. The Networked Thermostat shall provide a minimum of six (6) levels of keypad lockout.
 7. The Networked Thermostat shall provide the flexibility to adjust the following parameters:
 - a. Adjustable Temporary Occupancy from 0 to 24 hours
 - b. Adjustable heating/cooling deadband from 2° F to 5° F
 - c. Adjustable heating/cooling cycles per hour from 4 to 8
 8. The Networked Thermostat shall employ nonvolatile electrically erasable programmable read-only memory (EEPROM) for all adjustable parameters.

C. Networked Thermostat (TEC 26X7)

1. The Networked Thermostat shall be capable of controlling a pressure dependant Variable Air Volume System or other similar zoning type systems employing reheat.
2. The Networked Thermostat shall communicate over the FC Bus using BACnet Standard protocol SSPC-135, Clause 9.
 - a. The Networked Thermostat shall be capable of remote read/write and parameter adjustment from the web based User Interface (UI) through an NAE.
3. The Networked Thermostat shall include an intuitive User Interface providing plain text messages:
 - a. Two line, 8 character backlit display
 - b. LED indicators for Fan, Heat, and Cool status
 - c. Three (3) User Interface Keys
 - (1) Override
 - (2) Up
 - (3) Down
 - d. The display shall continuously scroll through the following parameters:
 - (1) Room Temperature
 - (2) System Mode
 - (3) Schedule Status – Occupied/Unoccupied/Override
 - (4) Applicable Alarms
4. The Networked Thermostat shall provide the flexibility to support any one of the following inputs:
 - a. Integral Indoor Air Temperature Sensor
 - b. Duct Mount Air Temperature Sensor
 - c. Remote Indoor Air Temperature Sensor with Occupancy Override and LED Indicator
 - d. Two configurable binary inputs
5. The Networked Thermostat shall provide the flexibility to support either of the following outputs.
 - a. Two On/Off or Floating

- b. Two Proportional (0 to 10V)
 6. The Networked Thermostat shall provide a minimum of six (6) levels of keypad lockout.
 7. The Networked Thermostat shall provide the flexibility to adjust the following parameters:
 - a. Adjustable Temporary Occupancy from 0 to 24 hours
 - b. Adjustable heating/cooling deadband from 2° F to 5° F
 - c. Adjustable heating/cooling cycles per hour from 4 to 8
 8. The Networked Thermostat shall employ nonvolatile electrically erasable programmable read-only memory (EEPROM) for all adjustable parameters.
- D. Networked Thermostat (TEC 26X5)
 1. The Networked Thermostat shall be capable of controlling a two pipe fan coil with a single speed fan.
 2. The Networked Thermostat shall communicate over the FC Bus using BACnet Standard protocol SSPC-135, Clause 9.
 - a. The Networked Thermostat shall be capable of remote read/write and parameter adjustment from the web based User Interface (UI) through an NAE.
 3. The Networked Thermostat shall include an intuitive UI providing plain text messages:
 - a. Two line, 8 character backlit display
 - b. LED indicators for Fan, Heat, and Cool status
 - c. Five (5) User Interface Keys
 - (1) Mode
 - (2) Fan
 - (3) Override

- (4) Up
 - (5) Down
 - d. The display shall continuously scroll through the following parameters:
 - (1) Room Temperature
 - (2) System Mode
 - (3) Schedule Status – Occupied/Unoccupied/Override
 - (4) Applicable Alarms
 - 4. The Networked Thermostat shall provide the flexibility to support any one of the following inputs:
 - a. Integral Indoor Air Temperature Sensor
 - b. Duct Mount Air Temperature Sensor
 - c. Indoor Air Temperature Sensor with Occupancy Override and LED Indicator
 - d. Two configurable binary inputs
 - 5. The Networked Thermostat shall provide the flexibility to support either of the following outputs:
 - a. One (1) fan control
 - b. One Proportional (0 to 10V)
 - 6. The Networked Thermostat shall provide a minimum of six (6) levels of keypad lockout.
 - 7. The Networked Thermostat shall provide the flexibility to adjust the following parameters.
 - a. Adjustable Temporary Occupancy from 0 to 24 hours
 - b. Adjustable heating/cooling deadband from 2° F to 5° F
 - c. Adjustable heating/cooling cycles per hour from 4 to 8
 - 8. The Networked Thermostat shall employ nonvolatile electrically erasable programmable read-only memory (EEPROM) for all adjustable parameters.
- E. Network Sensors (NS-XXX700X)
- 1. The Network Sensors (NS) shall have the ability to monitor the following variables as required by the systems sequence of operations.

- a. Zone Temperature
 - b. Zone Humidity
 - c. Zone Setpoint
2. The NS shall transmit the zone information back to the controller on the Sensor-Actuator Bus (SA Bus) using BACnet Standard protocol SSPC-135, Clause 9.
 3. The Network Sensors shall include the following items:
 - a. A backlit Liquid Crystal Display (LCD) to indicate the Temperature, Humidity and Setpoint
 - b. An LED to indicate the status of the Override feature
 - c. A button to toggle the temperature display between Fahrenheit and Celsius
 - d. A button to initiate a timed override command
 4. The NS shall be available with either screw terminals or phone jack.
 5. The NS shall be available in either surface mount or wall mount styles.

2.8 SYSTEM TOOLS:

A. System Configuration Tool (SCT).

1. The Configuration Tool shall be a software package enabling a computer platform to be used as a stand-alone engineering configuration tool for a Network Automation Engine (NAE) or a Network Integration Engine (NIE).
2. The configuration tool shall provide an archive database for the configuration and application data.
3. The configuration tool shall have the same look-and-feel at the User Interface (UI) regardless of whether the configuration is being done online or offline.
4. The configuration tool shall include the following features:
 - a. Basic system navigation tree for connected networks
 - b. Integration of WebCTRL, LonWorks, and BACnet enabled devices
 - c. Customized user navigation trees
 - d. Point naming operating parameter setting
 - e. Graphic diagram configuration

- f. Alarm and event message routing
 - g. Graphical logic connector tool for custom programming
 - h. Downloading, uploading, and archiving databases
5. The configuration tool shall have the capability to automatically discover field devices on connected buses and networks. Automatic discovery shall be available for the following field devices:
 - a. BACnet Devices
 - b. LonWorks devices
 - c. N2 Bus devices
 - d. WebCTRL networks
6. The configuration tool shall be capable of programming the Field Equipment Controllers.
 - a. The configuration tool shall provide the capability to configure, simulate, and commission the Field Equipment Controllers.
 - b. The configuration tool shall allow the FECs to be run in Simulation Mode to verify the applications.
 - c. The configuration tool shall contain a library of standard applications to be used for configuration.
7. The configuration tool shall be capable of programming the field devices.
 - a. The configuration tool shall provide the capability to configure, simulate, and commission the field devices.
 - b. The configuration tool shall allow the field devices to be run in Simulation Mode to verify the applications.
 - c. The configuration tool shall contain a library of standard applications to be used for configuration.
8. A wireless access point shall allow a wireless enabled portable PC to make a temporary Ethernet connection to the automation network.
 - a. The converter shall provide a temporary wireless connection between the SA or FC Bus and a wireless enabled portable PC.
 - b. The converter shall support downloading and troubleshooting FEC and field devices from the PC over the wireless connection.
 - c. The converter shall employ Bluetooth Wireless Technology.

B. Wireless MS/TP Convertor (BTCVT)

1. The converter shall be powered through a connection to either the Sensor-Actuator (SA) or the Field Controller (FC) Bus.
2. The converter shall operate over a minimum of thirty three (33) feet within a building.
3. The converter shall have LED indicators to provide information regarding the following conditions:
 - a. Power - On/Off
 - b. Fault – Fault/No Fault
 - c. SA/FC Bus – Bus Activity/ No Bus Activity
 - d. Blue – Bluetooth Communication Established/ Bluetooth Communication Not Established
4. The SWCVT shall comply with FCC Part 15.247 regulations for low-power unlicensed transmitters.

C. Handheld VAV Balancing Sensor (ATV7003)

1. The sensor shall be a light weight portable device of dimensions not more than 3.2 x 3.2 x 1.0 inches.
2. The sensor shall be capable of displaying data and setting balancing parameters for VAV control applications.
3. The sensor shall be powered through a connection to either the Sensor-Actuator (SA) or the Field Controller (FC) Bus.
4. The sensor shall be a menu driven device that shall modify itself automatically depending upon what type of application resides in the controller.
5. The sensor shall contain a dial and two buttons to navigate through the menu and to set balancing parameters.
6. The sensor shall provide an adjustable time-out parameter that will return the controller to normal operation if the balancing operation is aborted or abandoned.
7. The sensor shall include the following:
 - a. 5 foot retractable cable
 - b. Laminated user guide
 - c. Nylon carrying case

8. The sensor shall be Underwriters Laboratory UL 916 listed and CSA certified C22.2 N. 205, CFR47.

2.9 INPUT DEVICES

A. General Requirements

1. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.

B. Temperature Sensors

1. General Requirements:

- a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.
- b. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD.
- c. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion:

2. Room Temperature Sensors

- a. Room sensors shall be constructed for either surface or wall box mounting.
- b. Room sensors shall have the following options when specified:
 - (1) Setpoint reset slide switch providing a +3 degree (adjustable) range
 - (2) Individual heating/cooling setpoint slide switches
 - (3) A momentary override request push button for activation of after-hours operation
 - (4) Analog thermometer

3. Room Temperature Sensors with Integral Display

- a. Room sensors shall be constructed for either surface or wall box mounting.
- b. Room sensors shall have an integral LCD display and four button keypad with the following capabilities:
 - (1) Display room and outside air temperatures
 - (2) Display and adjust room comfort setpoint

- (3) Display and adjust fan operation status
- (4) Timed override request push button with LED status for activation of after-hours operation
- (5) Display controller mode
- (6) Password selectable adjustment of setpoint and override modes

4. Thermo Wells

- a. When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting.
- b. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure.
- c. Thermo wells and sensors shall be mounted in a threadolet or 1/2" NPT saddle and allow easy access to the sensor for repair or replacement.
- d. Thermo wells shall be constructed of 316 stainless steel.

5. Outside Air Sensors

- a. Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield.
- b. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.
- c. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.

6. Duct Mount Sensors

- a. Duct mount sensors shall mount in an electrical box through a hole in the duct, and be positioned so as to be easily accessible for repair or replacement.
- b. Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate.
- c. For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be used.

7. Averaging Sensors

- a. For ductwork greater in any dimension than 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.
 - b. For plenum applications, such as mixed air temperature measurements, a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.
 - c. Capillary supports at the sides of the duct shall be provided to support the sensing string.
8. Acceptable Manufacturers: Mitsubishi, Johnson Controls, Setra (or approved equal).

C. Humidity Sensors

1. The sensor shall be a solid-state type, relative humidity sensor of the Bulk Polymer Design. The sensor element shall resist service contamination.
2. The humidity transmitter shall be equipped with non-interactive span and zero adjustments, a 2-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.
3. The humidity transmitter shall meet the following overall accuracy, including lead loss and Analog to Digital conversion. 3% between 20% and 80% RH @ 77 Deg F unless specified elsewhere.
4. Outside air relative humidity sensors shall be installed with a rain proof, perforated cover. The transmitter shall be installed in a NEMA 3R enclosure with sealtite fittings and stainless steel bushings.
5. A single point humidity calibrator shall be provided, if required, for field calibration. Transmitters shall be shipped factory pre-calibrated.
6. Duct type sensing probes shall be constructed of 304 stainless steel, and shall be equipped with a neoprene grommet, bushings, and a mounting bracket.
7. Acceptable Manufacturers: Johnson Controls, Veris Industries, and Mamac, or approved equal.

D. Differential Pressure Transmitters

1. General Air and Water Pressure Transmitter Requirements:
 - a. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.
 - b. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.

- c. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.
 - d. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.
2. Low Differential Water Pressure Applications (0" - 20" w.c.)
- a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points.
 - b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
 - (1) .01-20" w.c. input differential pressure range
 - (2) 4-20 mA output
 - (3) Maintain accuracy up to 20 to 1 ratio turndown
 - (4) Reference Accuracy: +0.2% of full span
 - c. Acceptable Manufacturers: Setra and Mamac.
3. Medium to High Differential Water Pressure Applications (Over 21" w.c.)
- a. The differential pressure transmitter shall meet the low pressure transmitter specifications with the following exceptions:
 - (1) The differential pressure transmitter shall meet the low pressure transmitter specifications with the following exceptions
 - (2) Reference Accuracy: +1% of full span (includes non-linearity, hysteresis, and repeatability).
 - b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.
 - c. Acceptable Manufacturers: Setra and Mamac.

4. Building Differential Air Pressure Applications (-1" to +1" w.c.)
 - a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
 - b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
 - (1) -1.00 to +1.00 w.c. input differential pressure ranges (Select range appropriate for system application)
 - (2) 4-20 mA output
 - (3) Maintain accuracy up to 20 to 1 ratio turndown
 - (4) Reference Accuracy: +0.2% of full span
 - c. Acceptable Manufacturers: Johnson Controls and Setra.
5. Low Differential Air Pressure Applications (0" to 5" w.c.)
 - a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
 - b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
 - (1) (0.00 - 1.00" to 5.00") w.c. input differential pressure ranges (Select range appropriate for system application)
 - (2) 4-20 mA output
 - (3) Maintain accuracy up to 20 to 1 ratio turndown
 - (4) Reference Accuracy: +0.2% of full span
 - c. Acceptable Manufacturers: Johnson Controls and Setra
6. Medium Differential Air Pressure Applications (5" to 21" w.c.)
 - a. The pressure transmitter shall be similar to the Low Air Pressure Transmitter, except that the performance specifications are not as severe. Differential pressure transmitters shall be provided that meet the following performance requirements:

- (1) Zero & span: (c/o F.S./Deg. F): .04% including linearity, hysteresis and repeatability
- (2) Accuracy: 1% F.S. (best straight line) Static Pressure Effect: 0.5% F.S. (to 100 PSIG)
- (3) Thermal Effects: <+.033 F.S./Deg. F. over 40°F. to 100°F. (calibrated at 70°F.)

- b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.
- c. Acceptable manufacturers: Johnson Controls and Setra.

E. Flow Monitoring

1. Air Flow Monitoring

a. Fan Inlet Air Flow Measuring Stations

- (1) At the inlet of each fan and near the exit of the inlet sound trap, airflow traverse probes shall be provided that shall continuously monitor the fan air volumes and system velocity pressure.
- (2) Each traverse probe shall be of a dual manifolded, cylindrical, type 3003 extruded aluminum configuration, having an anodized finish to eliminate surface pitting and unnecessary air friction. The multiple total pressure manifold shall have sensors located along the stagnation plane of the approaching airflow. The manifold should not have forward projecting sensors into the air stream. The static pressure manifold shall incorporate dual offset static tops on the opposing sides of the averaging manifold so as to be insensitive to flow-angle variations of as much as + 20° in the approaching air stream.
- (3) The airflow traverse probe shall not induce a measurable pressure drop, nor shall the sound level within the duct be amplified by its singular or multiple presence in the air stream. Each airflow-measuring probe shall contain multiple total and static pressure sensors placed at equal distances along the probe length. The number of sensors on each probe and the quantity of probes utilized

at each installation shall comply with the ASHRAE Standards for duct traversing.

- (4) Acceptable manufacturers: Air Monitor Corp., Tek-Air, Ebtron, and Dietrich Standard.
- b. Single Probe Air Flow Measuring Sensor
- (1) The single probe airflow-measuring sensor shall be duct mounted with an adjustable sensor insertion length of up to eight inches. The transmitter shall produce a 4-20 mA or 0-10 VDC signal linear to air velocity. The sensor shall be a hot wire anemometer and utilize two temperature sensors and a heater element temperature. The other sensor shall measure the downstream air temperature. The temperature differential shall be directly related to airflow velocity.
- c. Duct Air Flow Measuring Stations
- (1) Each device shall be designed and built to comply with, and provide results in accordance with, accepted practice as defined for system testing in the ASHRAE Handbook of fundamentals, as well as in the Industrial Ventilation Handbook.
 - (2) Airflow measuring stations shall be fabricated of 14-gauge galvanized steel welded casing with 90 Deg. connecting flanges in configuration and size equal to that of the duct into which it is mounted. Each station shall be complete with an air directionalizer and parallel cell profile suppressor (3/4" maximum cell) across the entering air stream and mechanically fastened to the casing in such a way to withstand velocities up to 6000 feet per minute. This air directionalizer and parallel cell honeycomb suppressor shall provide 98% free area, equalize the velocity profile, and eliminate turbulent and rotational flow from the air stream prior to the measuring point.
 - (3) The total pressure measurement side (high side) will be designed and spaced to the Industrial Ventilation Manual 16th Edition, Page 9-5. The self-averaging manifolding will be manufactured of brass and copper components.
 - (4) The static pressure sensing probes (low side) shall be bullet-nosed shaped, per detailed radius, as illustrated in Industrial Ventilation Manual 16th Edition, Page 9-5.
 - (5) The main take-off point from both the total pressure and the static pressure manifolds must be symmetrical.
 - (6) Total and static pressure manifolds shall terminate with external ports for connection to control tubing. An identification label shall be placed on each unit casing, listing model number, size, area, and specified airflow capacity.

(7) Installation Considerations

- (a) The maximum allowable pressure loss through the Flow and Static Pressure elements shall not exceed .065" w.c. at 1000 feet per minute, or .23" w.c. at 2000 feet per minute. Each unit shall measure the airflow rate within an accuracy of plus 2% as determined by U.S. – GSA certification tests, and shall contain a minimum of one total pressure sensor per 36 square inches of unit measuring area.
- (b) The units shall have a self-generated sound rating of less than NC40, and the sound level within the duct shall not be amplified nor shall additional sound be generated.
- (c) Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct. Station flanges shall be two inch to three inch to facilitate matching connecting ductwork.
- (d) Where control dampers are shown as part of the airflow measuring station, opposed blade precision controlled volume dampers integral to the station and complete with actuator, pilot positioner, and linkage shall be provided.
- (e) Stations shall be installed in strict accordance with the manufacturer's published requirements, and in accordance with ASME Guidelines affecting non-standard approach conditions.

(8) Acceptable manufacturers: Air Monitor Corp., Tek-Air, Ebtron, and Dietrich Standard.

d. Static Pressure Traverse Probe

- (1) Duct static traverse probes shall be provided where required to monitor duct static pressure. The probe shall contain multiple static pressure sensors located along exterior surface of the cylindrical probe.
- (2) Acceptable manufacturers: Cleveland Controls.

e. Shielded Static Air Probe

- (1) A shielded static pressure probe shall be provided at each end of the building. The probe shall have multiple sensing ports, an impulse suppression chamber, and airflow shielding. A suitable probe for indoor and outdoor locations shall be provided.

2. Water Flow Monitoring

- a. Water flow meters shall be electromagnetic type with integral microprocessor-Based electronics. The meter shall have an accuracy of 0.25%.
- b. Acceptable manufacturers: Onicon.

F. Power Monitoring Devices

1. Current Measurement (Amps)

- a. Current measurement shall be by a combination current transformer and a current transducer. The current transformer shall be sized to reduce the full amperage of the monitored circuit to a maximum 5 Amp signal, which will be converted to a 4-20 mA DDC compatible signal for use by the Facility Management System.
- b. Current Transformer – A split core current transformer shall be provided to monitor motor amps.
 - (1) Operating frequency – 50 - 400 Hz
 - (2) Insulation – 0.6 Kv class 10Kv BIL
 - (3) UL recognized
 - (4) Five amp secondary
 - (5) Select current ration as appropriate for application
 - (6) Acceptable manufacturers: Veris Industries
- c. Current Transducer – A current to voltage or current to mA transducer shall be provided. The current transducer shall include:
 - (1) 6X input over amp rating for AC inrushes of up to 120 amps
 - (2) Manufactured to UL 1244
 - (3) Accuracy: +.5%, Ripple +1%
 - (4) Minimum load resistance 30kOhm
 - (5) Input 0-20 Amps
 - (6) Output 4-20 mA
 - (7) Transducer shall be powered by a 24VDC regulated power supply (24 VDC +5%)

(8) Acceptable manufacturers: Veris Industries

G. Refrigerant Leak Detectors

1. The refrigerant leak detector shall be a standalone device and shall provide a SPDT output to directly energize the refrigeration room exhaust ventilation fans. The detector shall include a sensor or sensors connected to a control panel. Two relay contacts at the control panel shall provide trouble and alarm indication to the Facility Management System. The alarm relay contact shall also directly energize the exhaust fans.
2. The refrigerant leak detector shall sense the type of refrigerant used in the specified chillers. Multiple sensors shall be required to detect different refrigerants and/or provide proper sensing coverage for the area of the refrigeration room.
3. Acceptable manufacturers: Johnson Controls, MSA Instruments.

H. Duct Smoke Detectors

1. Duct smoke detectors shall be furnished as specified in Section 17621, Fire Detection and Alarm System, for installation under Division 15.
2. All wiring for duct smoke detectors shall be provided under Section 17621, Fire Detection and Alarm System.

I. Status and Safety Switches

1. General Requirements
 - a. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the BMS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.
2. Current Sensing Switches
 - a. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.
 - b. Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.

- c. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.
 - d. Acceptable manufacturers: Veris Industries.
- 3. Air Filter Status Switches
 - a. Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.
 - b. A complete installation kit shall be provided, including: static pressure tops, tubing, fittings, and air filters.
 - c. Provide appropriate scale range and differential adjustment for intended service.
 - d. Acceptable manufacturers: Johnson Controls, Cleveland Controls.
- 4. Air Flow Switches
 - a. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.
 - b. Acceptable manufacturers: Johnson Controls, Cleveland Controls.
- 5. Air Pressure Safety Switches
 - a. Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120VAC.
 - b. Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.
 - c. Acceptable manufacturers: Johnson Controls, Cleveland Controls.
- 6. Water Flow Switches
 - a. Water flow switches shall be equal to the Johnson Controls P74.
- 7. Low Temperature Limit Switches
 - a. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.

- b. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.
- c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.
- d. The low temperature limit switch shall be equal to Johnson Controls A70.

2.10 OUTPUT DEVICES

A. Actuators

1. General Requirements

- a. Damper and valve actuators shall be electronic and/or pneumatic, as specified in the System Description section.

2. Electronic Damper Actuators

- a. Electronic damper actuators shall be direct shaft mount.
- b. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized Based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction and a gear release to allow manual positioning.
- c. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
- d. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and other dampers, as specified in the sequence of operations, shall be furnished

with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as "quick acting," shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.

e. Acceptable manufacturers: Johnson Controls, Mamac.

3. Electronic Valve Actuators

- a. Electronic valve actuators shall be manufactured by the valve manufacturer.
- b. Each actuator shall have current limiting circuitry incorporated in its design to prevent damage to the actuator.
- c. Modulating and two-position actuators shall be provided as required by the sequence of operations. Actuators shall provide the minimum torque required for proper valve close-off against the system pressure for the required application. The valve actuator shall be sized Based on valve manufacturer's recommendations for flow and pressure differential. All actuators shall fail in the last position unless specified with mechanical spring return in the sequence of operations. The spring return feature shall permit normally open or normally closed positions of the valves, as required. All direct shaft mount rotational actuators shall have external adjustable stops to limit the travel in either direction.
- d. Modulating Actuators shall accept 24 VAC or VDC and 120 VAC power supply and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
- e. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Butterfly isolation and other valves, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop the associated pump or chiller.
- f. Acceptable manufacturers: Johnson Controls.

B. Control Dampers

1. The BMS Contractor shall furnish all automatic dampers. All automatic dampers shall be sized for the application by the BMS Contractor or as specifically indicated on the Drawings.
2. All dampers used for throttling airflow shall be of the opposed blade type arranged for normally open or normally closed operation, as required. The damper is to be sized so that, when wide open, the pressure drop is a sufficient amount of its close-off pressure drop to shift the characteristic curve to near linear.
3. All dampers used for two-position, open/close control shall be parallel blade type arranged for normally open or closed operation, as required.
4. Damper frames and blades shall be constructed of either galvanized steel or aluminum. Maximum blade length in any section shall be 60". Damper blades shall be 16-gauge minimum and shall not exceed eight (8) inches in width. Damper frames shall be 16-gauge minimum hat channel type with corner bracing. All damper bearings shall be made of reinforced nylon, stainless steel or oil-impregnated bronze. Dampers shall be tight closing, low leakage type, with synthetic elastomer seals on the blade edges and flexible stainless steel side seals. Dampers of 48"x48" size shall not leak in excess of 8.0 cfm per square foot when closed against 4" w.g. static pressure when tested in accordance with AMCA Std. 500.
5. Airfoil blade dampers of double skin construction with linkage out of the air stream shall be used whenever the damper face velocity exceeds 1500 FPM or system pressure exceeds 2.5" w.g., but no more than 4000 FPM or 6" w.g. Acceptable manufacturers are Johnson Controls D-7250 D-1250 or D-1300, Ruskin CD50, and Vent Products 5650.
6. One piece rolled blade dampers with exposed or concealed linkage may be used with face velocities of 1500 FPM or below. Acceptable manufacturers are: Johnson Controls D-1600, Ruskin CD36, and Vent Products 5800.
7. Multiple section dampers may be jack-shafted to allow mounting of piston pneumatic actuators and direct connect electronic actuators. Each end of the jackshaft shall receive at least one actuator to reduce jackshaft twist.

C. Control Relays

1. Control Pilot Relays
 - a. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.
 - b. Mounting Bases shall be snap-mount.
 - c. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.

- d. Contacts shall be rated for 10 amps at 120VAC.
- e. Relays shall have an integral indicator light and check button.
- f. Acceptable manufacturers: Johnson Controls, Lectro.

D. Control Valves

1. All automatic control valves shall be fully proportioning and provide near linear heat transfer control. The valves shall be quiet in operation and fail-safe open, closed, or in their last position. All valves shall operate in sequence with another valve when required by the sequence of operations. All control valves shall be sized by the control manufacturer, and shall be guaranteed to meet the heating and cooling loads, as specified. All control valves shall be suitable for the system flow conditions and close against the differential pressures involved. Body pressure rating and connection type (sweat, screwed, or flanged) shall conform to the pipe schedule elsewhere in this Specification.
2. Chilled water control valves shall be modulating plug, ball, and/or butterfly, as required by the specific application. Modulating water valves shall be sized per manufacturer's recommendations for the given application. In general, valves (2 or 3-way) serving variable flow air handling unit coils shall be sized for a pressure drop equal to the actual coil pressure drop, but no less than 5 PSI. Valves (3-way) serving constant flow air handling unit coils with secondary circuit pumps shall be sized for a pressure drop equal to 25% the actual coil pressure drop, but no less than 2 PSI. Mixing valves (3-way) serving secondary water circuits shall be sized for a pressure drop of no less than 5 PSI. Valves for terminal reheat coils shall be sized for a 2 PSIG pressure drop, but no more than a 5 PSI drop.
3. Ball valves shall be used for hot and chilled water applications, water terminal reheat coils, radiant panels, unit heaters, package air conditioning units, and fan coil units except those described hereinafter.
4. Modulating plug water valves of the single-seat type with equal percentage flow characteristics shall be used for all special applications as indicated on the valve schedule. Valve discs shall be composition type. Valve stems shall be stainless steel.
5. Butterfly valves shall be acceptable for modulating large flow applications greater than modulating plug valves, and for all two-position, open/close applications. In-line and/or three-way butterfly valves shall be heavy-duty pattern with a body rating comparable to the pipe rating, replaceable lining suitable for temperature of system, and a stainless steel vane. Valves for modulating service shall be sized and travel limited to 50 degrees of full open.

Valves for isolation service shall be the same as the pipe. Valves in the closed position shall be bubble-tight.

6. Acceptable manufacturers: Johnson Controls.
- E. Electronic Signal Isolation Transducers
1. A signal isolation transducer shall be provided whenever an analog output signal from the BMS is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input signal from a remote system.
 2. The signal isolation transducer shall provide ground plane isolation between systems.
 3. Signals shall provide optical isolation between systems.
 4. Acceptable manufacturers: Advanced Control Technologies.
- F. External Manual Override Stations
1. External manual override stations shall provide the following:
 - a. An integral HAND/OFF/AUTO switch shall override the controlled device pilot relay.
 - b. A status input to the Facility Management System shall indicate whenever the switch is not in the automatic position.
 - c. A Status LED shall illuminate whenever the output is ON.
 - d. An Override LED shall illuminate whenever the HOA switch is in either the HAND or OFF position.
 - e. Contacts shall be rated for a minimum of 1 amp at 24 VAC.
- G. Electronic/Pneumatic Transducers
1. Electronic to Pneumatic transducers shall provide:
 - a. Output: 3-15 PSIG
 - b. Input: 4-20 mA or 0-10 VDC
 - c. Manual output adjustment
 - d. Pressure gauge
 - e. External replaceable supply air filter
 - f. Acceptable manufacturers: Johnson Controls, Mamac.

2.11 MISCELLANEOUS DEVICES

- A. Variable Frequency Motor Speed Control Drives
- B. Local Control Panels
 - 1. All control panels shall be factory constructed, incorporating the BMS manufacturer's standard designs and layouts. All control panels shall be UL inspected and listed as an assembly and carry a UL 508 label listing compliance. Control panels shall be fully enclosed, with perforated sub-panel, hinged door, and slotted flush latch.
 - 2. In general, the control panels shall consist of the DDC controller(s), display module as specified and indicated on the plans, and I/O devices—such as relays, transducers, and so forth—that are not required to be located external to the control panel due to function. Where specified the display module shall be flush mounted in the panel face unless otherwise noted.
 - 3. All I/O connections on the DDC controller shall be provide via removable or fixed screw terminals.
 - 4. Low and line voltage wiring shall be segregated. All provided terminal strips and wiring shall be UL listed, 300-volt service and provide adequate clearance for field wiring.
 - 5. All wiring shall be neatly installed in plastic trays or tie-wrapped.
 - 6. A convenience 120 VAC duplex receptacle shall be provided in each enclosure, fused on/off power switch, and required transformers.
- C. Power Supplies
 - 1. DC power supplies shall be sized for the connected device load. Total rated load shall not exceed 75% of the rated capacity of the power supply.
 - 2. Input: 120 VAC +10%, 60Hz.
 - 3. Output: 24 VDC.
 - 4. Line Regulation: +0.05% for 10% line change.
 - 5. Load Regulation: +0.05% for 50% load change.
 - 6. Ripple and Noise: 1 mV rms, 5 mV peak to peak.
 - 7. An appropriately sized fuse and fuse block shall be provided and located next to the power supply.
 - 8. A power disconnect switch shall be provided next to the power supply.
- D. Thermostats

1. Electric room thermostats of the heavy-duty type shall be provided for unit heaters, cabinet unit heaters, and ventilation fans, where required. All these items shall be provided with concealed adjustment. Finish of covers for all room-type instruments shall match and, unless otherwise indicated or specified, covers shall be manufacturer's standard finish.

PART 3 - EXECUTION

3.1 BMS SPECIFIC REQUIREMENTS

A. Graphic Displays

1. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.
2. User shall access the various system schematics via a graphical penetration scheme and/or menu selection.

B. Custom Reports

1. Provide custom reports as required for this project.

C. Actuation/Control Type

1. Primary Equipment:
 - a. Controls shall be provided by equipment manufacturer as specified herein.
 - b. All damper and valve actuation shall be electric.

2. Air Handling Equipment:
 - a. All air handlers shall be controlled with a HVAC-DDC Controller.
 - b. All damper and valve actuation shall be electric.
3. Terminal Equipment:
 - a. Terminal Units (VAV, UV, etc.) shall have electric damper and valve actuation.
 - b. All Terminal Units shall be controlled with HVAC-DDC Controller.

3.2 INSTALLATION PRACTICES

A. BMS Wiring

1. All conduit, wiring, accessories and wiring connections required for the installation of the Building Management System, as herein specified, shall be provided by the BMS Contractor unless specifically shown on the Electrical Drawings under Division 16 Electrical. All wiring shall comply with the requirements of applicable portions of Division 16 and all local and national electric codes, unless specified otherwise in this section.
2. All BMS wiring materials and installation methods shall comply with BMS manufacturer recommendations.
3. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the BMS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the BMS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
4. Class 2 Wiring
 - a. All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.
 - b. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5' from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.
5. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.

6. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.
- B. BMS Line Voltage Power Source
1. 120-volt AC circuits used for the Building Management System shall be taken from panel boards and circuit breakers provided by Division 16.
 2. Circuits used for the BMS shall be dedicated to the BMS and shall not be used for any other purposes.
 3. DDC terminal unit controllers may use AC power from motor power circuits.
- C. BMS Raceway
1. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 1/2".
 2. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect..
 3. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
 4. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.
- D. Penetrations
1. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways.
 2. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.
 3. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.
 4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.
- E. BMS Identification Standards
1. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.

2. Cable types specified in Item A shall be color coded for easy identification and troubleshooting.
- F. BMS Panel Installation
1. The BMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.
 2. The BMS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.
- G. Input Devices
1. All Input devices shall be installed per the manufacturer recommendation.
 2. Locate components of the BMS in accessible local control panels wherever possible.
- H. HVAC Input Devices – General
1. All Input devices shall be installed per the manufacturer recommendation.
 2. Locate components of the BMS in accessible local control panels wherever possible.
 3. The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.
 4. Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.
 5. Outside Air Sensors
 - a. Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outside air conditions accurately.
 - b. Sensors shall be installed with a rain proof, perforated cover.
 6. Water Differential Pressure Sensors
 - a. Differential pressure transmitters used for flow measurement shall be sized to the flow-sensing device.
 - b. Differential pressure transmitters shall be supplied with tee fittings and shut-off valves in the high and low sensing pick-up lines.
 - c. The transmitters shall be installed in an accessible location wherever possible.

7. Medium to High Differential Water Pressure Applications (Over 21" w.c.)
 - a. Air bleed units, bypass valves and compression fittings shall be provided.
8. Building Differential Air Pressure Applications (-1" to +1" w.c.)
 - a. Transmitters exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.
 - b. The interior tip shall be inconspicuous and located as shown on the drawings.
9. Air Flow Measuring Stations
 - a. Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct.
 - b. Station flanges shall be two inch to three inch to facilitate matching connecting ductwork.
10. Duct Temperature Sensors
 - a. Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.
 - b. The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.
 - c. For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.
 - d. The sensor shall be mounted to suitable supports using factory approved element holders.
11. Space Sensors
 - a. Shall be mounted per ADA requirements.
 - b. Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.
12. Low Temperature Limit Switches
 - a. Install on the discharge side of the first water or steam coil in the air stream.
 - b. Mount element horizontally across duct in a serpentine pattern insuring each square foot of coil is protected by 1 foot of sensor.

- c. For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.

13. Air Differential Pressure Status Switches

- a. Install with static pressure tips, tubing, fittings, and air filter.

14. Water Differential Pressure Status Switches

- a. Install with shut off valves for isolation.

I. HVAC Output Devices

1. All output devices shall be installed per the manufacturers recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.
2. Actuators: All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke. When any pneumatic actuator is sequenced with another device, pilot positioners shall be installed to allow for proper sequencing.
3. Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.
4. Control Valves: Shall be sized for proper flow control with equal percentage valve plugs. The maximum pressure drop for water applications shall be 5 PSI. The maximum pressure drop for steam applications shall be 7 PSI.
5. Electronic Signal Isolation Transducers: Whenever an analog output signal from the Building Management System is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input a signal from a remote system, provide a signal isolation transducer. Signal isolation transducer shall provide ground plane isolation between systems. Signals shall provide optical isolation between systems.

3.3 TRAINING

A. The BMS contractor shall provide the following training services:

1. One day of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the BMS software layout and naming conventions, and a walk through of the facility to identify panel and device locations.

3.4 COMMISSIONING

- A. Contractor to fully commission all aspects of the Building Management System work.
- B. Acceptance Check Sheet
 - 1. Prepare a check sheet that includes all points for all functions of the BMS.
 - 2. Submit the check sheet to the Engineer for approval.
 - 3. The Engineer will use the check sheet as the basis for acceptance with the BMS Contractor.
- C. VAV box performance verification and documentation:
 - 1. The BMS Contractor shall test each FCU for operation and correct flow. At each step, after a settling time, FCU air flows and damper positions will be sampled. Following the tests, a pass/fail report indicating results shall be produced. Possible results are Pass, No change in flow between full open and full close, Reverse operation or Maximum flow not achieved. The report shall be submitted as documentation of the installation.
 - 2. The BMS Contractor shall issue a report based on a sampling of the FCU calculated loop performance metrics. The report shall indicate performance criteria, include the count of conforming and non-conforming units, list the non-conforming units along with their performance data, and shall also include graphical representations of performance.
- D. Promptly rectify all listed deficiencies and submit to the Engineer that this has been done.

3.5 CONTROL POINTS

- A. Basic control points are on Drawings.

END OF SECTION

SECTION 15990 – TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Section 15400 – Plumbing
- B. Section 15600 – Heating, Ventilating and Air Conditioning
- C. Section 15950 – Control System

1.3 SUMMARY

- A. This section includes the testing, adjustment, and balancing of air systems; testing, adjustment, and balancing of hydronic and refrigerating systems; measurement of final operating condition of HVAC systems; sound measurement of equipment operating conditions; and vibration measurement of equipment operating conditions.

1.4 REFERENCES AND STANDARDS

- A. AABC - National Standards for Total System Balance
- B. ADC - Test Code for Grilles, Registers, and Diffusers
- C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems
- D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems
- E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing

1.5 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.
- C. Field Reports: Submit under provisions of the Contract, including General and Supplementary Conditions.

- D. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- E. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
- F. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- G. Bind Submittal in booklet form.
- H. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.
 - 1. Test Reports: Indicate data on NEBB forms.

1.6 REGULATORY REQUIREMENTS

- A. Conform to REFERENCES AND STANDARDS.
- B. Conform to all Rules, Ordinances and Regulations of the State of Hawaii, County of Hawaii.

1.7 QUALITY ASSURANCE

- A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum fifteen years documented experience, certified by AABC, and with place of business located within 100 miles of project site.
- B. Perform total system balance in accordance with NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- C. Perform Work under supervision of NEBB Certified Testing, Balancing and Adjusting Supervisor and registered Professional Engineer experienced in performance of this Work and licensed in the State of Hawaii.

1.8 PRE-BALANCING CONFERENCE

- A. Convene one week prior to commencing work of this section, under provisions of Division 1.

1.9 SEQUENCING AND SCHEDULING

- A. Sequence work under the provisions of the Contract, including General and Supplementary Conditions.

- B. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 AGENCIES

- A. Air Balance Hawaii, Inc.
- B. Pacific Test and Balance, Inc.
- C. TAB Engineers

3.2 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Pumps are rotating correctly.

14. Proper strainer baskets are clean and in place.
 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.
 - C. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

3.4 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.5 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- F. Check and adjust systems approximately six months after final acceptance and submit report.

3.6 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
1. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
 2. Measure air quantities at air inlets and outlets.
 3. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
 4. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
 5. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
 6. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
 7. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
 8. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
 9. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
 10. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
 11. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches (12.5 Pa) positive static pressure near the building entries.
 12. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

13. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.
14. On fan powered VAV boxes, adjust air flow switches for proper operation.

3.7 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
 - B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
 - C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
 - D. Effect system balance with automatic control valves fully open to heat transfer elements.
 - E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
1. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

END OF SECTION

SECTION 16010 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Basic Electrical Requirements specifically applicable to Division 16 Sections.

1.3 SCOPE OF WORK

- A. The specifications describe the quality and character of the materials and methods of installation.
- B. The drawings include plans of the building, with diagrammatic layouts showing approximate locations of equipment and devices. Before installing, study adjacent architectural features, and make installation in the most logical manner in accordance with Code and Regulatory Requirements.
- C. The electrical symbols, notes, instructions and schedules on the drawings are included as part of these specifications.

1.4 WORK SCHEDULE AND SEQUENCE

- A. Install work in stages to accommodate Owner's operational requirements. Coordinate schedule and hours of operation with Owner prior to start of construction.

1.5 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code
- B. National Electrical Safety Code

1.6 SUBMITTALS

- A. Conform to Division 1 requirements.
- B. Include a transmittal form clearly indicating the Project, the name of the Contractor and the contents of the submittal.
- C. Include Contractor's stamp and signature indicating that the submittal has been reviewed and conforms to Contract Documents. Submittals without Contractor's stamp will be returned without review.

- D. Identify deviations from Contract Documents, including variations and limitations. Review of a submittal does not constitute acceptance of deviations from the Contract Documents, unless such deviation is clearly indicated as such on the submittal, and specifically accepted as such.
- E. Submit shop drawings and product data, grouped to include complete systems, products and accessories in a single package.
- F. Mark dimensions and values in units to match those specified.
- G. Ordering of equipment prior to approval of submittals is done entirely at the risk of the Contractor.

1.7 PROJECT RECORD DRAWINGS

- A. Conform to Division 1 requirements.
- B. Keep an accurate record of the work under this Contract, as it progresses, to be available for inspection at all times. See individual Division 16 Sections for specific requirements.
- C. Upon completion of the work, transfer all changes and information onto a new set of reproducible drawings in an orderly and legible manner.

1.8 QUALITY ASSURANCE

- A. For actual fabrication, installation and testing of the work, use only trained and experienced workers completely familiar with the equipment and materials, and the manufacturer's installation requirements.

1.9 GUARANTEE

- A. In addition to the guarantees required elsewhere, all work, materials and equipment provided under the electrical sections shall be guaranteed for a minimum period of one year from the date of acceptance of the work by the Owner. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall immediately furnish all necessary labor and materials to correct the trouble without cost to the Owner. The Contractor, under this guarantee, shall be responsible for all damage to any part of the premises caused by equipment furnished under this section.

1.10 REGULATORY REQUIREMENTS

- A. Conform to Uniform Building Code, Uniform Fire Code, and NFPA 101 Life Safety Code.
- B. Electrical: Conform to NFPA 70.
- C. Fire Alarm: Conform to NFPA 72 and ADA.

- D. Conform to all State and County regulations.
- E. See Division 1 Sections regarding permits. Arrange for work to be inspected by the Authority Having Jurisdiction (AHJ) as it progresses. Pay all inspection fees and deliver certificates of completion and inspection to the Owner before final payment.

1.11 PROJECT/SITE CONDITIONS

- A. Visit the project site and become familiar with field conditions including accessibility and physical obstructions. Bid submission indicates familiarity with, and acceptance of, field conditions.
- B. Separate Sections cover site, architectural and mechanical Work. Study the complete set of contract documents to become familiar with the entire Project including site, architectural and structural features and systems as related to Work in this Division. Special attention should be paid to Divisions featuring equipment requiring electrical interface including Owner-furnished equipment, elevator equipment, and mechanical systems (plumbing, hvac, fire sprinkler, controls).
- C. Should there be omissions or discrepancies in the plans and specifications, or discrepancies from actual site conditions, bring them to the attention of the Engineer ten (10) working days in advance of the date of bid opening so that corrections or clarifications can be made.
- D. Install Work in locations shown on Drawings, unless prevented by Project conditions. Coordinate work with that of other trades. Verify that adjacent and related construction conforms to contract documents.
- E. If Project conditions, including changes initiated by other trades or discovery of conditions unknown at time of bid, require unspecified materials and methods or rearrangement of Work, prepare drawings showing proposed changes to meet Project conditions. Obtain permission of the Engineer before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. See Drawings and individual Sections of Division 16

2.2 SUBSTITUTIONS

- A. Conform to Division 1 requirements. Conformance to construction documents is the responsibility of the substitutor, regardless of approval.
- B. Layout on drawings, including space allotted for clearances, access, etc., is based on performance and physical attributes of equipment specified and/or scheduled on plans. Coordinate with other systems, subsystems and trades as required when using substituted materials or equipment.

- C. If the use of substitute materials or equipment requires alternate arrangement of equipment, fixtures, devices, wiring or accessories, prepare drawings showing proposed changes. Obtain permission of the Engineer before proceeding.
- D. If the use of substitute materials or equipment results in different performance than that provided by the specified materials or equipment, adjust Work as required to provide parity performance, at no additional cost to the Owner. Obtain permission of the Engineer before proceeding.
- E. If the use of substitute materials or equipment results in an increase in the cost, including changes to the Work of other trades, pay for any said increase in cost.
- F. See Drawings and individual Sections of Division 16 for further specific information required for substitutions.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. See Drawings and individual Sections of Division 16.

END OF SECTION

SECTION 16060 – ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Electrical demolition.

1.2 RELATED SECTIONS

- A. Division 1 Sections

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified on Drawings and in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Demolition Drawings are based on casual field observation and existing record documents.
- B. Verify field conditions and circuiting arrangements are as shown on Drawings.
- C. Verify that abandoned wiring and equipment serve only abandoned facilities.
- D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION AND SEQUENCE OF WORK

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages with Utility Company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service. Disable system only to make modifications and expansions. Make temporary connections to maintain service in areas adjacent to work area.

- E. Existing Fire Alarm System: Maintain existing system in service until new system is installed, tested and accepted. Disable system only to make modifications and expansions. Obtain permission from the Owner at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area

3.3 DEMOLITION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of Division 1 and this Section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
- F. Disconnect and remove electrical devices and equipment serving user equipment that has been removed.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.
- K. Repair adjacent construction and finishes using materials and methods compatible with existing electrical installations, or as specified.

3.4 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

- C. Luminaires: Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts, and broken electrical parts.
- D. Repair surfaces to match existing conditions.

3.5 INSTALLATION

- A. Install relocated materials and equipment under the provisions of Division 1.

END OF SECTION

SECTION 16111 – CONDUIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Section 16130 - Boxes
- B. Section 16190 - Supporting Devices
- C. Section 16195 - Electrical Identification

1.3 SUMMARY

- A. Section includes: Metal conduit; flexible metal conduit; liquid tight flexible metal conduit; electrical metallic tubing; nonmetal conduit; flexible nonmetallic conduit; fittings and conduit bodies.

1.4 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- D. ANSI/NFPA 70 - National Electrical Code
- E. NECA "Standard of Installation"
- F. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
- G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing

1.5 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70.

1.6 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Product Data: Provide for conduit and fittings.

1.7 PROJECT RECORD DRAWINGS

- A. Submit under provisions of Division 1.
- B. Accurately record actual routing of conduits larger than 2 inches.

1.8 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site under provisions of Division 1.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

1.10 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Minimum Size: 1/2 inch unless otherwise specified.
- B. Underground Installations:
 - 1. More than Five Feet from Foundation Wall: Use thick wall nonmetallic conduit.
 - 2. Within Five Feet from Foundation Wall: Use rigid steel conduit.
 - 3. In or Under Slab on Grade: Use thick wall nonmetallic conduit.
 - 4. Minimum Size: 1 inch.

- C. Outdoor Locations, Above Grade: Use rigid steel conduit and electrical metallic tubing.
- D. In Slab Above Grade:
 - 1. Use thick wall nonmetallic conduit.
 - 2. Maximum Size Conduit in Slab: 1 inch; 3/4 inch for conduits crossing each other.
- E. Interior Locations:
 - 1. Concealed: Use electrical metallic tubing.
 - 2. Exposed: Use rigid steel conduit and electrical metallic tubing. Use rigid steel conduit where subject to physical damage.

2.2 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings.

2.3 FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel or aluminum construction.
- B. Fittings: ANSI/NEMA FB 1.

2.4 LIQUID TIGHT FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel or aluminum construction with neoprene or PVC jacket.
- B. Fittings: ANSI/NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: ANSI C80.3; galvanized tubing.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel compression or set screw type.

2.6 NONMETALLIC CONDUIT

- A. Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

2.7 NONMETALLIC TUBING

- A. Nonmetallic tubing is prohibited.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- F. Fasten conduit supports to building structure and surfaces under provisions of Section 16190.
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.
- J. Route conduit parallel and perpendicular to walls.
- K. Route conduit in and under slab from point-to-point; do not cross conduits in slab.
- L. Maintain adequate clearance between conduit and piping.
- M. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- N. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- O. Bring conduit to shoulder of fittings; fasten securely.
- P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- Q. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations, and to cast boxes.

- R. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for, or use hydraulic one-shot bender to fabricate, bends in metal conduit larger than 2 inch mm) size.
- S. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- T. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints.
- U. Provide suitable pull string in each empty conduit except sleeves and nipples.
- V. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- W. Ground and bond conduit under provisions of Section 16170.
- X. Identify conduit under provisions of Section 16195.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Division 7.
- B. Coordinate conduit penetrations through roof with piping and ductwork. Use prefabricated roof penetration accessories. Coordinate with roofing installer. Use materials and methods specified in Division 7.

END OF SECTION

SECTION 16123 – BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Section 16111 - Conduit
- B. Section 16130 - Boxes

1.3 SUMMARY

- A. Section Includes: Building wire and cable; nonmetallic-sheathed cable; underground feeder and branch circuit cable; armored cable; metal clad cable; wiring connectors and connections.

1.4 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code

1.5 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Product Data: Provide for conductor and cable assembly type including connectors and bushings.
- C. Test Reports: Indicate procedures and values obtained.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum fifteen years documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated on Drawings.
- B. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions. Include wire and cable lengths within 10 feet of length shown.
- C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.9 COORDINATION

- A. Coordinate Work under provisions of Division 1.
- B. Determine required separation between cable and other work.
- C. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.1 BUILDING WIRE AND CABLE

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Type: ANSI/NFPA 70; Type XHHW insulation for feeders and branch circuits larger than #8 AWG; Type THHN/THWN insulation for feeders and branch circuits #8 AWG and smaller.

2.2 NONMETALLIC-SHEATHED CABLE

- A. Type NMC is prohibited.

2.3 UNDERGROUND FEEDER AND BRANCH CIRCUIT CABLE

- A. Description: ANSI/NFPA 70, Type UF.
- B. Conductors: Insulated copper, with uninsulated equipment ground conductor.
- C. Insulation: 600 volts, thermoplastic THHN/THWN, 90 degrees C.

- D. Conductor Jacket: Heat-stabilized nylon.
- E. Assembly jacket: 600 volts, sunlight-resistant PVC, 60 degrees C.

2.4 ARMORED CABLE

- A. Type AC is prohibited.

2.5 METAL CLAD CABLE

- A. Description: ANSI/NFPA 70, Type MC.
- B. Conductors: Insulated copper conductors including insulated equipment grounding conductor.
- C. Insulation: 600 volts, thermoplastic THHN, 90 degrees C.
- D. Jacket: Polypropylene tape.
- E. Armor: Flexible smooth, corrugated or interlocked steel or aluminum armor with insulated bushings integral to connectors. Red plastic inserts are prohibited.

2.6 WIRING CONNECTORS

- A. Split Bolt Connectors are prohibited.
- B. Solderless Pressure Connectors.
- C. Spring Wire Connectors.
- D. Compression Connectors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

- A. Use only building wire in raceway for panel and equipment feeders, and branch circuit wiring.
- B. Metal clad cable may be used only for fixture whips.

- C. Use wiring methods indicated on Drawings.

3.4 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- C. Use stranded conductors for control circuits.
- D. Use conductor not smaller than 12 AWG for power and lighting circuits.
- E. Use conductor not smaller than 14 AWG for control circuits.
- F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- G. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
- H. Pull all conductors into raceway at same time.
- I. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- J. Protect exposed cable from damage.
- K. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels.
- L. Use suitable cable fittings and connectors.
- M. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- N. Clean conductor surfaces before installing lugs and connectors.
- O. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- P. Use compression connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- Q. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- R. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable under provisions of Section 16195.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.6 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Division 1.
- B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- C. Verify continuity of each branch circuit conductor.

END OF SECTION

SECTION 16130 – BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Section 07840 - Fire Stopping

1.3 SUMMARY

- A. Section includes: Wall and ceiling outlet boxes; floor boxes; pull and junction boxes.

1.4 REFERENCES

- A. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- B. ANSI/NFPA 70 - National Electrical Code
- C. NECA "Standard of Installation"
- D. NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports
- E. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)

1.5 DESIGN REQUIREMENTS

- A. Box Size: ANSI/NFPA 70.

1.6 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Product Data: Provide manufacturer's catalog information showing construction, dimensions and configurations.
- C. Submit manufacturer's installation instructions.

1.7 PROJECT RECORD DRAWINGS

- A. Submit under provisions of Division 1.
- B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.8 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site under provisions of Division 1.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- B. Nonmetallic Outlet Boxes: NEMA OS 2.
- C. Cast Boxes: NEMA FB 1, Type FD, aluminum or cast ferrous alloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- D. Wall Plates for Finished Areas: As specified in Section 16140.

2.2 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Surface Mounted Cast Metal Box: NEMA 250, Type 4 or 6; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron, or cast aluminum.

2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- C. In-Ground Cast Metal Box: NEMA 250, Type 6, outside or inside flanged, recessed cover box for flush mounting:
 1. Material: Galvanized cast iron, or cast aluminum.
 2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
 3. Cover Legend: "ELECTRIC".
- D. Fiberglass Handholes: Die molded glass fiber hand holes:
 1. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side.
- E. Cover: Glass fiber weatherproof cover with nonskid finish.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Verify exact locations of floor boxes and outlets prior to rough-in.
- B. Examine architectural elevation drawings and cabinet detail drawings prior to rough-in.

3.2 INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.
- E. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.
- F. Maintain headroom and present neat mechanical appearance.
- G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable luminaire.

- I. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- J. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- K. Use flush mounting outlet box in finished areas.
- L. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- M. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
- N. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- O. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- P. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- Q. Use adjustable steel channel fasteners for hung ceiling outlet box.
- R. Do not fasten boxes to ceiling support wires.
- S. Support boxes independently of conduit.
- T. Use gang box where more than one device is mounted together. Do not use sectional box.
- U. Use gang box with plaster ring for single device outlets.
- V. Use cast outlet box in exterior locations and wet locations.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Division 7.
- B. Coordinate installation of outlet boxes for equipment connected under Section 16180.

3.4 ADJUSTING

- A. Adjust floor box flush with finish flooring material.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused box openings.

3.5 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 16180 – WIRING CONNECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Section 15600 – Heating Ventilating and Air Conditioning
- B. Section 15950 – Building Automation System
- C. Section 16111 – Conduit
- D. Section 16123 – Building Wire & Cable
- E. Section 16130 – Boxes
- F. Section 16441 – Enclosed Switches

1.3 SUMMARY

- A. Section Includes: Electrical connections to Owner-furnished equipment, and equipment specified under other Divisions and Sections.

1.4 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code
- B. NEMA WD 1 - General Purpose Wiring Devices
- C. NEMA WD 6 - Wiring Device Configurations

1.5 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 CORDS AND CAPS

- A. Attachment Plug Construction: Conform to NEMA WD 1.
- B. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
- C. Cord Construction: ANSI/NFPA 70, Type SJO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
- D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Coordinate work with systems and other trades under provisions of Division 1.
- B. Obtain and review shop drawings, product data, and manufacturer's instructions for Owner-Furnished equipment, and equipment furnished under other Divisions and Sections.
- C. Determine connection locations and requirements prior to roughing in.
- D. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
- E. Sequence electrical connections to coordinate with start-up schedule for equipment.

3.2 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.
- B. Verify that equipment supplied matches submittal data.

3.3 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight

- flexible conduit with watertight connectors in damp or wet locations.
- C. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.
 - D. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated.
 - E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
 - F. Install disconnect switches, controllers, control stations, and control devices as indicated.
 - G. Modify equipment control wiring with terminal block jumpers as indicated.
 - H. Provide interconnecting conduit and wiring between devices and equipment where indicated or required.

END OF SECTION

SECTION 16190 – SUPPORTING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Conduit and equipment supports; anchors and fasteners.

1.3 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code
- B. NECA - National Electrical Contractors Association

1.4 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide adequate corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

C. Anchors and Fasteners:

1. Concrete Structural Elements: Use precast insert system, expansion anchors, and preset inserts.
2. Steel Structural Elements: Use beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
5. Solid Masonry Walls: Use expansion anchors and preset inserts.
6. Sheet Metal: Use sheet metal screws.

2.2 STEEL CHANNEL

- A. Description: Galvanized or Painted steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Do not use spring steel clips and clamps.
- E. Do not use powder-actuated anchors.
- F. Obtain permission from Engineer before drilling or cutting structural members.
- G. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- I. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- J. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

PN15120006 Job No. CA-1205-C
Energy Efficient Air Conditioning System for Bldg 618, AASF #2
Hilo, Hawai'i

END OF SECTION

SECTION 16195 – ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Nameplates and labels; wire and cable markers; conduit markers.

1.3 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- B. Letter Size:
 - 1. Use 1/8 inch letters for identifying individual equipment and loads.
 - 2. Use 1/4 inch letters for identifying grouped equipment and loads.
- C. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.2 WIRE MARKERS

- A. Description: Cloth, tape, split sleeve, or tubing type wire markers.
- B. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2. Control Circuits: Control wire number indicated on shop drawings.

2.3 UNDERGROUND WARNING TAPE

- A. Description: 4 inch wide plastic tape, detectable type, colored yellow with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

- A. Install nameplates at each distribution and control enclosure, and in communications cabinets. Install nameplates parallel to equipment lines.
- B. Secure nameplate to equipment front using screws, rivets, or adhesive. Secure nameplate to inside surface of door on panelboards that are recessed in finished locations.
- C. Install labels at individual wall switches and receptacles.
- D. Install wire markers at each conductor in panelboard gutters, pull boxes, outlet and junction boxes.
- E. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

END OF SECTION

SECTION 16441 – ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 RELATED SECTIONS

- A. Section 15600 – Heating Ventilating and Air Conditioning
- B. Section 15950 – Building Automation System
- C. Division 15 – Mechanical Equipment
- D. Section 16180 – Wiring Connections

1.3 SUMMARY

- A. Section Includes: Fusible switches; nonfusible switches; fuses.

1.4 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code
- B. NEMA KS 1 - Enclosed Switches
- C. UL 248 – Low-Voltage Fuses
- D. UL 248-12 - Class R Fuses.

1.5 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Product Data: Provide switch ratings and enclosure dimensions.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use , stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum fifteen years documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 EXTRA MATERIALS

- A. Furnish under provisions of Division 1.
- B. Provide three of each size and type fuse installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Siemens - ITE.
- B. General Electric.
- C. Cutler-Hammer.
- D. Square D.
- E. Substitutions: None.

2.2 ENCLOSED SWITCHES

- A. Fusible Switch Assemblies: NEMA KS 1, Type HD load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate Class R fuses
- B. Nonfusible Switch Assemblies: NEMA KS 1, Type HD load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- C. Enclosures: NEMA KS 1.
 - 1. Interior Dry Locations: Type 1.
 - 2. Exterior Locations: Type 3R.

2.3 FUSES

- A. Manufacturers:
 - 1. Bussman.
 - 2. Gould-Shawmut.
 - 3. Substitutions: None.
- B. Description: UL 248; UL 248-12; Dual element, current limiting, time delay; 250 or 600 volt; Class RK 1.
- C. Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Install disconnect switches where indicated.
- B. Provide NEMA 1 switches for all indoor location unless otherwise indicated.
- C. Provide NEMA 3R switches at all exterior locations unless otherwise indicated.
- D. Provide fusible disconnect switches for all hermetically-sealed air conditioning equipment units and elevator power supplies.
- E. Install fuses in fusible disconnect switches
- F. Provide adhesive label on inside door of each switch indicating UL fuse class and size for replacement.

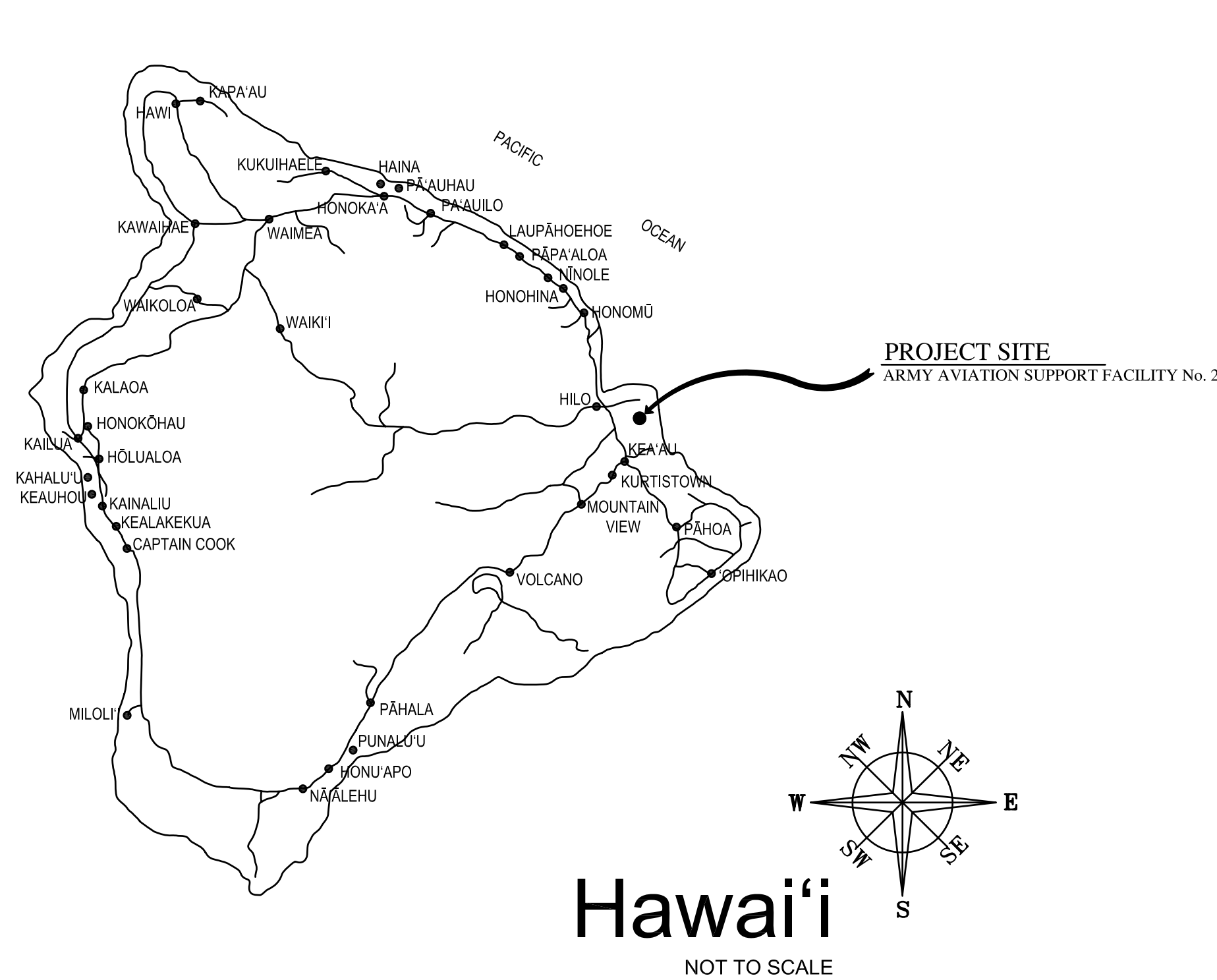
END OF SECTION

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
PN15120006 JOB NO. CA-1205-C
ENERGY EFFICIENT AIR CONDITIONING SYSTEM
FOR BLDG 618, AASF #2
HILO, HAWAII

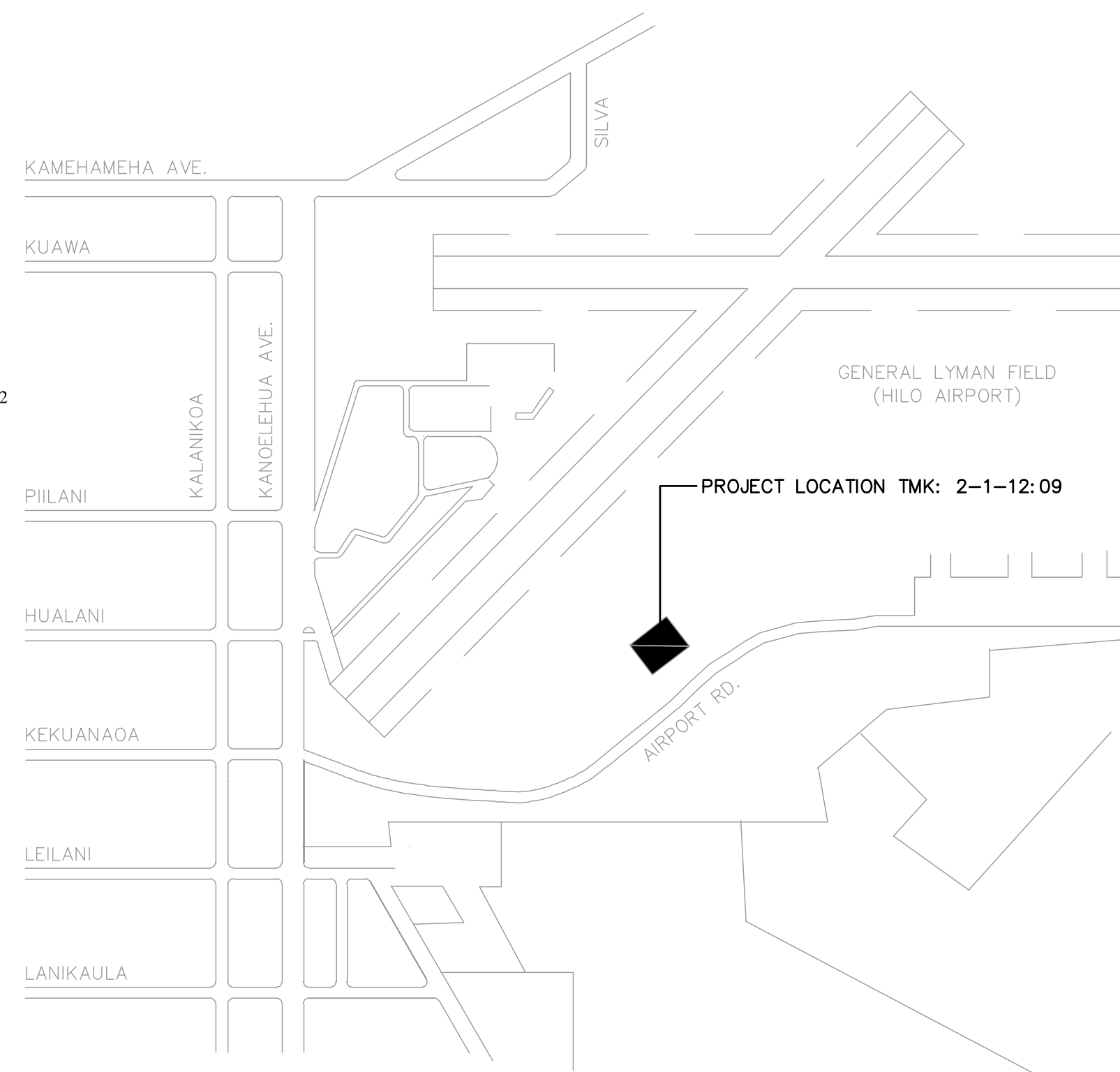
ELECTRICAL ENGINEER: DOUGLAS ENGINEERING PACIFIC, INC.
MECHANICAL ENGINEER: DOUGLAS ENGINEERING PACIFIC, INC.

INDEX TO DRAWINGS

SHT.	DWG	TITLE
1	T-1	TITLE SHEET
2	M-0.1	CONSTRUCTION NOTES
3	M-0.2	MECHANICAL EQUIPMENT SCHEDULES, ABBREVIATIONS, LEGEND
4	M-0.3	MECHANICAL EQUIPMENT SCHEDULES, CONTROL POINTS SCHEDULE
5	M-1	PARTIAL MECHANICAL DEMOLITION PLAN
6	M-2	PARTIAL MECHANICAL DEMOLITION PLAN
7	M-3	AIR CONDITIONING & VENTILATION OVERALL PLAN
8	M-4	PARTIAL AIR CONDITIONING & VENTILATION PLAN
9	M-5	PARTIAL AIR CONDITIONING & VENTILATION PLAN
10	M-6	PARTIAL AIR CONDITIONING & VENTILATION PLAN
11	M-7	PARTIAL AIR CONDITIONING & VENTILATION PLAN
12	M-8	PARTIAL AIR CONDITIONING & VENTILATION PLAN
13	M-9	MECHANICAL ROOM PLUMBING PLAN & HEAT EXCHANGER DIAGRAMS
14	M-10	ACCU-1 REFRIGERANT PIPING DIAGRAM
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17	M-13	AIR CONDITIONING SYSTEM SCHEMATIC
18	M-14	DETAILS
19	E-1	ELECTRICAL GENERAL NOTES AND LEGEND
20	E-2	PARTIAL ELECTRICAL PLAN
21	E-3	PARTIAL ELECTRICAL PLAN



1 VICINITY MAP
T-1 NOT TO SCALE



2 LOCATION MAP
T-1 NOT TO SCALE

REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
TITLE SHEET				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: KL	T-1			
DRAWN: EA				

CONSTRUCTION NOTES:

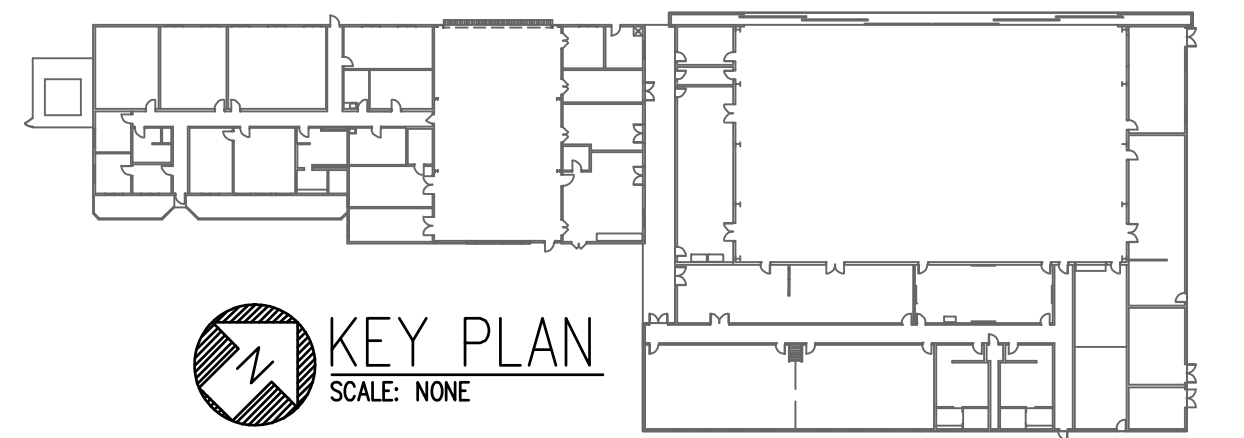
1. CONTRACTOR SHALL VISIT THE SITE AND BE COMPLETELY FAMILIAR WITH THE EXISTING CONDITIONS AND THE AMOUNT AND KIND OF WORK TO BE PERFORMED. EXISTING CONDITIONS ARE BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR SHALL VERIFY THE LOCATION, INVERT, SIZE, AND CONDITION OF EXISTING CONDITIONS AND NOTIFY THE ENGINEER IMMEDIATELY IF ANY DISCREPANCIES ARE ENCOUNTERED. FAILURE BY THE CONTRACTOR TO FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS AND/OR OBSTRUCTIONS SHALL NOT RELIEVE HIM FROM ANY RESPONSIBILITY FOR PERFORMING WORK HIS PROPERLY. NO ADDITIONAL COMPENSATION SHALL BE ALLOWED BECAUSE OF CONDITIONS THAT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO BECOME THOROUGHLY FAMILIAR WITH THE JOB SITE AND OTHER WORK TO BE PERFORMED UNDER THIS CONTRACT. SUBMISSION OF A BID WILL BE CONSIDERED AN ACKNOWLEDGEMENT ON THE PART OF THE BIDDER OF HIS VISITATION TO THE SITE.
2. SOLID WASTE REPORT REQUIRED. RECYCLING FOR LANDFILL DIVERSION. TONNAGE REPORTS.
3. FOR THE ACTUAL FABRICATION, INSTALLATION, AND TESTING OF WORK UNDER THIS SECTION, THE CONTRACTOR SHALL USE ONLY THOROUGHLY TRAINED AND EXPERIENCED WORKMEN, COMPLETELY FAMILIAR WITH THE ITEMS REQUIRED AND WITH THE MANUFACTURER'S RECOMMENDATIONS AS TO THEIR USE.
4. ALL WORK SHALL CONFORM TO THE FOLLOWING CODES AND STANDARDS:
 - 4.1. INTERNATIONAL BUILDING CODE
 - 4.2. INTERNATIONAL MECHANICAL CODE
 - 4.3. UNIFORM PLUMBING CODE
 - 4.4. NATIONAL FIRE PROTECTION ASSOCIATION REQUIREMENTS
 - 4.5. NATIONAL ELECTRICAL CODE
 - 4.6. HAWAII STATE DEPARTMENT OF HEALTH
 - 4.7. COUNTY OF HAWAII BUILDING ORDINANCES AND AMENDMENTS
 - 4.8. ALL OTHER APPLICABLE CODES AND STANDARDS
5. CONTRACTORS AND VENDORS SHALL ENSURE THAT THEIR EMPLOYEES ARE FAMILIAR WITH DOD SAFETY MEASURES PRIOR TO START OF WORK. DOD SAFETY & SECURITY BRIEFING TO BE GIVEN BY SGM HARA PRIOR TO START OF WORK.
6. CONTRACTOR SHALL PROVIDE, INSTALL, AND MAINTAIN ALL NECESSARY SIGNS, FLARES, LIGHTS, BARRICADES, AND OTHER PROTECTIVE DEVICES FOR THE PROTECTION, SAFETY, AND CONVENIENCE OF THE PUBLIC.
7. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND PAY ALL APPLICABLE FEES PRIOR TO COMMENCING ANY WORK.
8. WHERE EQUIPMENT, MANUFACTURER'S, OR ACCESSORIES ARE USED WHICH DIFFER IN ARRANGEMENT, CONFIGURATION, DIMENSIONS, RATINGS, OR ENGINEERING PARAMETERS FROM THOSE INDICATED ON THE CONTRACT DOCUMENTS, THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS INVOLVED IN INTEGRATING THE EQUIPMENT OR ACCESSORIES INTO THE SYSTEM AND FOR OBTAINING THE PERFORMANCE FROM THE SYSTEM INTO WHICH THESE ITEMS ARE PLACED. THIS MAY INCLUDE CHANGES FOUND NECESSARY DURING THE TESTING, ADJUSTING, AND BALANCING PHASE OF THE PROJECT.
9. THE DRAWINGS, SPECIFICATIONS, AND CONSTRUCTION NOTES ARE INTENDED TO SUPPLEMENT ONE ANOTHER. ANY MATERIAL OR LABOR CALLED FOR IN ONE, BUT NOT THE OTHER, SHALL BE PROVIDED AS IF MENTIONED IN ALL. LABOR AND/OR MATERIALS NEITHER SHOWN NOR SPECIFIED, BUT OBVIOUSLY NECESSARY FOR THE COMPLETION AND PROPER FUNCTIONING OF THE SYSTEM SHALL BE PROVIDED BY THE CONTRACTOR WITHOUT ADDITIONAL COST.
10. ANY CONFLICT BETWEEN THE MECHANICAL CONSTRUCTION DOCUMENTS AND SPECIFICATIONS AND ANY OTHER CONSTRUCTION DOCUMENTS AND THEIR RESPECTIVE SPECIFICATIONS, OR MANUFACTURER'S RECOMMENDATIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.
11. REQUESTS FOR INFORMATION: RFI'S SUBMITTED WITHOUT PROPOSED SOLUTIONS WILL BE RETURNED WITHOUT REVIEW. REARRANGEMENT OF WORK FOR THE PURPOSE OF COORDINATION BETWEEN TRADES SHALL NOT BE CONSIDERED REASON FOR EXTRA COST.
12. MATERIALS: MANUFACTURER'S LISTED IN THE SCHEDULES SHOW STYLE AND QUALITY. EQUIVALENT FIXTURES MAY BE SUBSTITUTED WITH APPROVAL OF THE ENGINEER. SUBSTITUTION OF ANOTHER MANUFACTURER'S PRODUCT FOR EQUIPMENT SPECIFIED HEREINAFTER AND FOR ITEMS WITH "OR APPROVED/ACCEPTABLE EQUAL." AFTER THE BRAND NAME REQUIRES WRITTEN PERMISSION BY THE ARCHITECT PRIOR TO BIDDING. NO SUBSTITUTIONS WILL BE CONSIDERED AFTER THE BID OPENING. ACCEPTABLE EQUAL PRODUCTS OF THE FOLLOWING MANUFACTURER'S ARE ACCEPTABLE IN LIEU OF THOSE SPECIFIED HEREINAFTER BY SPECIFIC MANUFACTURER AND MODEL NUMBER.
 - 12.1. MOTOR STARTER: ALLEN BRADLEY, WESTINGHOUSE, GENERAL ELECTRIC, CUTLER-HAMMER, FURNAS
 - 12.2. AIR DISTRIBUTION DEVICES: METALAIRE, TITUS, POTTORFF, PRICE.
 - 12.3. MOTORS: CENTURY, U.S., RELIANCE, GENERAL ELECTRIC, WESTINGHOUSE, GOULD.
 - 12.4. FANS: PENN, COOK, NUTONE.
 - 12.5. AIR CONDITIONING SYSTEM: CARRIER, TRANE, MAGICAIRE, MITSUBUSHI, LG.
 - 12.6. INSULATION: KNAUF, JOHNS-MANVILLE, CERTAINTEEED, RUBATEX, ARMAFLEX.
13. AIR CONDITIONING
 - 13.1. AIR CONDITIONING EQUIPMENT: SEE SCHEDULES.
 - 13.2. DUCT WORK: DUCT WORK SIZES SHOWN ON THE DRAWINGS ARE INSIDE NET DIMENSIONS. ALL WORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF ASHRAE AND SMACNA. RIGID ROUND/RECTANGULAR DUCTS SHALL BE MADE OF GALVANIZED SHEET METAL. FLEXIBLE ROUND DUCTS SHALL BE THERMAFLEX MK-E, OR APPROVED EQUAL. MAXIMUM FLEXIBLE DUCT LENGTH TO BE 5'-0".
 - 13.3. DUCTWORK INSULATION: ALL SUPPLY/RETURN DUCTS AND RELATED FITTINGS SHALL BE INSULATED WITH OWENS-CORNING FIBERGLASS ALL-SERVICE DUCT WRAP TYPE 150, 1.5 LB./CU. FT. DENSITY: 1 1/2" OR 2" THICK. THE DUCT WRAP INSULATION SHALL CONSIST OF A BLANKET OF GLASS FIBERS FACTORY-LAMINATED TO REINFORCED FOIL/KRAFT (FRK) VAPOR RETARDER FACING WITH A 2" (MIN.) STAPLING AND TAPING FLANGE ON ONE EDGE. WHEN INSTALLED IN ACCORDANCE WITH RECOMMENDED INSTALLATION PROCEDURES, DUCT WRAP INSULATION SHALL PROVIDE INSTALLED R-VALUES OF 6 OR 8 (MIN). DUCT WRAP INSULATION SHALL MEET THE REQUIREMENTS OF ASTM C 1290, TYPE III, TO MAXIMUM

- SERVICE TEMPERATURE OF 250F. FACING MATERIAL SHALL MEET THE REQUIREMENTS OF ASTM C 1136, TYPE II, WHEN SURFACE BURNING CHARACTERISTICS ARE DETERMINED IN ACCORDANCE WITH ASTM E 84 WITH THE FOIL SURFACE OF THE MATERIAL EXPOSED TO THE FLAME AS IT IS IN THE FINAL COMPOSITE. INSULATION SHALL BE INSTALLED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 13.4. EXTERIOR PIPING INSULATION: PIPING EXPOSED TO THE EXTERIOR SHALL BE ENCAPSULATED IN 0.016 INCH THICK ALUMINUM OR 0.010 INCH THICK STAINLESS STEEL JACKET, EMBOSSED SURFACE, WITH FACTORY BONDED MOISTURE BARRIER WITH SAFETY EDGE.
 - 13.5. THERMOSTATS: AS PROVIDED BY AIR CONDITIONING EQUIPMENT MANUFACTURER.
 - 13.6. FILTER/DRYER, SOLENOID VALVE, AND SITE GLASS TO BE INSTALLED IF RECOMMENDED BY MANUFACTURER.
14. DDC CONTROLS SYSTEM:
- 14.1. NEW DDC ENERGY MANAGEMENT CONTROLS SYSTEM MUST BE MAPPED TO EXISTING HIARNG SERVER. MAPPING MUST BE DONE BY A MANUFACTURER AUTHORIZED AUTOMATED LOGIC VENDOR.
 - 14.2. HIARNG DCSIM WILL PROVIDE SELECT LAN NETWORK SWITCH PORTS TO COMMUNICATE TO HIARNG EMCS SERVER.
15. IDENTIFICATION:
- PROVIDE IDENTIFICATION STICKERS AND/OR SIGNS FOR INSTALLED PIPES AND EQUIPMENT. IDENTIFICATION STICKERS SHALL INDICATE PIPE USE AND MUST BE INSTALLED AT NO MORE THAN 30 FEET APART.
- PROVIDE STENCILS. LETTERS/NUMBERS FOR MARKING PIPES AND EQUIPMENT SHALL NOT BE LESS THAN 1 INCH IN HEIGHT.
- PROVIDE SNAP-ON PIPE MARKERS. MARKERS SHALL BE CYLINDRICAL SELF-COILING PLASTIC SHEETS THAT SNAP OVER PIPING INSULATION AND ARE HELD TIGHTLY IN PLACE WITHOUT THE USE OF ADHESIVE, TAPE, OR STRAPS. LETTERS, NUMBERS, AND FLOW DIRECTION ARROWS ON PIPE MARKERS SHALL BE A MINIMUM OF 1 INCH IN HEIGHT AND SHALL BE W.H. BRADY, SETON, OR EQUAL.
- PROVIDE ENGRAVED NAME PLATES. NAME PLATES SHALL HAVE WHITE LETTERS ON A BLACK BACKGROUND, 1/8" THICK PLASTIC LAMINATE, BEVELED EDGES, SCREW MOUNTING, SETONPLY STYLE 2060 BY SETON NAME PLATE COMPANY, STYLE EIP BY EMD CO., OR EQUAL BY W.H. BRADY.
- PROVIDE VALVE TAGS. VALVE TAGS SHALL BE ROUND BRASS TAGS WITH 1/2" NUMBERS, 1/4" SYSTEM IDENTIFICATION ABBREVIATION, 1 1/2" MINIMUM DIAMETER, WITH BRASS JACK CHAINS OR BRASS 'S' HOOKS AROUND THE VALVE STEM AND SHALL BE EMD CO., SETON NAME PLATE COMPANY, OR W.H. BRADY.
- PROVIDE STICKERS. STICKERS SHALL HAVE BLACK LETTERS ON A WHITE BACKGROUND ON ALL THERMOSTATS ILLUSTRATING THE ASSOCIATED VAV BOX. STICKERS SHALL BE A MINIMUM 1/2" HIGH WITH 1/8" HIGH LETTERS.
16. PLUMBING:
- 16.1. WATER PIPING ABOVE GROUND SHALL BE COPPER TYPE 'L'. WATER PIPING BELOW GROUND SHALL BE COPPER TYPE 'K' WRAPPED WITH PLASTIC SHIELD. USE NO LEAD TIN SOLDER OR SIMILAR.
 - 16.2. INSULATION SHALL BE OWENS-CORNING FIBERGLASS 25 AJS/SSL HEAVY DENSITY SECTIONAL PIPE INSULATION OR JOHNS-MANVILLE MICRO-LOK AP-T PLUS OR EQUIVALENT. PROVIDE ALUMINUM JACKET ON ALL INSULATION EXPOSED TO WEATHER. ALL PIPING INSULATION IN ACCESSIBLE AREAS WITHIN 8'-0" OF THE FINISHED FLOOR SHALL BE PROVIDED WITH 'ZESTON 2000' PVC PIPE AND FITTING JACKET. ALL OTHER PIPING INSULATION SHALL BE PROVIDED WITH ASJ JACKETING. PROVIDE RIGID, FOAM-GLASS INSULATION SECTIONS AT ALL POINTS OF SUPPORT.
- | COLD WATER SUPPLY AND HOT WATER SUPPLY/RETURN PIPES | |
|---|-------------------------------|
| COLD WATER PIPE SIZE (INCHES) | INSULATION THICKNESS (INCHES) |
| ALL | N/A |
| HOT WATER PIPE SIZE (INCHES) | INSULATION THICKNESS (INCHES) |
| 1/2" THRU 1 1/2" | 1 |
| 2" THRU 4" | 1 1/2" |
| 6" THRU 8" | 2" |
17. EQUIPMENT AND MATERIAL SUBMITTAL: IN ACCORDANCE WITH SECTION 01330, "SUBMITTAL PROCEDURES." BEFORE BEGINNING WORK, SUBMIT FOR REVIEW THE MANUFACTURER'S CERTIFIED LITERATURE SHOWING RATINGS AND DIMENSIONS OF EQUIPMENT AND A LIST INDICATING ALL MATERIAL ITEMS THAT ARE OF A DIFFERENT MANUFACTURER OR MODEL THAN THOSE SPECIFIED. SUBMITTALS SHALL INCLUDE THE FOLLOWING ITEMS.
- 17.1. AIR DISTRIBUTION DEVICES, REGISTERS, GRILLS, DIFFUSERS.
 - 17.2. FANS WITH SOUND DATA.
 - 17.3. AIR CONDITIONING UNITS WITH SOUND DATA.
 - 17.4. DUCTWORK, PIPING, AND INSULATION MATERIALS.
 - 17.5. CONTROL SENSORS, DEVICES, AND WIRING.
18. SHOP DRAWINGS: IN ACCORDANCE WITH SECTION 01330, "SUBMITTAL PROCEDURES." AFTER REVIEW OF MATERIAL SUBMITTALS IS COMPLETE, SUBMIT (4) SETS OF DIMENSIONED INSTALLATION SHOP DRAWINGS FOR APPROVAL TO THE ARCHITECT OR ENGINEER. SHOP DRAWINGS SHALL BE DRAWN TO SCALE AND SHALL INDICATE EQUIPMENT LAYOUT, DUCTWORK, HANGERS, SUPPORT DETAILS, PROPOSED DEPARTURES FROM CONTRACT DOCUMENTS DUE TO FIELD CONDITIONS, REQUIREMENTS FOR CONCRETE WORK, ACCESS PANELS, INSERTS IN SLABS, OPENINGS IN STRUCTURE, AND PIPING LAYOUT. CONTRACTOR TO COORDINATE SHOP DRAWINGS WITH OTHER TRADES TO AVOID INTERFERENCES. REPRODUCED COPIES OF THE CONTRACT DOCUMENTS WILL NOT BE ACCEPTED AS SHOP DRAWINGS. NO WORK SHALL COMMENCE UNTIL WRITTEN APPROVAL OF THE SHOP DRAWINGS IS RECEIVED FROM THE ARCHITECT OR ENGINEER. ALL WORK DONE WITHOUT PRIOR APPROVAL SHALL BE SUBJECT TO REPAIR OR REPLACEMENT AT NO ADDITIONAL COST TO THE OWNER. APPROVAL OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY OF A COMPLETE INSTALLATION OR PROPER PERFORMANCE. ELECTRONIC AND/OR CAD FILES WILL NOT BE RELEASED TO THE CONTRACTOR FOR THE PURPOSE OF PRODUCING SHOP DRAWINGS.

19. AS-BUILT DRAWINGS: IN ACCORDANCE WITH SECTION 01330, "SUBMITTAL PROCEDURES." CONTRACTOR TO RECORD CHANGES FROM THE CONTRACT DRAWINGS TO REFLECT AS-BUILT CONDITIONS. SHOW ALL CONCEALED PIPING, DUCTWORK, AND EQUIPMENT. INDICATE LOCATION OF INSULATING VALVES, DAMPERS, AND ITEMS REQUIRING MAINTENANCE OR INSPECTION. CONTRACTOR TO SUBMIT AS-BUILT DRAWINGS FOR REVIEW PRIOR TO FINAL INSPECTION.
20. OPERATION AND MAINTENANCE MANUALS: IN ACCORDANCE WITH SECTION 01330, "SUBMITTAL PROCEDURES." SUBMIT HARD BOUND COPIES OF THE OPERATING AND MAINTENANCE MANUALS ON ALL EQUIPMENT AND THE SYSTEM AS A WHOLE. THE MANUAL SHALL IDENTIFY ALL EQUIPMENT, THE MANUFACTURER'S NAME, MODEL, AND SERIAL NUMBER, AND SHALL INCLUDE THE MANUFACTURER'S OPERATION AND MAINTENANCE MANUALS INCLUDING WIRING DIAGRAMS AND SOURCE OF SERVICE AND REPLACEMENT PARTS. WHEN USING PUBLISHED MANUALS COVERING MORE EQUIPMENT THAN ONE EQUIPMENT ITEM OR MODEL OPTION, IDENTIFY WHICH DATA AND INSTRUCTIONS APPLY TO THE EQUIPMENT FURNISHED FOR THIS PROJECT. SUBMIT COMPLETE MANUALS FOR REVIEW PRIOR TO FINAL INSPECTION, AS SPECIFIED IN DIVISION 1. OPERATING INSTRUCTIONS IN MANUAL SHALL INCLUDE:
- 20.1. GENERAL DESCRIPTION OF THE SYSTEM.
 - 20.2. STEP BY STEP PROCEDURES TO FOLLOW IN PUTTING EACH PIECE OF EQUIPMENT IN OPERATION.
 - 20.3. PROVIDE WIRING DIAGRAMS FOR EACH EQUIPMENT UNIT.
 - 20.4. PROVIDE SCHEMATIC CONTROL DIAGRAMS FOR EACH SEPARATE FAN SYSTEM. EACH DIAGRAM SHALL SHOW LOCATIONS OF SENSORS, RELAYS, STARTERS, AND START-STOP SWITCHES. SHOW CORRECT OPERATION SETTING FOR EACH CONTROL INSTRUMENT.
 - 20.5. PROVIDE DIAGRAMS FOR THE ENTIRE CONTROL SYSTEM SHOWING THE LOCATION AND WIRING OF ALL RELATED SENSORS, CONTROL DEVICES, AND INTERLOCKS.
 - 20.6. INCLUDE ALL AIR BALANCE AND TEST REPORTS.
21. TEST AND BALANCE REPORT: IN ACCORDANCE WITH SECTION 15990, "TESTING, ADJUSTING, AND BALANCING." CONTRACTOR SHALL PROVIDE A TEST AND AIR BALANCE REPORT BY A CERTIFIED NEBB AND AABC PROFESSIONAL UPON COMPLETION OF THE PROJECT, ONE COPY OF THE TEST AND AIR BALANCE REPORT SHALL BE PROVIDED TO THE ENGINEER, AND OWNER FOR REVIEW PRIOR TO THE ACCEPTANCE OF THE WORK AND REQUEST FOR PAYMENT OF SUBSTANTIAL COMPLETION.
- PROVIDE TOTAL MECHANICAL SYSTEMS TESTING, ADJUSTING AND BALANCING. REQUIREMENTS INCLUDE THE BALANCE OF AIR DISTRIBUTION, ADJUSTMENT OF NEW AND EXISTING SYSTEMS TO PROVIDE DESIGN QUANTITIES INDICATED ON THE DRAWINGS, ELECTRICAL MEASUREMENT AND VERIFICATION OF PERFORMANCE OF ALL EQUIPMENT, ALL IN ACCORDANCE WITH PUBLISHED STANDARDS OF NEBB AND AABC.
- TEST, ADJUST, AND BALANCE ALL AIR SYSTEMS SO THAT EACH ROOM, PIECE OF EQUIPMENT, OR TERMINAL DEVICE IS USING THE QUANTITIES INDICATED ON THE DRAWINGS (±10%). THE TEST AND BALANCE AGENCY SHALL MAKE PERIODIC SITE VISITS TO DETERMINE THAT PROVISIONS ARE BEING MADE TO ACCOMPLISH THE SPECIFIED TESTING, ADJUSTING, AND BALANCING WORK. THESE PROVISIONS INCLUDE CLEARANCES, ACCESS PANELS, ETC. IF PROBLEMS ARE FOUND THAT MAKE THE SYSTEM UNABLE TO BE BALANCED TO THE APPROPRIATE QUANTITIES, THE CONTRACTOR SHALL CORRECT ANY INSTALLATION DEFICIENCIES FOUND BY THE TEST AND BALANCE AGENCY. THIS WORK SHALL INCLUDE WORK SPECIFIED AND/OR SHOWN ON THE CONTRACT DOCUMENTS. INSTALLING CONTRACTOR SHALL CORRECT THE DEFICIENT WORK AT NO COST TO THE OWNER.
- IF ISSUES ARISE WHERE THE CONTRACTOR IS REQUIRED TO MAKE CHANGES TO THE SYSTEM DUE TO BALANCING DIFFICULTIES, THE BALANCING CONTRACTOR IS REQUIRED TO REVISIT THE SITE AS MANY TIMES AS NECESSARY TO SATISFY THE BALANCING REQUIREMENTS OF THE SYSTEM AS SPECIFIED ON THE CONTRACT DOCUMENTS.
22. FIRE SPRINKLER: STRUCTURES UNDERGOING CONSTRUCTION, ALTERATION OR DEMOLITION OPERATIONS, INCLUDING THOSE IN UNDERGROUND LOCATIONS, SHALL COMPLY WITH NFPA 241, STANDARD FOR SAFEGUARDING CONSTRUCTION, ALTERATION, AND DEMOLITION OPERATIONS, AND THIS CHAPTER, NFPA 1 2006, AS AMENDED.
- FIRE SAFETY DURING ALTERATION:
- 16.4.4.1 WHERE THE BUILDING IS PROTECTED BY FIRE PROTECTION SYSTEMS, SUCH SYSTEMS SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES DURING ALTERATION.
- 16.4.4.2 WHERE ALTERATION REQUIRES MODIFICATION OF A PORTION OF THE FIRE PROTECTION SYSTEM, THE REMAINDER OF THE SYSTEM SHALL BE KEPT IN SERVICE AND THE FIRE DEPARTMENT SHALL BE NOTIFIED.
- 16.4.4.3 WHEN IT IS NECESSARY TO SHUT DOWN THE SYSTEM, THE AUTHORITY HAVING JURISDICTION (AHJ) SHALL HAVE THE AUTHORITY TO REQUIRE ALTERNATE MEASURES OF PROTECTION UNTIL THE SYSTEM IS RETURNED TO SERVICE.
- 10.8.1.1 AS NECESSARY DURING EMERGENCIES, MAINTENANCE, DRILLS, PRESCRIBED TESTING, ALTERATIONS, OR RENOVATIONS, PORTABLE OR FIXED FIRE-EXTINGUISHING SYSTEMS OR DEVICES OR ANY FIRE-WARNING SYSTEM SHALL BE PERMITTED TO BE MADE INOPERATIVE OR INACCESSIBLE. A FIRE WATCH SHALL BE REQUIRED AS SPECIFIED IN SECTIONS 13.3.4.3.5.2(3), 13.7.1.4.4, 16.5.4, 20.2.3.6, 34.6.3.3, 41.2.2.5, 41.2.2.6, 41.2.4, 41.3.4, 41.4.1, 34.5.4.3, AND 25.1.8 AT NO COST TO THE AHJ. NFPA 1 2006, AS AMENDED.
23. IN ACCORDANCE WITH DIVISION 1. CONTRACTOR SHALL PROVIDE A WRITTEN GUARANTEE TO REPAIR OR REPLACE, AT THE CONTRACTOR'S OWN EXPENSE, ANY PARTS THAT MAY DEVELOP ANY DEFECTS DUE TO FAULTY MATERIALS OR WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR AFTER FINAL PAYMENT.

ENVIRONMENTAL NOTES:

1. PRIOR TO START OF CONSTRUCTION AND WITHIN 30 DAYS OF COMPLETION OF PROJECT, CONTRACTOR SHALL SUBMIT TO HIARNG-ENV A HAZARDOUS MATERIAL INVENTORY LOG OF CHEMICAL PRODUCTS TO BE USED IN THE PROJECT, AND PROVIDE AN UPDATE NO LATER THAN 31 JANUARY OF EACH CALENDAR YEAR. THE LOG SHALL INCLUDE THE PRODUCT NAME AND MANUFACTURER ID NUMBER, CONTAINER SIZE, AMOUNT USED, AND MAXIMUM NUMBER OF CONTAINERS TO BE STORED ON SITE AT ANY GIVEN DAY DURING THE PROJECT. MATERIAL SAFETY DATA SHEETS (MSDSs) SHALL BE PROVIDED OR MADE AVAILABLE TO THE COR AND HIARNG-ENV UPON REQUEST.
2. PRIOR TO START OF CONSTRUCTION, CONTRACTOR WILL PROVIDE TO HIARNG-ENV AN ESTIMATE OF THE MAXIMUM AMOUNT OF HAZARDOUS WASTE EXPECTED TO BE GENERATED PER MONTH, AND THE TOTAL AMOUNT ANTICIPATED BEING STORED ON-SITE AT ANY GIVEN TIME. ALL WASTE WILL BE STORED IN A SECURED AREA PENDING REMOVAL FOR DISPOSAL, WITH SIGNAGE INDICATING CONTACT INFORMATION AND SHALL BE MANAGED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS FOR DISPOSAL OF WASTE GENERATED FROM THIS PROJECT AND SHALL PROVIDE COPIES OF ALL WASTE DISPOSAL DOCUMENTATION (INCLUDING ANY REQUIRED LAB ANALYSES, WASTE PROFILES, AND ANY OTHER SUPPORTING DOCUMENTATION) TO THE COR AND HIARNG-ENV, ALONG WITH DRAFT COPIES OF THE WASTE MANIFESTS FOR REVIEW PRIOR TO WASTE SHIPMENT OFF-SITE FOR DISPOSAL. IF THE CONTRACTOR UTILIZES A HIARNG EPA ID NUMBER FOR WASTE DISPOSAL, MANIFESTS WILL ONLY BE SIGNED BY INDIVIDUALS AUTHORIZED BY HIARNG-ENV.
4. CONTRACTOR SHALL USE PROTECTIVE MEASURES FOR ON-SITE CHEMICALS, EQUIPMENT AND VEHICLES TO PREVENT SPILLS AND LEAKS INTO THE ENVIRONMENT AND ENSURE ONLY RAINWATER ENTERS ON-SITE UICs, STORM DRAINS, SWALES, STREAMS, AND OTHER PATHS TO NAVIGABLE WATERS.
5. CONTRACTOR SHALL REPORT SPILLS IMMEDIATELY TO THE COR AND HIARNG-ENV AND COMPLETE THE HIARNG SPILL INCIDENT REPORT FORM AS REQUIRED. CONTRACTOR SHALL IMMEDIATELY CLEAN UP SPILLS IAW FEDERAL AND STATE GUIDELINES AND TO THE SATISFACTION OF HIARNG-ENV. CONTRACTOR SHALL MAINTAIN ADEQUATE SPILL SUPPLIES COMMENSURATE WITH THE POTENTIAL FOR SPILLS, AND WILL CONTRACT OUT SPILL CLEANUP BEYOND THEIR CAPABILITIES. CONTRACTOR SHALL ACCOMPLISH ALL REGULATORY VERBAL AND WRITTEN NOTIFICATIONS TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE (LEPC), NATIONAL RESPONSE CENTER (NRC), ENVIRONMENT PROTECTION AGENCY (EPA), AS APPLICABLE, AND PROVIDE HIARNG-ENV COPIES OF ALL SPILL REPORTS.
6. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY AND ALL REQUIRED ENVIRONMENTAL PERMITS, E.G., CONSTRUCTION-RELATED SURFACE DISCHARGE PERMITS, COUNTY-REQUIRED INDUSTRIAL WASTEWATER DISCHARGE PERMITS, MINOR (POLLUTION) SOURCE AIR PERMITS, ETC. FOR ANY CONTRACT-RELATED WORK.



REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
CONSTRUCTION NOTES				DATE:
				MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-0.1			
DRAWN: EA/MOS				

AIR COOLED CONDENSER SCHEDULE

MARK	LOCATION	UNITS SERVING	TOTAL CAPACITY (MBH)	WEIGHT (LBS)	CONDENSER DATA			ELECTRICAL DATA				BASIS OF DESIGN	MECH NOTES
					FAN NO	NO CKT	AMB TEMP (°F)	V	PH	MFS	MCA		
ACCU-1	SEE PLANS	1-11	158.4	532/430	2	2	95	208	3	40/30	34/31, 25/23	mitsubishi PUHY-P168TSKMU-A-RS	1,2,3
ACCU-2	SEE PLANS	12-15, 18	126.8	697	2	1	95	208	3	60	53/49	mitsubishi PUHY-P144TKMU-A-BS	1,2
ACCU-3	SEE PLANS	16-17, 19-21, HEX-1	172.8	532/430	2	2	95	208	3	40/30	34/31, 23/21	mitsubishi PURY-P168TSKMU-A-BS	1,2,3

MECHANICAL NOTES:

- REFRIGERANT PIPE QUANTITIES AND SIZE TO BE PER PLANS.
- OUTDOOR UNITS SHALL BE PROVIDED WITH OPTIONAL SEACOST PROTECTION.
- THIS UNIT CONSISTS OF TWO SEPARATE MODULES AND REQUIRES SEPARATE ELECTRICAL CONNECTIONS FOR EACH INDIVIDUAL MODULE.

FAN COIL UNIT - DX SCHEDULE

MARK	LOCATION SERVED	WEIGHT (LBS)	CFM	OA CFM	ESP (IN)	TOTAL LOAD (MBH)	SENS LOAD (MBH)	TOTAL CAP (MBH)	SENS CAP (MBH)	EAT DB/WB (°F)	REFR TYPE	V	PH	MCA (A)	MCCP/ MAX FUSE (A)	UNIT TYPE	BASIS OF DESIGN	ACCU NO.	MECH NOTES
FCU-1	104 SECURITY	42	212	15	-	5.5	4.8	7.2	6.0	74.5/62.4	R410A	208	1	0.25	15	CASS 1W	PMFY-P08NBMU-E	ACCU-1	1,2,3
FCU-2	105 CLERICAL	38	390	30	-	9.0	8.0	10.9	8.4	75.2/62.8	R410A	208	1	0.35	15	CASS 3W	PLFY-P12NCMU-E	ACCU-1	1,2,3,5
FCU-3	107 CLERICAL	38	390	30	-	7.2	6.2	10.9	8.3	75.0/62.9	R410A	208	1	0.35	15	CASS 4W	PLFY-P12NCMU-E	ACCU-1	1,2,3
FCU-4	108 SAFETY BRIEFING	38	328	30	-	6.0	4.7	7.5	5.8	75.6/64.0	R410A	208	1	0.25	15	CASS 1W	PMFY-P08NBMU-E	ACCU-1	1,2,3
FCU-5	108 STAN RM	38	328	30	-	6.2	4.8	7.5	5.9	75.7/64.0	R410A	208	1	0.25	15	CASS 1W	PMFY-P08NBMU-E	ACCU-1	1,2,3
FCU-6	109 CONFERENCE	86	1483	150	0.2	31.7	22.1	34.1	26.2	77.9/66.0	R410A	208	1	3.5	15	DUCTED	PEFY-P36NMAU-E2	ACCU-1	1,2,3,4
FCU-7	110 FLIGHT OPER	67	883	75	0.28	23.8	19.1	27.6	20.5	75.2/63.4	R410A	208	1	2.73	15	DUCTED	PEFY-P30NMAU-E2	ACCU-1	1,2,3,4
FCU-8	111 RAID	58	600	35	0.16	14.2	12.1	16.4	13.1	75.1/63.1	R410A	208	1	1.56	15	DUCTED	PEFY-P18NMAU-E2	ACCU-1	1,2,3,4
FCU-9	112/113 RAID/BREAK	54	388	55	0.14	11.6	9.0	14.0	9.9	76.1/64.0	R410A	208	1	1.2	15	DUCTED	PEFY-P15NMSU-E	ACCU-1	1,2,3,4
FCU-10	118 COMMANDER	49	371	35	0.18	9.2	7.7	10.9	8.0	75.0/63.0	R410A	208	1	1.2	15	DUCTED	PEFY-P12NMAU-E2	ACCU-1	1,2,3,4
FCU-11	121/122 SUPPLY	67	883	55	0.21	19.5	16.2	22.0	18.1	75.0/63.3	R410A	208	1	2.73	15	DUCTED	PEFY-P24NMAU-E2	ACCU-1	1,2,3,4
FCU-12	123 WEIGHT	67	883	145	0.10	19.0	12.3	21.3	16.4	77.4/66.6	R-410A	208	1	2.73	15	DUCTED	PEFY-P24NMAU-E2	ACCU-2	1,2,3,4
FCU-13	127 TOOL	49	371	35	0.14	9.6	7.0	10.4	7.3	75.4/64.4	R-410A	208	1	1.2	15	DUCTED	PEFY-P12NMAU-E2	ACCU-2	1,2,3,4
FCU-14	131 TOOL	38	390	50	-	7.3	5.4	10.3	7.6	75.3/64.2	R-410A	208	1	0.35	15	CASS 4W	PLFY-P12NCMU-E	ACCU-2	1,2,3
FCU-15	133 MAINT. OPER	67	883	95	0.17	24.0	17.5	26.1	19.0	76.1/64.9	R-410A	208	1	2.73	15	DUCTED	PEFY-P30NMAU-E2	ACCU-2	1,2,3,4
FCU-18	137 TROOP HOLDING	214	2542	335	0.26	58.0	42.6	62.6	51.2	76.5/64.8	R-410A	208	1	7.7	15	DUCTED	PEFY-P72NMHSU-E	ACCU-2	1,2,3,4
FCU-16	134 ALSE	120	1066	110	0.49	30.1	21.2	34.5	23.1	75.9/65.0	R-410A	208	1	1.5	15	VERTICAL	PVfy-P36E00B	ACCU-3	1,2,4
FCU-17	135 TRAINING CTR	120	1066	240	0.45	31.5	21.1	34.8	23.3	77.7/66.3	R-410A	208	1	1.5	15	VERTICAL	PVfy-P36E00B	ACCU-3	1,2,4
FCU-19	138 BREAK	214	2542	250	0.53	60.7	47.9	68.0	55.0	75.9/63.8	R-410A	208	1	7.7	15	DUCTED	PEFY-P72NMHSU-E	ACCU-3	1,2,4
FCU-20	145 AMONICS	108	715	70	0.40	19.5	14.5	22.8	15.9	75.6/64.3	R-410A	208	1	0.99	15	VERTICAL	PVfy-P24E00B	ACCU-3	1,2,4
FCU-21	149 STORAGE	38	350	50	-	6.8	4.7	7.7	6.0	76.4/65.3	R-410A	208	1	0.29	15	CASS 4W	PLFY-P08NCMU-E	ACCU-3	1,2,3,4

MECHANICAL NOTES:

- MOUNT FCU PER MANUFACTURER GUIDELINES.
- FOR REFRIGERANT PIPING SIZES SEE SYSTEM SCHEMATIC DIAGRAM
- PROVIDE WITH CONDENSATE PUMP.
- PROVIDE WITH OPTIONAL FILTER BOX ASSY. EQUIP WITH RETURN AIR DAMPER AND CONNECTION FOR O.A.
- PROVIDE BLOCK-OFFS AS NEEDED.

PUMP SCHEDULE

TAG	DESCRIPTION	LOCATION	GPM	TDH FT H2O	POWER				BASIS OF DESIGN	NOTES
					VOLT/PH/Hz	AMP	WATTS	HP		
HWCP-1	CIRCULATES TO HYDRONIC HEX	MECH ROOM	3	2	115/ 1/ 60	0.22	25	1/25	GRUNDFOS MODEL UP 15-10 F	1,2
HWCP-2	CIRCULATES TO POTABLE	MECH ROOM	0.75	4.8	115/ 1/ 60	0.22	25	1/25	GRUNDFOS MODEL UP 15-10 B5	1,2

MECHANICAL NOTES:

- INSTALL PUMPS PER MANUFACTURER'S RECOMMENDATION.
- COORDINATE PUMP CONTROLS WITH ACCU-3 SCHEDULE.

HEAT EXCHANGER SCHEDULE

MARK	LOCATION	GPM	WT (LBS.)	HEATING CAP (MBH)	ENT WATER TEMP (°F)	REFR TYPE	V	PH	MCA (A)	MCCP/ MAX FUSE (A)	BASIS OF DESIGN	ACCU NO.	MECH NOTES
HEX-1	148 MECH	3	78	36.2	105.4	R410A	208	1	0.09	15	PWFY-P36NMU-E-AU	ACCU-3	1
HEX-2	148 MECH	0.75/3	8.74		75/115	WATER					BRAZED PLATE		
											ALFALAVAL CB30-18H		

MECHANICAL NOTES:

- Install unit per manufacturer's recommendation. Provide adequate height for min. 1/4" per foot slope for drain.

SUPPLY DIFFUSER/GRILLE SCHEDULE

MARK	MAX STATIC PD (IN WG)	MAX NC	MATERIAL	DAMPER (Y/N)	SIZE	NECK	THROW	FRAME TYPE	FINISH	BASIS OF DESIGN	MECH NOTES
1	0.13	30	ALUMINUM	N	12" X 12"	12" X 12"	4 WAY	SURFACE MOUNT	OFF WHITE	TITUS TDC-AA	1,2
2	0.13	30	ALUMINUM	N	9" X 9"	9" X 9"	4 WAY	SURFACE MOUNT	OFF WHITE	TITUS TDC-AA	1,2
3	0.13	30	ALUMINUM	N	14" X 14"	14" X 14"	4 WAY	SURFACE MOUNT	OFF WHITE	TITUS TDC-AA	1,2
4	0.13	30	ALUMINUM	N	12" X 12"	10" DIA	4 WAY	SURFACE MOUNT	OFF WHITE	TITUS TDC-AA	1,2
ED-1	0.13	30	ALUMINUM	N	12" X 12"	12" X 12"	4 WAY	SURFACE MOUNT	OFF WHITE	EXISTING	1,2
ED-2	0.13	30	ALUMINUM	N	16" X 16"	16" X 16"	4 WAY	SURFACE MOUNT	OFF WHITE	EXISTING	1,2
ED-3	0.13	30	ALUMINUM	N	14" X 14"	14" X 14"	4 WAY	SURFACE MOUNT	OFF WHITE	EXISTING	1,2
ED-4	0.13	30	ALUMINUM	N	15" X 15"	15" X 15"	4 WAY	SURFACE MOUNT	OFF WHITE	EXISTING	1,2
ED-5	0.13	30	ALUMINUM	N	12" X 12"	10" DIA	4 WAY	SURFACE MOUNT	OFF WHITE	EXISTING	1,2
ED-6	0.13	30	ALUMINUM	N	12" X 12"	8" DIA	4 WAY	SURFACE MOUNT	OFF WHITE	EXISTING	1,2
ED-7	0.13	30	ALUMINUM	N	6" X 6"	6" DIA	4 WAY	SURFACE MOUNT	OFF WHITE	EXISTING	1,2
ED-8	0.13	30	ALUMINUM	N	15" X 15"	12" DIA	4 WAY	SURFACE MOUNT	OFF WHITE	EXISTING	1,2

MECHANICAL NOTES:

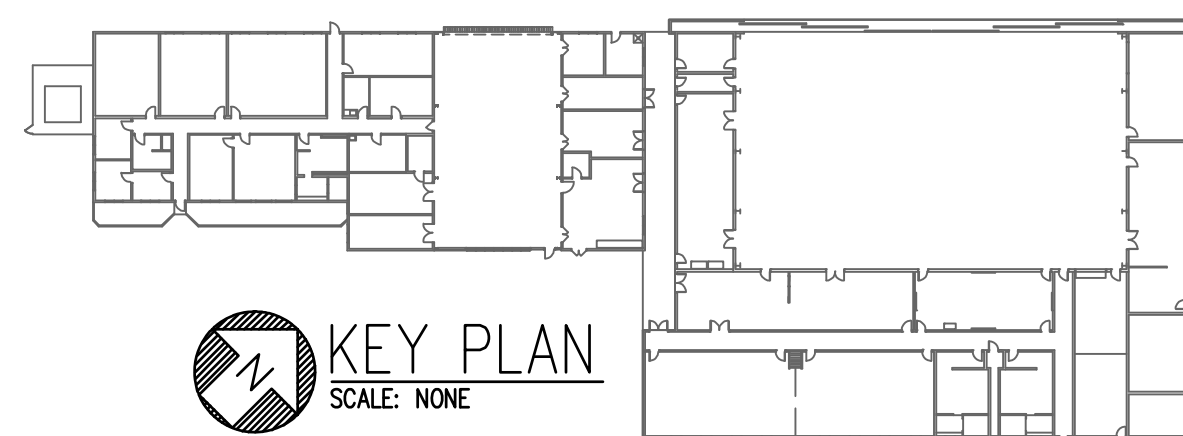
- CONTRACTOR SHALL COORDINATE MOUNTING AND SURFACE CONSTRUCTION PRIOR TO FURNISHING MATERIAL. SEE PLANS FOR LOCATION AND CFM.
- EQUIP WITH AG-75 OPPOSED BLADE DAMPER.

LEGEND

	SUPPLY AIR DIFFUSER TAG
	RETURN AIR DIFFUSER TAG
	EQUIPMENT-NUMBER
	SENSOR
	THERMOSTAT/OCCUPANCY SENSOR
	CONTROL BOARD
	EXISTING WASTE (W)
	NEW WASTE (W)
	REFRIGERANT PIPING
	EXISTING DUCTWORK
	NEW DUCTWORK
	FLEX DUCTWORK
	EXHAUST DUCT UP
	MAKE UP AIR DUCT UP
	SUPPLY DUCT UP
	RETURN DUCT UP
	NEW SUPPLY AIR DIFFUSER(SAD)
	NEW RETURN AIR GRILLE(RAG)
	BACK DRAFT DAMPER (BDD)
	VOLUME DAMPER
	FIRE DAMPER

ABBREVIATIONS

ACCU	AIR COOLED CONDENSING UNIT
BDD	BACK DRAFT DAMPER
CO	CLEAN OUT
(E)	EXISTING
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FS	FLOOR SINK
HW	HOT WATER
LL	LIQUID LINE
OA	OUTSIDE AIR
OAE	OR APPROVED EQUAL
P.O.C.	POINT OF CONNECTION
POR	POINT OF REMOVAL
RG	RETURN GRILLE
SD	SUPPLY DIFFUSER
SL	SUCTION LINE
TBR	TO BE REMOVED
VD	VOLUME DAMPER
VRF	VARIABLE REFRIGERANT FLOW



REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
MECHANICAL EQUIPMENT SCHEDULES, LEGEND, ABBREVIATIONS				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-0.2			
DRAWN: EA/MOS				

RETURN/OUTSIDE AIR GRILLE SCHEDULE

MARK	TYPE	MAX STATIC PD (IN WG)	MAX NC (DECIBELS)	SIZE	MATERIAL	DAMPER (Y/N)	FRAME TYPE	FINISH	MAKE AND MODEL #	MECH NOTES
1	RETURN	0.13	30	18" X 30"	ALUMINUM	N	GRID CEILING MOUNT	OFF WHITE	TITUS 350FL	1,2
2	RETURN	0.13	30	24" X 12"	ALUMINUM	N	GRID CEILING MOUNT	OFF WHITE	TITUS 350FL	1,2
3	RETURN	0.13	30	12"x10"	ALUMINUM	N	GRID CEILING MOUNT	OFF WHITE	TITUS 350FL	1,2
4	RETURN	0.13	30	6"x6"	ALUMINUM	N	GRID CEILING MOUNT	OFF WHITE	TITUS 350FL	1,2
5	RETURN	0.13	30	12"x12"	ALUMINUM	N	GRID CEILING MOUNT	OFF WHITE	TITUS 350FL	1,2
6	RETURN	0.13	30	18"x18"	ALUMINUM	N	GRID CEILING MOUNT	OFF WHITE	TITUS 350FL	1,2
7	OA INTAKE	0.13	30	6" X 6"	ALUMINUM	N	WALL MOUNTED	OFF WHITE	TITUS 355FL	1,3
8	OA INTAKE	0.13	30	36" X 8"	ALUMINUM	N	WALL MOUNTED	OFF WHITE	TITUS 355FL	1,3
EG-1	RETURN			20"x20"	ALUMINUM		GRID CEILING MOUNT	OFF WHITE	EXISTING	
EG-2	RETURN			14"x20"	ALUMINUM		GRID CEILING MOUNT	OFF WHITE	EXISTING	
EG-3	RETURN			14"x14"	ALUMINUM		GRID CEILING MOUNT	OFF WHITE	EXISTING	
EG-4	RETURN			18"x18"	ALUMINUM		GRID CEILING MOUNT	OFF WHITE	EXISTING	
EG-5	RETURN			10"x10"	ALUMINUM		GRID CEILING MOUNT	OFF WHITE	EXISTING	

MECHANICAL NOTES:

- CONTRACTOR SHALL COORDINATE MOUNTING AND SURFACE CONSTRUCTION PRIOR TO FURNISHING MATERIAL. SEE PLANS FOR LOCATION AND CFM.
- EQUIP WITH AG-15AA DAMPER.
- PROVIDE WITH INSECT SCREEN.

REHEAT COIL SCHEDULE

TAG	SERVES	DUCT DIM. (IN)	CFM	ELECTRICAL DATA						DELL CORP. MODEL#	MECH NOTES
				V/PH/Hz	HEATER KW	FLA	MCA	MOCPP	HEATER STEPS		
RHC-1	ALSE ROOM 134	20x14	1000	208/1/60	1.6	19.23*	24.04*	30*	SCR	INDEECO QUA	1,2

MECHANICAL NOTES:

- ALL DUCT HEATER ASSEMBLIES SHALL INCLUDE: AIR FLOW SWITCH FOR A POSITIVE PRESSURE SYSTEM, CONTROL TRANSFORMER CLASS 2-24V, DISCONNECTING CONTACTOR, MAGNETIC CONTACTOR, UNFUSED DOOR INTERLOCKING DISCONNECT, DUCT THERMOSTAT (50-90 DEG F), 100% SCR CONTROLLER, SLIP-IN CONSTRUCTION, HINGED COVER.
- CONTRACTOR SHALL VERIFY RIGHT OR LEFT CONTROL BOX LOCATION FOR NEC CLEARANCE PURPOSES.

OUTSIDE AIR FAN SCHEDULE

MARK	LOCATION	FAN TYPE	CFM	FAN DATA							SONES	BASIS OF DESIGN	NOTES
				EXTERNAL SP (IN WG)	FAN RPM	WATTS	V	PH	WEIGHT (LBS)				
OAF-1	STAN ROOM #108	INLINE	60	0.125	1,050	128	115	1	26	1.8	GREENHECK SQ-60-VG-1/6	1,3	
OAF-2	CLERICAL #107	INLINE	75	0.125	1,050	128	115	1	26	1.8	GREENHECK SQ-60-VG-1/6	2,3	
OAF-3	TOOL ROOM #131	INLINE	50	0.050	1,050	128	115	1	26	1.8	GREENHECK SQ-60-VG-1/6	4	
OAF-4	STORAGE #149	INLINE	50	0.050	1,050	128	115	1	26	1.8	GREENHECK SQ-60-VG-1/6	5	

MECHANICAL NOTES:

- EXHAUST FAN SHALL BE INTERLOCKED TO RUN WHEN EITHER FCU-4 OR FCU-5 ARE ON.
- EXHAUST FAN SHALL BE INTERLOCKED TO RUN WHEN EITHER FCU-2 OR FCU-3 ARE ON.
- PROVIDE WITH FACTORY PARALLEL BLADE BACKDRAFT DAMPER.
- EXHAUST FAN SHALL BE INTERLOCKED TO RUN WHEN FCU-14 IS ON.
- EXHAUST FAN SHALL BE INTERLOCKED TO RUN WHEN FCU-21 IS ON.

LOUVER SCHEDULE

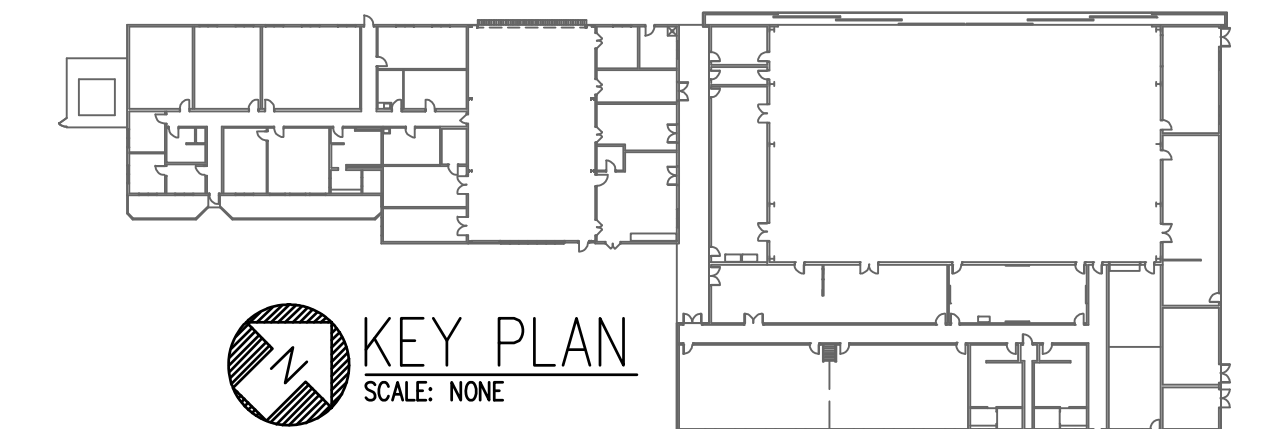
MARK	LOCATION	MAX PD (IN WG)	SIZE	CFM	MAKE AND MODEL #	MECH NOTES
L-1	SEE PLANS	0.13	32" X 18"	450	POTTORF EFD-435	1,2

MECHANICAL NOTES:

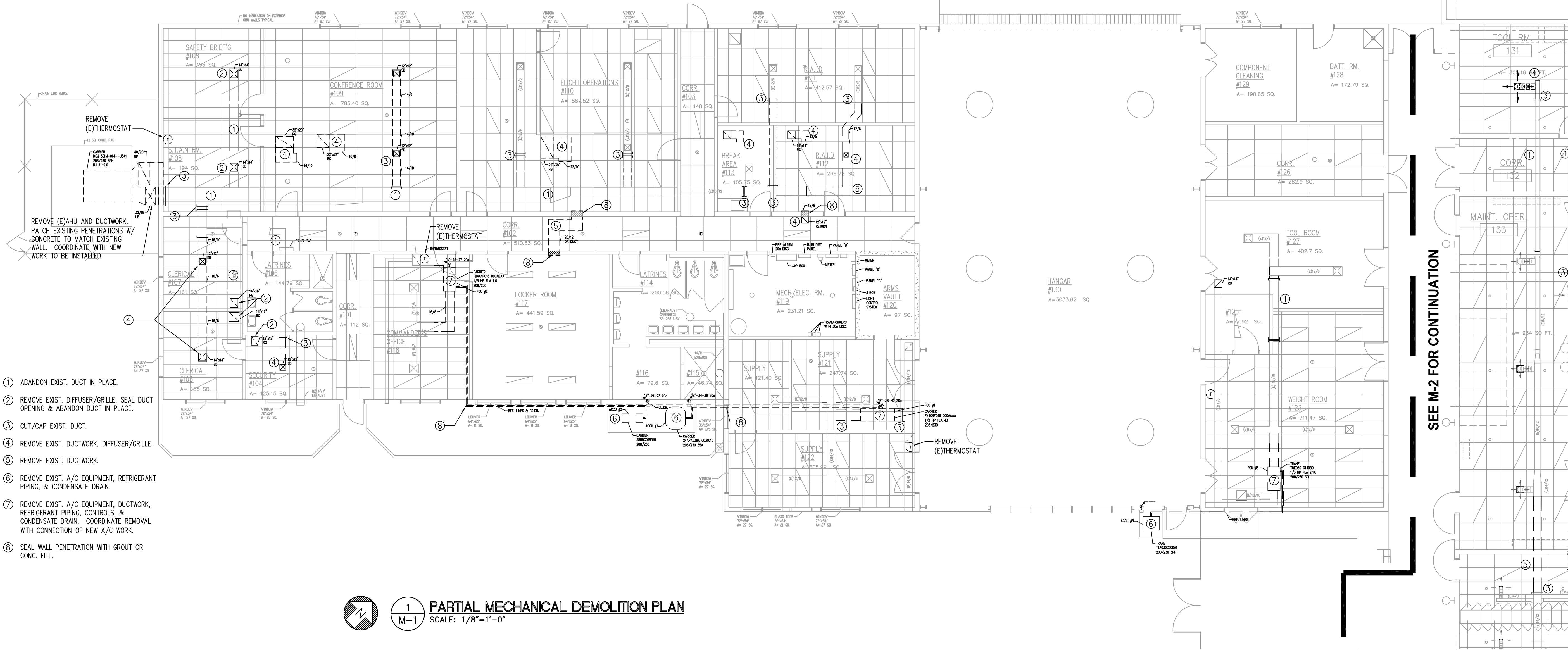
- CONTRACTOR SHALL COORDINATE MOUNTING AND SURFACE CONSTRUCTION PRIOR TO FURNISHING MATERIAL.
- PROVIDE INSECT SCREEN.

CONTROL POINTS SCHEDULE

EQUIPMENT TAG	RUN/STOP STATUS	SPACE TEMP.	TSTAT SETPOINT	OCCUPANCY STATUS	SPACE RELATIVE HUMIDITY	AIR FLOW SWITCH STATUS	DISCHARGE AIR TEMP.	HOT SIDE: INLET TEMP.	HOT SIDE: OUTLET TEMP.	COLD SIDE: INLET TEMP.	COLD SIDE: OUTLET TEMP.	STORAGE TEMP.	OPERATING CONDITIONS	PUMP INTERLOCK (E)E/F-3	INTERLOCK	NOTES
ACCU-1	X	X														
ACCU-2	X	X														
ACCU-3	X	X														
FCU-1	X	X	X	X												
FCU-2	X	X	X	X												
FCU-3	X	X	X	X												
FCU-4	X	X	X	X												
FCU-5	X	X	X	X												
FCU-6	X	X	X	X												
FCU-7	X	X	X	X												
FCU-8	X	X	X	X												
FCU-9	X	X	X	X												
FCU-10	X	X	X	X												
FCU-11	X	X	X	X												
FCU-12	X	X	X	X												
FCU-13	X	X	X	X												
FCU-14	X	X	X	X												
FCU-15	X	X	X	X	X					X						
FCU-16	X	X	X	X	X					X						
FCU-17	X	X	X	X												
FCU-18	X	X	X	X												
FCU-19	X	X	X	X												
FCU-20	X	X	X	X												
FCU-21	X	X	X	X												
RHC-1 (w/ SCR CONTROL)		X								X	X					
MOTORIZED DAMPERS															X	
HWCP-1		X	X													
HWCP-2		X	X													
HEX-1		X								X	X	X	X	X	X	
HEX-2										X	X	X	X			
HW STORAGE TANK															X	



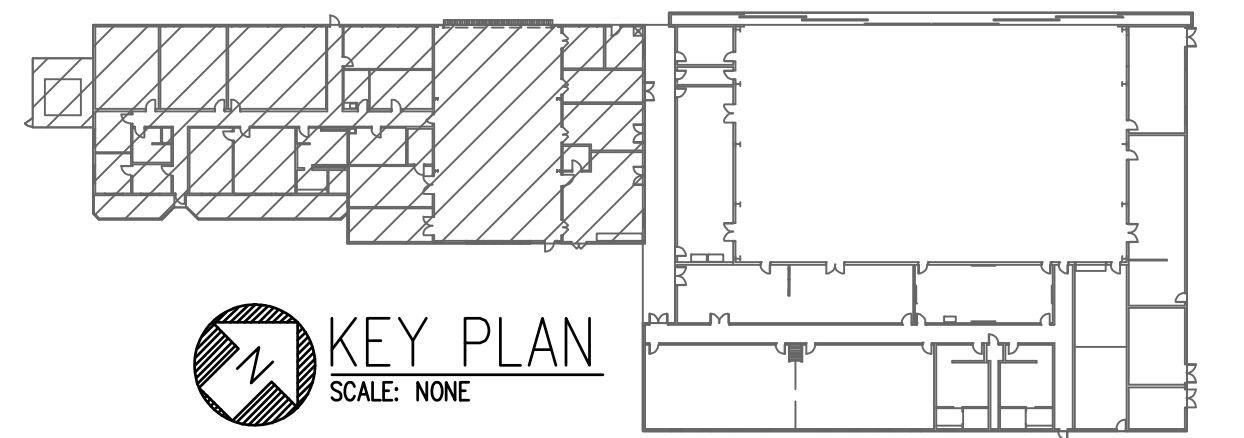
REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
MECHANICAL EQUIPMENT SCHEDULES, CONTROL POINTS SCHEDULE				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-0.3			
DRAWN: EA/MOS				



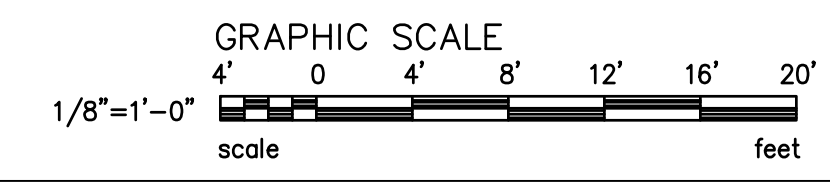
- ① ABANDON EXIST. DUCT IN PLACE.
- ② REMOVE EXIST. DIFFUSER/GRILLE. SEAL DUCT OPENING & ABANDON DUCT IN PLACE.
- ③ CUT/CAP EXIST. DUCT.
- ④ REMOVE EXIST. DUCTWORK, DIFFUSER/GRILLE.
- ⑤ REMOVE EXIST. DUCTWORK.
- ⑥ REMOVE EXIST. A/C EQUIPMENT, REFRIGERANT PIPING, & CONDENSATE DRAIN.
- ⑦ REMOVE EXIST. A/C EQUIPMENT, DUCTWORK, REFRIGERANT PIPING, CONTROLS, & CONDENSATE DRAIN. COORDINATE REMOVAL WITH CONNECTION OF NEW A/C WORK.
- ⑧ SEAL WALL PENETRATION WITH GROUT OR CONC. FILL.

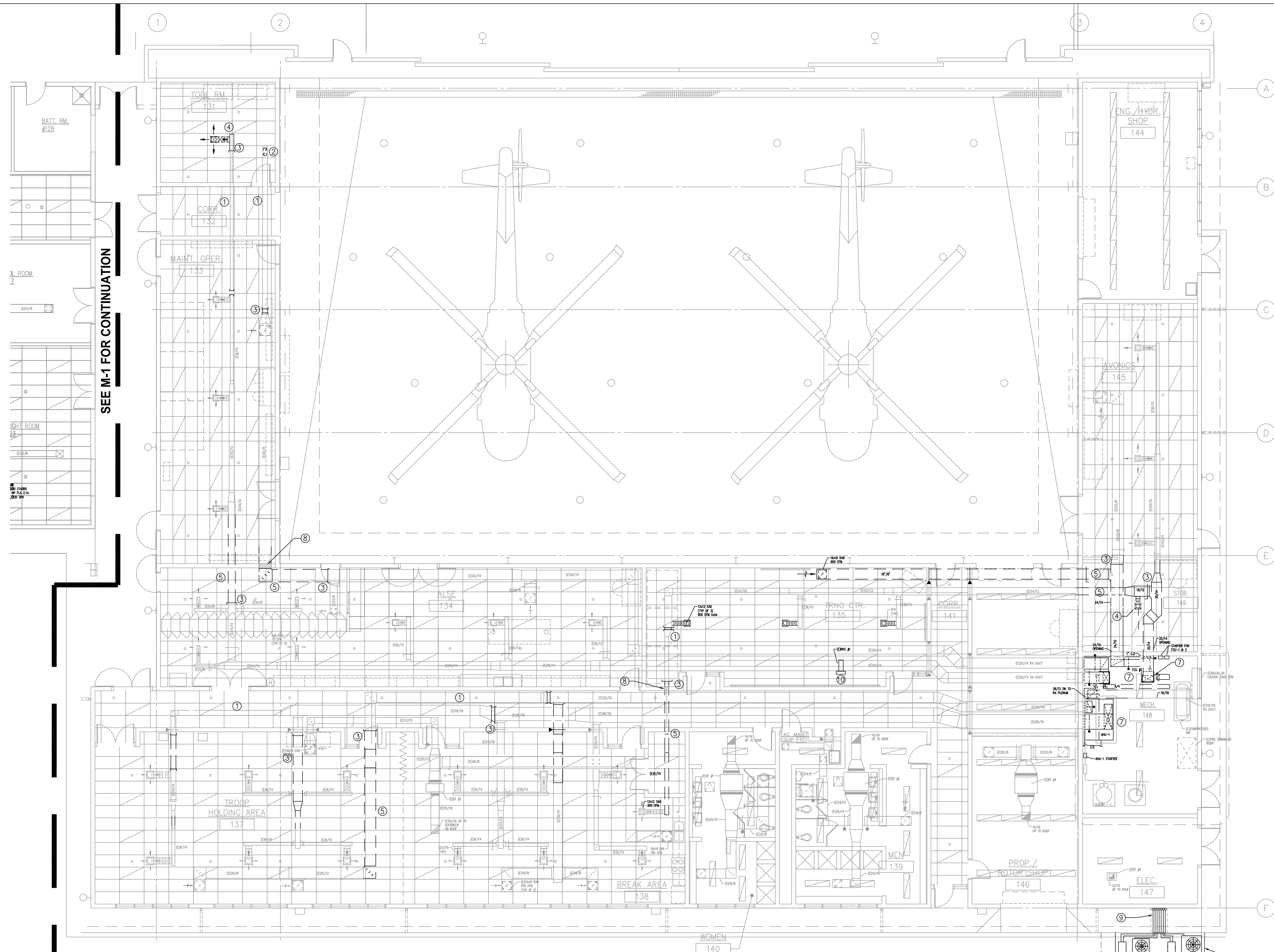
1
M-1 **PARTIAL MECHANICAL DEMOLITION PLAN**
SCALE: 1/8"=1'-0"

SEE M-2 FOR CONTINUATION



REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL MECHANICAL DEMOLITION PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-1			
DRAWN: EA/MOS				

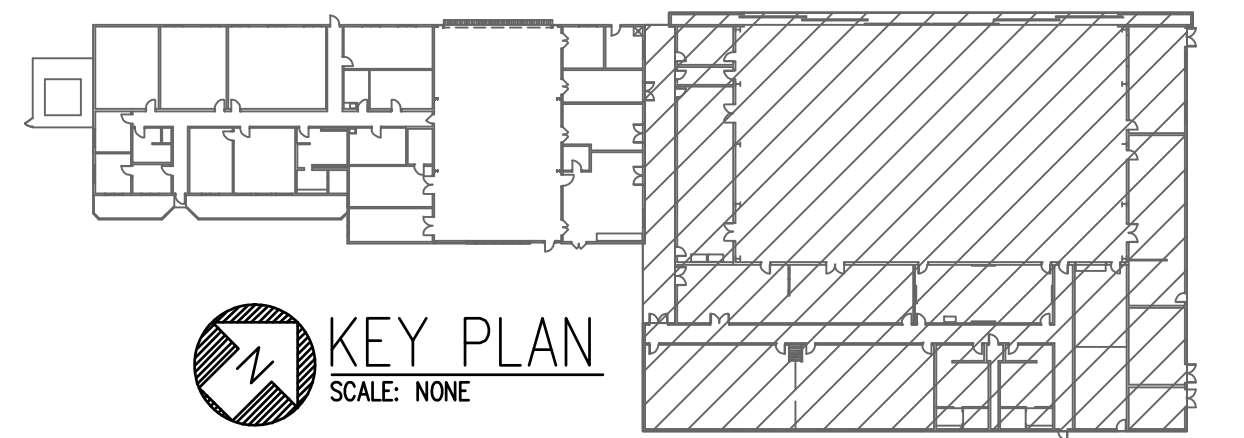




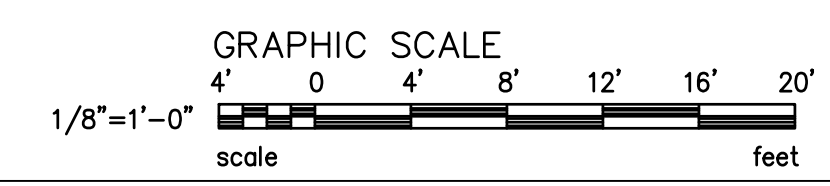
SEE M-1 FOR CONTINUATION

- ① ABANDON EXIST. DUCT IN PLACE.
- ② REMOVE EXIST. DIFFUSER/GRILLE. SEAL DUCT OPENING & ABANDON DUCT IN PLACE.
- ③ CUT/CAP EXIST. DUCT.
- ④ REMOVE EXIST. DUCTWORK, DIFFUSER/GRILLE.
- ⑤ REMOVE EXIST. DUCTWORK.
- ⑥ REMOVE EXIST. A/C EQUIPMENT, REFRIGERANT PIPING, & CONDENSATE DRAIN.
- ⑦ REMOVE EXIST. A/C EQUIPMENT, DUCTWORK, REFRIGERANT PIPING, CONTROLS, & CONDENSATE DRAIN. COORDINATE REMOVAL WITH CONNECTION OF NEW A/C WORK.
- ⑧ SEAL WALL PENETRATION WITH GROUT OR CONC. FILL.
- ⑨ CUT & CAP UNDERGROUND REFRIGERANT LINES AT OR BELOW GRADE TO AVOID TRIPPING HAZARD. ABANDON UNDERGROUND REFRIGERANT LINES IN PLACE.
- ⑩ EXIST. REHEAT COIL TO BE REPLACED WITH NEW.

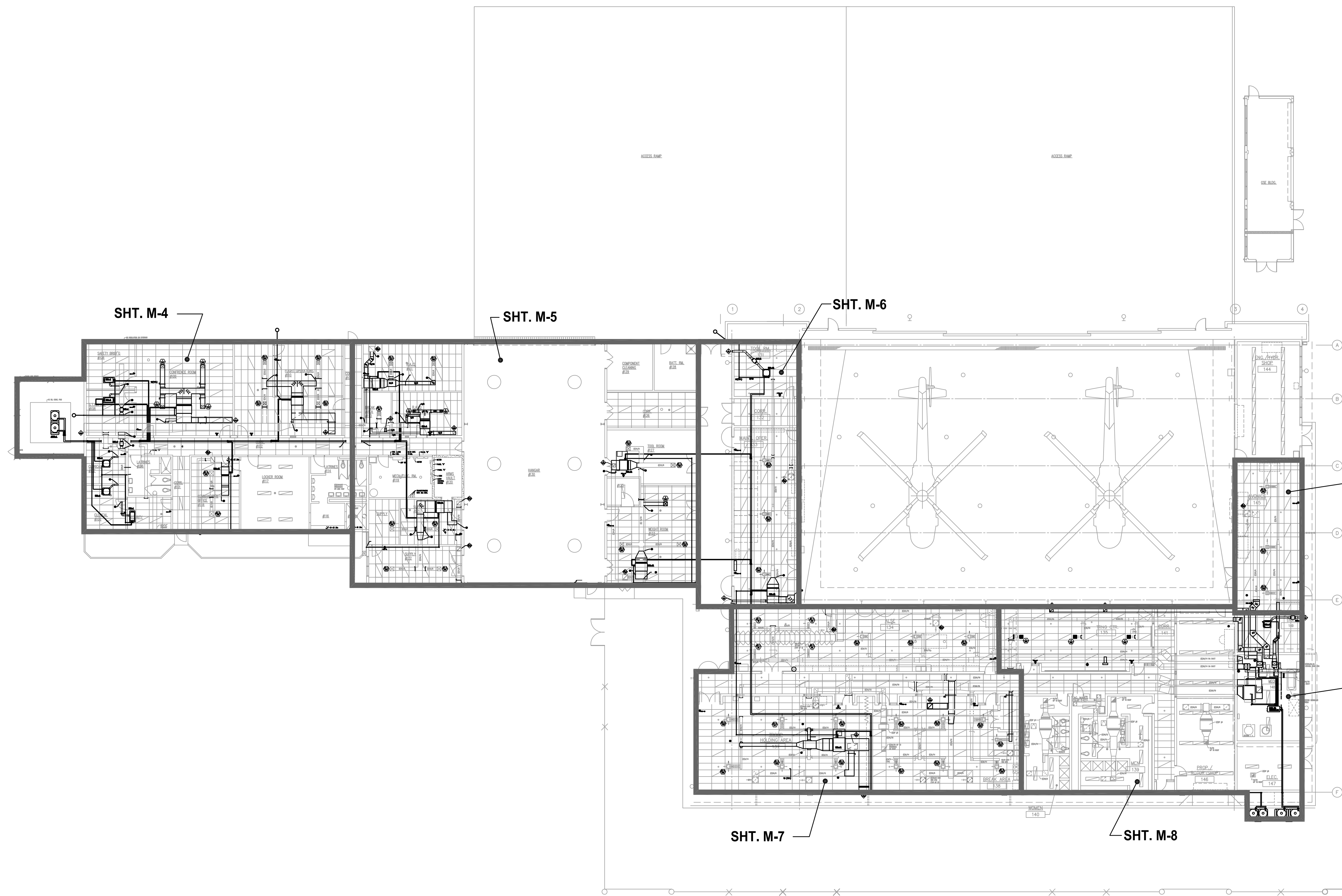
EXISTING D.E.A BLDG.



1 PARTIAL MECHANICAL DEMOLITION PLAN
SCALE: 1/8"=1'-0"

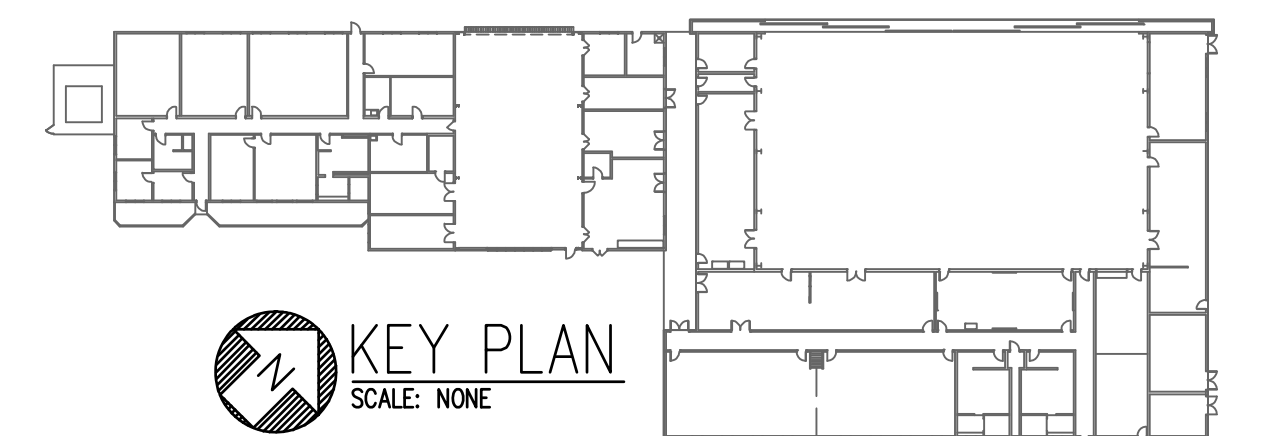


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ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL MECHANICAL DEMOLITION PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-2			
DRAWN: EA/MOS				



SEE M-6 FOR CONTINUATION

SEE M-8 FOR CONTINUATION



KEY PLAN
SCALE: NONE

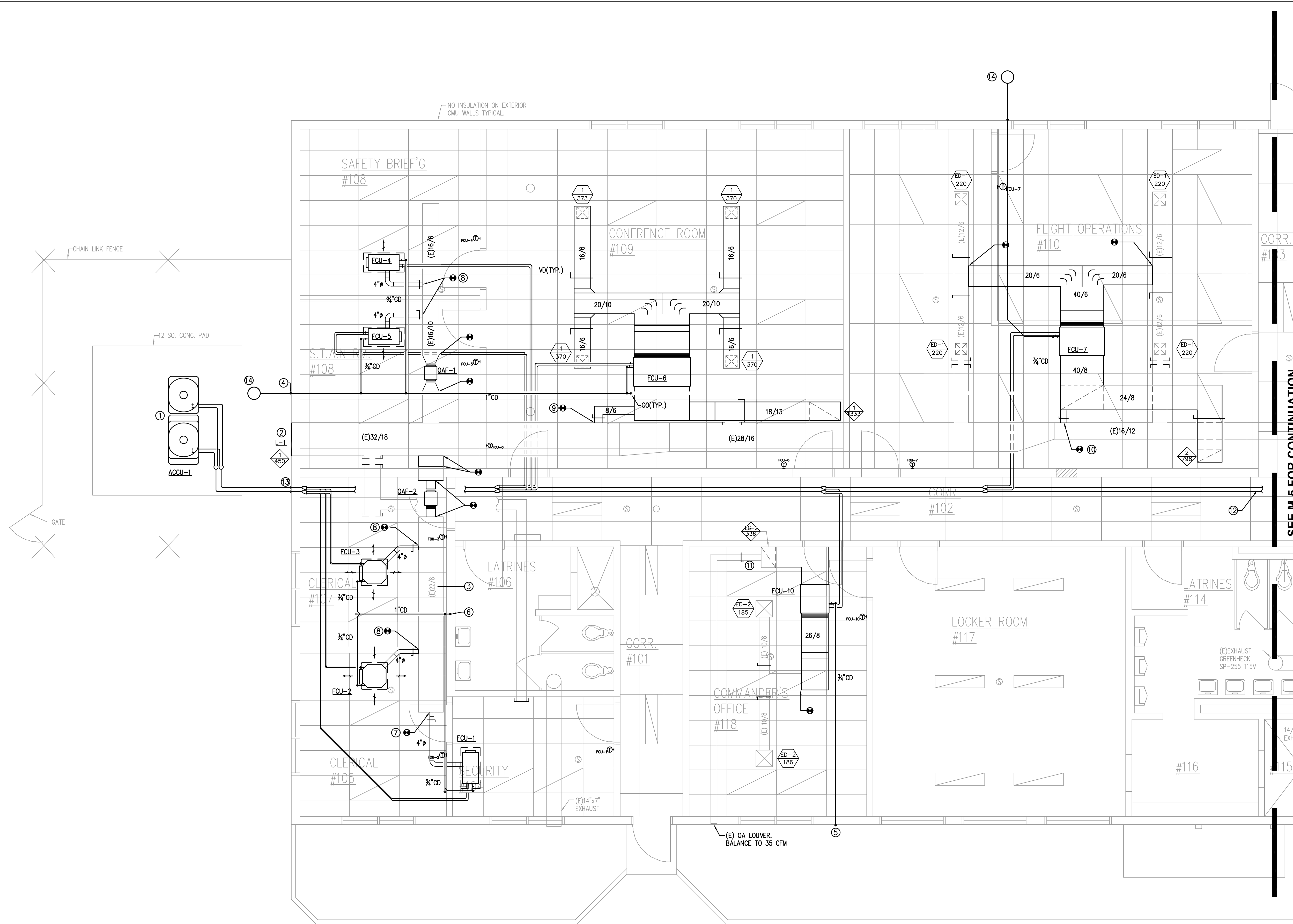


1
M-3

AIR CONDITIONING & VENTILATION OVERALL PLAN
SCALE: 1/16"=1'-0"

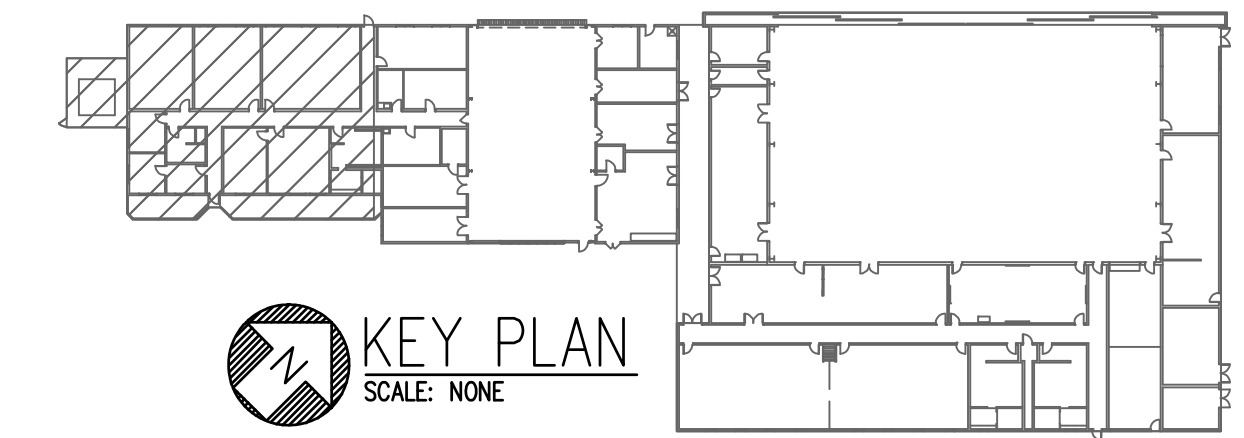
REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
AIR CONDITIONING & VENTILATION PLAN				DATE:
				MARCH 14, 2014
SCALE:	AS NOTED	DRAWING NO:		M-3
DESIGNED:	MOS	SHEET:		
DRAWN:	EA/MOS			

GRAPHIC SCALE
1/16"=1'-0"
0 4' 8' 12' 16' 20'
scale feet

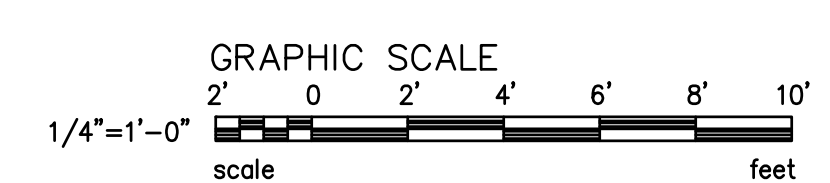


- ① FOR REFRIGERANT PIPE SIZING, SEE REFRIGERANT PIPING DIAGRAM.
- ② (E)32/18 DUCT TO BE REUSED AS AN OUTSIDE AIR DUCT.
- ③ (E)22/8 DUCT TO BE REUSED AS AN OUTSIDE AIR DUCT.
- ④ ROUTE 1" CD DOWN ALONG WALL. TERMINATE AT DRYWELL.
- ⑤ ROUTE 3/4" CD DOWN ALONG WALL. TERMINATE 6" ABOVE GRADE.
- ⑥ ROUTE 1" CD THROUGH WALL TO (E)LAV DRAIN. REFER TO DRAIN CONNECTION DETAIL.
- ⑦ CONNECT TO (E)22/8 DUCT. BALANCE TO 15 CFM OA.
- ⑧ CONNECT TO (E) DUCT. BALANCE TO 30 CFM OA.
- ⑨ CONNECT TO (E) DUCT. BALANCE TO 150 CFM OA.
- ⑩ CONNECT TO (E) DUCT. BALANCE TO 75 CFM OA.
- ⑪ CONNECT TO (E) DUCT. BALANCE TO 35 CFM OA.
- ⑫ 3/8" LL AND 3/4" SL TO FCU-8, 9, 11. REFER TO M-5 FOR CONTINUATION. REFER TO REFRIGERANT PIPING DIAGRAM FOR COMPLETE REFRIGERANT SYSTEM PIPING SIZES.
- ⑬ 3/8" LL AND 1 1/8" SL UP ALONG WALL AND INTO CEILING SPACE. REFER TO REFRIGERANT PIPING DIAGRAM FOR COMPLETE REFRIGERANT SYSTEM PIPING SIZES.
- ⑭ DRYWELL. SEE DETAIL 6/M-14.

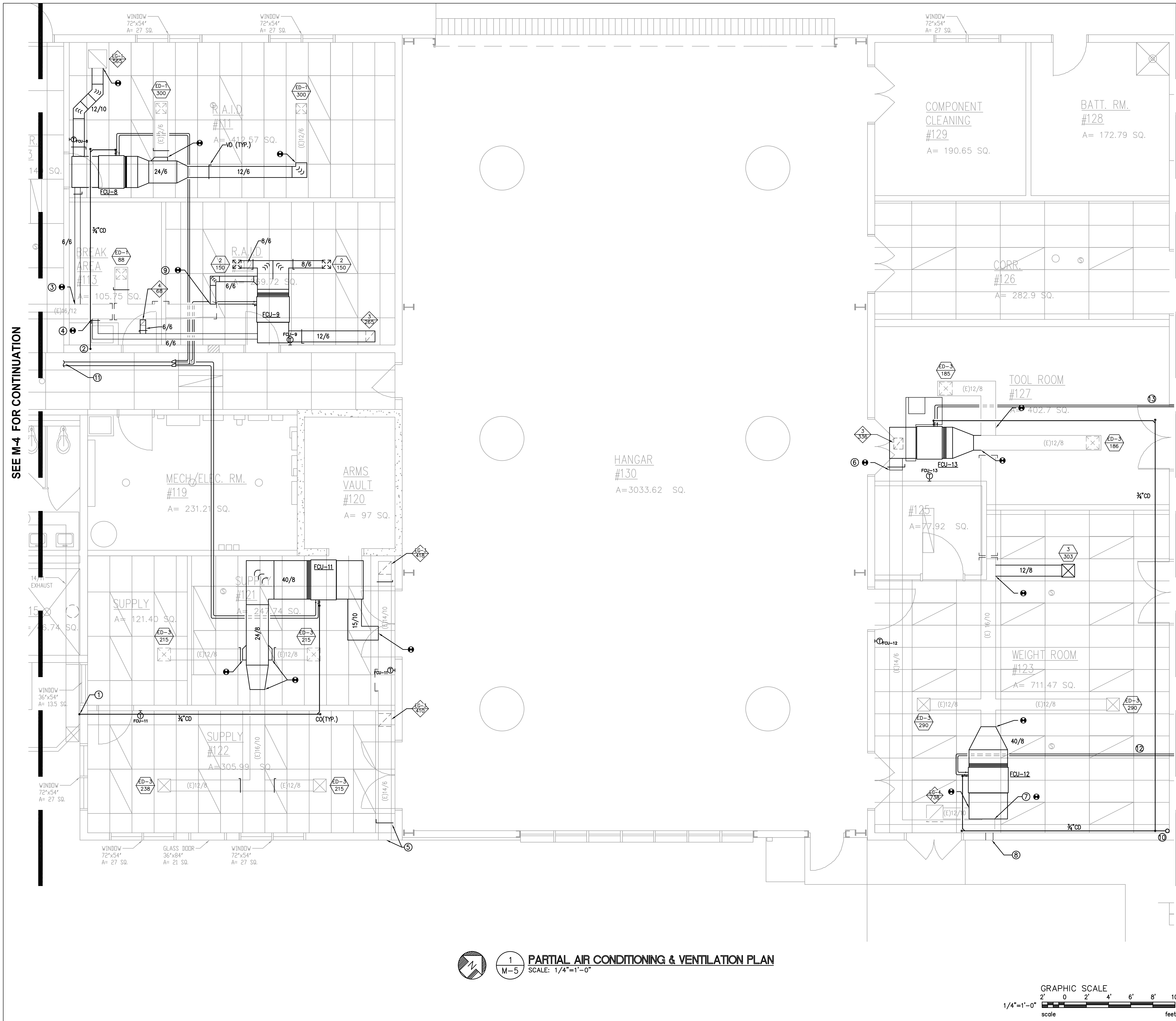
SEE M-5 FOR CONTINUATION



PARTIAL AIR CONDITIONING & VENTILATION PLAN
SCALE: 1/4"=1'-0"



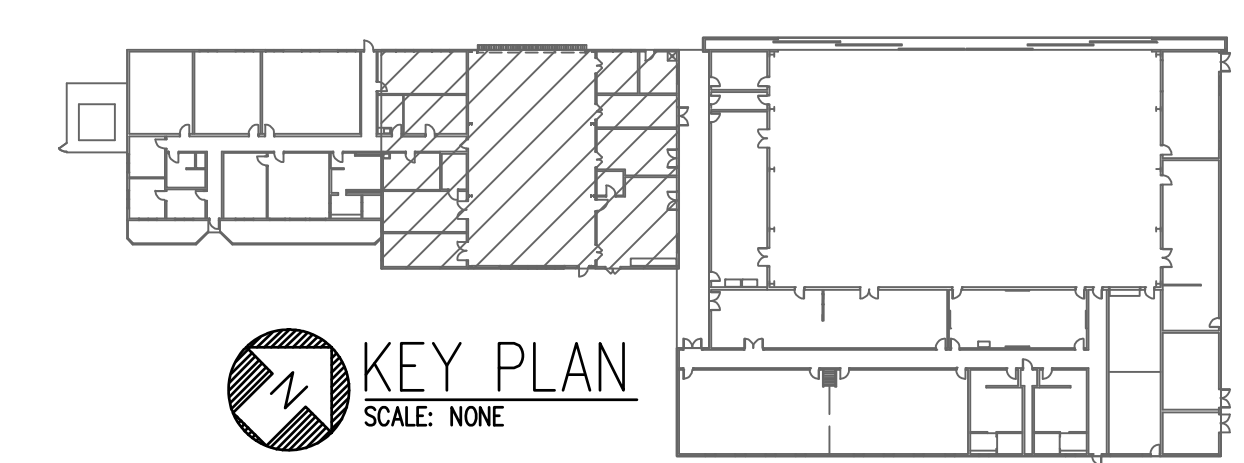
REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL AIR CONDITIONING & VENTILATION PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS/PKY	M-4			
DRAWN: MOS/PKY				



- ① 3/4" CD DOWN WALL. TERMINATE MINIMUM 6" ABOVE GRADE.
- ② 3/4" CD DOWN THROUGH TO CONNECT TO (E) LAV/(E) SK DRAIN TRAP. REFER TO TRAP CONNECTION DETAIL.
- ③ CONNECT 6/6 OA DUCT TO (E) DUCTWORK. BALANCE OA TO 35 CFM.
- ④ CONNECT 6/6 OA DUCT TO (E) DUCTWORK. BALANCE OA TO 55 CFM.
- ⑤ REUSE (E) 14/6 OA LOUVER FOR VENTILATION AIR. BALANCE OA TO 55 CFM.
- ⑥ OA CONNECTION TO (E) 14/6 DUCT. BALANCE TO 35 CFM.
- ⑦ OA CONNECTION TO (E) 14/6 DUCT. BALANCE TO 145 CFM.
- ⑧ REUSE (E) 8X6 OA LOUVER. 180 CFM TOTAL.
- ⑨ CONNECT 6/6 SA DUCT TO (E) 12/6. 88 CFM SA TO DIFFUSER IN BREAK AREA #113.
- ⑩ REPLACE (E) CD WITH 1" CD DRAIN. USE EXISTING ROUTING TO EXTERIOR.
- ⑪ 3/8" LL AND 3/4" SL FROM ACCU-1. REFER TO M-4 FOR CONTINUATION. REFER TO REFRIGERANT PIPING DIAGRAM FOR COMPLETE REFRIGERANT SYSTEM PIPING SIZES.
- ⑫ 3/8" LL AND 3/4" SL FROM ACCU-2. REFER TO M-6 FOR CONTINUATION. REFER TO REFRIGERANT PIPING DIAGRAM FOR COMPLETE REFRIGERANT SYSTEM PIPING SIZES.
- ⑬ 3/8" LL AND 1/2" SL FROM ACCU-2. REFER TO M-6 FOR CONTINUATION. REFER TO REFRIGERANT PIPING DIAGRAM FOR COMPLETE REFRIGERANT SYSTEM PIPING SIZES.

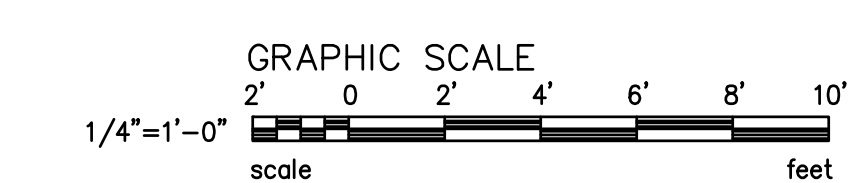
SEE M-4 FOR CONTINUATION

SEE M-6 FOR CONTINUATION



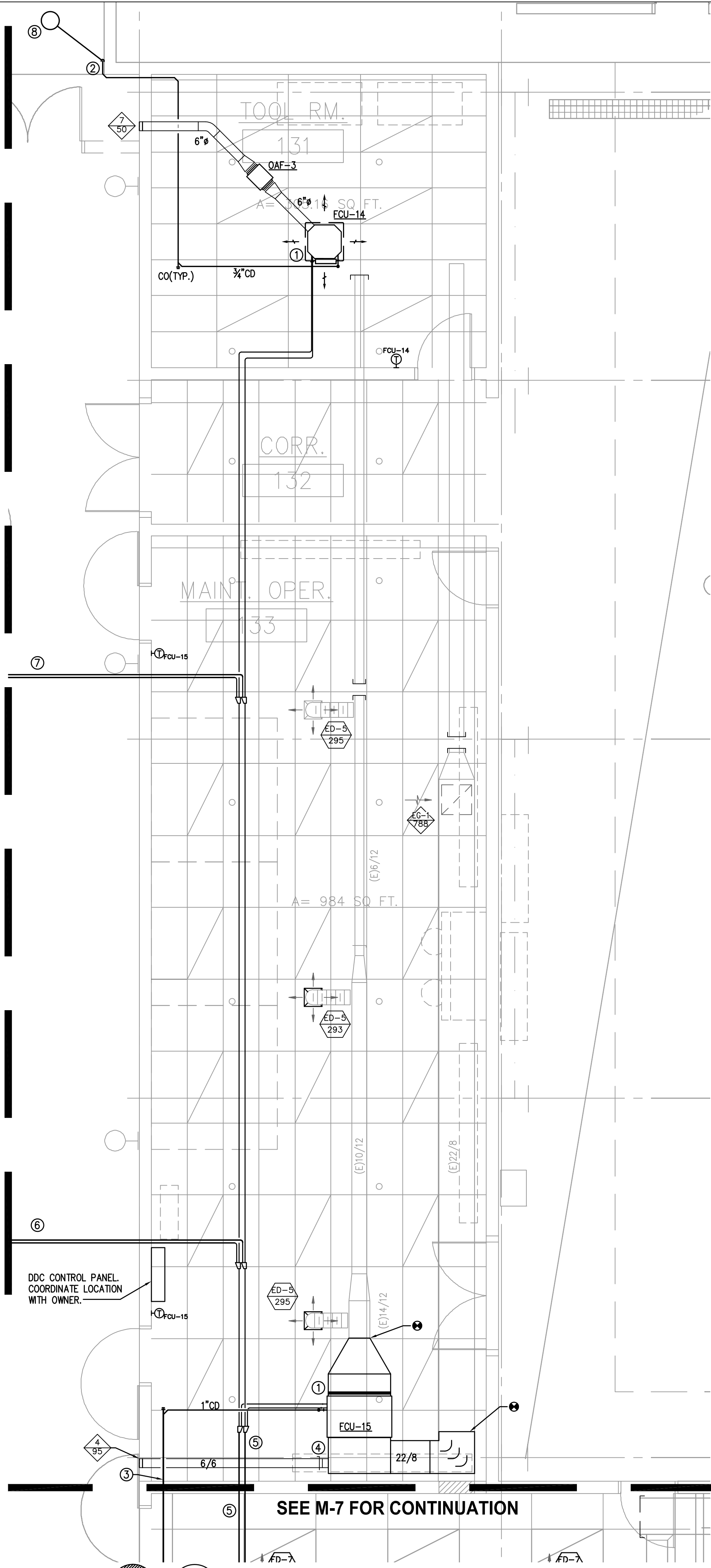
REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL AIR CONDITIONING & VENTILATION PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS/PKY	DRAWN: MOS/PKY			
SHEET:				M-5

1 PARTIAL AIR CONDITIONING & VENTILATION PLAN
M-5 SCALE: 1/4"=1'-0"



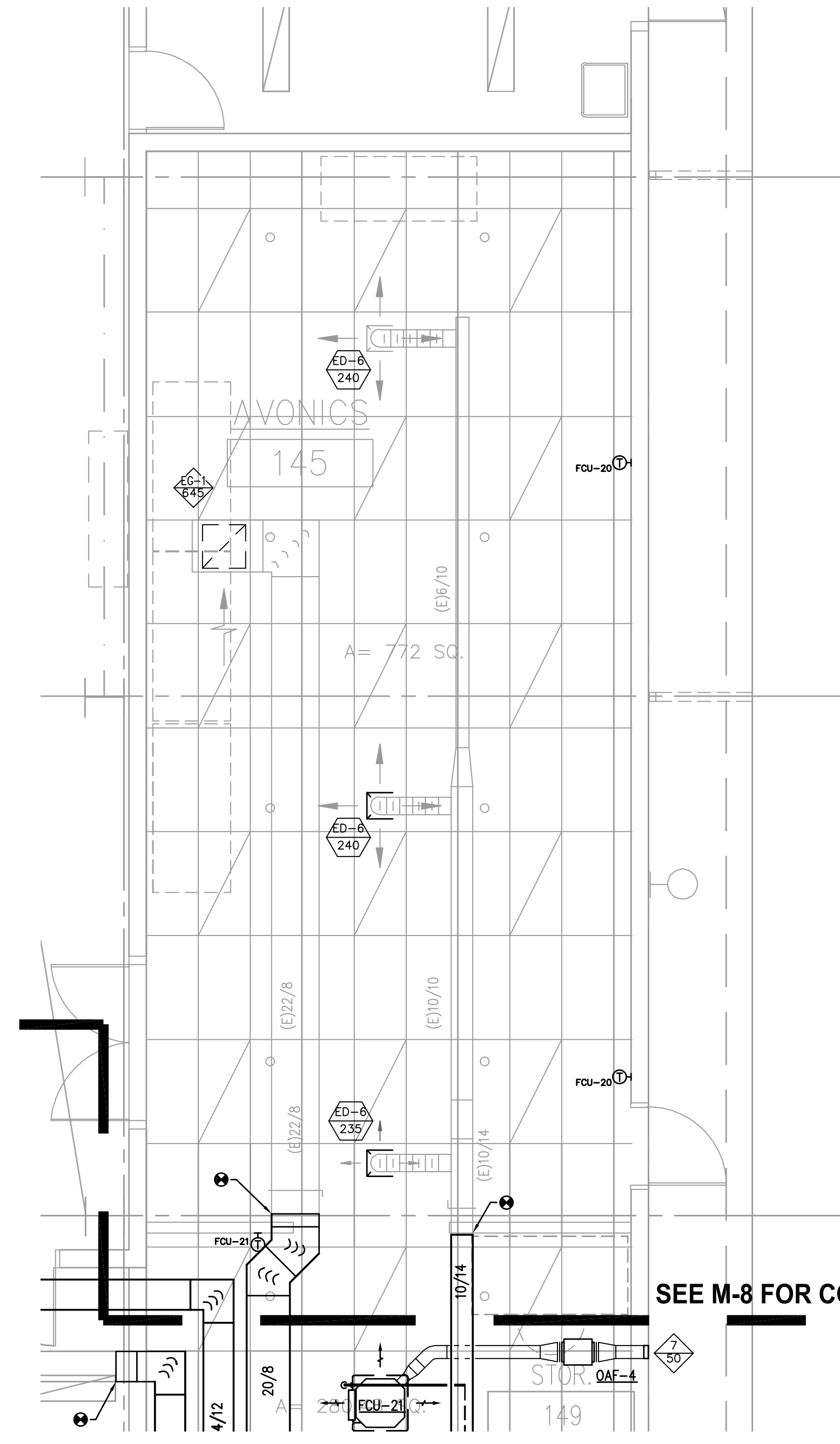
- ① FOR REFRIGERANT PIPE SIZING, SEE REFRIGERANT PIPING DIAGRAM.
- ② 3/4" CD DOWN ALONG WALL. TERMINATE AT DRYWELL.
- ③ ROUTE 1" CD TO EXISTING ELECTRIC WATER COOLER DRAIN IN TROOP HOLDING AREA 137. REFER TO SHEET M-6 FOR CONTINUATION.
- ④ BALANCE OA TO 95 CFM.
- ⑤ 3/8" LL AND 7/8" SL FROM ACQU-2. REFER TO M-7 FOR CONTINUATION.
- ⑥ 3/8" LL AND 3/8" SL TO ECU-12. REFER TO M-4 FOR CONTINUATION. REFER TO REFRIGERANT PIPING DIAGRAM FOR COMPLETE REFRIGERANT SYSTEM PIPING SIZES.
- ⑦ 3/8" LL AND 1/2" SL TO ECU-13. REFER TO M-4 FOR CONTINUATION. REFER TO REFRIGERANT PIPING DIAGRAM FOR COMPLETE REFRIGERANT SYSTEM PIPING SIZES.
- ⑧ DRYWELL. SEE DETAIL 6/M-14.

SEE M-5 FOR CONTINUATION



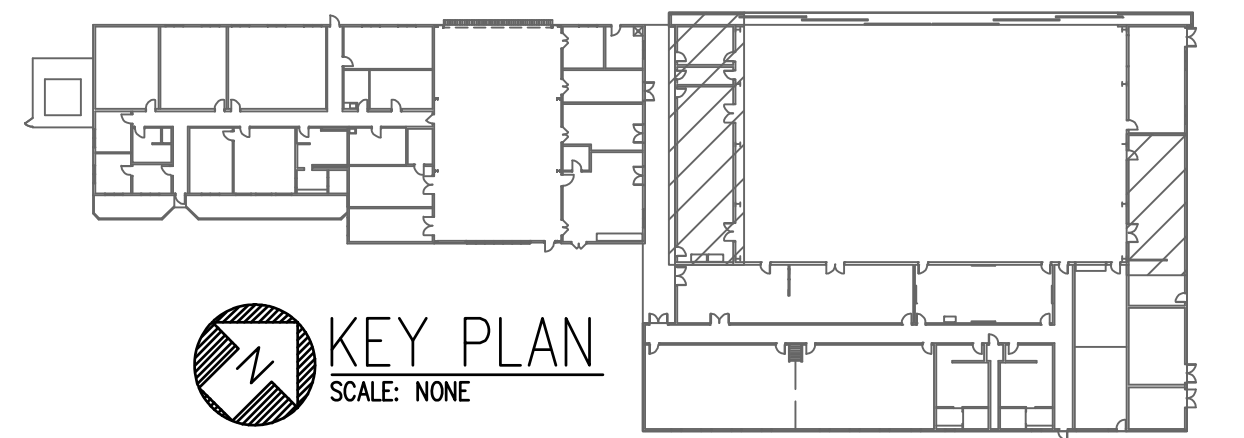
1 PARTIAL AIR CONDITIONING & VENTILATION PLAN
M-6 SCALE: 1/4"=1'-0"

SEE M-7 FOR CONTINUATION



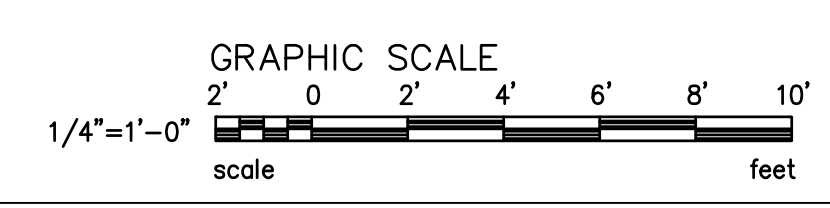
2 PARTIAL AIR CONDITIONING & VENTILATION PLAN
M-6 SCALE: 1/4"=1'-0"

SEE M-8 FOR CONTINUATION

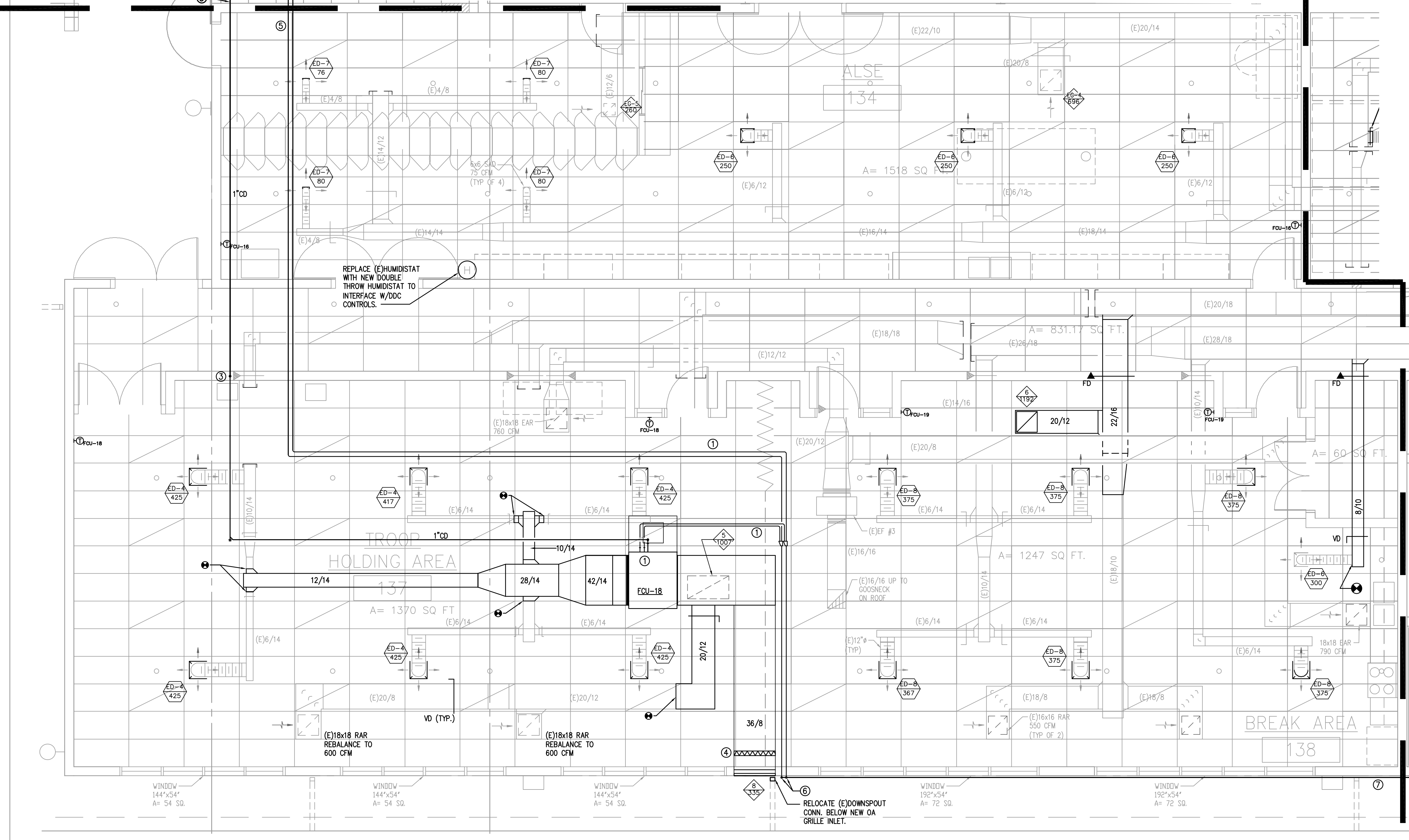


KEY PLAN
SCALE: NONE

REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL AIR CONDITIONING & VENTILATION PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS/PKY	M-6			
DRAWN: MOS/PKY				



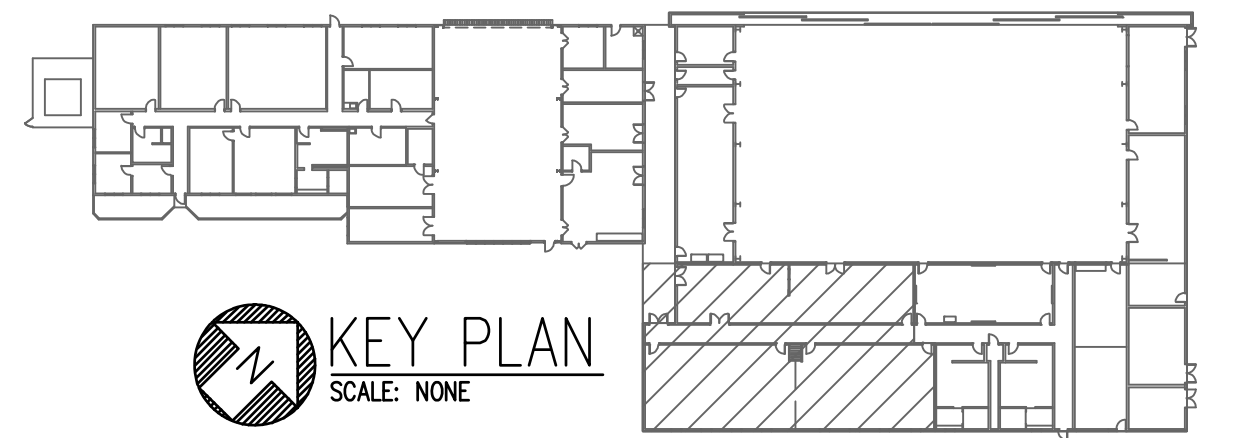
SEE M-6 FOR CONTINUATION



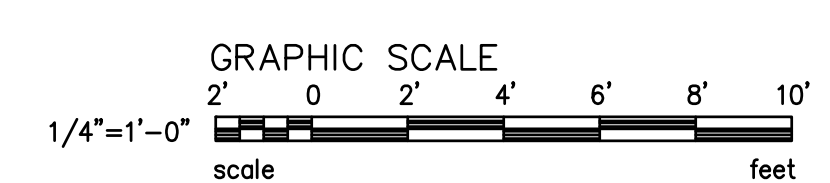
- ① FOR REFRIGERANT PIPE SIZING, SEE REFRIGERANT PIPING DIAGRAM.
- ② ROUTE 1" CD FCU-16, REFER TO SHEET M-6.
- ③ ROUTE 1" CD DOWN THROUGH WALL TO CONNECT TO DRINKING FOUNTAIN DRAIN PIPE. REFER TO DRAIN CONNECTION DETAIL.
- ④ MOTORIZED DAMPER. BALANCE TO 335 CFM OA. INTERLOCK WITH (E)EF #3 TO FULLY OPEN WHEN (E)EF #3 IS TURNED ON.
- ⑤ 3/8" LL AND 3/8" SL FROM TO FCU-12, 13, 14, AND 15. REFER TO M-6 FOR CONTINUATION.
- ⑥ 1/2" LL AND 1/8" SL UP ALONG WALL AND INTO CEILING SPACE. REFER TO REFRIGERANT PIPING DIAGRAM FOR COMPLETE REFRIGERANT SYSTEM PIPING SIZES.
- ⑦ 1/2" LL AND 1/8" SL ALONG WALL FROM ACCU-2. REFER TO SHEET M-8 FOR CONTINUATION.

SEE M-8 FOR CONTINUATION

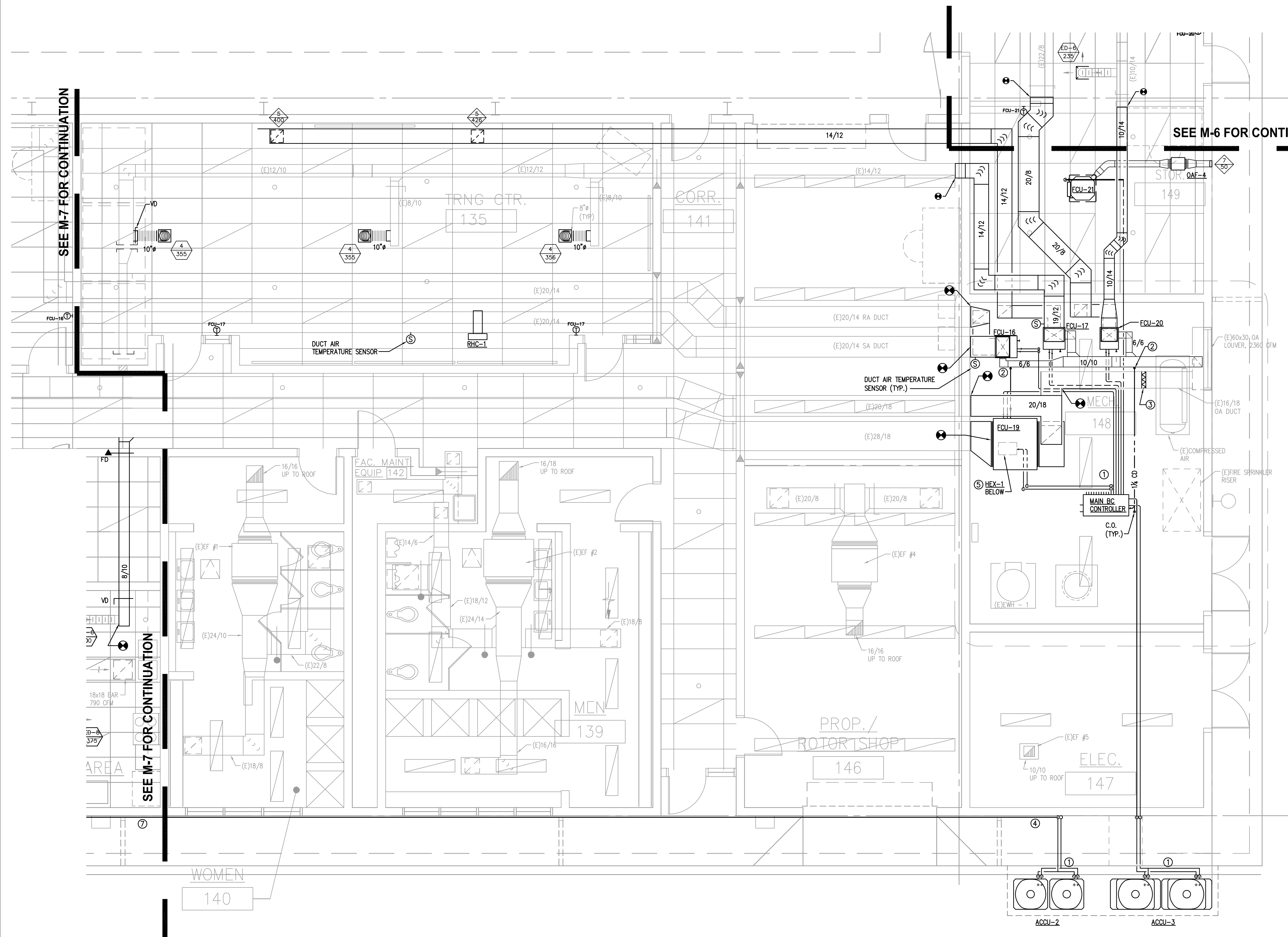
1
M-7
PARTIAL AIR CONDITIONING & VENTILATION PLAN
SCALE: 1/4"=1'-0"



REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL AIR CONDITIONING & VENTILATION PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS/PKY	M-7			
DRAWN: MOS/PKY				



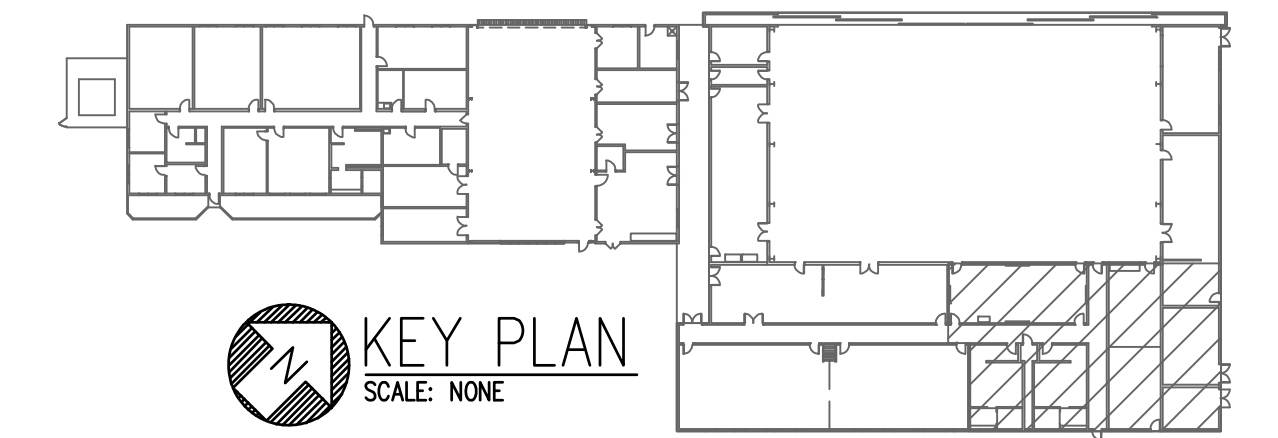
SEE M-7 FOR CONTINUATION



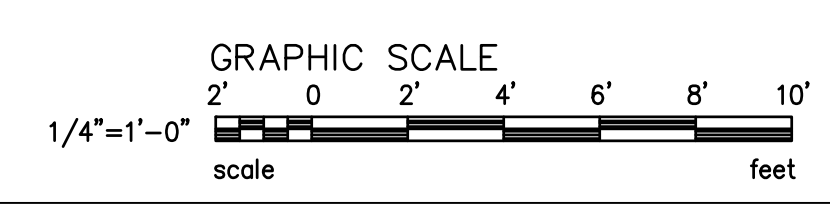
SEE M-6 FOR CONTINUATION

- ① FOR REFRIGERANT PIPE SIZING, SEE REFRIGERANT PIPING DIAGRAMS, 1/M-11 AND 1/M-12.
- ② CD LINES DOWN TO FLOOR LEVEL, SEE 1/M-9.
- ③ MOTORIZED DAMPER. BALANCE TO 250 CFM OA. INTERLOCK WITH (E)EF#3 TO FULLY OPEN WHEN (E)EF#3 IS TURNED ON.
- ④ REFRIGERANT PIPING ALONG WALL BELOW EVE.
- ⑤ FOR HEAT EXCHANGER PLUMBING PLAN & PIPING DIAGRAMS SEE M-9.
- ⑥ 1/2" LL AND 1/8" SL. ALONG WALL FROM ACCU-2. REFER TO SHEET M-7 FOR CONTINUATION.
- ⑦ SEE DET. 1/M-9 FOR CONDENSATE DRAIN PIPING.

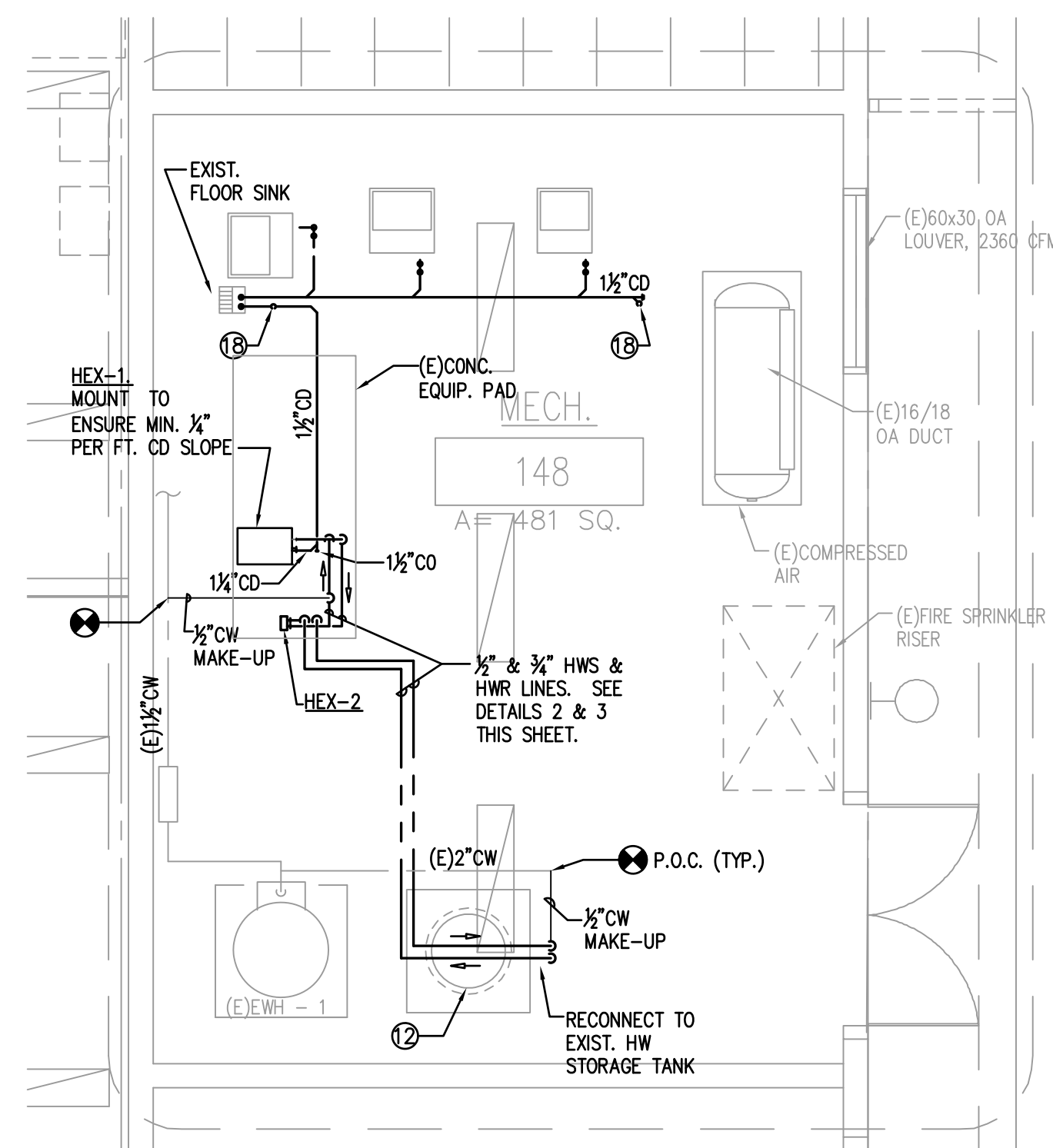
SEE M-7 FOR CONTINUATION



1
M-8 PARTIAL AIR CONDITIONING & VENTILATION PLAN
SCALE: 1/4"=1'-0"



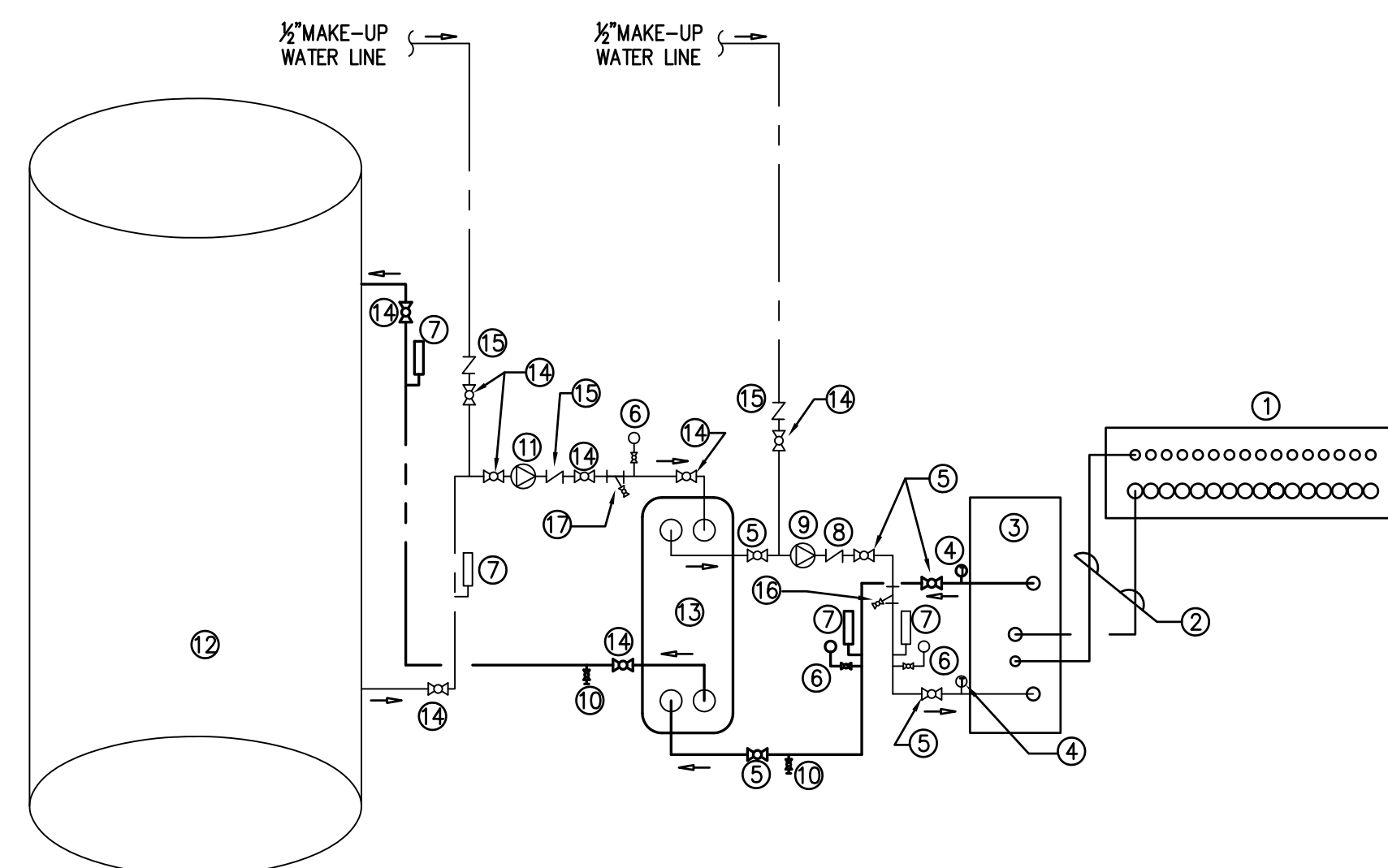
REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL AIR CONDITIONING & VENTILATION PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED		DRAWING NO:		
DESIGNED: MOS/PKY		M-8		
DRAWN: MOS/PKY				



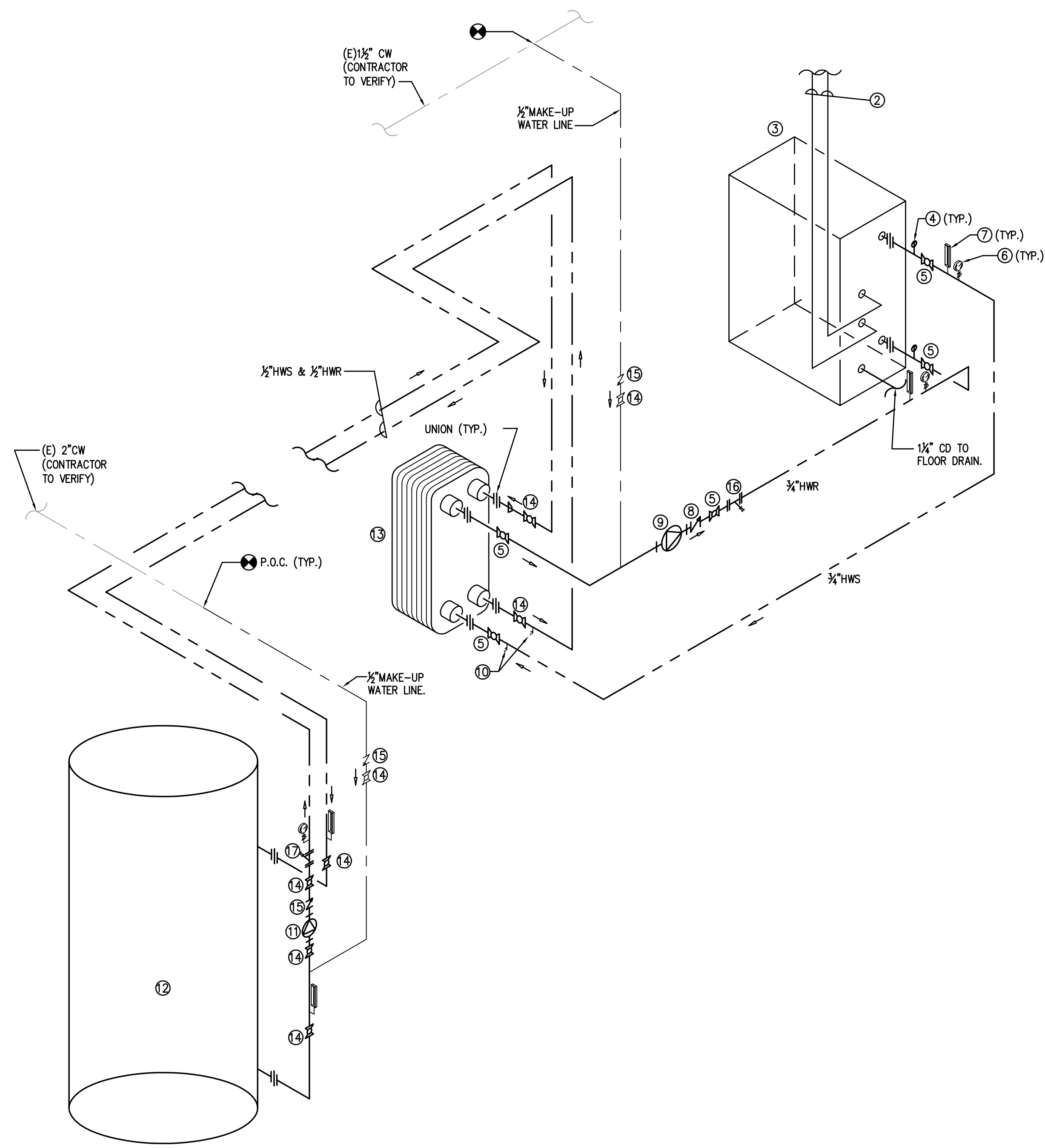
1 MECHANICAL ROOM PLUMBING PLAN
SCALE: 1/4"=1'-0"

SHEET LEGEND

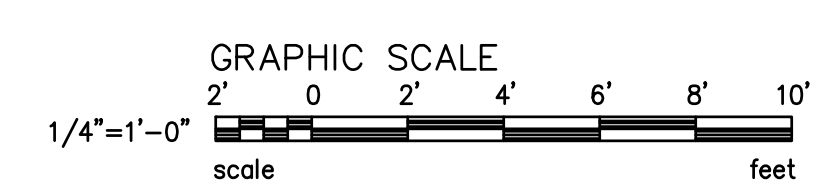
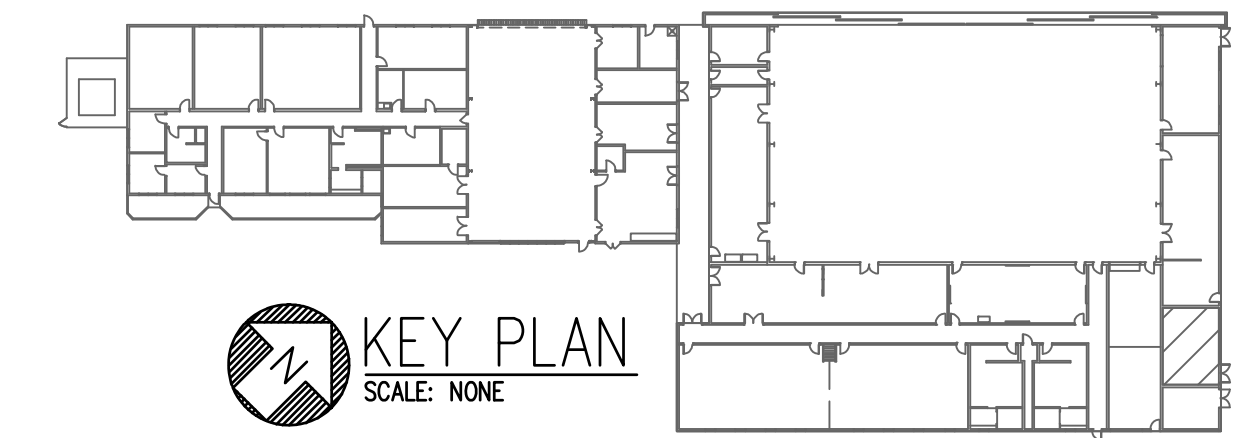
①	REFRIGERANT BRANCH CIRCUIT CONTROLLER	⑨	RECIRCULATING PUMP, 3 GPM, HWCP-1
②	REFRIGERANT LINES SHOWN M-12 FOR REFRIGERANT SCHEMATIC DIAGRAM	⑩	1/2" RELIEF VALVE
③	HYDRONIC HEAT EXCHANGER, HEX-1	⑪	RECIRCULATING PUMP, 0.75 GPM, HWCP-2
④	THERMISTOR	⑫	EXISTING 120 GALLON HOT WATER TANK
⑤	3/4" BALL VALVE	⑬	BRAZED PLATE HEAT EXCHANGER, HEX-2
⑥	1/2" BALL VALVE	⑭	1/2" BALL VALVE
⑦	PRESSURE GAGE ASSEMBLY	⑮	1/2" CHECK VALVE
⑧	THERMOMETER	⑯	3/4" STRAINER
		⑰	1/2" STRAINER
		⑱	CD FROM ABOVE



2 HEAT EXCHANGER FLOW DIAGRAM
NOT TO SCALE



3 HEAT EXCHANGER PIPING DIAGRAM
NOT TO SCALE



REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
MECHANICAL ROOM PLUMBING PLAN & HEAT EXCHANGER DIAGRAMS				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-9			
DRAWN: MOS				

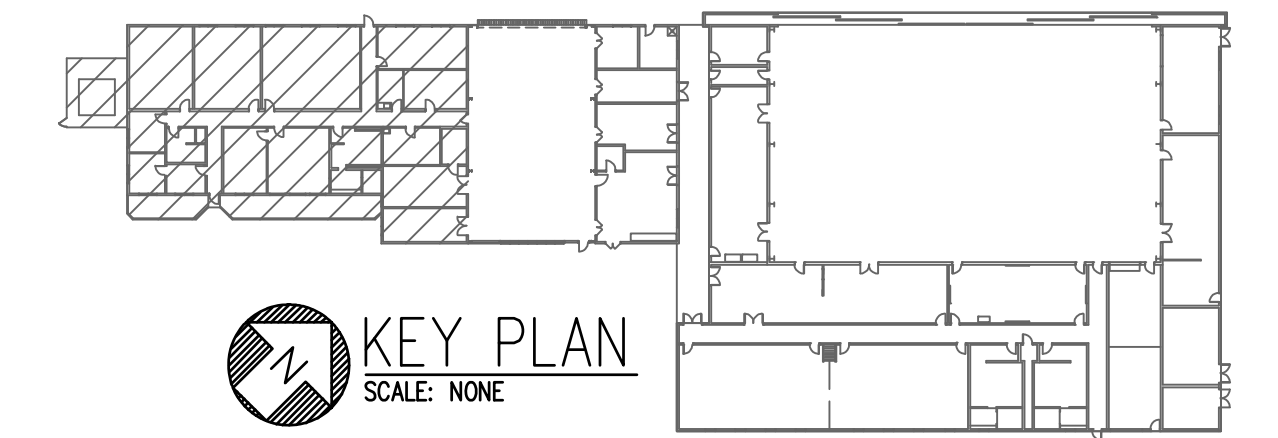
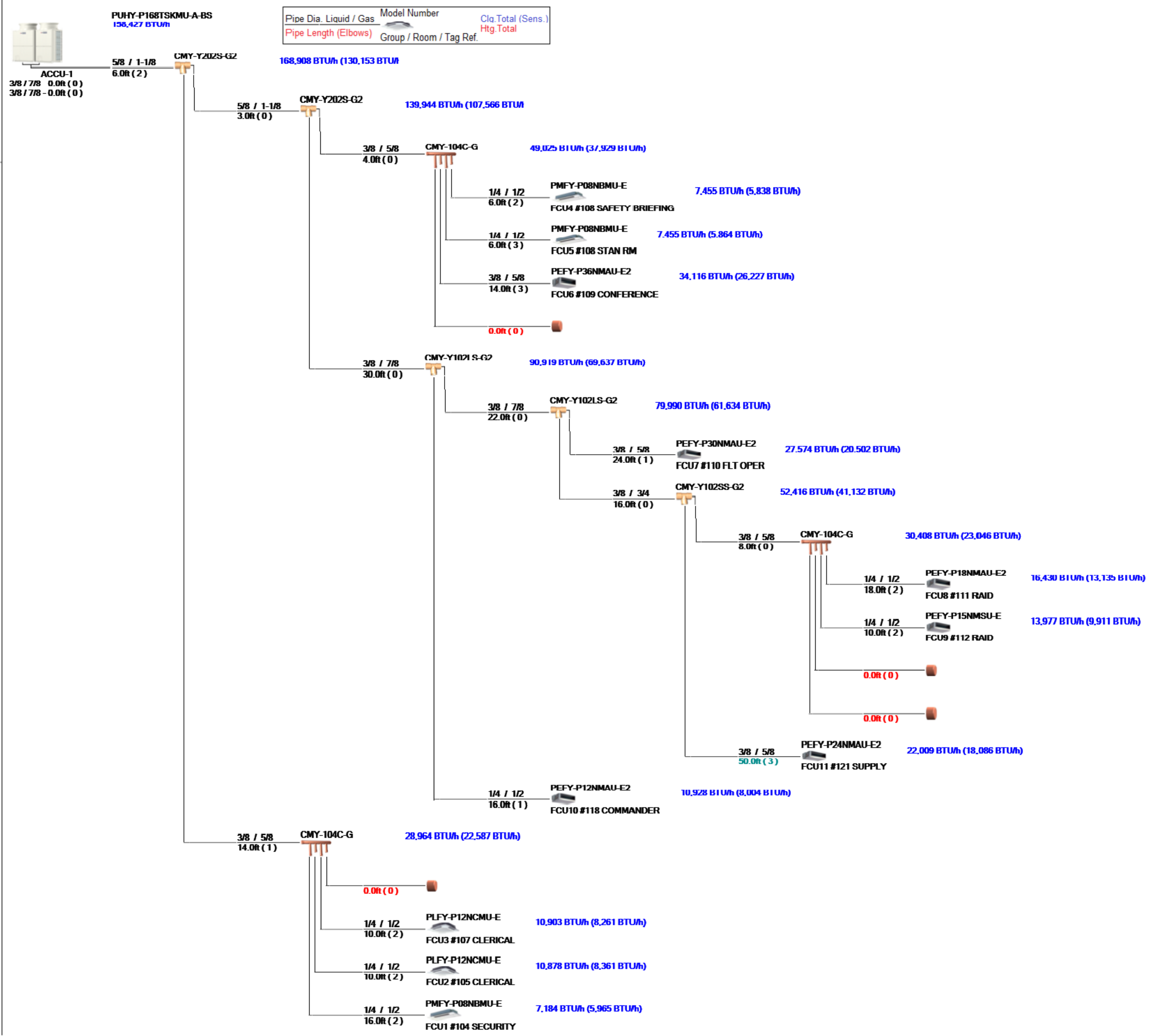
Indoor Units: 11 / 1 to 36
 Capacity: 183 / 84 to 218 (108.9%)
 * Connectable capacity is not actual capacity.
 Total Pipe Length: 283.0 / 3280.0 feet
 Furthest Actual: 127.0 / 541.0 feet
 Furthest Equiv.: 135.2 / 623.0 feet
 After 1st Branch Actual: 121.0 / 295.0 feet
 After 1st Branch Equiv.: 125.9 / 295.0 feet

Correction Factors
 Outdoor Unit Capacity: 1.02 1.00
 Temperatures: 0.98 1.00
 Piping Length: 0.94 0.98
 Defrosting: - 1.00

Total Derate: 0.94 0.98

Additional Refrigerant: 25.6 lb
 Total Refrigerant Amount: 70.8 lb

Conditions (°F)
 Cooling
 Indoor DB 80.0 Humidity 51.8% Indoor WB 67.0
 Outdoor DB 88.0
 Heating
 Indoor DB 70.0
 Outdoor DB 61.0 Humidity 75.0% Outdoor WB 56.3



1 ACCU-1 REFRIGERANT PIPING DIAGRAM
 M-10 NOT TO SCALE

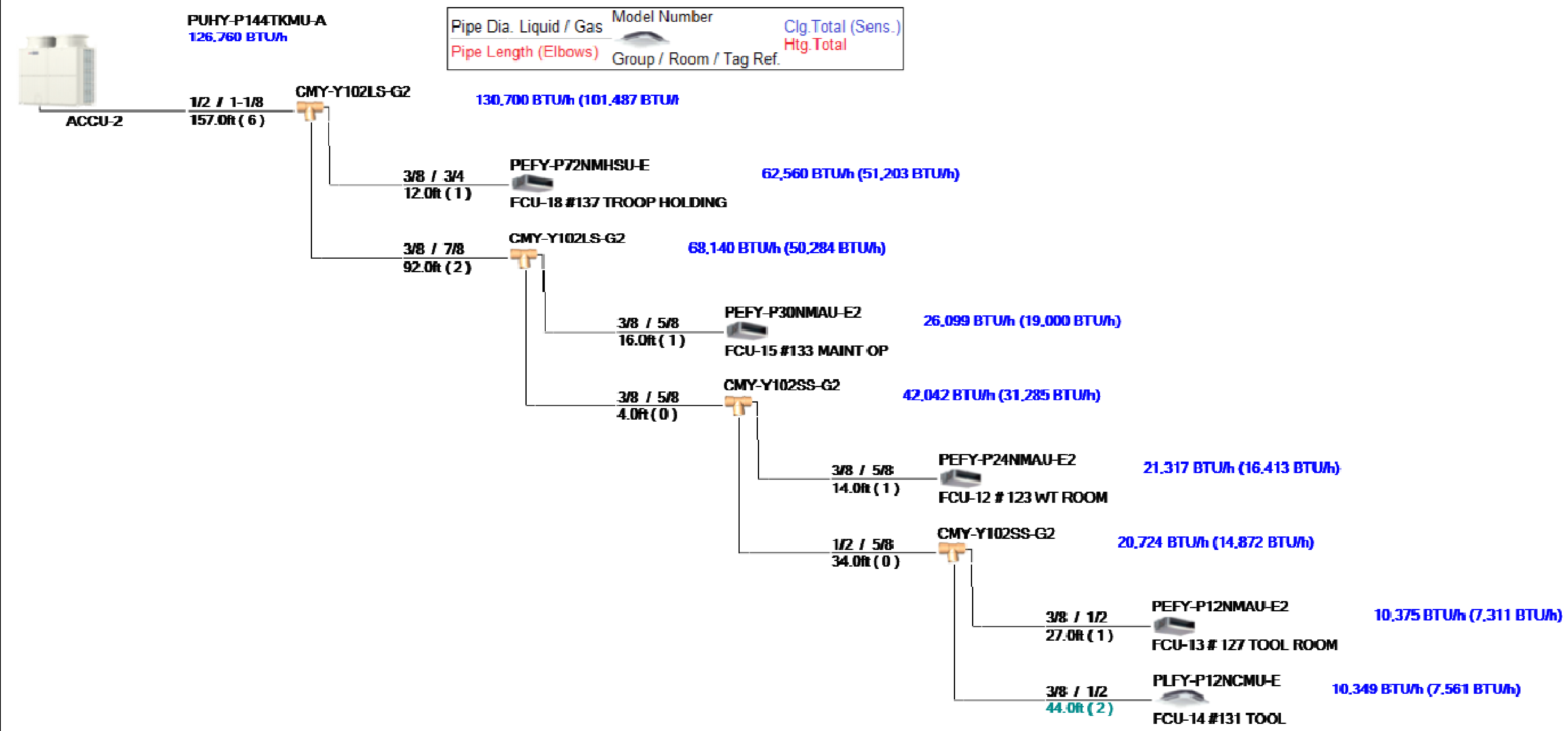
REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
ACCU-1 REFRIGERANT PIPING DIAGRAM				DATE:
				MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-10			
DRAWN: EA/MOS				

Indoor Units: 5 / 1 to 31
Capacity: 150 / 72 to 187 (104.2%)
 * Connectable capacity is not actual capacity.
Total Pipe Length: 400.0 / 3280.0 feet
Furthest Actual: 331.0 / 541.0 feet
Furthest Equiv.: 347.4 / 623.0 feet
After 1st Branch Actual: 174.0 / 295.0 feet
After 1st Branch Equiv.: 180.6 / 295.0 feet
Correction Factors
Outdoor Unit Capacity: 1.01 1.00
Temperature: 1.01 1.00
Piping Length: 0.86 0.95
Defrosting: - 1.00

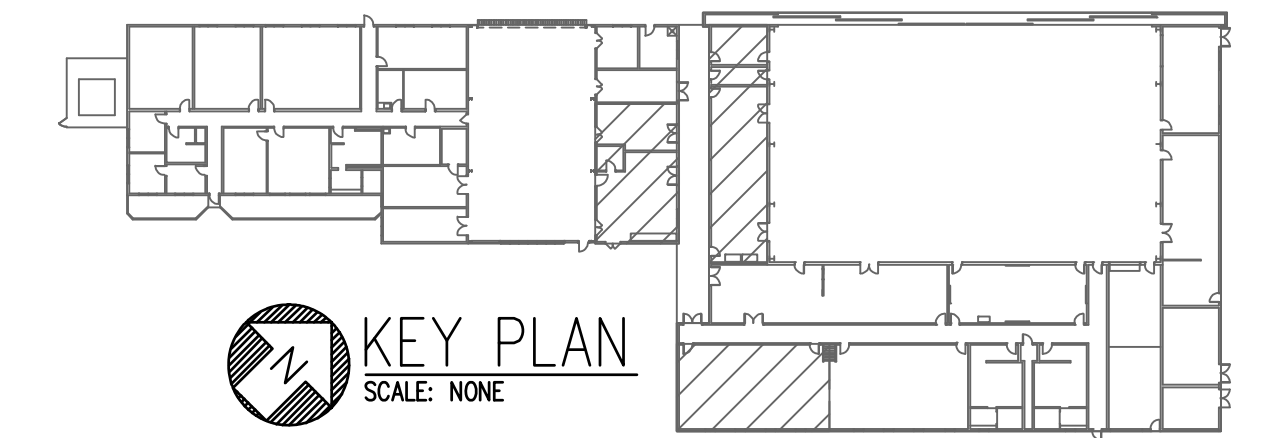
Total Derate: 0.88 0.95

Additional Refrigerant: 51.6 lb
Total Refrigerant Amount: 77.6 lb

Conditions (°F)
Cooling
 Indoor DB 80.0 Humidity 51.8% Indoor WB 67.0
 Outdoor DB 88.0
Heating
 Indoor DB 70.0
 Outdoor DB 61.0 Humidity 75.0% Outdoor WB 56.3



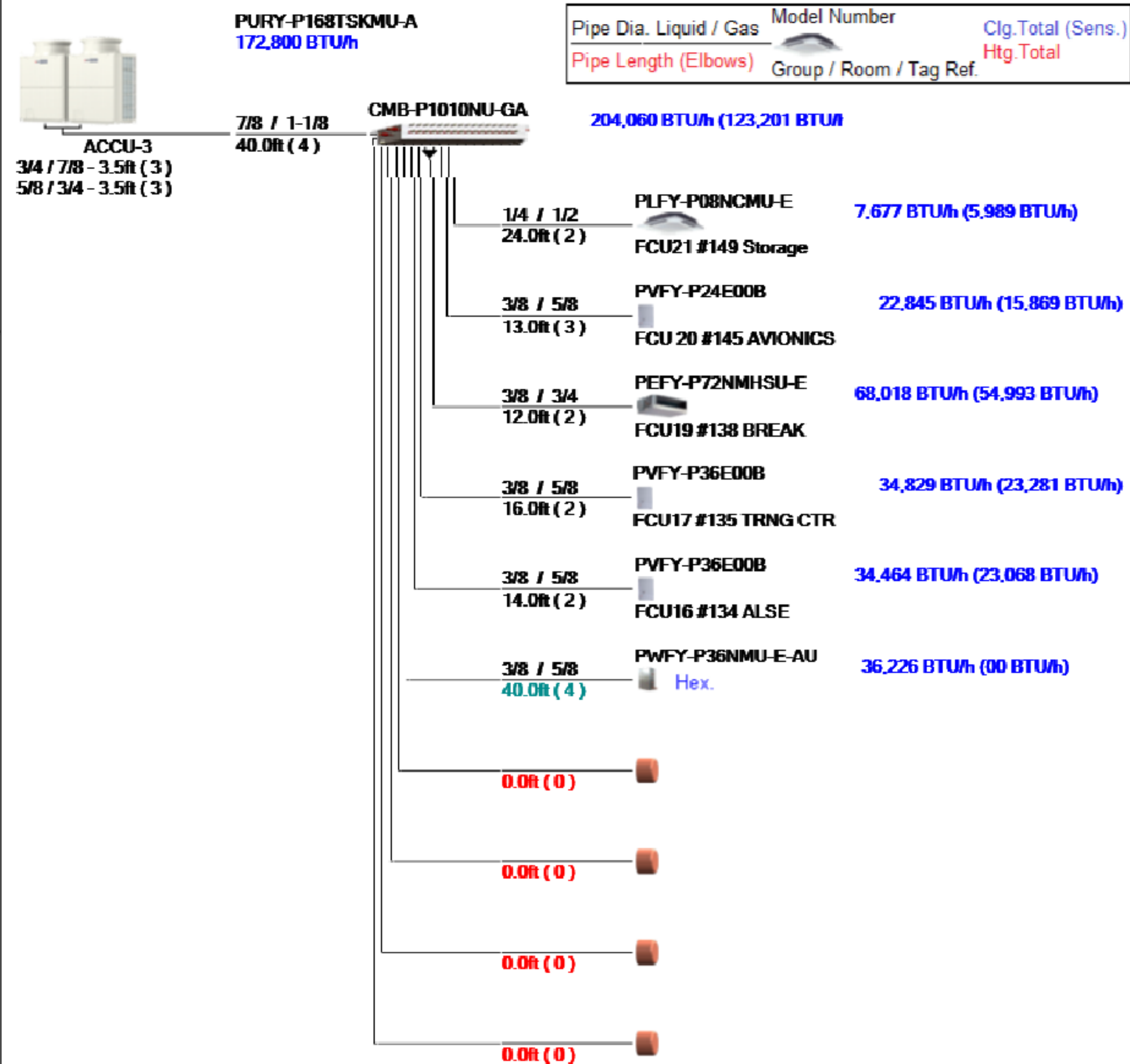
1 ACCU-2 REFRIGERANT PIPING DIAGRAM
 M-11 NOT TO SCALE



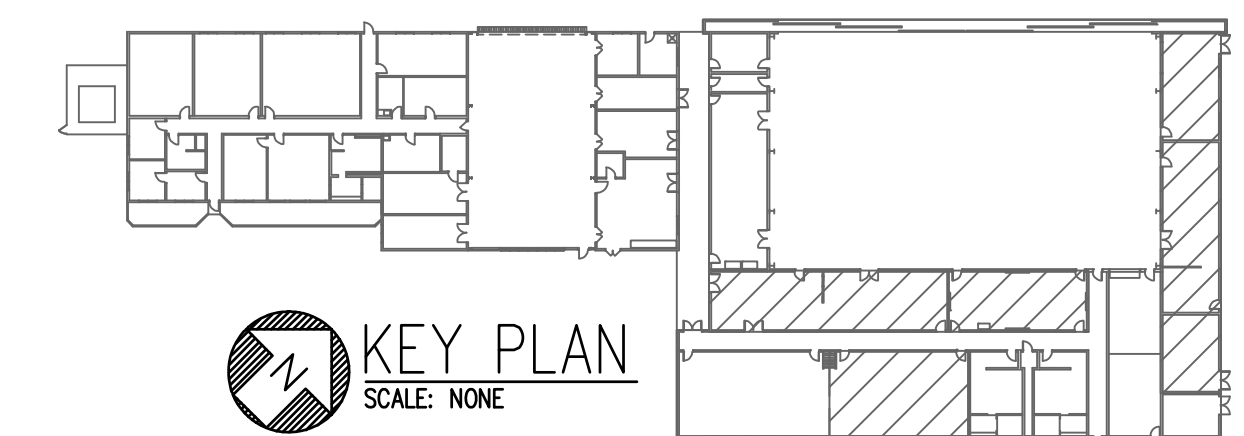
REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
ACCU-2 REFRIGERANT PIPING DIAGRAM				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-11			
DRAWN: EA/MOS				

Indoor Units: 6 / 1 to 42
Capacity: 212 / 84 to 252 (126.3%)
 * Connectable capacity is not actual capacity.
Total Pipe Length: 166.0 / 1925.0 feet
Furthest Actual: 83.5 / 541.0 feet
Furthest Equiv.: 101.5 / 623.0 feet
After 1st Branch Actual: 40.0 / 131.0 feet
After 1st Branch Equiv.: 46.6 / 131.0 feet
Correction Factors:
Outdoor Unit Capacity: 1.06 1.00
Temperature: 1.02 1.01
Piping Length: 0.96 0.98
Defrosting: - 1.00
Total Derate: 1.03 0.99
Additional Refrigerant: 37.9 lb
Total Refrigerant Amount: 89.9 lb

Conditions (°F)
Cooling
 Indoor DB 80.0 Humidity 51.8% Indoor WB 67.0
 Outdoor DB 88.0
Heating
 Indoor DB 70.0
 Outdoor DB 61.0 Humidity 75.0% Outdoor WB 56.3



1
 M-12 ACCU-3 REFRIGERANT PIPING DIAGRAM
 NOT TO SCALE

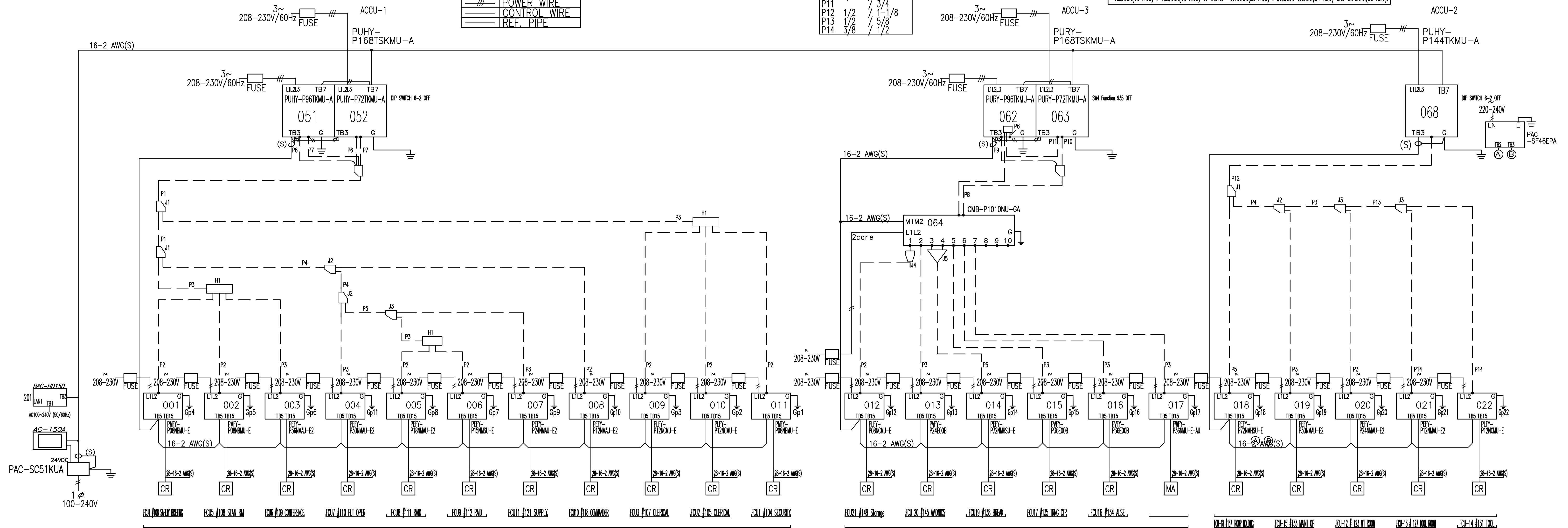


REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
ACCU-3 REFRIGERANT PIPING DIAGRAM				DATE: MARCH 14, 2014
SCALE:	AS NOTED	DRAWING NO:		
DESIGNED:	MOS	M-12		
DRAWN:	EA/MOS			

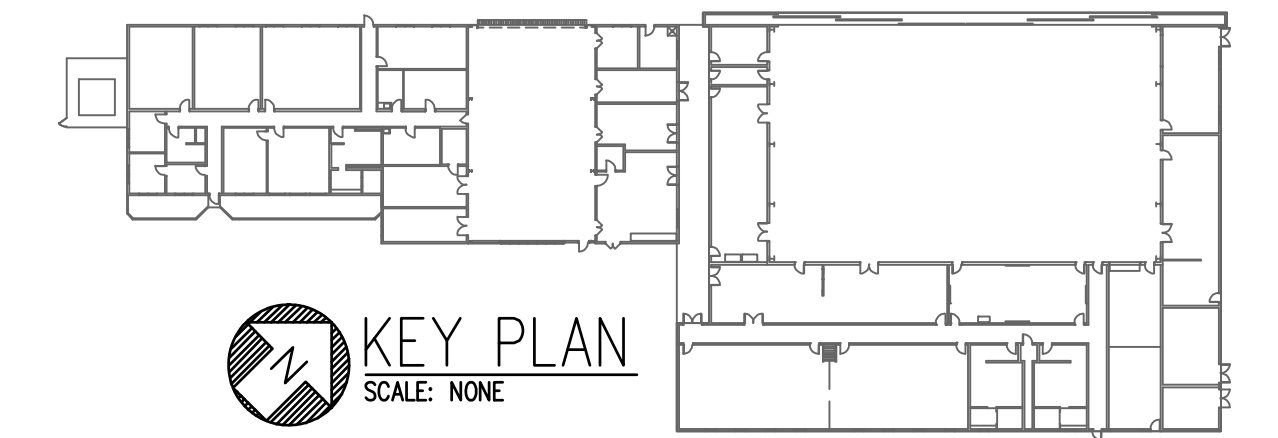
PIPING LIST	
SYMBOL	BRANCH PIPE MODEL NAME
J1	CMY-Y202S-G2
J2	CMY-Y102LS-G2
J3	CMY-Y102SS-G2
J4	Reducer
J5	CMY-R160-J
H1	CMY-104C-G
SYMBOL	LIQUID PIPE/GAS PIPE SIZE
P1	5/8 1-1/8
P2	1/4 1/2
P3	3/8 5/8
P4	3/8 7/8
P5	3/8 3/4
P6	3/8 7/8
P7	3/8 1-1/8
P8	7/8 1-1/8
P9	3/4 5/8
P10	5/8 3/4
P11	1/2 1-1/8
P12	1/2 1-1/8
P13	1/2 5/8
P14	3/8 1/2

AASF Bldg 618 & 672		CONT.No 11102	PAGE
DIAGRAM DISPLAY	SYMBOL DESCRIPTION		
---	POWER WIRE		
---	CONTROL WIRE		
---	REF. PIPE		

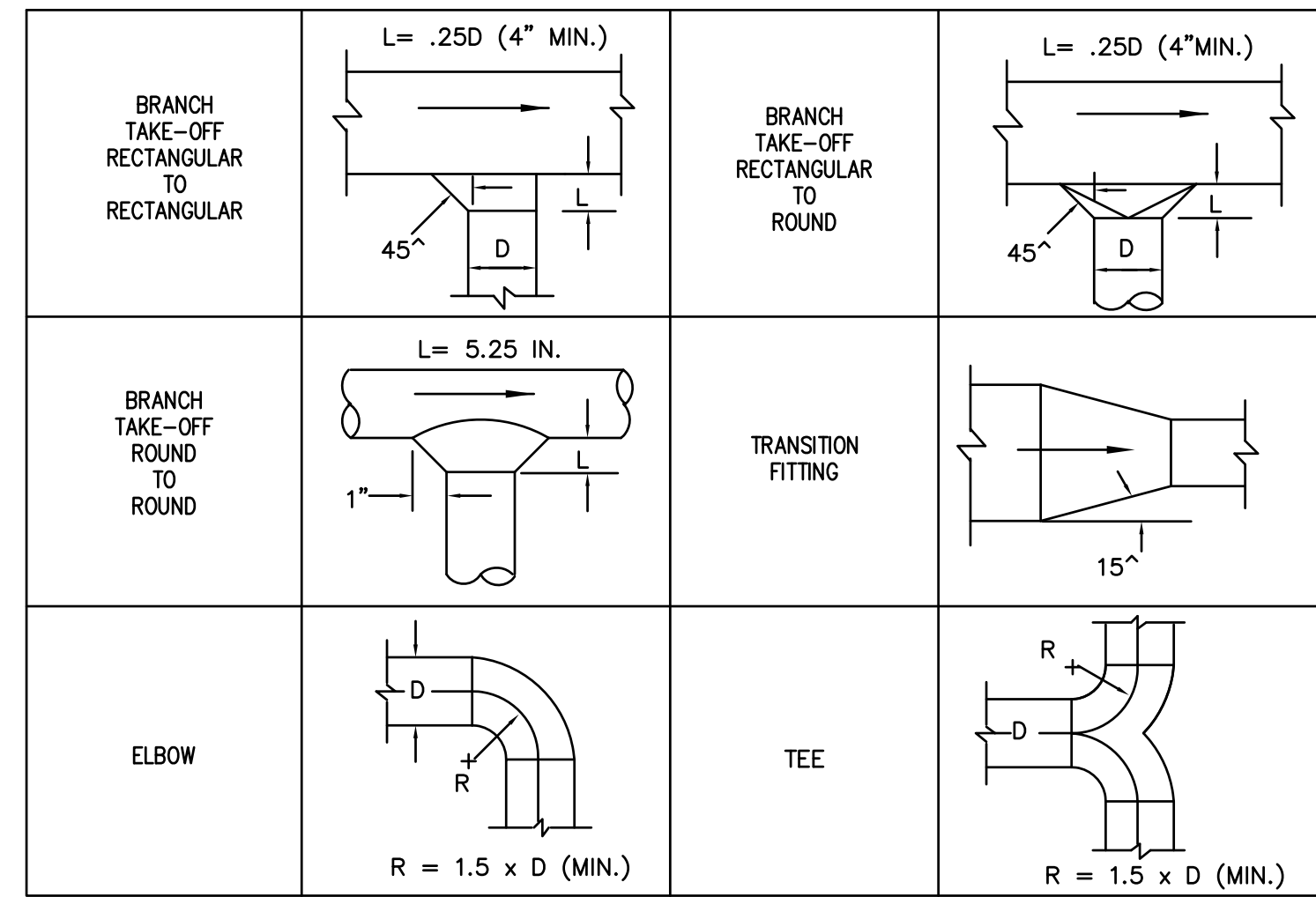
Additional refrigerant charge is needed depending on the size and length of extended piping. Please refer the amount of pre-charge and the formula of calculation which is mentioned on the data book.
 1.25mm²(16 AWG) : 1.25mm²(16 AWG) or more. 0.75mm²(20 AWG) : between 0.5mm²(24 AWG) and 0.75mm²(20 AWG).



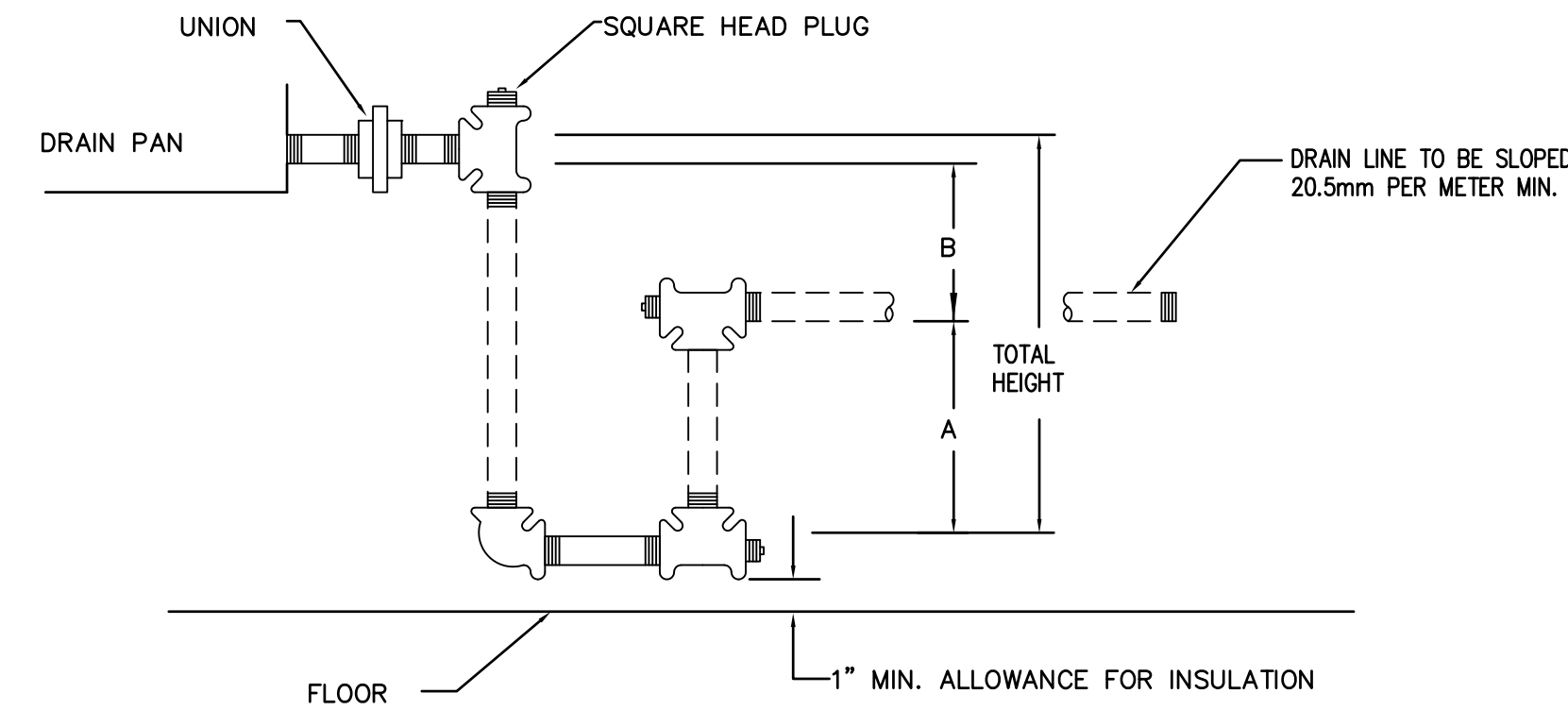
1 AIR CONDITIONING SYSTEM SCHEMATIC
 M-13 NOT TO SCALE



REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
AIR CONDITIONING SYSTEM SCHEMATIC				DATE:
				MARCH 14, 2014
SCALE:	AS NOTED	DRAWING NO.:		
DESIGNED:	MOS			
DRAWN:	EA/MOS	SHEET:	M-13	



1 DUCT TRANSITION DETAILS
M-14 NOT TO SCALE



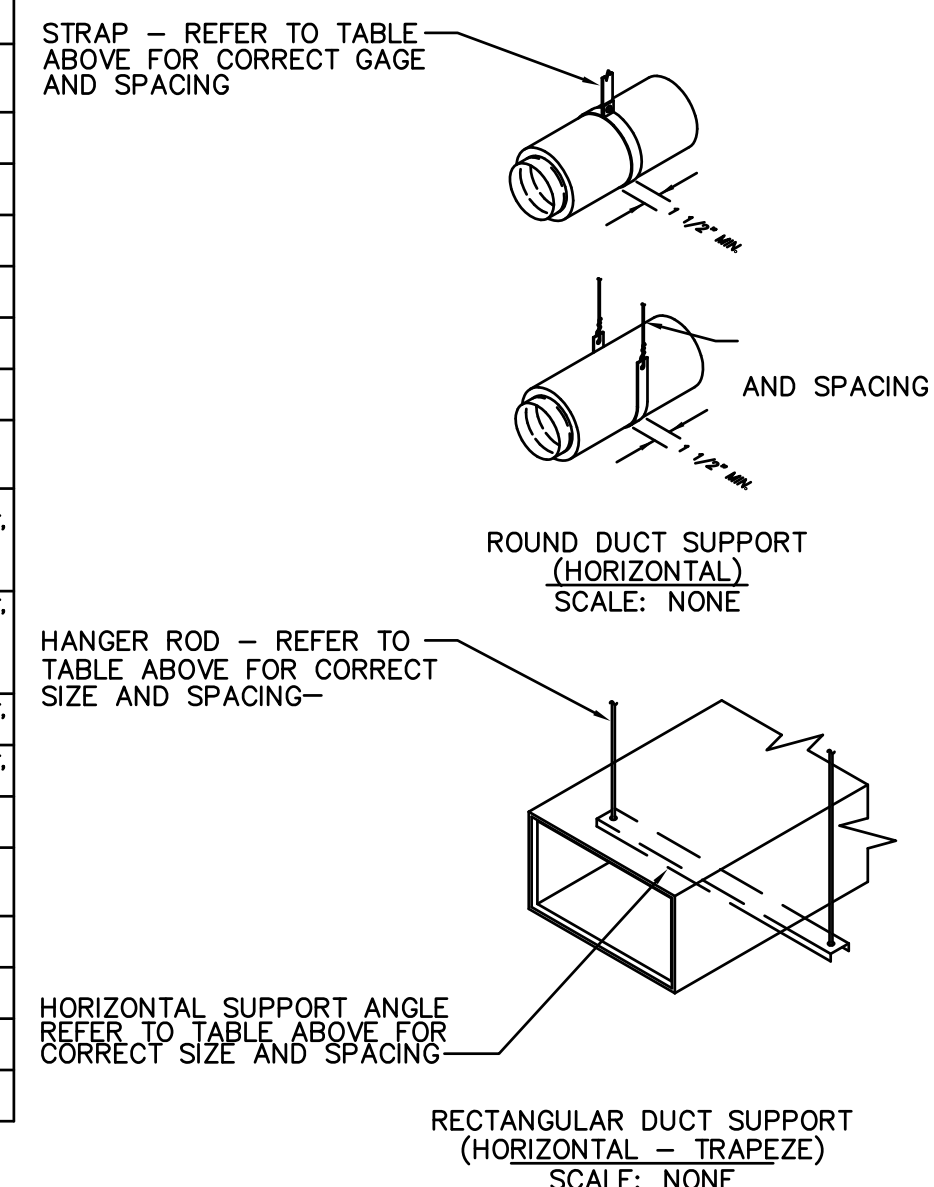
- NOTES:
- FILL TRAP MANUALLY ON INITIAL START-UP
 - TRAP EACH COMPONENT DRAIN CONNECTION.
 - PIPE SIZE SHALL NOT BE LESS THAN DRAIN PAN CONNECTION SIZE
 - POSITIVE PRESSURE AT DRAIN PAN
A = POS. S.P. ON THE DRAIN PAN + 2"
B = 1"
TOTAL HEIGHT OF TRAP = A+B+(1/4 x PIPE DIAMETER)
 - NEGATIVE PRESSURE AT DRAIN PAN
A = 1"
B = NEG. S.P. + 2"
TOTAL HEIGHT OF TRAP = A+B+(1/4 x PIPE DIAMETER)
 - CONTRACTOR MAY USE STEEL, COPPER, OR PVC PIPE
 - PROVIDE 2" AIR GAP AT DISCHARGE OF DRAIN PIPE

4 CONDENSATE TRAP DETAIL
M-14 NOT TO SCALE

DUCT SUPPORTS - VERTICAL DUCTS			
MAXIMUM SIDE OF RECTANGULAR DUCT	METAL STRAP OR ANGLE BRACKET	MAXIMUM DIAMETER OF ROUND DUCTS	STRAPS
24"	1" x 1/8" STRAP (1)	10"	0.047 (NO. 18 GAGE) GALVANIZED STEEL 2" WIDE (1)
36"	1" x 1" x 1/8" ANGLE (1)	20"	0.058 (NO. 16 GAGE) GALVANIZED STEEL 2" WIDE (1)
48"	1 1/8" x 1 1/8" x 1/8" ANGLE (1)	40"	1/8" STEEL X 1 1/2" (1)
60"	1 1/2" x 1 1/2" x 1/8" ANGLE (1)	60"	1/8" STEEL X 2" (1)
OVER 60"	2" x 2" x 1/8" ANGLE (1)	OVER 60"	3/16" STEEL X 2" (1)

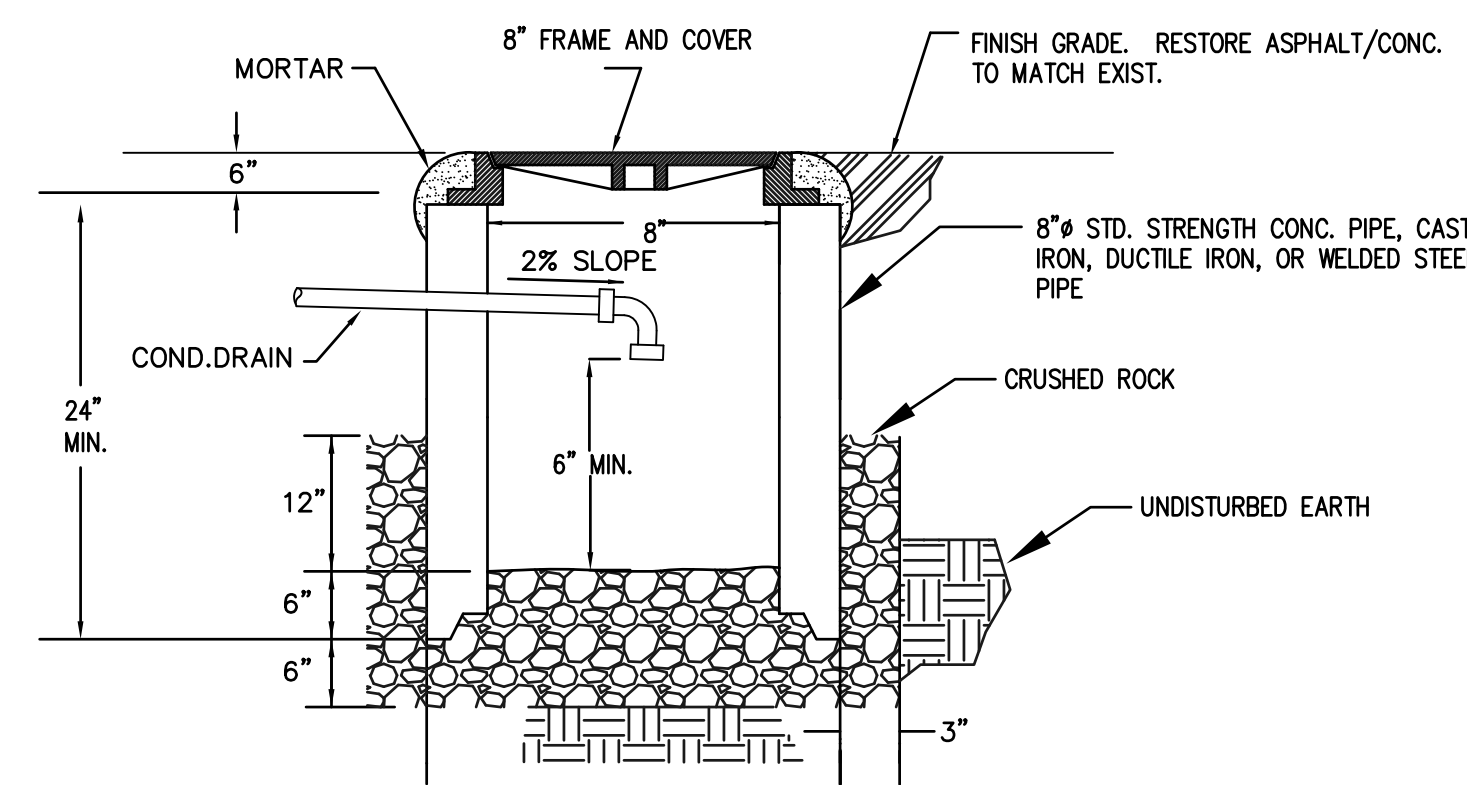
DUCT SUPPORTS - HORIZONTAL DUCTS			
MAXIMUM SIDE OF RECTANGULAR DUCT	METAL STRAP OR ANGLE BRACKET	MAXIMUM DIAMETER OF ROUND DUCTS	STRAPS
18"	1" x 1/8" GAGE (2)	10"	SAME GAGE AS GALV. STEEL DUCT, 1" WIDE OR (NO. 18 GAGE GALV. STEEL WIRE) ON 10" CENTERS
30"	1" x 1/8" GAGE (2)	20"	SAME GAGE AS GALV. STEEL DUCT, 1" WIDE OR (NO. 18 GAGE GALV. STEEL WIRE) TIED TO 1" GALV. STEEL BRACKETS AROUND DUCT ON 10" CENTERS
48"	1" x 1/8" (2)	40"	SAME GAGE AS GALV. STEEL DUCT, 1 1/2" WIDE OR 8" GAGE GALV. STEEL BRACKETS AROUND DUCT ON 10" CENTERS
60"	1" x 1/8" (2)	60"	SAME GAGE AS GALV. STEEL DUCT, 1 1/2" WIDE OR 8" CENTERS
80"	1" x 1/8" (2)	OVER 60"	SAME GAGE AS GALV. STEEL DUCT, 1 1/2" WIDE ON 4" CENTERS

DUCT SUPPORTS - HORIZONTAL DUCTS - TRAPEZE-TYPE SUPPORTS		
MAXIMUM DIAMETER OF ROUND DUCT OR SIDE OF RECTANGULAR DUCT	HORIZONTAL SUPPORT ANGLE (3)	HANGER
36"	1 1/2" x 1 1/2" x 1/8"	1/4" ROUND ROD OR 1" x 1" x 1/8" ANGLE
48"	2" x 2" x 1/8"	1/4" ROUND ROD OR 1" x 1" x 1/8" ANGLE
60"	2" x 2" x 1/8"	5/16" ROUND ROD OR 1" x 1" x 1/8" ANGLE
84"	2" x 2" x 1/8"	3/8" ROUND ROD OR 1" x 1" x 1/8" ANGLE

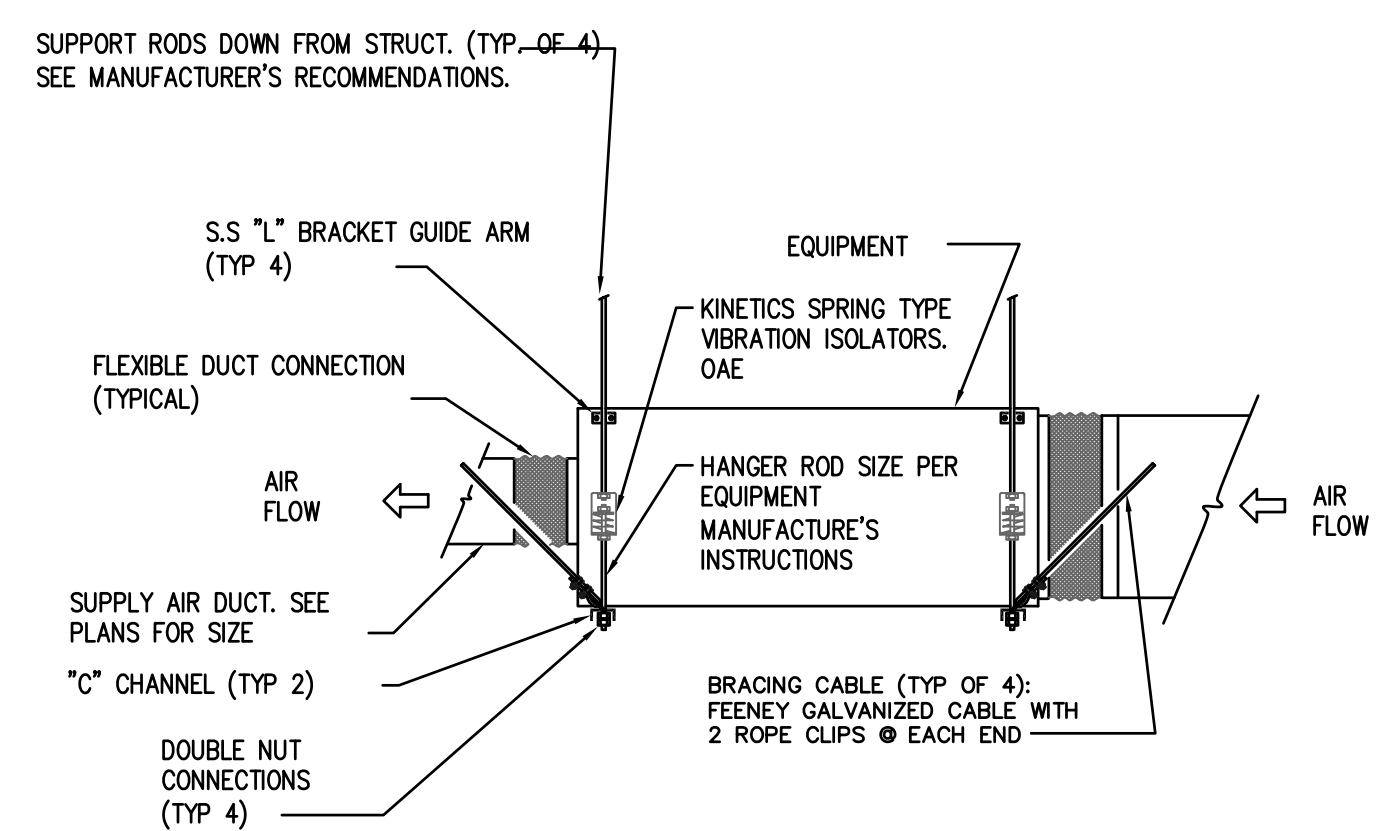


(1) SPACED VERTICALLY NOT MORE THAN 12 FEET (3658 MM) ON CENTERS
(2) SPACED HORIZONTALLY NOT MORE THAN 10 FEET (3048 MM) ON CENTERS
(3) SPACED NOT MORE THAN 8 FEET (2438 MM) ON CENTERS

2 MISC. DUCT SUPPORT DETAIL
M-14 NOT TO SCALE

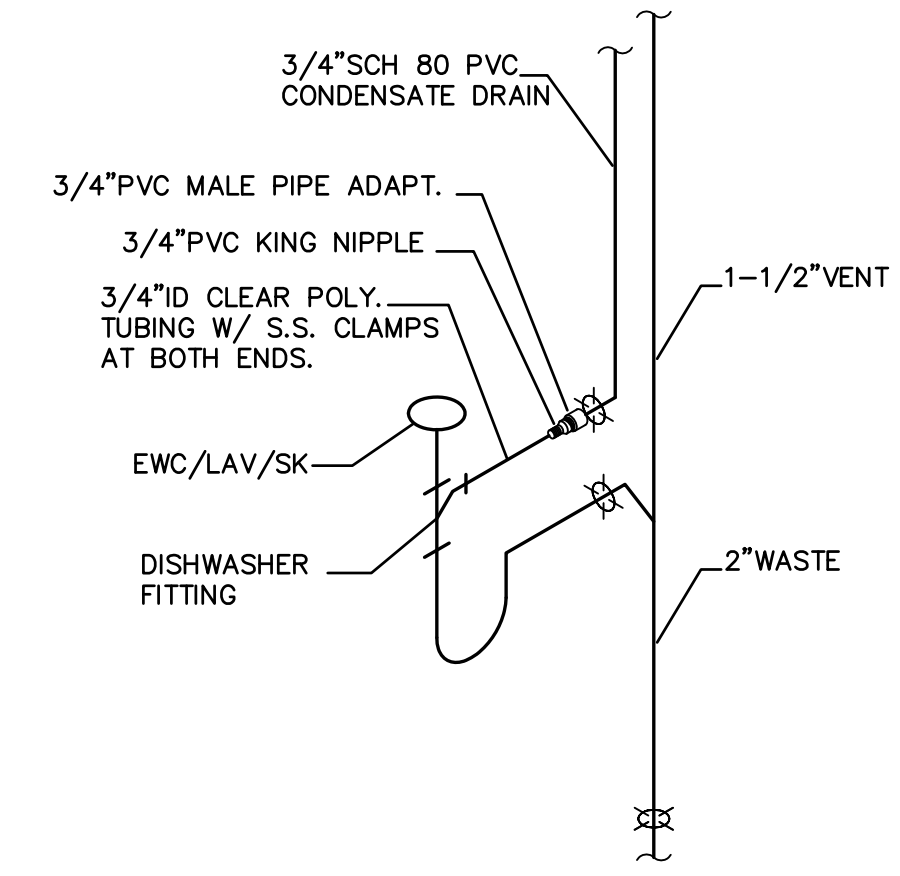


5 DRYWELL DETAIL
M-14 NOT TO SCALE

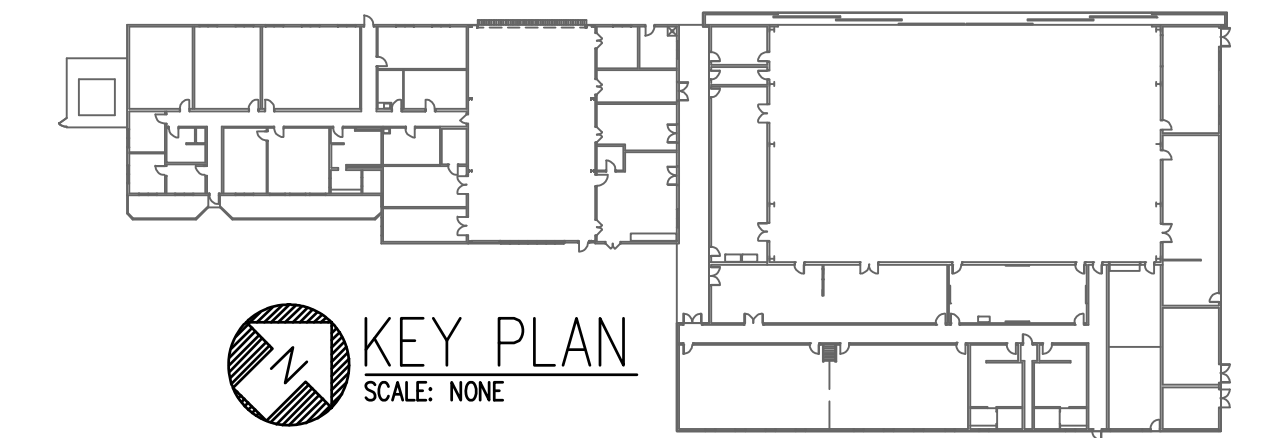


NOTE: LOCATE HANGER RODS AND VIBRATION ISOLATORS IN A LOCATION THAT DOES NOT HINDER SERVICE ACCESS TO UNIT.

3 EQUIPMENT HANGING DETAIL
M-14 NOT TO SCALE



6 CONDENSATE DRAIN CONNECTION DETAIL
M-14 NOT TO SCALE



REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
DETAILS				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: MOS	M-14			
DRAWN: EA/MOS				

ELECTRICAL GENERAL NOTES

SEE DIVISION 16 SPECIFICATIONS FOR EXPANDED REQUIREMENTS

- WORK INCLUDES INSTALLATION OF ALL ELECTRICAL SYSTEMS COMPLETE AND OPERATIONAL TO THE SATISFACTION OF THE OWNER AS LIMITED BY THE CONTRACT DOCUMENTS.
- ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE 2008 EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70) WITH HAWAII AMENDMENTS, NATIONAL ELECTRICAL SAFETY CODE AND ALL LOCAL RULES AND REGULATIONS.
- SUBMIT DRAWINGS FOR, AND OBTAIN AND PAY FOR, ALL NECESSARY PERMITS.
- VISIT THE JOB SITE AND VERIFY ALL EXISTING CONDITIONS AND THE EXTENT OF REMOVAL, RELOCATION, RECONNECTION AND/OR NEW WORK PRIOR TO BIDDING. BID SUBMISSION SHALL BE CONSIDERED AS EVIDENCE OF SITE INSPECTION AND RESOLUTION OF ALL DISCREPANCIES AND QUESTIONS. NO EXTRA PAYMENT WILL BE AUTHORIZED FOR WORK MADE NECESSARY BY FAILURE TO VISIT THE SITE.
- SUBMIT SHOP DRAWINGS TO THE ARCHITECT FOR ALL LUMINAIRES, EQUIPMENT AND DEVICES COVERED BY THIS CONTRACT FOR APPROVAL PRIOR TO ORDERING. SHOP DRAWINGS SHALL BEAR THE CONTRACTOR'S STAMP AND SIGNATURE INDICATING THEY HAVE BEEN CHECKED AND ARE IN COMPLIANCE WITH THE CONTRACT DOCUMENTS. SHOP DRAWINGS NOT BEARING CONTRACTOR APPROVAL WILL BE RETURNED WITHOUT REVIEW.
- SHOP DRAWINGS ARE INTENDED TO SHOW UNDERSTANDING OF, AND COMPLIANCE WITH, THE CONTRACT DOCUMENTS. CAD FILES OF THE PROJECT DOCUMENTS WILL NOT BE AVAILABLE FOR USE AS SHOP DRAWINGS.
- SHOULD PROJECT CONDITIONS, INCLUDING CONDITIONS DISCOVERED THROUGH DEMOLITION OR CHANGES IN OTHER TRADES, REQUIRE REARRANGEMENT OF WORK, MARK SUCH CHANGES ON AS-BUILT DRAWINGS. IF PROJECT CONDITIONS REQUIRE UNSPECIFIED MATERIALS OR METHODS, SUBMIT REQUEST FOR INFORMATION (RFI) TO THE ARCHITECT WITH DRAWINGS SHOWING THE PROPOSED ALTERNATIVE MATERIALS OR METHODS. DO NOT PROCEED WITH THE WORK UNTIL APPROVAL IS OBTAINED. RFIs SUBMITTED WITHOUT PROPOSED SOLUTIONS WILL BE RETURNED WITHOUT REVIEW. REARRANGEMENT OF WORK FOR THE PURPOSE OF COORDINATION BETWEEN TRADES SHALL NOT BE CONSIDERED REASON FOR EXTRA COST.
- PROVIDE RECORD DOCUMENTS AT THE CLOSE OF CONSTRUCTION. INCLUDE OPERATIONS AND MAINTENANCE MANUALS FOR ALL EQUIPMENT, AND COPIES OF WARRANTIES, TEST RECORDS AND CERTIFICATIONS. INCLUDE AS-BUILT DRAWINGS: SHOW ALL CHANGES MADE PER PROJECT CONDITIONS, LOCATIONS OF ALL DISTRIBUTION APPARATUS, PULL AND JUNCTION BOXES, AND ROUTING OF CONDUITS 2" AND LARGER.
- ALL WIRING SHALL BE IN CONDUIT. ALL CONDUIT IN FINISHED AREAS SHALL BE CONCEALED. ALL CONDUIT IN UNFINISHED AREAS MAY BE EXPOSED. MINIMUM CONDUIT SIZE IS 0.5 INCH. EMT AND FLEXIBLE METAL CONDUIT SHALL BE USED FOR ALL INTERIOR APPLICATIONS. EMT AND RIGID GALVANIZED STEEL CONDUIT SHALL BE USED FOR ALL EXPOSED EXTERIOR LOCATIONS. CONDUIT IN OR UNDER THE SLAB SHALL BE SCHEDULE 40 PVC. ALL BURIED CONDUIT NOT UNDER A SLAB SHALL BE SCHEDULE 40 PVC, CONCRETE ENCASED WHERE INDICATED.
- FITTINGS FOR EMT CONDUIT SHALL BE STEEL SET SCREW OR COMPRESSION TYPE. DIE-CAST FITTINGS ARE PROHIBITED. FITTINGS FOR RGS CONDUIT SHALL BE GALVANIZED MALLEABLE IRON. FITTINGS FOR PVC CONDUIT SHALL BE SCHEDULE 40 PVC.
- CONDUIT SIZES INDICATED ON THE DRAWINGS MAY BE PURPOSELY OVERSIZED FOR FUTURE CONDUCTORS OR TO AVOID EXCESS CONDUIT HEATING. CONDUIT SIZES NOT SHOWN ON THE DRAWINGS SHALL BE SIZED BY THE CONTRACTOR BASED ON THE NUMBER OF CONDUCTORS TO BE INSTALLED, IN ACCORDANCE WITH NFPA 70.
- PROVIDE AND INSTALL ALL JUNCTION AND PULL BOXES REQUIRED FOR THE INSTALLATION OF ELECTRICAL DEVICES AND EQUIPMENT, WHETHER OR NOT INDICATED ON PLANS. SIZING OF BOXES SHALL BE PER NFPA 70.
- ALL PENETRATIONS THROUGH FIRE RATED WALLS AND SLABS SHALL BE SEALED TO MAINTAIN THE INTEGRITY OF THE FIRE RATING, USING A U.L. LISTED FIRE RATED SEALANT.
- OBTAIN APPROVAL FROM THE ARCHITECT BEFORE MAKING ANY PENETRATIONS THROUGH STRUCTURAL MEMBERS OR FIRE RATED WALLS OR CEILINGS.
- ALL CONDUCTORS #8 AND LARGER SHALL BE STRANDED COPPER, 600 VOLT INSULATION TYPE XHHW. ALL CONDUCTORS SMALLER THAN #8 SHALL BE SOLID COPPER, 600 VOLT INSULATION TYPE THHN/THWN.
- METAL-CLAD ARMORED (TYPE AC OR MC) AND NONMETALLIC-SHEATHED (TYPE NM OR NMS) CABLE IS PROHIBITED.
- PROVIDE A GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN ALL FEEDERS AND BRANCH CIRCUITS, INCLUDING SWITCH LEGS. SIZE GROUNDING CONDUCTOR PER NFPA 70, TABLE 250-122.
- BRANCH CIRCUIT ARRANGEMENTS ON PLANS ARE DIAGRAMMATIC AND DO NOT INDICATE ACTUAL ROUTING. USE #10 AWG CONDUCTORS FOR 20A 120V BRANCH CIRCUIT CONDUCTORS LONGER THAN 75 FEET, AND FOR 20A 277V BRANCH CIRCUITS LONGER THAN 200 FEET.
- UPDATE THE CIRCUIT DIRECTORIES IN EXISTING PANELBOARDS TO ACCURATELY REFLECT THE NEW CIRCUITING.
- ALL DISCONNECT SWITCHES AND ENCLOSED CIRCUIT BREAKERS SHALL BE NEMA 1 INDOORS AND NEMA 3R OUTDOORS UNLESS NOTED OTHERWISE. VOLTAGE, AMPERE AND MINIMUM A.I.C. RATINGS ARE SHOWN ON DIAGRAMS AND PLANS. MANUFACTURERS: SIEMENS-ITE, GENERAL ELECTRIC, CUTLER-HAMMER, SQUARE D.
- CONFIRM EXACT EQUIPMENT LOCATIONS PRIOR TO ROUGH-IN.

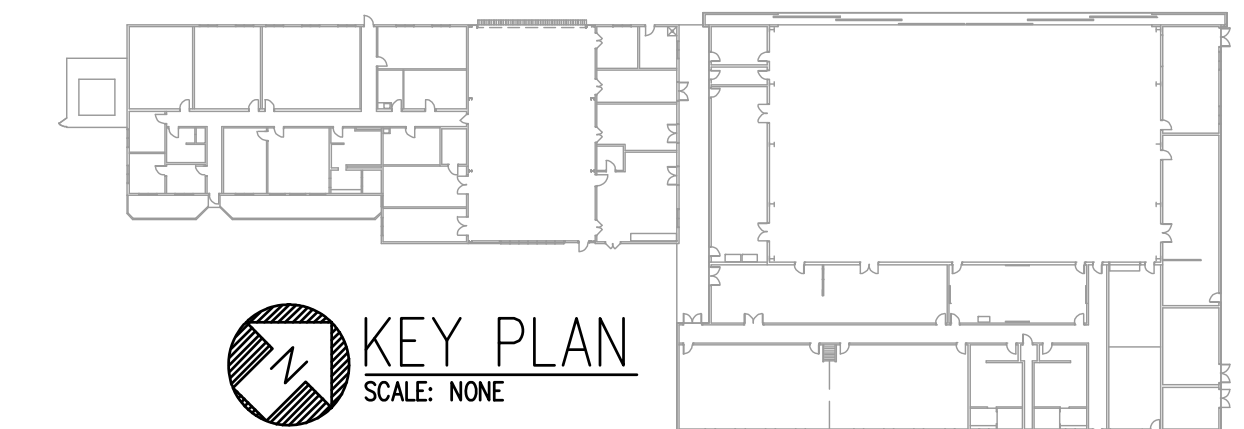
ELECTRICAL LEGEND

- NEW WORK
- - - - - EXISTING OR BY OTHERS
- * - * - * - EXISTING TO BE REMOVED
- PANELBOARD, 277/480V 3Ø 4 WIRE
- PANELBOARD, 120/208V 3Ø 4 WIRE
- EQUIPMENT CABINET - AS INDICATED
- DISCONNECT SWITCH, VOLTAGE AND RATING TO MATCH CIRCUIT BREAKER
- JUNCTION BOX, SIZE PER N.E.C.
- CONNECTION TO EQUIPMENT FURNISHED BY OTHERS
- DUPLEX RECEPTACLE, 20A 125V GROUND FAULT CURRENT INTERRUPTING, SPECIFICATION GRADE, MOUNTED +15", U.N.O.
- HVAC DDC 360° CONTROL OCCUPANCY SENSOR, CEILING MOUNTED. IR-TEC # 05-363 OR APPROVED EQUAL.
- CONDUIT AND WIRE, SAME WIRE AS INDICATED ON HOME RUN, CONDUIT SIZE DETERMINED BY CONTRACTOR
- HOME RUN TO PANEL, CIRCUIT NO. INDICATED, MIN. 0.5"-2#12,#12GND. U.N.O. COMBINE UP TO THREE 1P15A OR 1P20A CIRCUITS IN ONE HOME RUN USING OPPOSITE PHASE LEGS ONLY; PROVIDE SEPARATE NEUTRAL CONDUCTORS FOR EACH CIRCUIT - OR - PROVIDE APPROVED HANDLE TIES FOR CIRCUIT BREAKERS SERVING MULTI-WIRE CIRCUITS. DO NOT COMBINE NEUTRALS ON COMPUTER POWER CIRCUITS.
- CONDUIT ONLY, WITH PULL WIRE
- UNLESS NOTED OTHERWISE
- WEATHERPROOF

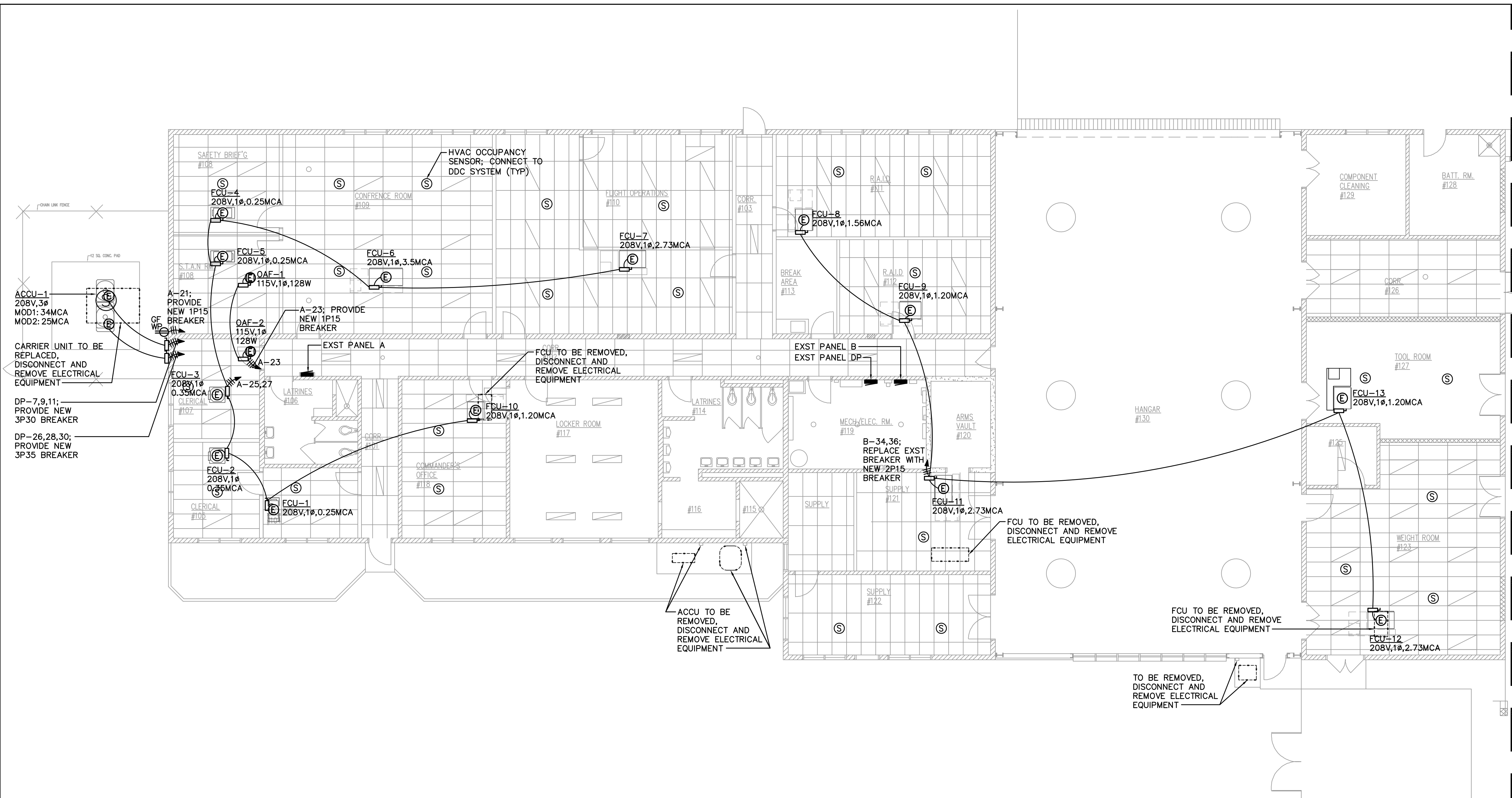
PANEL: M (EXST)

VOLTAGE: 208/120V 3PH 4W +GND MAIN BUS TYPE AND SIZE: 400A CU
 TYPE: BOLT-ON MAIN BREAKER: 3P300
 MOUNTING: SURFACE MINIMUM A.I.C.: 22,000

CKT. No.	CIRCUIT USE OR DESCRIPTION	WIRE SIZE	CKT. BRKR.	KVA		CKT. BRKR.	WIRE SIZE	CIRCUIT USE OR DESCRIPTION	CKT. No.	
				PHASE	PHASE					
1	ACCU-3; MOD 1	8	3P40*	3.0	A	4.0	3P60*	6	ACCU-2	2
3	---	8	---	3.0	B	4.0	---	6	---	4
5	---	8	---	3.0	C	4.0	---	6	---	6
7	SPARE	---	3P50	---	A	2.2	3P30	10	ACCU-3; MOD 2	8
9	---	---	---	---	B	2.2	---	10	---	10
11	---	---	---	---	C	2.2	---	10	---	12
13	EXST CIRCUIT (E)	---	3P25	2.0	A	5.5	3P60	---	EW-1	(E) 14
15	---	(E)	---	2.0	B	5.5	---	---	---	(E) 16
17	---	(E)	---	2.0	C	5.5	---	---	---	(E) 18
19	CA-1 (E)	---	3P40	2.9	A	1.0	1P15	---	EXST CIRCUIT	(E) 20
21	---	(E)	---	2.9	B	1.0	1P15	---	EXST CIRCUIT	(E) 22
23	---	(E)	---	2.9	C	1.0	1P20	---	EXST CIRCUIT	(E) 24
25	SPARE	---	2P15	---	A	0.5	2P15	12	FCU-14,15,18,21	28
27	---	---	---	---	B	0.5	---	12	---	28
29	SPARE	---	2P15	---	C	0.7	2P20*	12	FCU-16,17,19,20/HEX-1/BC CONTR	30
31	---	---	---	---	A	0.7	---	12	---	32
33	EF-1 (E)	---	1P20	0.7	B	0.7	1P20	---	EF-4	(E) 34
35	EF-2 (E)	---	1P20	1.1	C	0.3	1P20	---	EF-5	(E) 36
37	EF-3 (E)	---	1P20	0.7	A	0.2	1P20	---	RECEPTACLE	(E) 38
39	AIRDRYER (E)	---	1P20	1.0	B	0.8	2P20	---	RHC-1	40
41	HWCP-1,2,0AF-4	12	1P15*	0.2	C	0.8	---	---	---	42
DEMAND FACTOR:		0.9	---	22.7	24.3	23.7				
TOTAL KVA:		70.7	TOTAL AMPS:		196.2	* PROVIDE NEW BREAKER				
DEMAND KVA:		63.6	DEMAND AMPS:		176.6					

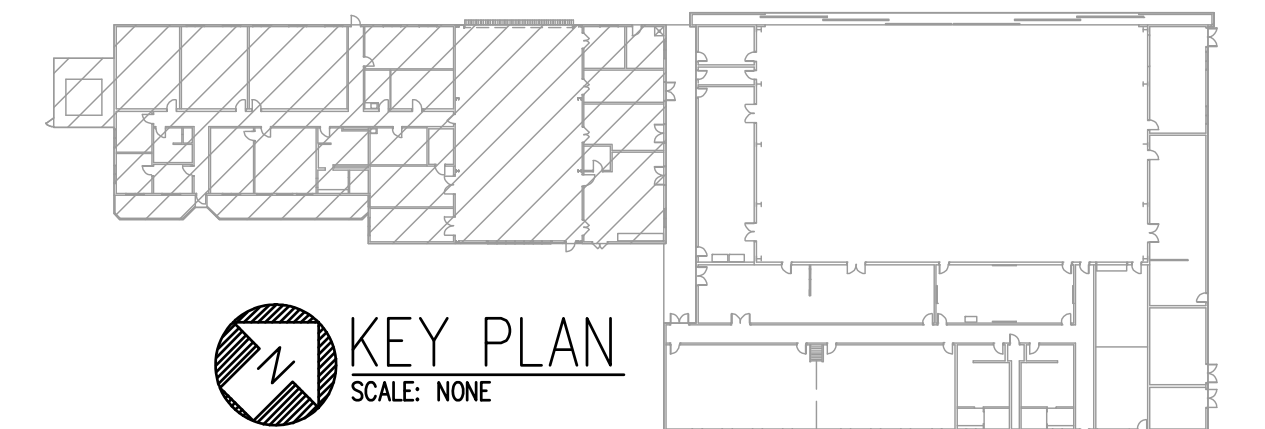
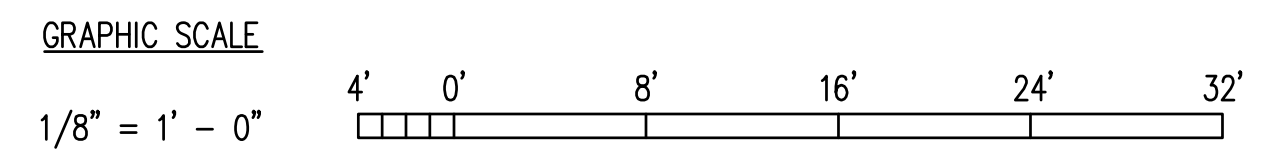


REVISION NO.	DESCRIPTION	DATE	BY	CHK'D	
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII					
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII					
ELECTRICAL GENERAL NOTES AND LEGEND				DATE:	MARCH 14, 2014
SCALE:	AS NOTED	DRAWING NO:			
DESIGNED:	KL	E-1			
DRAWN:	EA/KL				SHEET:

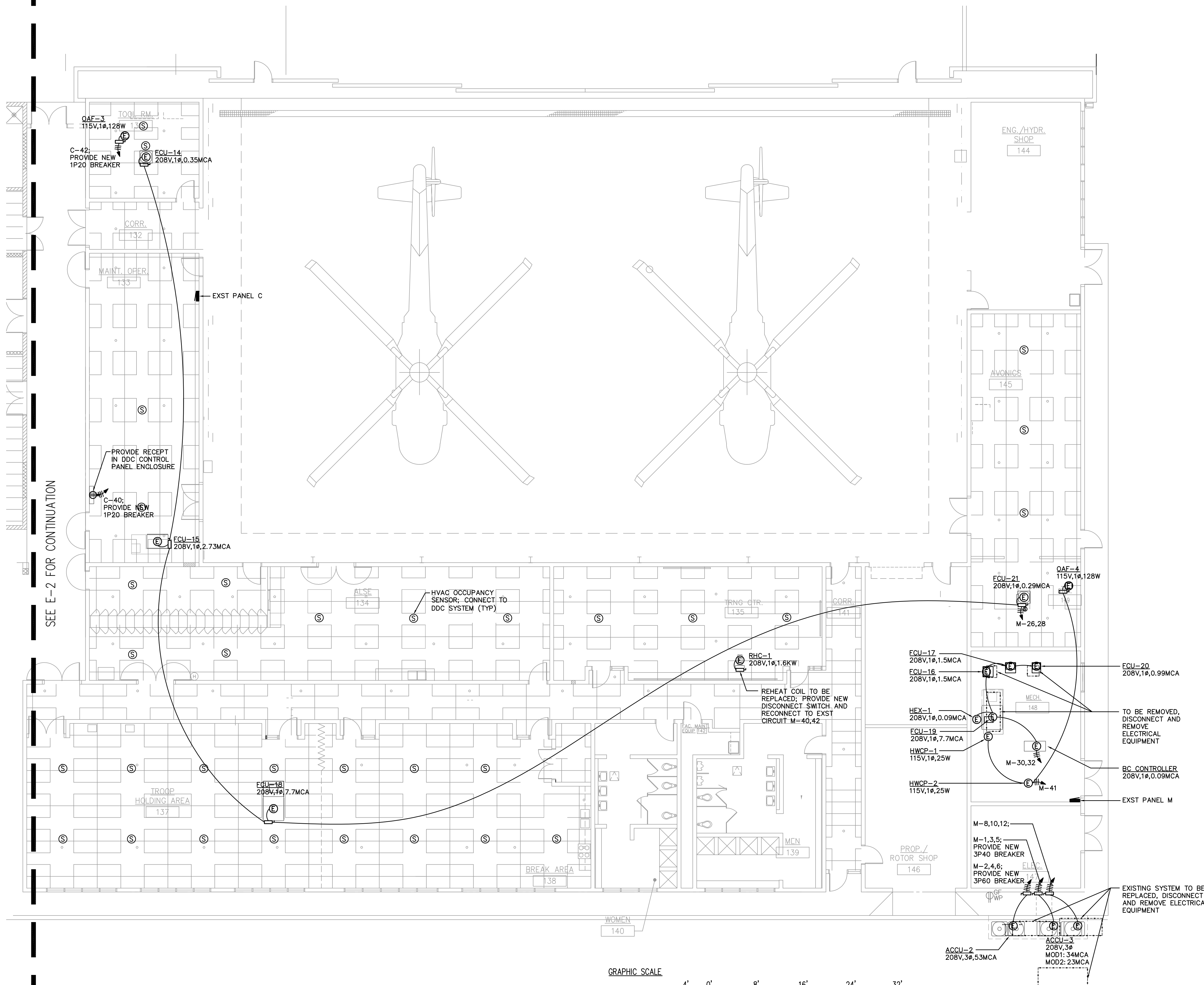


SEE E-3 FOR CONTINUATION

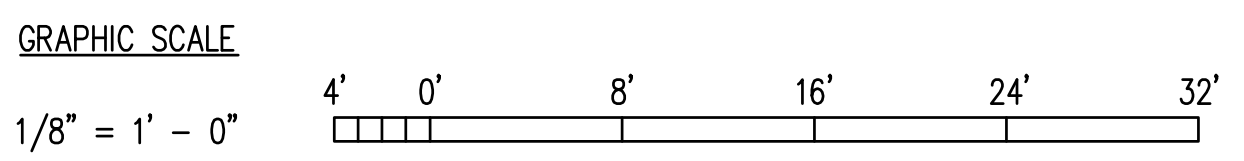
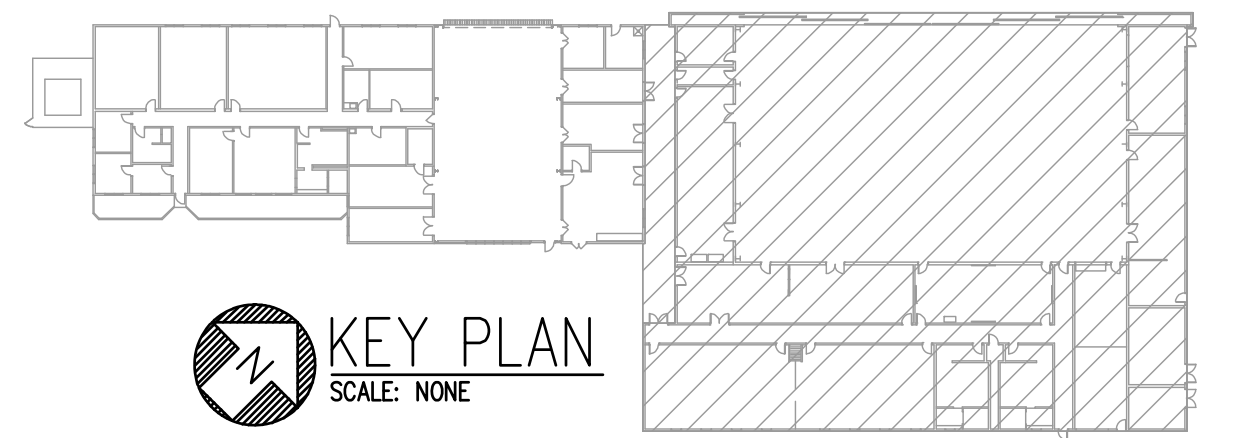
PARTIAL ELECTRICAL PLAN
SCALE: 1/8" = 1' - 0"



REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL ELECTRICAL PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: KL	E-2			
DRAWN: EA/KL				



SEE E-2 FOR CONTINUATION



PARTIAL ELECTRICAL PLAN
SCALE: 1/8" = 1' - 0"

REVISION NO.	DESCRIPTION	DATE	BY	CHK'D
DEPARTMENTS OF THE ARMY AND AIR FORCE NATIONAL GUARD OF HAWAII OFFICE OF THE ENGINEER, FORT RUGER, HAWAII				
ENERGY EFFICIENT AIR CONDITIONING SYSTEM BLDG 618, ARMY AVIATION SUPPORT FACILITY #2, HILO, HAWAII				
PARTIAL ELECTRICAL PLAN				DATE: MARCH 14, 2014
SCALE: AS NOTED	DRAWING NO:			
DESIGNED: KL	E-3			
DRAWN: EA/KL				