SPECIFICATIONS FOR:

Air Conditioning System Replacement at Building 1898, Kalaeloa, State of Hawaii, Department of Defense, Hawaii Army National Guard, Job No. CA-1332-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 "Air Conditioning System Replacement at Building 1898, Kalaeloa, State of Hawaii, Department of Defense, Hawaii Army National Guard, Job No. CA-1332-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 17, 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: Remove and replace current air conditioning system.

The estimated cost is between $650,000 and $900,000.

A Pre-Bid Conference/Site Visit will be held on June 29, 2015 at 10:00am. Contractors are to meet Mr. Aaron Lau at the entrance to Building 1898 on Wright Street in Kalaeloa, prior to 10:00am. Enter Wright Street from Enterprise Street, the building is just past the guard shack on the left. Contractors are required to call Mr. Lau at 808-672-1532 before 4:30 pm on June 26, 2015 to register for the 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.

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 19, 2015

Air Conditioning System Replacement at Building 1898, Kalaeloa, State of Hawaii,
Department of Defense, Hawaii Army National Guard,
Job No. CA-1332-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: _____

_____

Name and Title (Please Type or Print)

Telephone No.:

_____

*_____

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

Fax No.: _____

(*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 one year 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 or State wage rates apply to this contract.

3. Contract will be awarded based on the total lump sum bid.

4. A Pre-Bid Conference/Site Visit will be held on June 29, 2015 at 10:00 am. Contractors are to meet Mr. Aaron Lau at the entrance to Building 1898 on Wright Street in Kalaeloa, prior to 10:00am. Enter Wright Street from Enterprise Street, the building is just past the guard shack on the left. Contractors are required to call Mr. Lau at 808-672-1532 before 4:30 pm on June 26, 2015 to register for the 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.

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.

HAWAII PRODUCTS PREFERENCE

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 must possess a valid State of Hawaii Contractor's license in the appropriate classification.

1. The Contractor shall call Mr. Aaron Lau at 672-1532 and obtain permission before visiting the site.

2. The Adjutant General or his designated representative reserves the right to reject any and/or all bids and waive any defects when, in his opinion, such rejection or waiver will be in the best interest of the State.

3. The award of the contract shall be conditioned upon funds being made available for these projects and further upon the right of the Adjutant General or his designated representative to hold all bids received for a period of ninety (90) days from the date of the opening thereof, unless otherwise required by law, during which time no bid may be withdrawn.

4. The liquidated damages per working day for failure to complete the work on time shall be at $189.00 per working day or as stipulated in the General Conditions, whichever is higher.

5. By submitting this proposal, the undersigned is declaring his firm has not been assisted or represented on this matter by an individual who has, in a State capacity, been involved in the subject matter of this contract in the past two years.

6. Upon the acceptance of the proposal by the Adjutant General or his designated representative, the undersigned must enter into and execute a contract for the same and furnish a bond, as required by law. This bond shall conform to the provisions of Section 103D-324 of the Hawaii Revised Statutes and any law applicable thereto.

7. If the lowest bid received by the State exceeds the funds available for this project, the State reserves the right to negotiate with the lowest responsible bidder as permitted under Section 103D-302, Hawaii Revised Statutes, as amended, to reduce the scope of work and award a contract therefore.

8. This contract may be awarded as an informal contract as determined by the Adjutant General or his designated representative in accordance with the applicable Hawaii Revised Statutes as amended, whereby a purchase order will be executed and used as the formal contract.

   Receipt of the following addenda issued by the Department is acknowledged by the day(s) of the receipt indicated below:

   Addendum No. 1 _____ Addendum No. 2 _____
   Date
   Addendum No. 3 _____ Addendum No. 4 _____

It is understood that failure to receive any such addendum shall not relieve the Contractor from any obligation under this Proposal as submitted. (See Special Notice to Bidders for information regarding addenda.)

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

Title _____

_____

Name of Company

_____

Address

_____

_____

Telephone _____

Date _____

HAWAII GENERAL EXCISE TAX

I.D. NO. _____

LICENSE CLASSIFICATION AND/OR SUBCLASSIFICATION NO.

_____

(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. Apprenticeable 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 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.

(Rev. 08/25/2010)

(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 fore 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 Address 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 contractors 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 Statues §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.

Davis-Bacon Act:

Davis-Bacon Act prevailing wage rates apply to all State of Hawaii Construction contracts.

CERTIFICATION OF COMPLIANCE
FOR
EMPLOYMENT OF STATE RESIDENTS
HRS CHAPTER 103B, AS AMENDED BY ACT 192, SLH 2011

Project Title: _____

Agency Project No: _____

Contract No.: _____

As required by Hawai`i Revised Statutes Chapter 103B, as amended by Act 192, Session Laws of Hawaii 2011-Employment of State Residents on Construction Procurement Contracts, I hereby certify under oath, that I am an officer of _____ and
(Name of Contractor or Subcontractor Company)

for the Project Contract indicated above, _____ was in
(Name of Contractor or Subcontractor Company)

compliance with HRS Chapter 103B, as amended by Act 192, SLH 2011, by employing a workforce of which 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 the **Subcontractor** for this contract.

CORPORATE SEAL

_____
(Name of Company)

_____
(Signature)

_____
(Print Name)

_____
(Print Title)

Subscribed and sworn to me before this ____ day of _____, 201 .

Doc. Date: _____ # of Pages _____ 1st Circuit

Notary Name: _____

Doc. Description: _____

_____

_____

_____
Notary Public, 1st Circuit, State of Hawai`i
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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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

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 prosecution of the Work, which date shall also be the beginning of Contract Time.

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.

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

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.ehawaii.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 of non-adjustment of the contract time or contract price, the contractor shall file a notice if 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 Section7.17 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 Section7.17 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 polices. 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 polices. 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 2*s 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. (e). 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 Officers 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.

(S A M P L E)

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.

SECTION/ ITEM	SPECIFIED BRAND	SUBSTITUTE OR ALTERNATE BRAND	VARIANT 3/ FEATURES

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 1898, Kalaeloa, State of Hawaii, Department of Defense, Hawaii Army National Guard, Job No. CA-1332-C

1. GENERAL

Scope of Work: PN#15140009, CA-1332-C, Hawaii Army National Guard, Building 1898.

Contractor to furnish and install Air Conditioning System replacement items per drawings and specifications. Replace existing abandoned chiller, replace chilled water valves, install direct-digital-controls (DDC), replace variable-air-volume boxes (VAV), install variable frequency drives (VFD), and remove all pneumatic controls and piping. New DDC devices will tie into existing building Energy Management Controls System.

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.

Additional 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, at a minimum: 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 close

Points 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

ix. Equipment

VFD: Danfoss HVAC-VLT drive, with bypass and 3% input AC line reactors (or approved equal).

VAV: Metalaire, model TH-5000 with 120/24VAC transformers included and mounted on box (or approved equal).

DDC controller: Automated Logic ZN141v+ (or approved equal).

Thermostats: Automated Logic RS Pro Room Sensor (or approved equal).

Occupancy sensor: IR-TEC OS-363 HVAC Occupancy Sensor (or approved equal).

x. 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.

HVAC REPAIRS
BARBERS POINT BUILDING 1898
BARBERS POINT, KALAELOA, HAWAII

HAWAII ARMY NATIONAL GUARD
STATE OF HAWAII

JOB NO. CA-1332-C, PN#15140009

N
LOCATION MAP
SCALE: N.T.S.

AMEL Technologies, Inc.
2800 WOODLAWN DR SUITE 251 HONOLULU, HI 96822

INDEX OF DRAWINGS:

DESIGN TEAM:

MECHANICAL: AMEL TECHNOLOGIES, INC.
2800 WOODLAWN DR, SUITE 251
HONOLULU, HAWAII 96813

ELECTRICAL: MK ENGINEERS, INC.
286 KALIHI ST.
HONOLULU, HI 96819

A/E INFO

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII, U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16
SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN
SUBMITTAL DATE 06/05/14

DES	RH	DRW	RH	CHK	MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

COVER SHEET, INDEX OF DRAWINGS

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 01 OF 31

T1.0

MECHANICAL LEGEND

SYMBOL	ABBRV.	DESCRIPTION
	BV	FULL PORT BALL VALVE
		CAPPED/STUBOUT PIPE
	CH	CHILLER
	CHWP	CHILLED WATER PUMP
CHWR	CHWR	CHILLED WATER RETURN
CHWS	CHWS	CHILLED WATER SUPPLY
	CV	CHECK VALVE
	DEMO	DEMOLITION
	DDC	DIRECT DIGITAL CONTROL
	EF	EXHAUST FAN
	EXH.	EXHAUST
	(E)	EXISTING
		EXPANSION JOINT
	FLEX. CONN.	FLEXIBLE CONNECTION (DUCTWORK)
F	FS	FLOW SENSOR
	GV	GATE VALVE
	H-O-A	HAND-OFF-AUTO
	(N)	NEW
	NTS	NOT TO SCALE
	OA	OUTSIDE AIR
		PANEL
	POC	POINT OF CONNECTION
	POR	POINT OF REMOVAL
	TEMP	TEMPERATURE
	TG	TEMPERATURE GAUGE
T		THERMOSTAT
	VFD	VARIABLE FREQUENCY DRIVE

CITY AND COUNTY OF HONOLULU
REVISED ORDINANCE CHAPTER 32
HONOLULU COUNTY CODE 1990, AS AMENDED

TO THE BEST OF MY KNOWLEDGE, THIS PROJECT'S DESIGN SUBSTANTIALLY CONFORMS TO THE BUILDING ENERGY CONSERVATION CODE FOR:

MELEK YALCINTAS LICENSED PROFESSIONAL ENGINEER No. 10759-M HAWAII, U.S.A.

____ BUILDING COMPONENT SYSTEMS
____ ELECTRICAL COMPONENT SYSTEMS
__XX__ MECHANICAL COMPONENT SYSTEMS

SIGNATURE: Melek Yalcintas DATE: 04/30/2016
NAME: MELEK YALCINTAS
TITLE: MECHANICAL ENGINEER
LICENSE NO.: NO. 10759-M

MECHANICAL ENERGY COMPLIANCE FORM

CODE ARTICLE	COMPLIANCE METHOD
ENVELOPE	N/A
HVAC SYSTEMS	PRESCRIPTIVE
HVAC EQUIPMENT	PRESCRIPTIVE
SERVICE WATER HEATER	N/A
ENERGY MANAGEMENT	MEETS BASIC REQUIREMENTS

MECHANICAL GENERAL NOTES:

1. CONFORM TO ALL REQUIREMENTS OF THE BUILDING, PLUMBING, ELECTRICAL CODES OF THE CITY AND COUNTY OF HONOLULU, STATE OF HAWAII HEALTH REGULATIONS, FIRE MARSHALL'S REGULATIONS, AND ALL OTHER APPLICABLE REGULATIONS.
2. ALL WORK SHALL BE COORDINATED WITH THE STATE.
3. THE CONTRACTOR SHALL VERIFY ALL FIELD CONDITIONS PRIOR TO BID AND CONSTRUCTION. NO ADDITIONAL FEES WILL BE AUTHORIZED FOR THE CONTRACTOR'S FAILURE TO DO SO.
4. PRIOR TO BEGINNING ANY WORK, THE CONTRACTOR SHALL NOTIFY THE STATE OF ANY MAJOR DEVIATIONS OR DISCREPANCIES DISCOVERED IN THE PLANS AND SPECIFICATIONS DUE TO UNFORESEEN OR VARYING FIELD CONDITIONS AND COORDINATE WITH THE STATE. SHOULD PROJECT CONDITIONS REQUIRE REARRANGEMENT OF WORK, MARK SUCH CHANGES ON THE AS-BUILT DRAWINGS. IF THESE CHANGES REQUIRE ALTERNATE METHODS TO THOSE APPROVED BY THE CONTRACT DOCUMENTS, SUBMIT SHOP DRAWINGS SHOWING THE PROPOSED ALTERNATE METHODS TO THE STATE FOR REVIEW. DO NOT PROCEED UNTIL REVIEWED. APPROVED ALTERNATE METHOD SHALL BE PERFORMED AT NO ADDITIONAL COST TO THE STATE.
5. COORDINATE ALL WORK WITH OTHER TRADES TO AVOID INTERFERENCE AND DELAYS.
6. DRAWINGS DO NOT ATTEMPT TO SHOW EXACT DETAILS OF PIPING. PROVIDE OFFSETS AS NECESSARY TO AVOID LOCAL OBSTRUCTIONS OR INTERFERENCE WITH OTHER TRADES.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITS AND APPLICATIONS, INCLUDING BUT NOT LIMITED TO BUILDING PERMIT.
8. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO COVER THE COMPLETE INSTALLATION OF SYSTEMS TO FUNCTION AS DESCRIBED AND SPECIFIED. OMISSION OF THE DRAWINGS, OR SPECIFICATIONS, OR THE OMISSION OF DETAILS OF WORK, SHALL NOT RELIEVE THE CONTRACTOR FROM PERFORMING SUCH OMITTED, OR INCORRECTLY DESCRIBED DETAILS OF THE WORK, BUT SHALL BE PERFORMED AS IF FULLY AND CORRECTLY SET FORTH AND DESCRIBED IN THE DRAWINGS AND SPECIFICATIONS. THE CONTRACTOR SHALL NOTIFY THE STATE VERBALLY OF SUCH OMISSIONS AND PROVIDE A WRITTEN STATEMENT OF THE OMISSIONS WITHIN (5) WORKING DAYS OF VERBAL NOTIFICATION.
9. CONTRACTOR SHALL PROVIDE ADDITIONAL MATERIALS AND LABOR, AS NECESSARY, FOR A COMPLETE AND OPERABLE SYSTEM AT NO ADDITIONAL COST TO THE STATE.
10. ALL ITEMS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
11. PROVIDE DIELECTRIC UNIONS OR SEPARATIONS AT ALL DISSIMILAR METALS.
12. CONTRACTOR SHALL VERIFY ALL EXISTING LINE SIZES, POINT OF CONNECTION INVERT, AND CONDITION OF PIPES PRIOR TO ANY WORK DONE.
13. OBTAIN APPROVAL FROM THE STATE BEFORE MAKING ANY PENETRATIONS THROUGH STRUCTURAL MEMBERS, WALLS, AND SLABS.
14. CONTRACTOR SHALL CAULK ALL WALL PENETRATIONS WATER-TIGHT. USE BRASS, CHROME PLATED ESCUTCHEONS FOR ALL EXPOSED PIPING.
15. PROVIDE ACCESS PANELS FOR ALL ITEMS UNDER THIS SECTION REQUIRING SERVICING, INSPECTION, MAINTENANCE AND ADJUSTMENT.
16. REPAIR ANY AREAS OR SURFACES DAMAGED DURING CONSTRUCTION. TOUCH UP PAINTING TO MATCH EXISTING SURFACES.
17. INSTALLATION SHALL BE GUARANTEED TO BE FREE FROM DEFECTS FOR ONE YEAR FROM FINAL DATE OF ACCEPTANCE OF THE PROJECT AS A WHOLE.
18. SUBMIT A WRITTEN TEST AND BALANCE REPORT.

BOARD OF WATER SUPPLY NOTES:

1. THIS PROJECT DOES NOT REMOVE OR ADD ANY ADDITIONAL PLUMBING FIXTURES TO THE BUILDING.

A/E INFO

MELEK YALCINTAS LICENSED PROFESSIONAL ENGINEER No. 10759-M HAWAII, U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

APPR	DATE	DESCRIPTION	SYM

SUBMITAL PHASE: 100% FINAL DESIGN
SUBMITAL DATE: 06/05/14
DES RH | DRW RH | CHK MY

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HAWAII ARMY NATIONAL GUARD
BARBERS POINT BUILDING 1898
KALAELOA, HAWAII

HVAC REPAIRS

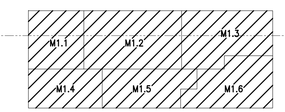
GENERAL NOTES, MECHANICAL LEGEND

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 02 OF 31

M0.0

MECHANICAL PLAN – DEMOLITION

3/32" = 1'-0"



KEY PLAN
NOT TO SCALE

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 16759-M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

A/E INFO

SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES	RH	DRW	RH	CHK	MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
KALAELOA, HAWAII
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
BARBERS POINT BUILDING 1898

HVAC REPAIRS

MECHANICAL PLAN – DEMOLITION

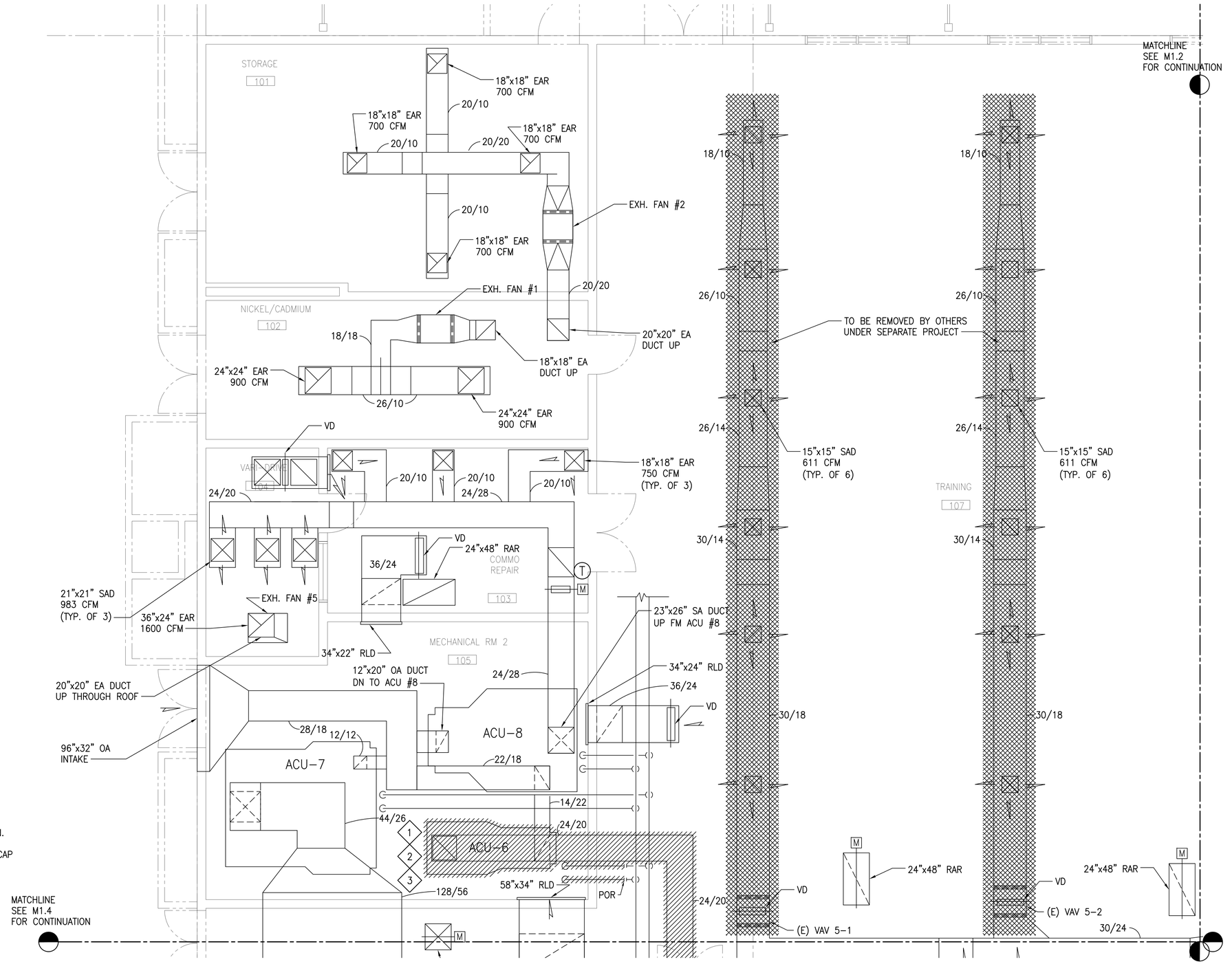
SCALE: AS NOTED

STATE JOB NO.
CA-1332-C

FEDERAL PROJECT NO.
15140009

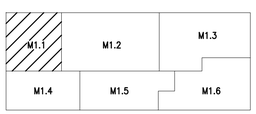
SHEET 03 OF 31

M1.0



KEYED NOTES:

1. DEMO ACU-6.
2. DEMO ASSOCIATED DUCTWORK AS SHOWN.
3. DEMO CHILLED WATER PIPING TO UNIT. CAP & SEAL AT POR.



KEY PLAN
NOT TO SCALE

PARTIAL MECHANICAL PLAN – DEMOLITION
1/4" = 1'-0"

A/E INFO

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16
SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN
SUBMITTAL DATE 06/05/14
DES RH | DRW RH | CHK MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

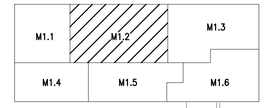
PARTIAL MECHANICAL PLAN – DEMOLITION

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 04 OF 31

M1.1

MATCHLINE
SEE M1.1
FOR CONTINUATION

MATCHLINE
SEE M1.3
FOR CONTINUATION



KEY PLAN
NOT TO SCALE

14/8
24/8
24/12
24/16
12"x12" SAD
373 CFM
(TYP. OF 6)
12"x12" SAD
400 CFM
(TYP. OF 6)
MAIN
CONFERENCE
ROOM
113
S2
144
S2
146
VD
18/10
15"x15" SAD
560 CFM
26/10
S2
SEC
148
24"x48" RAR
12' SLD,
1500 CFM
24"x30" RA DUCT
THROUGH WALL
26/18
18"x36" RAR
15"x15" SAD
652 CFM
(TYP. OF 5)
12"ø, TYP.
BS
14
EMERGENCY
OPERATIONS
CENTER
138
26/22
M
T
(E) VAV 5-3
(E) VAV 5-4
(E) VAV 5-5
(E) VAV 5-6
(E) VAV 5-7
34/30
34/34
40/34
40/38
50/38

PARTIAL MECHANICAL PLAN – DEMOLITION

1/4" = 1'-0"

A/E INFO

MICHELEK YALCINTAS
LICENSED
PROFESSIONAL
ENGINEER
No. 10759-M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

	APPR	DATE	DESCRIPTION	STM

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES	RH	DRW	RH	CHK	MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

PARTIAL MECHANICAL PLAN – DEMOLITION

SCALE: AS NOTED

STATE JOB NO.
CA-1332-C

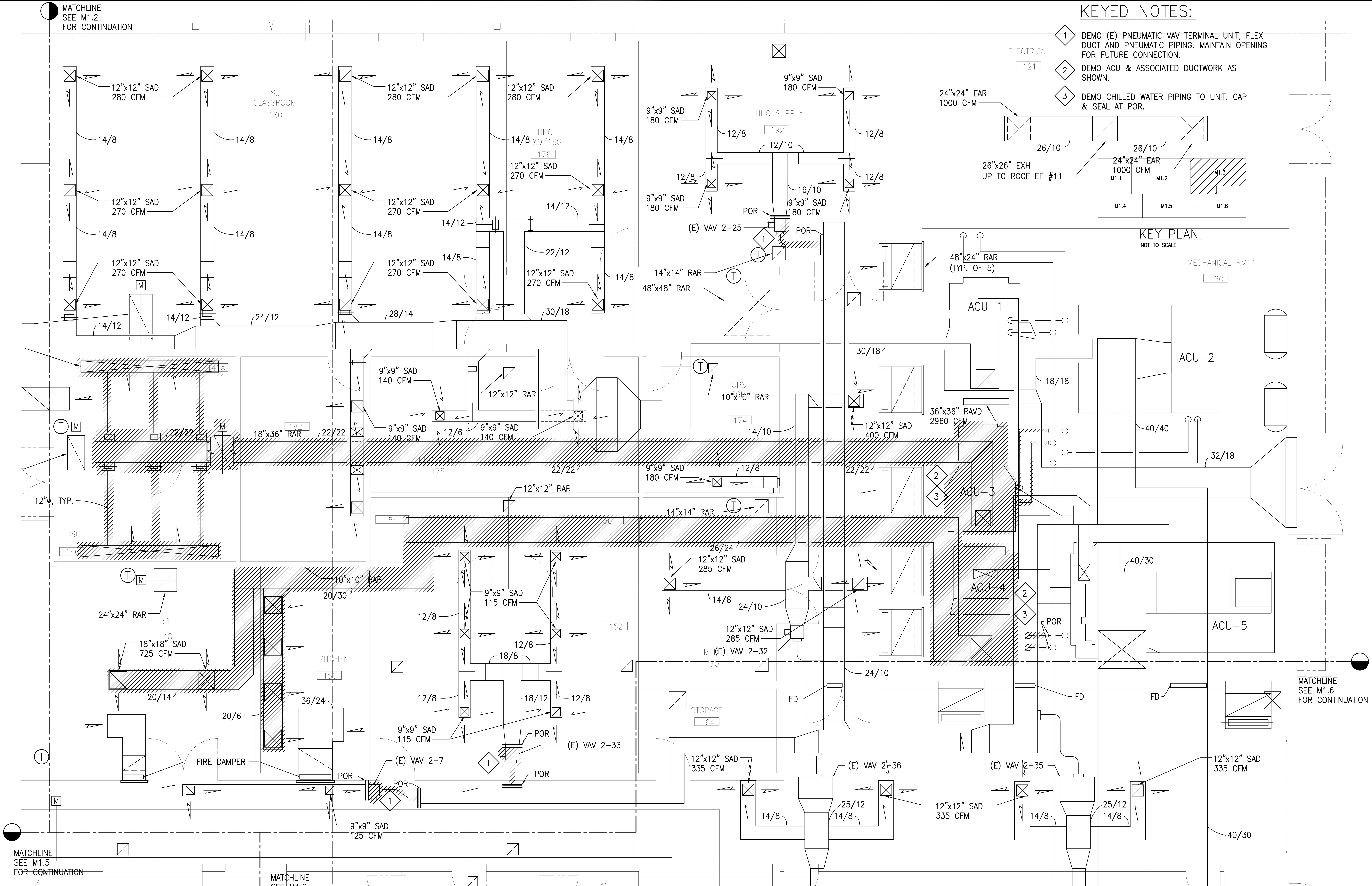
FEDERAL PROJECT NO.
15140009

SHEET 05 OF 31

M1.2

KEYED NOTES:

1. DEMO (E) PNEUMATIC VAV TERMINAL UNIT, FLEX DUCT AND PNEUMATIC PIPING. MAINTAIN OPENING FOR FUTURE CONNECTION.
2. DEMO ACU & ASSOCIATED DUCTWORK AS SHOWN.
3. DEMO CHILLED WATER PIPING TO UNIT. CAP & SEAL AT POR.



PARTIAL MECHANICAL PLAN – DEMOLITION

1/4" = 1'-0"

SEAL	MELEK YALCINTAS, LICENSED PROFESSIONAL ENGINEER No. 10759-M, HAWAII, U.S.A. AMEL TECHNOLOGIES, INC. LICENSE EXPIRATION DATE 4/30/16
SUBMITTAL PHASE	100% FINAL DESIGN
SUBMITTAL DATE	06/05/14
DES	RH
DRW	RH
CHK	MY
	STATE OF HAWAII, DEPARTMENT OF DEFENSE, HAWAII ARMY NATIONAL GUARD, FACILITY MANAGEMENT OFFICE, DESIGN AND PROJECT MANAGEMENT BRANCH
	BARBERS POINT BUILDING 1898, KALAELOA, HAWAII
	HVAC REPAIRS
	PARTIAL MECHANICAL PLAN – DEMOLITION
SCALE	AS NOTED
STATE JOB NO.	CA-1332-C
FEDERAL PROJECT NO.	15140009
SHEET	06 OF 31
	M1.3

KEYED NOTES:

1. DEMO (E) PNEUMATIC VAV TERMINAL UNIT, FLEX DUCT AND PNEUMATIC PIPING. MAINTAIN OPENING FOR FUTURE CONNECTION.

MATCHLINE SEE M1.1 FOR CONTINUATION

MATCHLINE SEE M1.2 FOR CONTINUATION

MATCHLINE SEE M1.1 FOR CONTINUATION

MATCHLINE SEE M1.5 FOR CONTINUATION

(E) VAV 5-1

24"x24" RAR

60/36

32' SLD 4480 CFM

30/24

POR

196A

123

12"x12" SAD 300 CFM

14/10

(E) VAV 2-14

14/14

VAULT 119

12"x12" SAD 335 CFM

15"x15" SAD 460 CFM

18/18

15"x15" SAD 460 CFM

18/24

POR

(E) VAV 2-31

18"x18" RAR

10"x10" RAR

24"x12" RAR

(E) VAV 6-1

DEMO ABANDONED EXH. DUCTS.

ELECTRICAL 125

36"x12" SAD 1270 CFM

9"x9" SAD 150 CFM

24/20 (E) VD

CAP & SEAL (E) DUCT ROOF PENETRATIONS

FD

20/14

POR

12"x12" SAD 300 CFM

(E) VAV 2-13

20/20

18"x18" SAD 750 CFM

20/10 126

20/10

9"x9" SAD 200 CFM

12"x12" SAD 300 CFM

12"x12" EAR 250 CFM

(E) CD

24/20

16/20

FD

FD

14/8

DEMO EXH. FAN #3 LEAVE (E) EAR OPEN TO PLENUM

14/12

12"x12" SAD 300 CFM 127

56/32

18/8

16"x16"TAG

VD

12/12

14/8

12"x12" EAR 250 CFM

30/14

42/26

30/18

WEIGHT ROOM 133

20/18

36' SLD 5040 CFM

48"x24" RAR

48"x24" RAR

14/8

14/8

1966

12"x12" SAD 300 CFM 127

10/8

8"x8"TAG

14/6

8"x8"TAG

PARTIAL MECHANICAL PLAN – DEMOLITION

1/4" = 1'-0"

KEY PLAN
NOT TO SCALE

M1.1 | M1.2 | M1.3 | M1.4 | M1.5 | M1.6

A/E INFO

NELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES	RH	DRW	RH	CHK	MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

PARTIAL MECHANICAL PLAN – DEMOLITION

SCALE: AS NOTED

STATE JOB NO. CA-1332-C

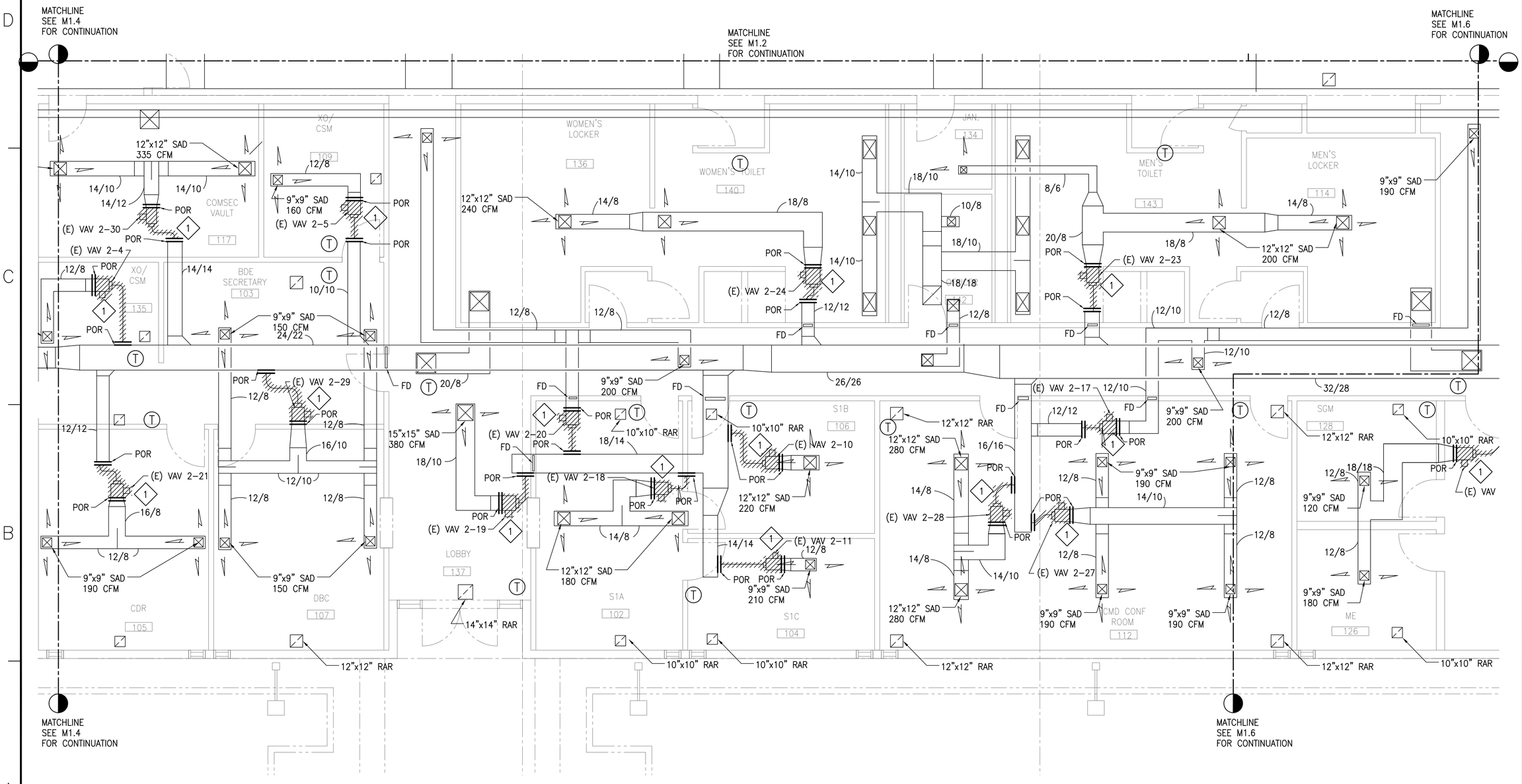
FEDERAL PROJECT NO. 15140009

SHEET 07 OF 31

M1.4

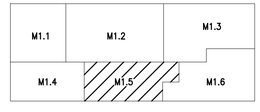
KEYED NOTES:

1. DEMO (E) PNEUMATIC VAV TERMINAL UNIT, FLEX DUCT AND PNEUMATIC PIPING. MAINTAIN OPENING FOR FUTURE CONNECTION.



PARTIAL MECHANICAL PLAN – DEMOLITION

1/4" = 1'-0"



KEY PLAN
NOT TO SCALE

A/E INFO

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 16759-M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

APPR	DATE	DESCRIPTION

SUBMITAL PHASE
100% FINAL DESIGN

SUBMITAL DATE 06/05/14

DES	RH	DRW	RH	CHK	MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
KALAELOA, HAWAII

HVAC REPAIRS

PARTIAL MECHANICAL PLAN – DEMOLITION

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
BARBERS POINT BUILDING 1898

SCALE: AS NOTED

STATE JOB NO. CA-1332-C

FEDERAL PROJECT NO. 15140009

SHEET 08 OF 31

M1.5

KEYED NOTES:

1. DEMO (E) PNEUMATIC VAV TERMINAL UNIT, FLEX DUCT AND PNEUMATIC PIPING. MAINTAIN OPENING FOR FUTURE CONNECTION.

MATCHLINE
SEE M1.2
FOR CONTINUATION

MATCHLINE
SEE M1.3
FOR CONTINUATION

MATCHLINE
SEE M1.5
FOR CONTINUATION

PARTIAL MECHANICAL PLAN – DEMOLITION

1/4" = 1'-0"

KEY PLAN
NOT TO SCALE

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 16759-M
HAWAII U.S.A.
AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

NO.	DESCRIPTION	DATE	APPR

SUBMITAL PHASE: 100% FINAL DESIGN
SUBMITAL DATE: 06/05/14
DES RH DRW RH CHK MY

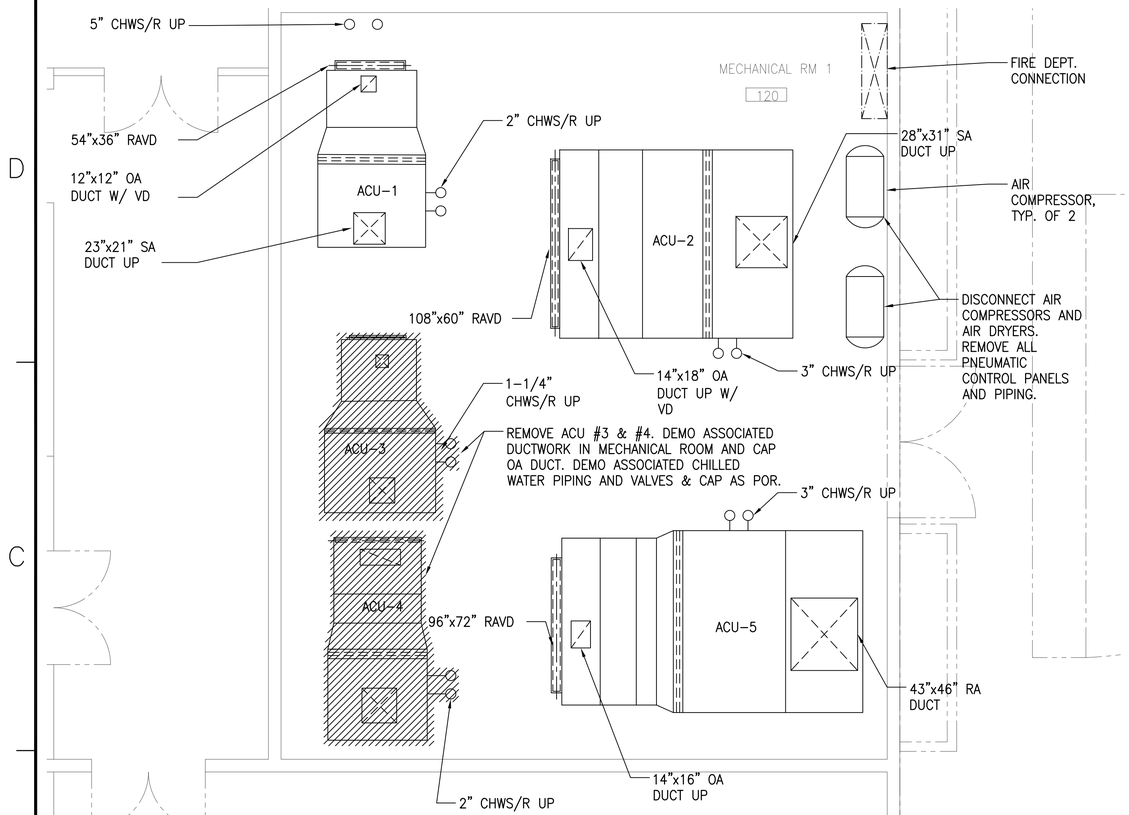
DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
KALAELOA, HAWAII
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
BARBERS POINT BUILDING 1898

HVAC REPAIRS

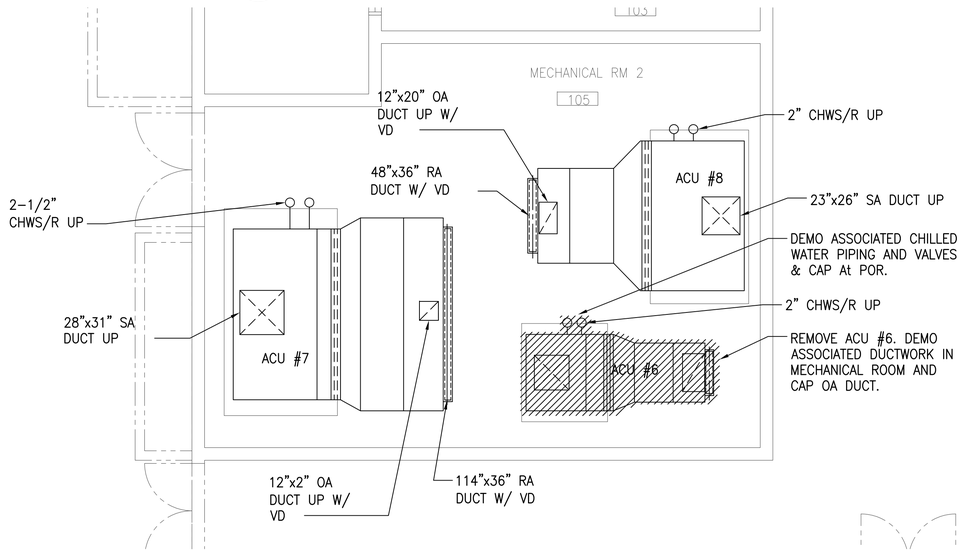
PARTIAL MECHANICAL PLAN – DEMOLITION

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 09 OF 31

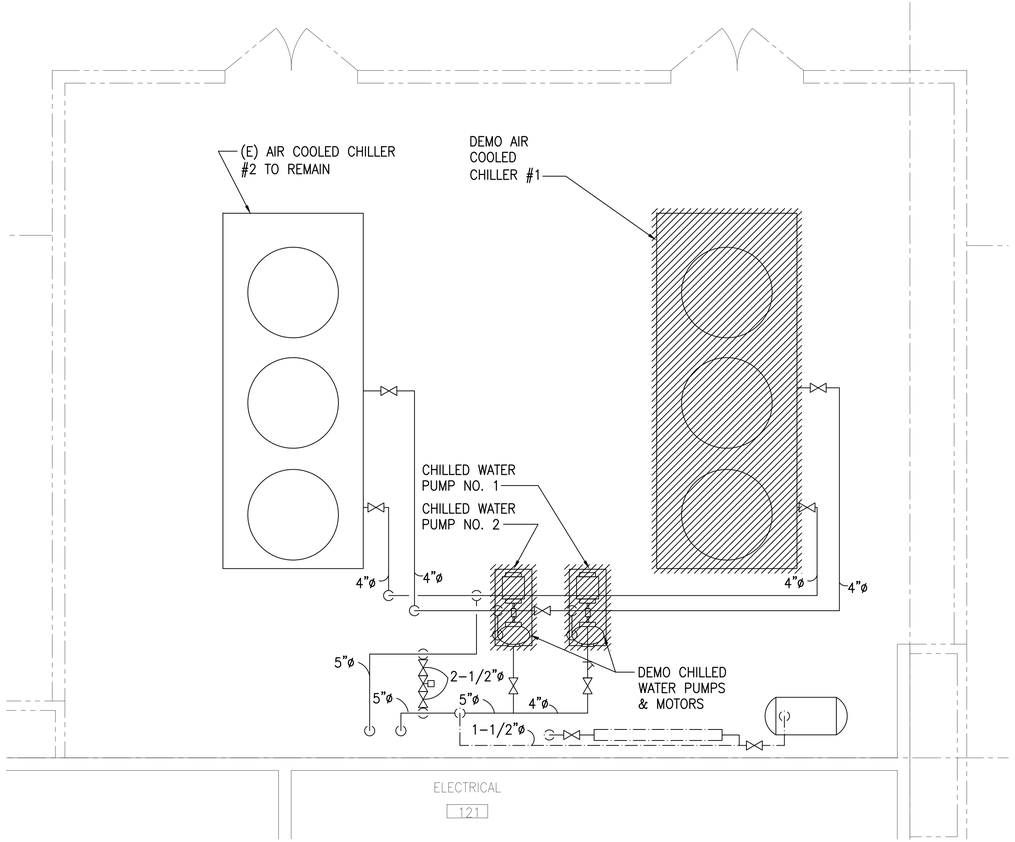
M1.6



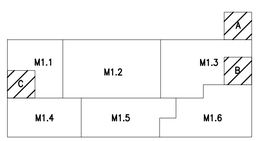
B ENLARGED MECH. RM. FLOOR PLAN – DEMO
1/4" = 1'-0"



C ENLARGED MECH. RM. FLOOR PLAN – DEMO
1/4" = 1'-0"



A ENLARGED MECH. YARD PLAN – DEMO
1/4" = 1'-0"



KEY PLAN
NOT TO SCALE

A/E INFO

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII, U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES	RH	DRW	RH	CHK	MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

ENLARGED PARTIAL MECHANICAL PLANS – DEMOLITION

SCALE: AS NOTED

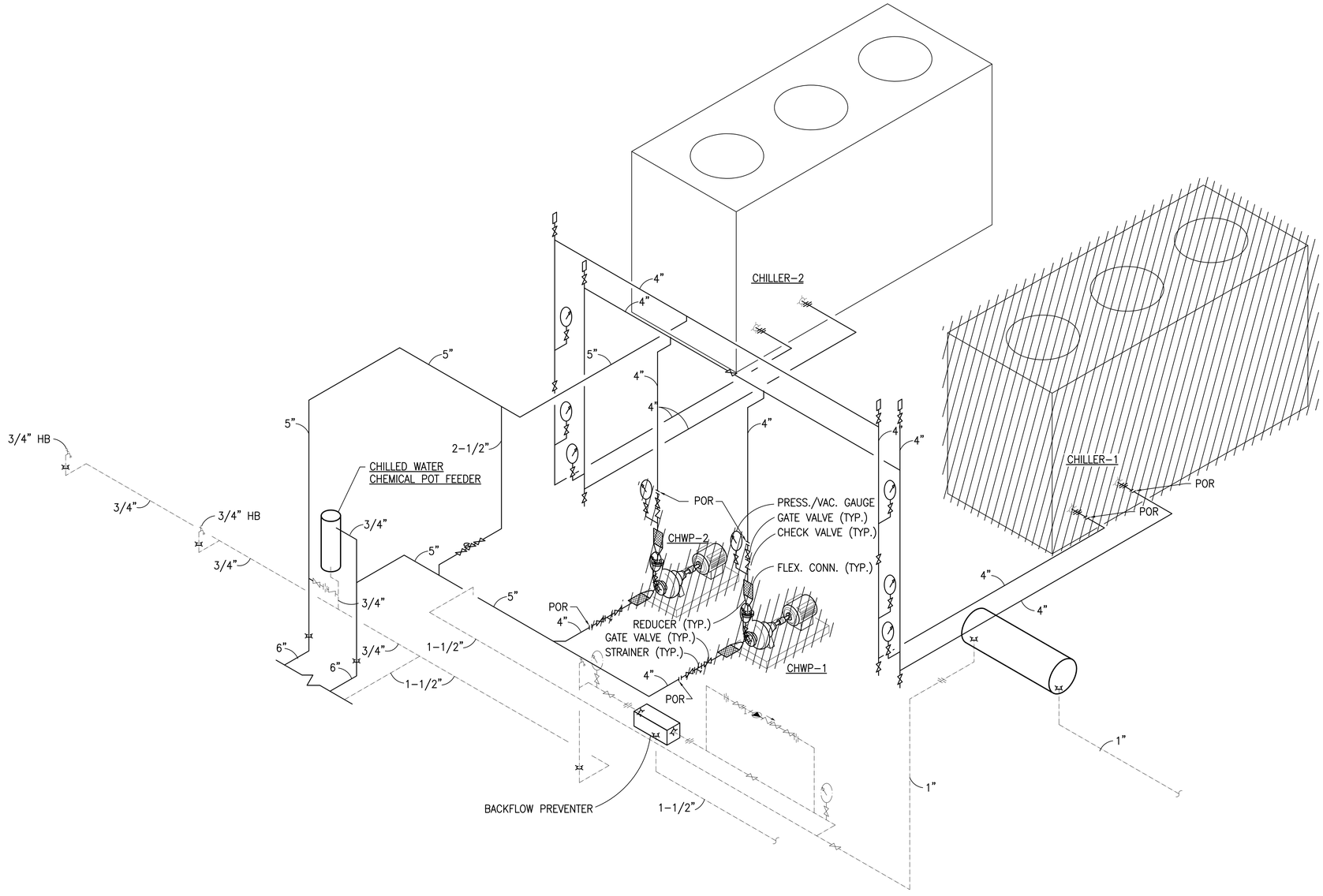
STATE JOB NO. CA-1332-C

FEDERAL PROJECT NO. 15140009

SHEET 10 OF 31

M1.7

NOTES:
1. REMOVE ALL CHILLED WATER PIPE INSULATION THROUGHOUT MECHANICAL YARD. ASSESS CONDITION OF ALL CHILLED WATER PIPING, VALVES, AND ACCESSORIES.
2. REPLACE ALL HORIZONTAL PIPE SUPPORTS IN MECHANICAL YARD.
3. DEMO CHILLER–1, CHWP–1, AND CHWP–2.



MECHANICAL YARD ISOMETRIC DIAGRAM – DEMOLITION
NOT TO SCALE

A/E INFO

NELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759–M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16
SEAL

DESCRIPTION	DATE	APPR
SUBMITTAL PHASE: 100% FINAL DESIGN		
SUBMITTAL DATE: 06/05/14		

DES RH | DRW RH | CHK MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

MECHANICAL YARD ISOMETRIC DIAGRAM – DEMOLITION

SCALE: AS NOTED
STATE JOB NO. CA–1332–C
FEDERAL PROJECT NO. 15140009
SHEET 11 OF 31

M1.8

NOTES:

DISCONNECT ALL RETURN AIR MODULATING DAMPERS. BALANCE AS MANUAL DAMPER.

MECHANICAL PLAN – NEW

3/32" = 1'-0"

KEY PLAN

NOT TO SCALE

M2.1 M2.2 M2.3 M2.4 M2.5 M2.6

A/E INFO

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 16759-M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

NUM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES RH | DRW RH | CHK MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

MECHANICAL PLAN – NEW

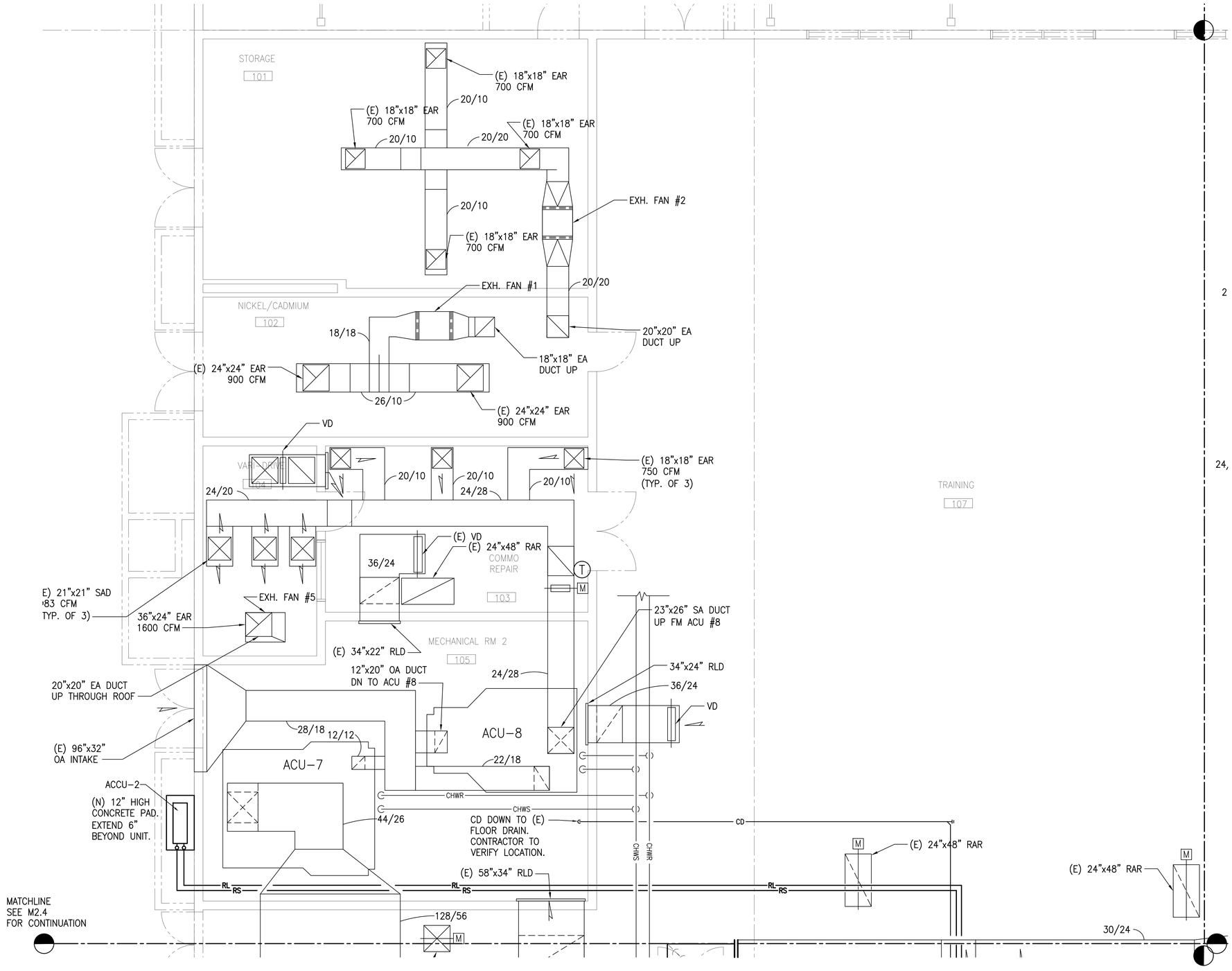
SCALE: AS NOTED

STATE JOB NO. CA-1332-C

FEDERAL PROJECT NO. 15140009

SHEET 12 OF 31

M2.0



PARTIAL MECHANICAL PLAN – NEW

1/4" = 1'-0"

KEY PLAN
NOT TO SCALE

A/E INFO

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

	APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES RH | DRW RH | CHK MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

PARTIAL MECHANICAL PLAN – NEW

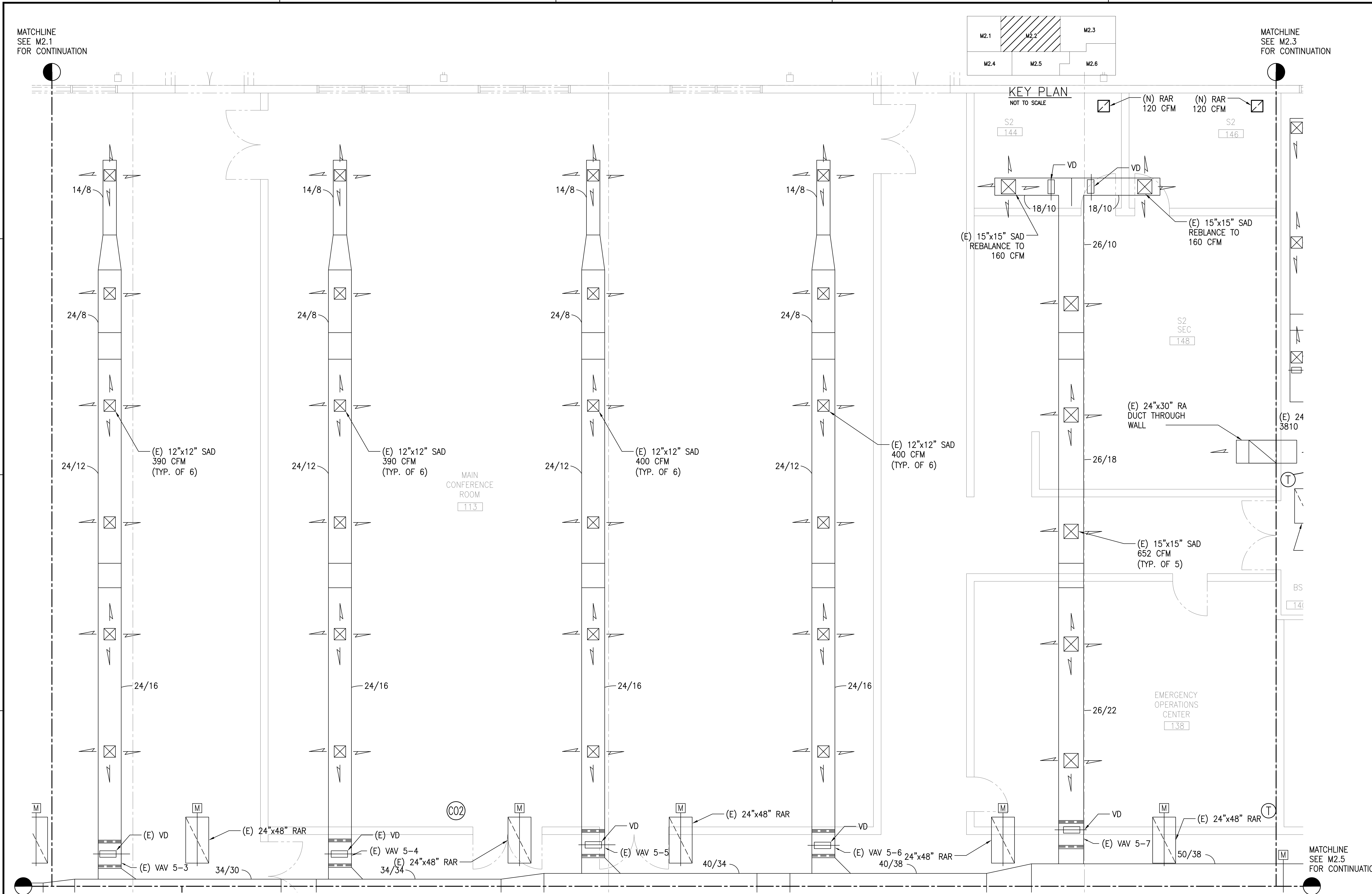
SCALE: AS NOTED

STATE JOB NO. CA-1332-C

FEDERAL PROJECT NO. 15140009

SHEET 13 OF 31

M2.1



MATCHLINE SEE M2.1 FOR CONTINUATION
MATCHLINE SEE M2.3 FOR CONTINUATION
MATCHLINE SEE M2.5 FOR CONTINUATION
KEY PLAN
NOT TO SCALE
M2.1
M2.2
M2.3
M2.4
M2.5
M2.6
(N) RAR 120 CFM
VD
18/10
(E) 15"x15" SAD REBALANCE TO 160 CFM
26/10
14/8
24/8
24/12
24/16
(E) 12"x12" SAD 390 CFM (TYP. OF 6)
(E) 12"x12" SAD 400 CFM (TYP. OF 6)
MAIN CONFERENCE ROOM 113
S2 144
S2 146
S2 SEC 148
(E) 24"x30" RA DUCT THROUGH WALL
26/18
(E) 15"x15" SAD 652 CFM (TYP. OF 5)
26/22
EMERGENCY OPERATIONS CENTER 138
C02
(E) VD
(E) VAV 5-3
(E) VAV 5-4
(E) VAV 5-5
(E) VAV 5-6
(E) VAV 5-7
(E) 24"x48" RAR
34/30
34/34
40/34
40/38
50/38

PARTIAL MECHANICAL PLAN – NEW
1/4" = 1'-0"

SUBMITTAL PHASE: 100% FINAL DESIGN
SUBMITTAL DATE: 06/05/14
DES RH | DRW RH | CHK MY

STATE OF HAWAII
DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
FACILITY MANAGEMENT OFFICE
DESIGN AND PROJECT MANAGEMENT BRANCH
BARBERS POINT BUILDING 1898
KALAELOA, HAWAII
HVAC REPAIRS
PARTIAL MECHANICAL PLAN – NEW

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 14 OF 31
M2.2

MATCHLINE
SEE M2.2
FOR CONTINUATION

S3
CLASSROOM
180

(E) 12"x12" SAD
280 CFM

(E) 12"x12" SAD
270 CFM

14/8

14/12

24/12

28/14

30/18

(E) 24"x48" RAR
3810 CFM

140A

C02

HHC
XO/1SG
176

22/12

(E) 48"x48" RAR

HHC SUPPLY
192

(E) 9"x9" SAD
REBALANCE TO
100 CFM

12/8

12/10

16/10

POC

(N) VAV 2-25

(E) 14"x14" RAR
360 CFM

ELECTRICAL
121

(E) 24"x24" EAR
1000 CFM

26/10

26"x26" EXH
UP TO ROOF EF #11

(E) 48"x24" RAR
(TYP. OF 5)

M2.1 M2.2 M2.3
M2.4 M2.5 M2.6

KEY PLAN
NOT TO SCALE

MECHANICAL RM 1
120

ACU-1

(N) MOTORIZED
OUTSIDE AIR
DAMPER

ACU-2

18/18

(N) DDC PANEL

(N) VFD FOR SAF-1

40/40

(N) SAF-1

32/18

(N) 12"x12" SAD
120 CFM

(N) VAV 2-40

182

(N) 10/6

(E) 18"x36" RAR
REBALANCE TO
190 CFM

(E) 9"x9" SAD
REBALANCE
TO 100 CFM

9"x9" SAD
140 CFM

12/6

12"x12" RAR
150 CFM

(E) 9"x9" SAD
REBALANCE TO
100 CFM

HHC ADMIN
178

OPS
10"x10" RAR

174

14/10

12"x12" SAD
400 CFM

(E) 9"x9" SAD
REBALANCE TO
160 CFM

(N) VAV2-6
14"x14" RAR

(N) RAR
90 CFM

154

156

(N) 12/8

(N) RAR
230 CFM

BSO
140

(E) 9"x9" SAD
REBALANCE
TO 100 CFM

(E) 12"x12" SAD
REBALANCE TO
160 CFM

14/8

24/10

(E) 12"x12" SAD
REBALANCE TO
200 CFM

(E) 24"x24" RAR
250 CFM

(N) VAV 2-39

148

(N) SAD
150 CFM

(N) 10/8

(N) VAV 2-38

KITCHEN
150

(N) SAD
110 CFM

36/24

(E) 9"x9" SAD
REBALANCE TO
75 CFM

12/8

18/8

18/12

152

(E) RAR
150 CFM

(E) VAV 2-32

170

(E) RAR
120 CFM

24/10

CD

FD

CD DOWN TO (E)
FLOOR DRAIN.
CONTRACTOR TO
VERIFY LOCATION.

STORAGE
164

CHWR
CHWS

ACU-5

40/30

MATCHLINE
SEE M2.6
FOR CONTINUATION

FIRE DAMPER

(N) VAV 2-33

(N) VAV 2-7

(E) 9"x9" SAD
125 CFM

(E) 12"x12" SAD
REBALANCE TO
300 CFM

(E) VAV 2-36

(E) VAV 2-35

(E) 12"x12" SAD
REBALANCE TO
220 CFM

25/12

14/8

MATCHLINE
SEE M2.5
FOR CONTINUATION

MATCHLINE
SEE M2.6
FOR CONTINUATION

PARTIAL MECHANICAL PLAN – NEW

1/4" = 1'-0"

A/E INFO

MICHELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII, U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES	RH	DRW	RH	CHK	MY

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
KALAELOA, HAWAII

HAWAII ARMY NATIONAL GUARD

HVAC REPAIRS

PARTIAL MECHANICAL PLAN – NEW

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

BARBERS POINT BUILDING 1898

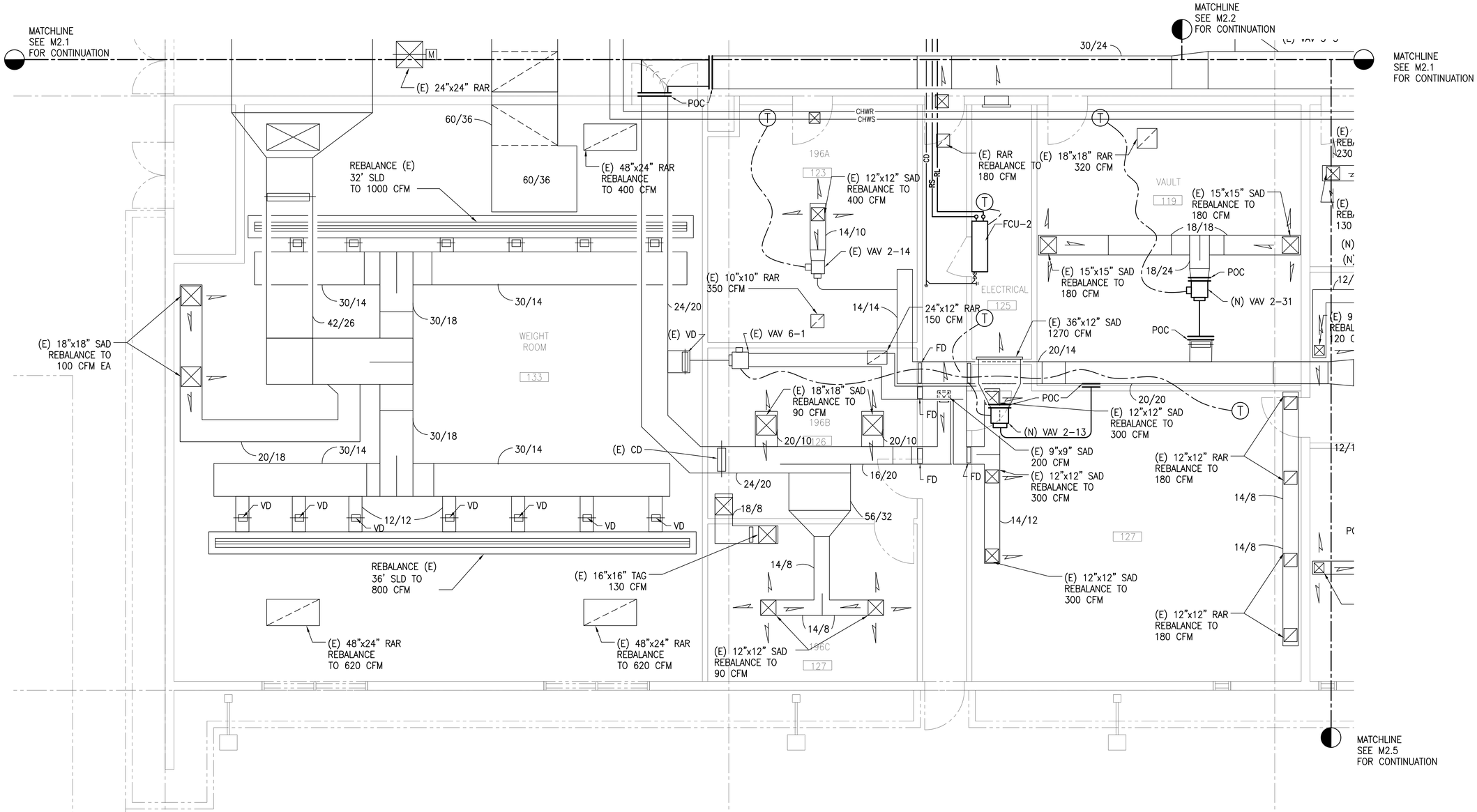
SCALE: AS NOTED

STATE JOB NO.
CA-1332-C

FEDERAL PROJECT NO.
15140009

SHEET 15 OF 31

M2.3



PARTIAL MECHANICAL PLAN – NEW

1/4" = 1'-0"

KEY PLAN
NOT TO SCALE

A/E INFO

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII U.S.A.

AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES	RH	DRW	RH	CHK	MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

PARTIAL MECHANICAL PLAN – NEW

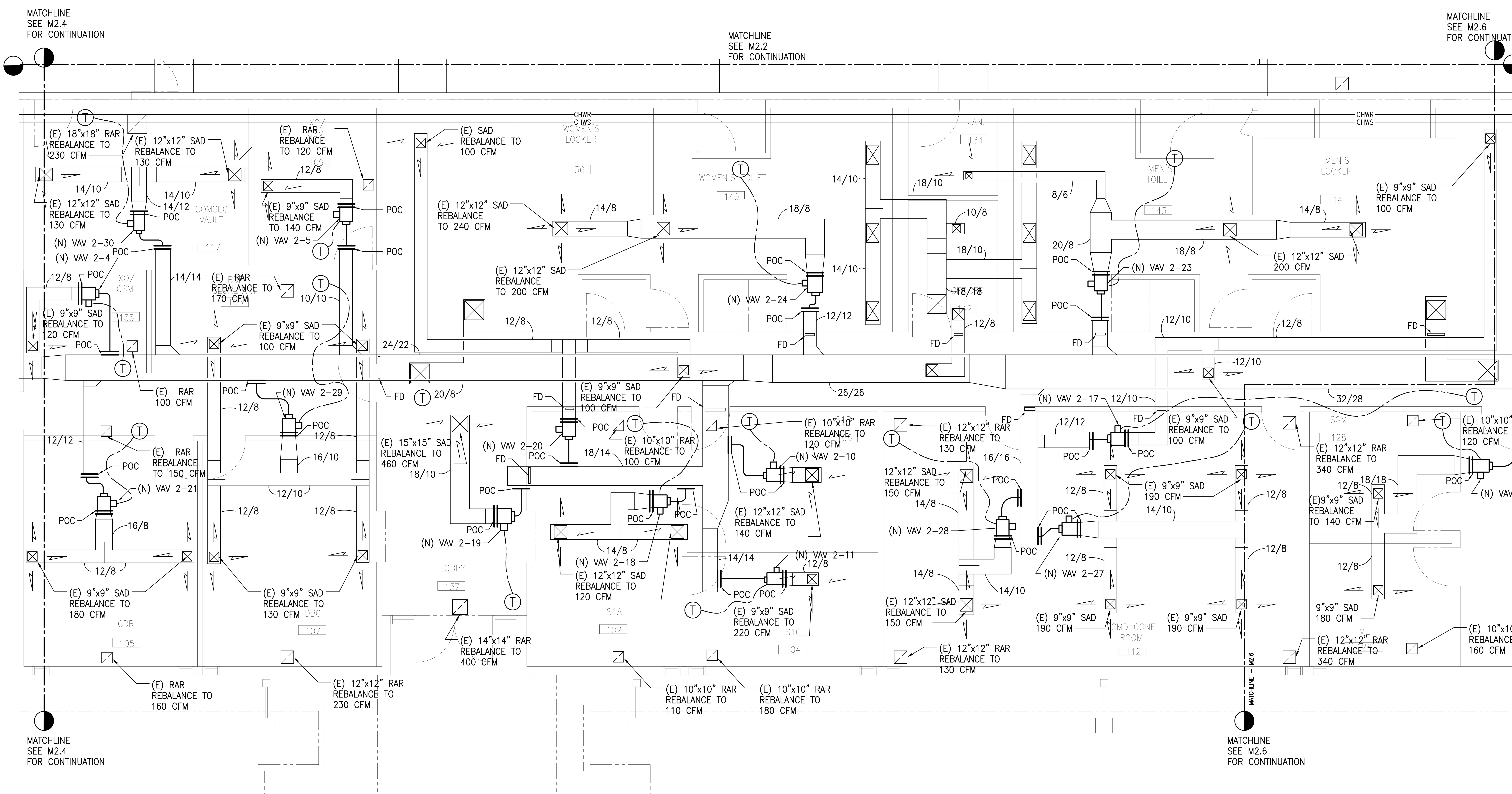
SCALE: AS NOTED

STATE JOB NO. CA-1332-C

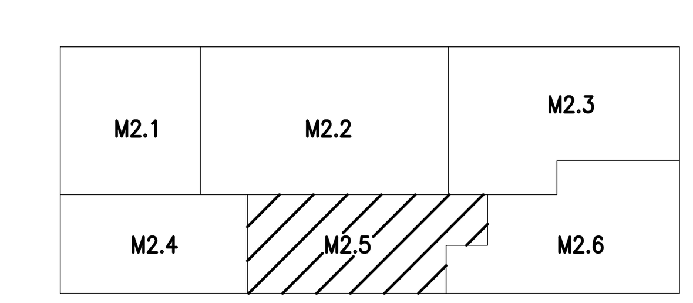
FEDERAL PROJECT NO. 15140009

SHEET 16 OF 31

M2.4



PARTIAL MECHANICAL PLAN – NEW
1/4" = 1'-0"



KEY PLAN
NOT TO SCALE

MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII, U.S.A.
AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16

SUBMITTAL PHASE: 100% FINAL DESIGN
SUBMITTAL DATE: 06/05/14
DES RH | DRW RH | CHK MY

STATE OF HAWAII
DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
FACILITY MANAGEMENT OFFICE
DESIGN AND PROJECT MANAGEMENT BRANCH
BARBERS POINT BUILDING 1898
KALAELOA, HAWAII

HVAC REPAIRS

PARTIAL MECHANICAL PLAN – NEW

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 17 OF 31

M2.5

MATCHLINE
SEE M2.2
FOR CONTINUATION

MATCHLINE
SEE M2.3
FOR CONTINUATION

MATCHLINE
SEE M2.5
FOR CONTINUATION

(N) 10/8
(N) SAD 110 CFM
KITCHEN 150
36/24
FIRE DAMPER
(E) RAR 150 CFM
12/8
18/12
12/8
(E) 9"x9" SAD REBALANCE TO 75 CFM
POC
(N) VAV 2-33
(N) VAV 2-7
(E) 9"x9" SAD 125 CFM
(E) RAR 120 CFM
STORAGE 164
24/10
FD
CD DOWN TO (E) FLOOR DRAIN. CONTRACTOR TO VERIFY LOCATION.
CD
(E) 12"x12" SAD REBALANCE TO 300 CFM
(E) VAV 2-36
(E) VAV 2-35
25/12
14/8
(E) 12"x12" SAD REBALANCE TO 220 CFM
40/30
CHWR
CHWS
MEN'S LOCKER 114
(E) 9"x9" SAD REBALANCE TO 100 CFM
(E) 12"x12" SAD 200 CFM
(E) SAD REBALANCE TO 120 CFM
(N) VAV 2-2
(E) 10"x10" RAR REBALANCE TO 100 CFM
(E) 10"x10" RAR REBALANCE TO 150 CFM
JAG 155
(N) VAV 2-1
(N) VAV 2-8
9"x9" SAD 170 CFM
10/10
12/8
9"x9" SAD REBALANCE TO 120 CFM
(E) RAR REBALANCE TO 100 CFM
OPS 158
(N) RAR 100 CFM
10"x10" RAR REBALANCE TO 120 CFM
9"x9" SAD REBALANCE TO 140 CFM
36/30
18/18
12/8
(E) 12"x12" SAD REBALANCE TO 300 CFM
14/12
14/8
BDE CONF ROOM 194
(N) RAR 475 CFM
(E) 12"x12" SAD REBALANCE TO 380 CFM
(N) RAR 450 CFM
20/6
ACCU-1
(N) 12" HIGH CONCRETE PAD. EXTEND 6" BEYOND UNIT.
RL
RS
FCU-1
50/38
(E) 18"x18" RAR
(E) 12"x12" RAR REBALANCE TO 160 CFM
38/30
(E) RAR REBALANCE TO 290 CFM
(E) RAR REBALANCE TO 650 CFM
14/10
RCAS HUB 158
S8 196
(E) 12"x12" SAD REBALANCE TO 300 CFM
(E) VAV 2-26
16/12
16/8
(E) 9"x9" SAD 185 CFM
(E) 9"x9" SAD 185 CFM
APOS 118
(N) VAV 2-7a
(E) 10"x10" RAR REBALANCE TO 140 CFM
32/28
SGM 128
(E) 10"x10" RAR REBALANCE TO 120 CFM
(E) 12"x12" RAR REBALANCE TO 340 CFM
(E) 10"x10" RAR REBALANCE TO 250 CFM
(N) VAV 2-34
(N) VAV 2-16
(N) VAV 2-22
122
48/38
(E)9"x9" SAD REBALANCE TO 140 CFM
9"x9" SAD 180 CFM
9"x9" SAD REBALANCE TO 290 CFM EACH
(E) 9"x9" SAD REBALANCE TO 100 CFM EACH
(E) 10"x10" RAR REBALANCE TO 90 CFM
(N) VAV 2-37
(E) 9"x9" SAD REBALANCE TO 140 CFM
(N) VAV 2-15
(E) 9"x9" SAD REBALANCE TO 140 CFM
HHC SUPPLY 166
(E) 12"x12" RAR REBALANCE TO 160 CFM
(E) 12"x12" RAR REBALANCE TO 340 CFM
(E) 10"x10" RAR REBALANCE TO 160 CFM
(E)10"x10" RAR REBALANCE TO 260 CFM
(E) 10"x10" RAR REBALANCE TO 90 CFM
S3 116
124
MF 126

PARTIAL MECHANICAL PLAN – NEW
1/4" = 1'-0"

KEY PLAN
NOT TO SCALE
M2.1 M2.2 M2.3 M2.4 M2.5 M2.6

A/E INFO
MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII U.S.A.
AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16
SEAL

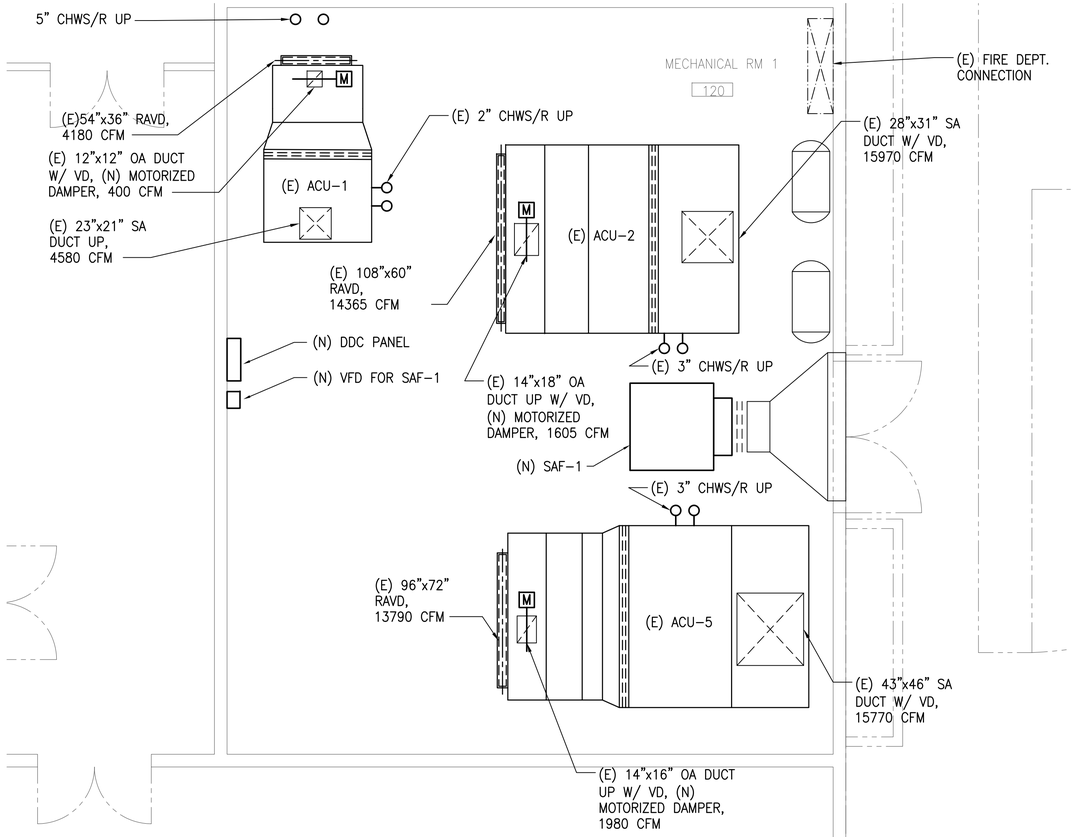
STM	DESCRIPTION
	DATE
	APPR

SUBMITTAL PHASE
100% FINAL DESIGN
SUBMITTAL DATE 06/05/14
DES RH | DRW RH | CHK MY

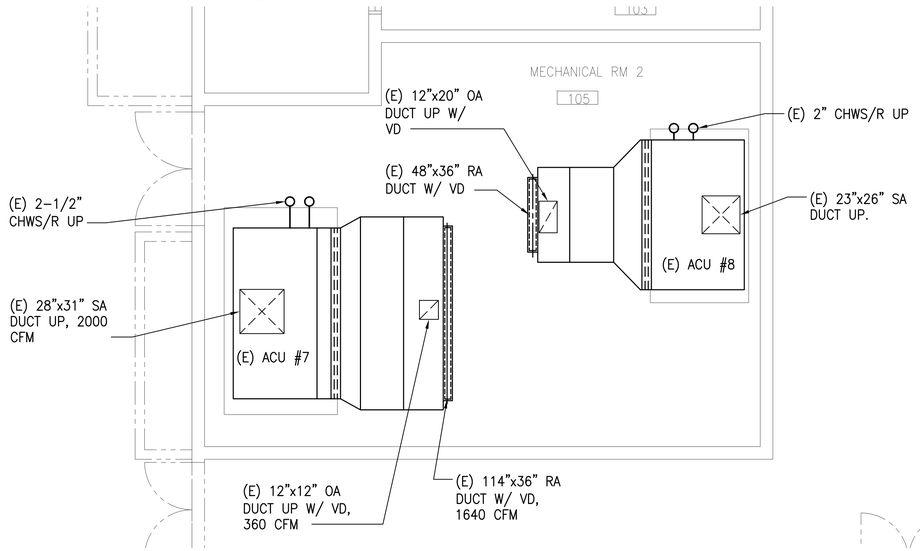
DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
FACILITY MANAGEMENT OFFICE
STATE OF HAWAII
DESIGN AND PROJECT MANAGEMENT BRANCH
KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS
PARTIAL MECHANICAL PLAN – NEW

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 18 OF 31
M2.6



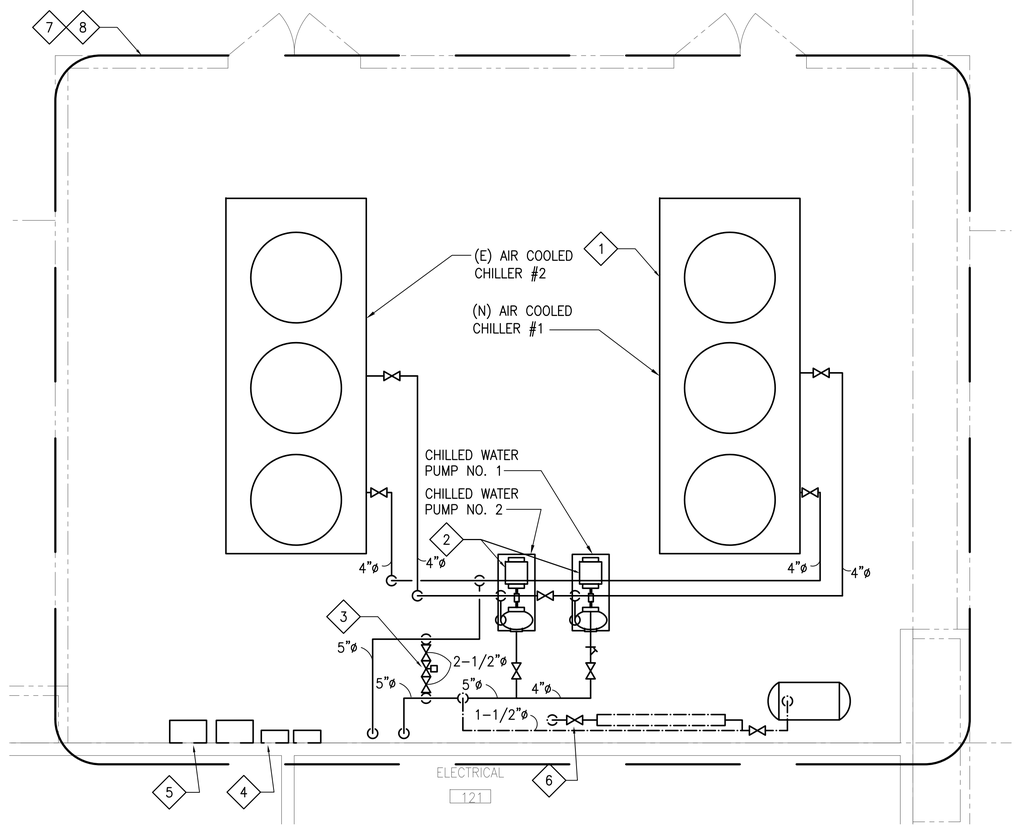
B ENLARGED MECH. RM. FLOOR PLAN – NEW
1/4" = 1'-0"



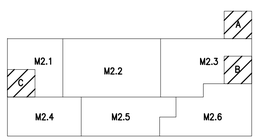
C ENLARGED MECH. RM. FLOOR PLAN – NEW
1/4" = 1'-0"

KEYED NOTES:

1. INSTALL (N) AIR-COOLED CHILLER #1, CONNECT TO DDC. REPAIR AND MODIFY (E) CONCRETE PADS TO ACCOMMODATE (N) CHILLER FOOTPRINTS.
2. INSTALL (N) CHILLED WATER PUMPS #1 & #2, WITH VFD, CONNECT TO DDC.
3. INSTALL (N) CHILLED WATER BYPASS VALVE, CONNECT TO DDC.
4. INSTALL (N) VFDs FOR CHILLED WATER PUMPS #1 & #2 WITH NEMA 4X ENCLOSURE
5. INSTALL (N) DDC PANELS FOR CHILLER #1 WITH NEMA 4X ENCLOSURE
6. INSTALL (N) WATER PRESSURE REGULATOR FOR MAKE-UP WATER.
7. REPLACE ALL TEMPERATURE AND PRESSURE GAUGES AND GAUGE STUB-OUT PIPING. INSULATE PIPING.
8. CONTRACTOR TO ASSESS AND REPORT ON CONDITION OF ALL CHILLED WATER SHUT-OFF VALVES IN MECHANICAL YARD.



A ENLARGED MECH. YARD PLAN – NEW
1/4" = 1'-0"



KEY PLAN
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HVAC REPAIRS

ENLARGED PARTIAL MECHANICAL PLANS – NEW

SCALE: AS NOTED

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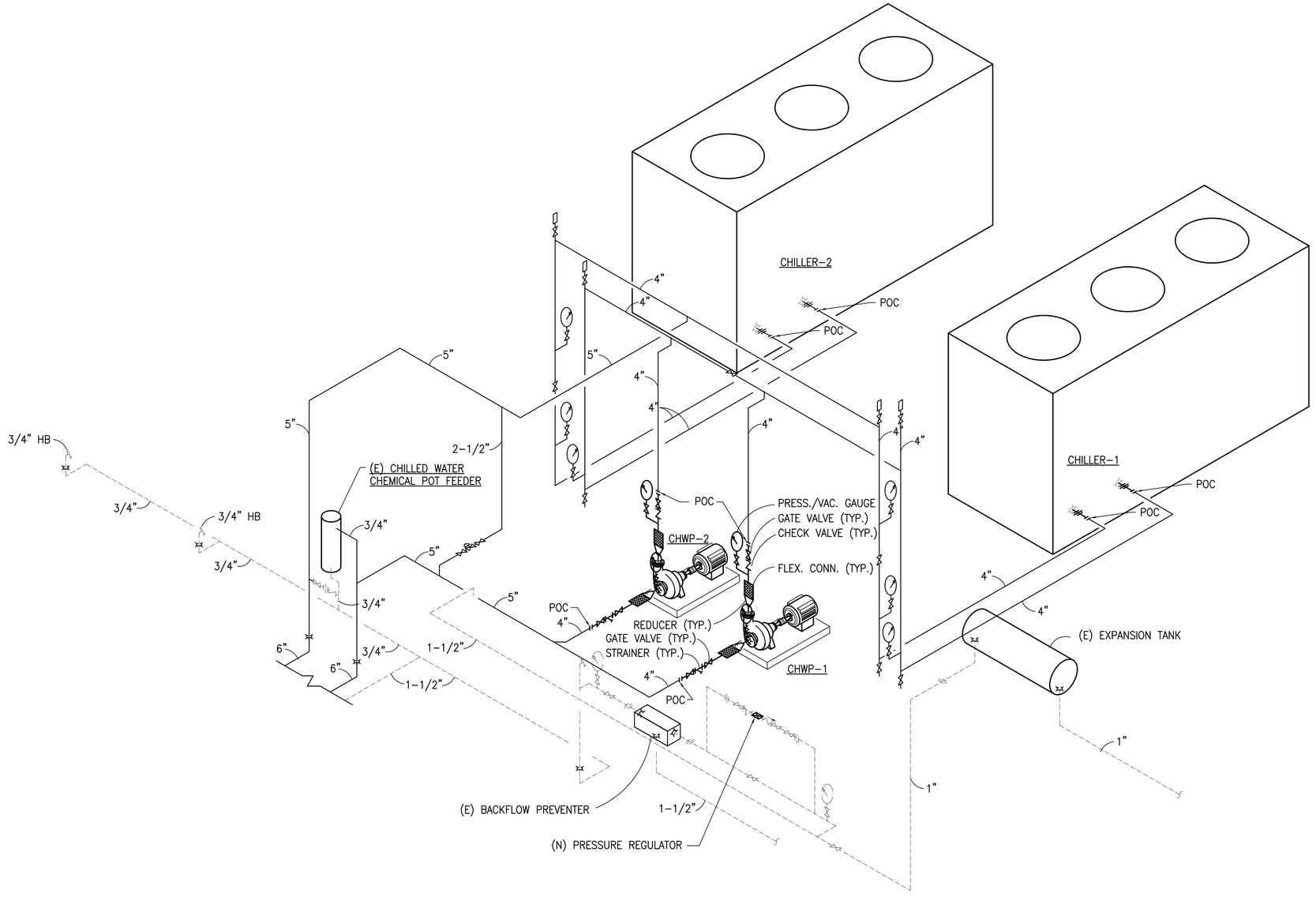
15140009

SHEET 19 OF 31

M2.7

NOTES:
1. REPLACE ALL CHILLED WATER PIPE INSULATION THROUGHOUT MECHANICAL YARD.
2. REPLACE ALL HORIZONTAL PIPE SUPPORTS IN MECHANICAL YARD.



MECHANICAL YARD ISOMETRIC DIAGRAM – NEW

NOT TO SCALE

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MECHANICAL YARD ISOMETRIC DIAGRAM – NEW

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SHEET 20 OF 31

M2.8

(N) AIR COOLED CHILLER SCHEDULE

UNIT	LOCATION	CAPACITY (TONS)	EFFICIENCY		REFRIG. CIRCUIT	REFRIG. TYPE	COOLER			CONDENSER			UNIT INPUT (KW)	ELECTRICAL			OPR. WT. (LBS)	MANUFACTURER AND MODEL OR APPROVED EQUAL	REMARKS
			FULL LOAD EER	PART LOAD IPLV			PD (FT.)	FLOW (GPM)	EWT (°F)	LWT (°F)	DESIGN AMB. TEMP. (°F)	NO. OF FANS (KW)		MCA (AMPS)	MOCP (AMPS)	V/PH/HZ			
CH-1	MECH YARD	84.0	10.31	15.93	2	R410A	22.7	201.7	54.0	44.0	95	6 1.135(EA)	97.8	185.5	200.0	460/3/60	3,698	CARRIER 30RAP090	

(E) AIR COOLED CHILLER SCHEDULE

UNIT	LOCATION	CAPACITY (TONS)	EFFICIENCY		REFRIG. CIRCUIT	REFRIG. TYPE	COOLER			CONDENSER			UNIT INPUT (KW)	ELECTRICAL			OPR. WT. (LBS)	MANUFACTURER AND MODEL	REMARKS
			FULL LOAD EER	PART LOAD IPLV			PD (FT.)	FLOW (GPM)	EWT (°F)	LWT (°F)	DESIGN AMB. TEMP. (°F)	NO. OF FANS (KW)		MCA (AMPS)	MOCP (AMPS)	V/PH/HZ			
CH-2	MECH YARD	81.1	9.8	15.4	4	R410A	12.8	194.7	54.0	44.0	95	6 1.62(EA)	99.3	396.7	450.0	208/3/60	5,565	MCQUAY AGZ080D	

(N) CHILLED WATER PUMP SCHEDULE

UNIT	SERVICE	TYPE	GPM	TOTAL HEAD (FT)	RPM	BHP	MIN. % PUMP EFF.	ELECTRICAL				MANUFACTURER AND MODEL OR APPROVED EQUAL	REMARKS
								HP	V	PH	Hz		
CHWP-1	CHILLER 1	END SUCTION	201.7	90	1750	–	70.0	7.5	460	3	60	AURORA 340 1 STG ENDSUC 2.5X3X9	T.E.F.C. MOTOR, PROVIDE WITH VARIABLE FREQUENCY DRIVE.
CHWP-2	CHILLER 2	END SUCTION	194.7	90	1750	–	70.0	7.5	460	3	60	AURORA 340 1 STG ENDSUC 2.5X3X9	T.E.F.C. MOTOR, PROVIDE WITH VARIABLE FREQUENCY DRIVE.

(N) SPLIT SYSTEM AIR CONDITIONING EQUIPMENT SCHEDULE

UNIT NO.	AREA SERVED	TOTAL CAP. (BTU/HR)	SENS. CAP. (BTU/HR)	ENT. AIR TEMP. DB/WB (DEG. F)	AMBIENT AIR CONDENSER TEMP. (DEG. F)	INDOOR UNIT												OUTDOOR UNIT										MAKE & MODEL OR APPROVED EQUAL	REMARKS
						SUPPLY AIR CFM	OUTSIDE AIR CFM	EXT. SP. (IN. WG)	INDOOR FAN kW	QTY.	FAN FLA	MIN. CIRC. AMPS	MAX. HEIGHT (IN.)	CONDENSATE DRAIN CONN. (DIA, IN.)	OPER. WEIGHT (LBS.)	ELECTRICAL			OUTDOOR FAN NO/kW	COMP. kW	MIN. CIRC. AMPS	REFRIG TYPE	REFRIG. LINE SIZE		MAX. dBA	MIN. EER	OPER. WEIGHT (LBS.)	ELECTRICAL				
																V	PH	Hz					RL	RS				V	PH	Hz	
FCU-1	IT ROOM	14,200	14,200	74.1/58.0	–	600	–	–	0.056	1	0.36	1.0	15	5/8	46	208	1	60											MITSUBISHI MR. SLIM FCU-1 PKA-A24KA4	
FCU-2	ELECTRICAL ROOM	14,200	14,200	74.1/58.0	–	900	–	–	0.056	1	0.57	1.0	15	5/8	46	208	1	60											MITSUBISHI MR. SLIM FCU-2 PKA-A36KA4	
ACCU-1																			1/0.075	2.21	18	R-410A	3/8	5/8	48	–	163	208	1	60	MITSUBISHI MR. SLIM ACCU-1 PUY-A24NHA4-BS	SERVES FCU-1
ACCU-2																			1/0.075	4.97	25	R-410A	3/8	5/8	48	–	163	208	1	60	MITSUBISHI MR. SLIM ACCU-2 PUY-A36NHA4-BS	SERVES FCU-2

(N) SUPPLY FAN SCHEDULE

UNIT	AREA SERVED	TYPE	CFM	TOTAL SP (INCH WG)	FAN RPM	ELECTRICAL				MAX. SONES	OPER. WEIGHT LBS.	MAKE & MODEL OR APPROVED EQUAL	REMARKS
						HP	V	PH	Hz				
SAF-1	OUTSIDE AIR	INLINE	3985	0.500	1588	1.5	208	3	60	21	208	GREENHECK BSQ 160-15	PROVIDE WITH VARIABLE FREQUENCY DRIVE.

(E) AIR HANDLING UNIT SCHEDULE

UNIT	AREA SERVED	TYPE	SUPPLY CFM	OUTSIDE AIR CFM	ESP (IN. WG)	ELECTRICAL				MAKE & MODEL	REMARKS
						HP	V	PH	Hz		
ACU-1	RM 178, 180, 182	DRAW-THRU	4,580	400	2.50	5	460	3	60	CARRIER 39ED11	RE-BALANCE OUTSIDE AIR TO ACU-1.
ACU-2	OFFICES	DRAW-THRU	15,970	1,605	2.75	20	460	3	60	CARRIER 39ED36	RE-BALANCE SYSTEM TO NEW DESIGN VALUES.
ACU-5	OFFICES	DRAW-THRU	15,770	1,980	2.75	20	460	3	60	CARRIER 39ED39	RE-BALANCE VAV 6-1 AFTER CONNECTING TO ACU-5.
ACU-7	RM 122	DRAW-THRU	2,000	360	2.00	15	460	3	60	CARRIER 39ED23	RE-BALANCE SYSTEM TO NEW DESIGN VALUES.
ACU-8	RM 103, 104	DRAW-THRU	5,200	720	1.25	5	460	3	60	CARRIER 39ED11	NO NEW WORK FOR THIS UNIT.

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KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

EQUIPMENT SCHEDULES

SCALE: AS NOTED

STATE JOB NO. CA-1332-C

FEDERAL PROJECT NO. 15140009

SHEET 21 OF 31

M3.0

(N) VAV TERMINAL UNITS

UNIT	ROOM	CFM		INLET SIZE DIA. (IN.)	PD @ MAX. CFM INCH WG	REHEAT KW	ELECTRICAL			MAKE & MODEL OR APPROVED EQUAL
		MIN	MAX				V	PH	HZ	
VAV 2-1	OFFICE 155-JAG	40	120	4	0.35	–	120	1	60	METAL-AIRE
VAV 2-2	OFFICE 154-CHAPLAIN	40	120	4	0.35	–	120	1	60	METAL-AIRE
VAV 2-4	OFFICE 135-XO/CSM	40	120	4	0.35	–	120	1	60	METAL-AIRE
VAV 2-5	OFFICE 134	40	140	4	0.35	–	120	1	60	METAL-AIRE
VAV 2-6	OFFICE 174	60	160	4	0.35	–	120	1	60	METAL-AIRE
VAV 2-7	CORRIDOR 111	140	140	4	0.35	–	120	1	60	METAL-AIRE
VAV 2-7a	OFFICE 118-A/S3	60	160	5	0.35	–	120	1	60	METAL-AIRE
VAV 2-8	OFFICE 158	60	170	5	0.35	–	120	1	60	METAL-AIRE
VAV 2-10	OFFICE 106	40	140	4	0.35	–	120	1	60	METAL-AIRE
VAV 2-11	OFFICE 104	70	220	5	0.35	–	120	1	60	METAL-AIRE
VAV 2-13	ELECTRICAL ROOM 125	250	1270	10	0.35	–	120	1	60	METAL-AIRE
VAV 2-15	COMPUTER 158-RCAS HUB	150	600	8	0.35	–	120	1	60	METAL-AIRE
VAV 2-16	OFFICE 116	180	580	8	0.35	–	120	1	60	METAL-AIRE
VAV 2-17	CORRIDOR 5 & 6	200	200	5	0.35	–	120	1	60	METAL-AIRE
VAV 2-18	OFFICE 102	80	240	5	0.35	–	120	1	60	METAL-AIRE
VAV 2-19	LOBBY 137	120	460	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-20	CORRIDOR 4 & 5	200	200	5	0.35	–	120	1	60	METAL-AIRE
VAV 2-21	OFFICE 105	110	360	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-22	OFFICE 126, 128	100	320	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-23	MEN'S LOCKER 114, JANITOR	370	450	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-24	WOMEN'S LOCKER 136	440	440	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-25	STORAGE 192	120	400	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-27	CONFERENCE 112	230	760	8	0.35	–	120	1	60	METAL-AIRE
VAV 2-28	CONFERENCE 112	130	300	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-29	OFFICE 107	140	460	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-30	ROOM 117	80	260	5	0.35	–	120	1	60	METAL-AIRE
VAV 2-31	ROOM 119	110	360	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-33	OFFICE 152, 154, 156	150	500	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-34	OFFICE 120, 122, 124	140	460	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-37	STORAGE 166	280	840	10	0.35	–	120	1	60	METAL-AIRE
VAV 2-38	ROOM 150-KITCHEN	70	220	5	0.35	–	120	1	60	METAL-AIRE
VAV 2-39	ROOM 148	90	300	6	0.35	–	120	1	60	METAL-AIRE
VAV 2-40	ROOM 140A	80	240	5	0.35	–	120	1	60	METAL-AIRE

NOTE:
CONNECT ALL (N) VAV TERMINAL UNITS TO (E) DDC SYSTEM

(E) VAV TERMINAL UNITS

UNIT	ROOM	CFM		INLET SIZE DIA. (IN.)	PD @ MAX. CFM INCH WG	REHEAT KW	ELECTRICAL			MAKE & MODEL OR APPROVED EQUAL
		MIN	MAX				V	PH	HZ	
VAV 2-14	OFFICE 123	210	400	6	0.35	–	120	1	60	
VAV 2-26	OFFICE 196	400	740	8	0.35	–	120	1	60	
VAV 2-32	RECEIVING, MED	220	560	10	0.35	–	120	1	60	
VAV 2-35	RECEIVING, BDE CONF. A	340	1280	12	0.35	–	120	1	60	
VAV 2-36	RECEIVING, BDE CONF. B	340	1280	12	0.35	–	120	1	60	
VAV 5-1	TRAINING	450	3660	20/16	0.35	–	120	1	60	TO BE REMOVED BY OTHERS
VAV 5-2	TRAINING	460	3660	20/16	0.35	–	120	1	60	TO BE REMOVED BY OTHERS
VAV 5-3	TRAINING	390	2340	16	0.35	–	120	1	60	
VAV 5-4	CONFERENCE 113	378	2340	16	0.35	–	120	1	60	
VAV 5-5	CONFERENCE 113	365	2400	16	0.35	–	120	1	60	
VAV 5-6	CONFERENCE 113	395	2400	16	0.35	–	120	1	60	
VAV 5-7	S4, S4 OFFICES, OPERATIONS	420	3570	16	0.35	–	120	1	60	
VAV 6-1	OFFICE 127	140	900	16	0.35	–	120	1	60	

NOTE:
DDC MAPPING TO (E) AUTOMATED LOGIC SYSTEM.

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HVAC REPAIRS

VAV SCHEDULE

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15140009

SHEET 22 OF 31

M3.1

(N) DDC POINTS DESCRIPTION	ANALOG														BINARY						SYSTEM FEATURES															NOTES
	INPUT										OUTPUT				INPUT						OUTPUT				ALARMS								PROGRAMS								
	TEMPERATURE	PRESSURE	AMPS	VALVE POSITION	kW / kWh	PERCENT	CFM	GPM	PPM	RELATIVE HUMIDITY	MODULATING CONTROL	VFD SPEED CONTROL	SET POINT ADJ.	VALVE CONTROL	STATUS ON/OFF	FILTER STATUS (ΔP)	OPEN/CLOSE	ALARM CONTACT STATUS			OFF-ON	OPEN/CLOSE	ENABLE/DISABLE	START STOP	HIGH ANALOG	LOW ANALOG	HIGH BINARY	LOW BINARY	SENSOR FAIL	FLOW FAIL	EQUIP. FAIL/COMM.	DIAGNOSTIC/PANEL ALARM		TIME SCHEDULING	DEMAND LIMITING	OPT. START/STOP	RESET	kW TRENDING	RUN TIME	SOFT START	CAPACITY CALS.	
CHILLER CH-1 & CH-2			●		●								●		●						●		●							●											
CHW FLOW								●																		●				●	●										
CHWS TEMP.	●												●												●	●			●							●					
CHWR TEMP.	●																								●	●			●											
CHW BYPASS				●				●						●																											
CHWP-1 & CHWP-2			●			●						●	●		●						●		●								●		●			●					
VAV AIR HANDLING UNIT (ACU 1, 2, 5, 7)																																								
SPACE CARBON DIOXIDE SENSOR									●																															
MODULATING DAMPER			●				●					●		●																											
VAV TERMINAL UNITS (TYP.)																																								
DAMPER OPERATOR						●					●																													
ZONE TEMP.	●																								●															
COOLING SETPOINT											●		●																											
ACTUAL AIR FLOW							●																																	
SAF-1	●	●	●			●	●					●	●		●						●		●								●		●			●					
ROOM 120 CARBON DIOXIDE SENSOR									●																															
SMOKE DETECTOR																		●																							

NOTE:
(E) DDC POINTS ARE OMITTED, ONLY (N) DDC POINTS ARE SHOWN.

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HVAC REPAIRS

DDC SCHEDULE

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15140009

SHEET 23 OF 31

M3.2

DDC SYSTEM SEQUENCE OF OPERATION: CENTRAL PLANT

I. GENERAL

MODIFY EXISTING DIRECT DIGITAL CONTROL (DDC) SYSTEM TO CONTROL AND MONITOR THE NEW POINTS INDICATED ON THE POINTS LIST SCHEDULE.

A. A DESCRIPTION OF THE NEW SYSTEMS AND EQUIPMENT WHICH SHALL BE MONITORED AND CONTROLLED THROUGH THE DDC SYSTEM AND OPERATIONAL SCHEDULE IS LISTED AS FOLLOW:

CENTRAL CHILLER PLANT CONSISTS OF CHILLERS CH-1, CH-2 AND CHILLED WATER PUMPS, CHWP-1, CHWP-2.

SUPPLY AIR FAN, SAF-1; VARIABLE AIR VOLUME TERMINAL UNITS.

B. EXISTING CENTRAL PLANT SCHEDULE

THE BUILDING OPERATIONAL HOURS ARE 6:00 AM TO 6:00 PM MONDAY; 7:00 AM TO 6:00 PM TUESDAY THROUGH FRIDAY; SATURDAY, SUNDAY, AND HOLIDAYS AS NEEDED.

II. CHILLER PLANT OPERATION

A. THE CHILLER PLANT DDC SYSTEM WILL MONITOR, CALCULATE, AND RECORD ALL LOADS, TEMPERATURES, FLOWS, AND OTHER DATA ON THE CHILLERS AND IN THE CHILLER PLANT AS INDICATED ON THE DDC SYSTEM POINTS LIST. THE SYSTEM SHALL CHECK THE SENSORS FOR FAILURE ONCE EVERY PROCESS LOOP. THE PROCESS LOOP SHALL BE DONE EVERY 5 MINUTES AND SHALL BE ADJUSTABLE FROM 0 TO 30 MINUTES. ALL ALARM AND TROUBLE CONDITIONS SHALL BE ANNUNCIATED AT THE OPERATOR'S STATION AND LOGGED FOR FUTURE REFERENCE.

B. THE DDC SYSTEM WILL SELECT, START AND STOP THE CHILLER IN ACCORDANCE WITH THE PROGRAMMED SCHEDULE.

C. EACH OF THE CHILLERS CH-1 AND CH-2 SHALL BE EQUIPPED WITH ITS OWN INTEGRAL DDC CONTROL PANEL WHICH SHALL BE USED TO CONTROL THE CHILLER, IMPLEMENT FACTORY-SET SAFETY DEVICES, AND ANNUNCIATE TROUBLE ALARMS AND DIAGNOSTICS INTERNAL TO THE CHILLER. THE PANEL SHALL BE PACKAGED WITH THE CHILLER BY THE CHILLER MANUFACTURER. THE CHILLER WILL START THE CHILLED WATER PUMP.

D. EACH CHILLER SHALL BE PROVIDED WITH ITS OWN H-A-O SWITCH FOR CONTROL. IN THE "AUTO" MODE OF OPERATION, THE CHILLERS SHALL OPERATE VIA THE DDC SYSTEM. THE "HAND" MODE WILL BYPASS THE DDC CONTROLS AND ALLOW FOR MANUAL OPERATION OF THE CHILLER.

E. THE CHILLERS SHALL BE PROGRAMMED TO GENERATE 44°F CHILLED WATER SUPPLY WITH 54°F CHILLED WATER RETURN TEMPERATURE.

F. COOLING SHALL BE ACCOMPLISHED THROUGH A LEAD/LAG CHILLER SYSTEM. THE LAG CHILLER SHALL TRACE THE LEAD CHILLER, COMING ONLINE ONLY IF THE LEAD CHILLER COOLING LOAD EXCEEDS 90 PERCENT OF ITS CAPACITY.

G. CH-1 SHALL BE SET AS THE LEAD CHILLER, CH-2 SHALL OPERATE AS THE LAG CHILLER INITIALLY. THE LEAD & LAG CHILLERS SHALL BE ROTATED ONCE PER MONTH TO REDUCE WEAR AND TEAR AND FOR MAINTENANCE.

H. THE CHILLED WATER PUMPS SHALL OPERATE AS VARIABLE FLOW PUMPS. AS THE LOAD DECREASES, FLOW THROUGH THE PLANT WILL DECREASE AS THE CHILLED WATER TEMPERATURE SENSOR MODULATES THE CHILLED WATER PUMPS TO MAINTAIN A SYSTEM RETURN CHILLED WATER TEMPERATURE OF 54°F. AT ANY TIME CHILLED WATER PUMPS SHALL MAINTAIN REQUIRED PRESSURE LEVEL OF THE CHILLED WATER SYSTEM. THIS SHALL BE ACCOMPLISHED BY USING A PRESSURE SENSOR AT THE HYDRAULICALLY MOST REMOTE CHILLED WATER PIPE LOCATION, WHERE A MINIMUM OF 15 FT WILL BE MAINTAINED.

I. MAINTAIN MINIMUM FLOW REQUIREMENTS THROUGH THE CHILLER AS RECOMMENDED BY THE CHILLER MANUFACTURER.

J. THE CHILLED WATER SYSTEM WILL CONTINUE TO OPERATE UNTIL THE DDC SYSTEM SHUTS DOWN THE SYSTEM OR IF THE BUILDING COOLING LOAD FALLS BELOW 10%.

K. THE CHILLED WATER SYSTEM WILL HAVE A CHILLED WATER BYPASS THAT WILL ENSURE THAT MINIMUM FLOW THROUGH THE CHILLERS ARE MAINTAINED. THE DDC CONTROL SYSTEM WILL MONITOR THE FLOW THROUGH THE LOOP AND WILL MODULATE THE MOTORIZED VALVE TO ENSURE THAT MINIMUM FLOW IS MAINTAINED. THE FLOW THROUGH THE BYPASS LOOP SHALL BE MONITORED AND DISPLAYED ON THE DDC SYSTEM.

III. MECHANICAL ROOM 1 SUPPLY AIR FAN OPERATION:

MECHANICAL ROOM 1 IS PROVIDED WITH SUPPLY AIR FAN, SAF-1 FOR MODULATING OUTSIDE AIR TO AIR HANDLING UNITS; ACU-1, ACU-2, AND ACU-5.

A. DURING BUILDING OPERATION HOURS, THE SUPPLY FAN, SAF-1, SHALL BE ON. SAF-1 IS EQUIPPED WITH VFD AND WILL MODULATE TO MAINTAIN CO2 LEVELS BELOW 750 PPM.

IV. DDC ALARM SYSTEMS:

A. CHILLER FAILURE:
DDC SYSTEM SHALL SENSE THE CHILLER FAILURE BY MONITORING THE CHILLED WATER SUPPLY TEMPERATURE AND BY FEEDBACK FROM CHILLER DDC SYSTEM. IF THE CHILLED WATER TEMPERATURE DOES NOT REACH 44F WITHIN 30 MINUTES OF ENERGIZING OF A CHILLER OR IF A FAILURE ALARM IS PROVIDED BY THE CHILLER, THE CHILLER IS ASSUMED TO HAVE FAILED. THE DDC SYSTEM SHALL SHUT DOWN THE SYSTEM THAT HAS FAILED AND INTITATE START-UP OF THE BACK-UP CHILLER. UPON FAILURE OF A SYSTEM THE DDC SYSTEM SHALL ALARM THAT A CHILLER SYSTEM HAS FAILED.

B. CHILLED WATER PUMP FAILURE:
THE DDC SYSTEM SHALL SENSE THE CHILLED WATER PUMP FAILURE BY MONITORING CHILLED WATER DIFFERENTIAL PRESSURE SWITCH. IF THE SWITCH DOES NOT CLOSE, THE PUMP IS ASSUMED TO HAVE FAILED. UPON FAILURE OF A SYSTEM THE DDC SYSTEM SHALL ALARM THAT A PUMP HAS FAILED AND INITIATE START-UP OF THE BACK-UP PUMP.

NOTE:
DDC MAPPING TO (E) AUTOMATED LOGIC SYSTEM.

A/E INFO
MELEK YALCINTAS
LICENSED PROFESSIONAL ENGINEER
No. 10759-M
HAWAII U.S.A.
AMEL TECHNOLOGIES, INC.
LICENSE EXPIRATION DATE 4/30/16
SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
100% FINAL DESIGN
SUBMITTAL DATE 06/05/14
DES RH | DRW RH | CHK MY

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HAWAII ARMY NATIONAL GUARD
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

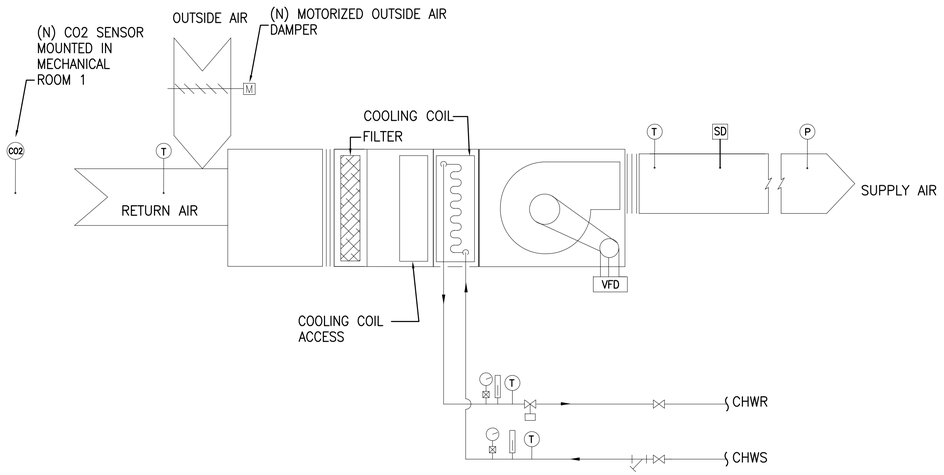
DDC SEQUENCE OF OPERATION

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 24 OF 31

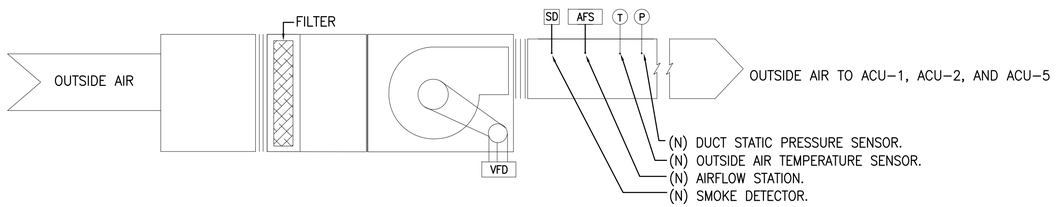
M4.0

TYPICAL (E) VAV AIR HANDLING UNIT SEQUENCE OF OPERATION W/ (N) MOTORIZED OUTSIDE AIR DAMPER AND CO2 SENSOR:

1. NEW OUTSIDE AIR MOTORIZED DAMPER MINIMUM POSITION SHALL BE SET AT 20%. IF CO2 SENSORS LOCATED AT AHU RETURN DUCT & SPACE INDICATE CO2 LEVELS HIGHER THAN 750 PPM, MOTORIZED DAMPER SHALL FULLY OPEN AND SAF-1 SHALL MODULATE TO A HIGHER SPEED TO MAINTAIN DUCT PRESSURE. AFTER 15 MINUTES, IF CO2 LEVEL IN SPACE AND RETURN DUCT FALLS BELOW 700 PPM, MOTORIZED DAMPER SHALL CLOSE TO ITS MINIMUM 20% LEVEL AND SAF-1 SHALL MODULATE TO A SLOWER SPEED TO MAINTAIN DUCT PRESSURE.
2. NEW MONITOR AND ALARM POINTS ON (E) DDC SYSTEM FOR THE AIR HANDLING UNIT:
   A. CARBON DIOXIDE LEVEL
   B. MOTORIZED OUTSIDE AIR DAMPER FAILURE
3. DDC SHALL ALARM WHEN THE CO2 LEVEL EXCEEDS 850 PPM.
4. AIR HANDLING UNITS AND SENSORS ARE EXISTING. PROVIDE (N) MOTORIZED OUTSIDE AIR DAMPER AND CO2 SENSORS AS INDICATED.



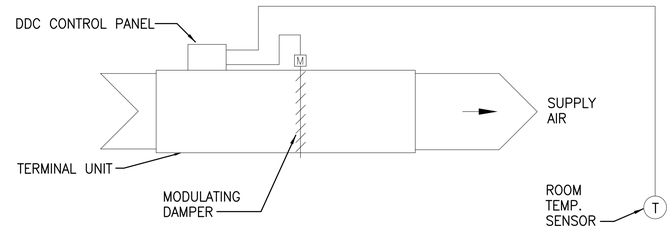
TYPICAL (E) VAV AIR HANDLING UNIT SCHEMATIC DIAGRAM (1)
NOT TO SCALE



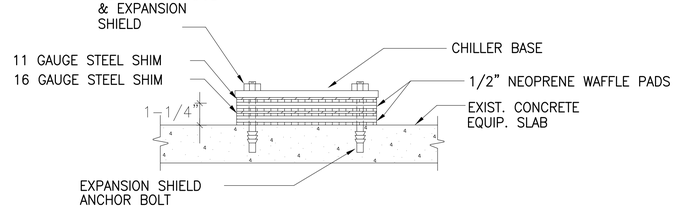
(N) SUPPLY AIR FAN SCHEMATIC DIAGRAM (2)
NOT TO SCALE

TYPICAL (N) VAV TERMINAL UNIT SEQUENCE OF OPERATION:

1. EACH TERMINAL UNIT SHALL BE INDIVIDUALLY CONTROLLED BY ITS OWN DDC VAV CONTROLLER.
2. THE VAV UNIT WILL MODULATE THE DAMPER TO MAINTAIN THE ROOM TEMPERATURE SETPOINT. VAV SHALL BE PRESSURE INDEPENDENT CONTROLS.
3. DDC SYSTEM SHALL MONITOR ROOM TEMPERATURE & DAMPER POSITION.



TYPICAL (N) VAV TERMINAL UNIT SCHEMATIC DIAGRAM (3)
NOT TO SCALE



CHILLER SUPPORT DETAIL (4)
NOT TO SCALE

CONTROL LEGEND

——•	INPUT POINT TO DDC PANEL
M	MODULATING MOTOR ACTUATOR FOR DAMPER OR VALVE
SD	SMOKE DETECTOR
T	TEMPERATURE SENSOR
VFD	VARIABLE FREQUENCY DRIVE
P	PRESSURE SENSOR
M	MODULATING DAMPER
	PRESSURE GAUGE
	TEMPERATURE GAUGE
	2-WAY MODULATING CONTROL VALVE
CO2	CO_2 SENSOR
AFS	AIRFLOW STATION

A/E INFO
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DES RH | DRW RH | CHK MY

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

AHU, VAV, AND SAF SCHEMATIC

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 25 OF 31

M4.1

GENERAL NOTES:

1. THE DRAWINGS DO NOT REFLECT ALL OF THE EXISTING CONDITIONS THAT MAY BE ENCOUNTERED DURING CONSTRUCTION. CONTRACTOR SHALL VISIT THE PROJECT SITE AND BECOME FAMILIAR WITH THE EXISTING CONDITIONS AND THE NEW WORK PRIOR TO THE START OF ON-SITE CONSTRUCTION ACTIVITIES. REPORT ANY DISCREPANCIES AND/OR DIFFERENCES BETWEEN THE EXISTING CONDITIONS AND THE DRAWINGS TO THE CONTRACTING OFFICER PRIOR TO COMMENCING CONSTRUCTION. RESOLVE ALL DISCREPANCIES AND QUESTIONS PRIOR TO START OF WORK.
2. THE LOCATION OF ALL ELECTRICAL APPARATUS AND DEVICES ARE APPROXIMATE AND BEFORE INSTALLING, STUDY THE CIVIL, ARCHITECTURAL, STRUCTURAL DETAILS TO MAKE THE INSTALLATION IN THE MOST LOGICAL MANNER. ANY PIECE OF EQUIPMENT AND/OR DEVICE MAY BE RELOCATED WITHIN 10-FEET BEFORE INSTALLATION AT THE DISCRETION OF THE CONTRACTING OFFICER WITHOUT ADDITIONAL CHARGE TO THE STATE.
3. ALL EXPOSED CONDUITS SHALL BE GALVANIZED RIGID STEEL CONDUIT EXCEPT EMT WITH COMPRESSION FITTINGS ALLOWED IN DRY, INTERIOR LOCATIONS (CLASSROOMS, OFFICES, STORAGE ROOMS, ETC..).
4. ALL CONDUIT STRAPS, FITTINGS AND SUPPORTS SHALL BE SMOOTH WITH NO EXPOSED SHARP OR PROTRUDING EDGES. OBTAIN APPROVAL FROM CONTRACTING OFFICER PRIOR TO INSTALLATION.
5. ALL CONDUIT STRAPS, MOUNTING SUPPORTS AND HARDWARE (NUTS, BOLTS, WASHERS, ANCHORS) IN WET OR DAMP LOCATIONS (RESTROOMS, WALKWAYS, BREEZEWAYS, LANAIS, ETC..) SHALL BE STAINLESS STEEL.
6. PRIME AND PAINT ALL EXPOSED CONDUITS, BOXES, MOUNTING SUPPORTS AND HARDWARE TO MATCH THE SURFACES ON WHICH THEY ARE MOUNTED. STAINLESS STEEL MATERIALS NEED NOT BE PAINTED.
7. PENETRATIONS THOUGH FIRE-RATED WALLS AND FLOORS SHALL BE SEALED TO MAINTAIN FIRE RATING. UTILIZE 3M CP25, PUTTY 303 OR EQUIVALENT.
8. THE CONTRACTOR SHALL CAREFULLY EXAMINE THE DRAWINGS AND READ THE SPECIFICATIONS AND ALL OTHER PROPOSED CONTRACT DOCUMENTS PRIOR TO SUBMITTAL OF THEIR BID PROPOSAL. THE CONTRACTOR SHALL FULLY INFORM THEMSELVES OF THE SCOPE OF THIS PROJECT PRIOR TO THE SUBMISSION OF HIS BID PROPOSAL AS TO ALL CONDITIONS AND LIMITATIONS UNDER WHICH THE WORK IS TO BE PERFORMED. THE BIDDER SHALL INCLUDE IN THEIR PROPOSAL, A SUM TO COVER ALL COSTS OF ITEMS NECESSARY TO PERFORM THE WORK AS SET FORTH IN THE PROPOSED CONTRACT DOCUMENTS. NO ALLOWANCE SHALL BE MADE TO THE CONTRACTOR DUE TO LACK OF SUCH KNOWLEDGE.
9. IF THE CONTRACTOR IS IN DOUBT AS TO THE INTENDED MEANING OF ANY PART OF THE PROPOSED CONTRACT DOCUMENTS, OR FINDS DISCREPANCIES IN OR OMISSIONS FROM ANY PART OF THE PROPOSED CONTRACT DOCUMENTS, HE MAY SUBMIT TO THE OFFICER IN CHARGE A REQUEST FOR INTERPRETATION THEREOF.
10. ALL WORK SHALL BE ACCOMPLISHED IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL LAWS, REGULATIONS AND STANDARDS HAVING JURISDICTION OVER THIS PROJECT.
11. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND CONDITIONS PRIOR TO FABRICATING AND/OR ORDERING MATERIALS.
12. ALL MATERIALS FOR THIS PROJECT SHALL BE NEW AND FREE FROM ANY AND ALL DEFECTS UNLESS SPECIFIED OTHERWISE.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL WORK AMONG THE VARIOUS TRADES AS NECESSARY TO AVOID CONFLICTS AND TO INSURE THAT THE INSTALLATION OF ALL MATERIALS AND PRODUCTS.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL BACKING, BLOCKING, BRACKETS, ETC. AS REQUIRED FOR THE PROPER AND SECURED INSTALLATION OF ALL MATERIALS AND PRODUCTS.
15. THE CONTRACTOR SHALL NOTIFY THE OFFICER IN CHARGE IMMEDIATELY UPON ENCOUNTERING OR SUSPECTING ANY ADDITIONAL HAZARDOUS MATERIALS, ETC. DURING THE COURSE OF THIS PROJECT. THE CONTRACTOR IS NOT AUTHORIZED TO HANDLE, TEST, OR REMOVE SUCH ADDITIONAL MATERIALS WITHOUT SPECIFIC AUTHORIZATION FROM THE OFFICER IN CHARGE.
16. THE CONTRACTOR, WITH THE SUPERVISION OF THE OFFICER IN CHARGE, SHALL INSPECT AND NOTE ALL EXISTING DAMAGES PRIOR TO THE START OF WORK. ANY NEW DAMAGES RESULTING FROM THE CONSTRUCTION SHALL BE CORRECTED AT THE CONTRACTOR'S COST.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A SAFETY BARRICADE, AS NECESSARY, OR REQUIRED BY THE OFFICER IN CHARGE AND SHALL ASSURE SAFETY FOR THE STAFF AND PUBLIC AT ALL TIMES.
18. THE CONTRACTOR SHALL REPORT ANY UNSATISFACTORY CONDITIONS AND/OR DISCREPANCIES TO THE OFFICER IN CHARGE. FAILURE TO COMPLY WITH THIS CONDITION MAY RESULT IN PLACING ANY AND ALL RESPONSIBILITY, LIABILITY AND EXPENSE TO THE CONTRACTOR.
19. IN THE EVENT OF ANY CONFLICTS AMONG DRAWINGS AND SPECIFICATIONS, THE MORE STRINGENT REQUIREMENT(S) SHALL PREVAIL.
20. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS, FEES, LICENSES AND INSPECTIONS.

ELECTRICAL SYMBOLS

	TELECOMM BACKBOARD
	DUPLEX RECEPTACLE, NEMA 5-20R, 125V, +18" AFF UON
	DUPLEX RECEPTACLE w/ GFCI PROTECTION, NEMA 5-20R, 125V
J	LARGE JUNCTION BOX, SIZE AS INDICATED
J	LARGE JUNCTION BOX, WALL MOUNTED, SIZE AS INDICATED
J	SMALL JUNCTION (OUTLET) BOX
J	SMALL JUNCTION (OUTLET) BOX, WALL MOUNTED
	DISCONNECT SWITCH, HEAVY DUTY, HP-RATED, SIZE AS INDICATED, +5'-6" TO TOP UON
	MOTOR STARTER
T	DRY-TYPE TRANSFORMER, FLOOR MOUNTED UON
E	EQUIPMENT CONNECTION
V	VAV WITH MANUAL MOTOR STARTER
M	MOTOR CONNECTION
UON	UNLESS OTHERWISE NOTED
WP	WEATHERPROOF WHILE IN USE
	CONDUIT UP
	CONDUIT DOWN
	CONDUIT & WIRING IN WALL OR CEILING
	CONDUIT & WIRING BELOW REFERENCED PLANE
	CONDUIT & WIRING EXPOSED
	HOMERUN TO APPLICABLE PANEL
	CONDUIT STUB
	FLEXIBLE CONDUIT
	SHADED AREA DESIGNATES THE REQUIRED WORKING SPACE CLEARANCE PER NEC 110-16. COORDINATE CLEARANCE WITH ALL OTHER TRADES. ENSURE THAT NO OTHER EQUIPMENT, STRUCTURE, OR PERMANENT APPURTENANCE ENCROACHES INTO THIS ZONE.

MINIMUM CONDUIT SIZE SHALL BE 3/4".
ANY CIRCUIT W/ NO FURTHER DESIGNATION INDICATES A TWO (2) WIRE CIRCUIT.
CIRCUITS W/ ADDITIONAL WIRES ARE INDICATED AS FOLLOWS: -///- 3 WIRES, -///- 4 WIRES, ETC. MINIMUM CONDUCTOR SIZE SHALL BE #12.
ALTHOUGH NOT INDICATED A SEPARATE GREEN GROUND CONDUCTOR SIZED PER THE N.E.C. SHALL BE INSTALLED IN ALL BRANCH CIRCUIT CONDUITS.

13098

A/E INFO

PAUL K. UYEDA
LICENSED PROFESSIONAL ENGINEER
No. 7646-E
HAWAII, USA
6/3/14

MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/16
SEAL

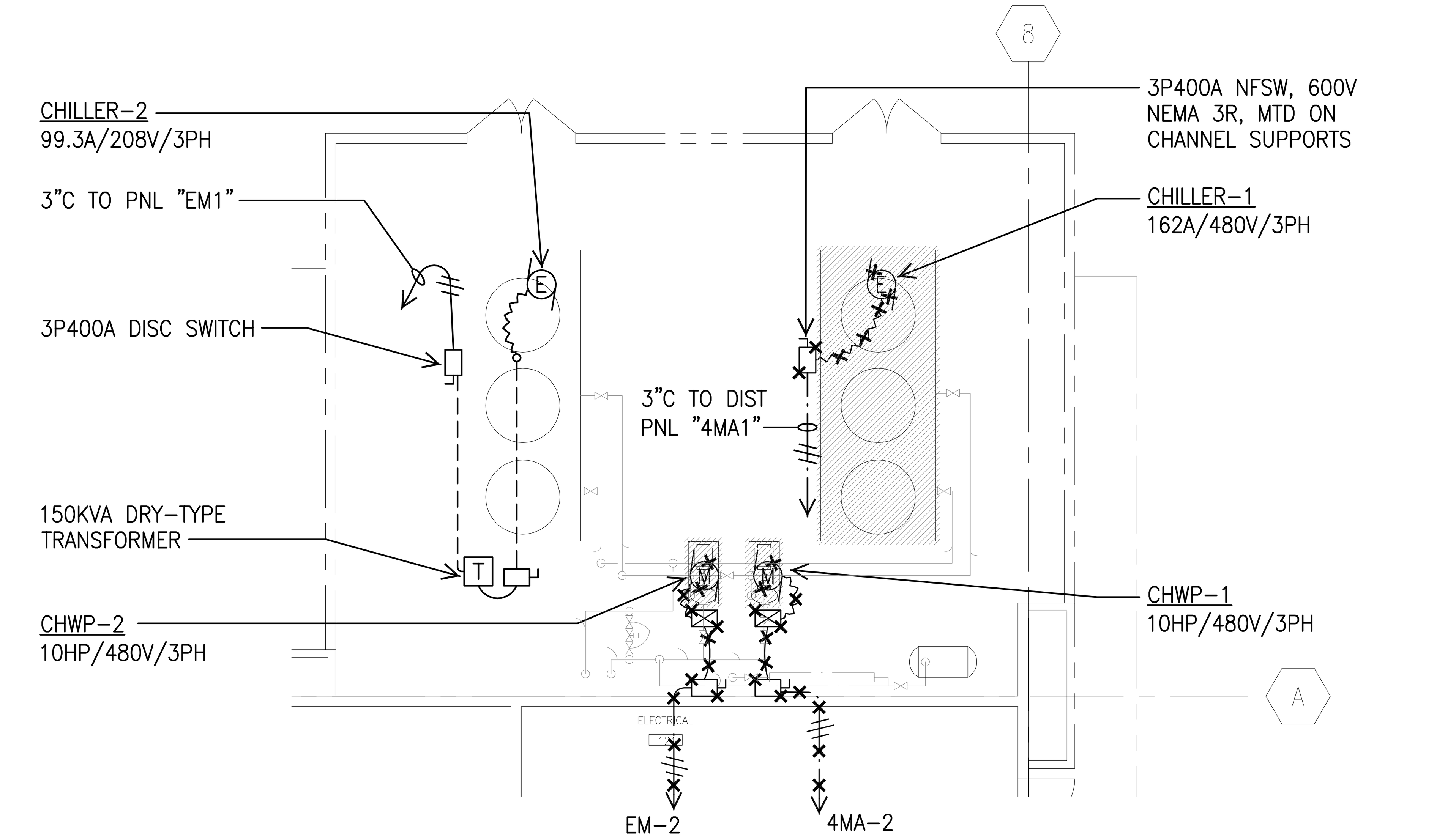
APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE
100% FINAL DESIGN
SUBMITTAL DATE 06/05/14

DES	CB	DRW	MKE	CHK	PKU

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HAWAII ARMY NATIONAL GUARD
KALAELOA, HAWAII
BARBERS POINT BUILDING 1898
HVAC REPAIRS
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
ELECTRICAL SYMBOL LIST

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 26 OF 31
E0.0



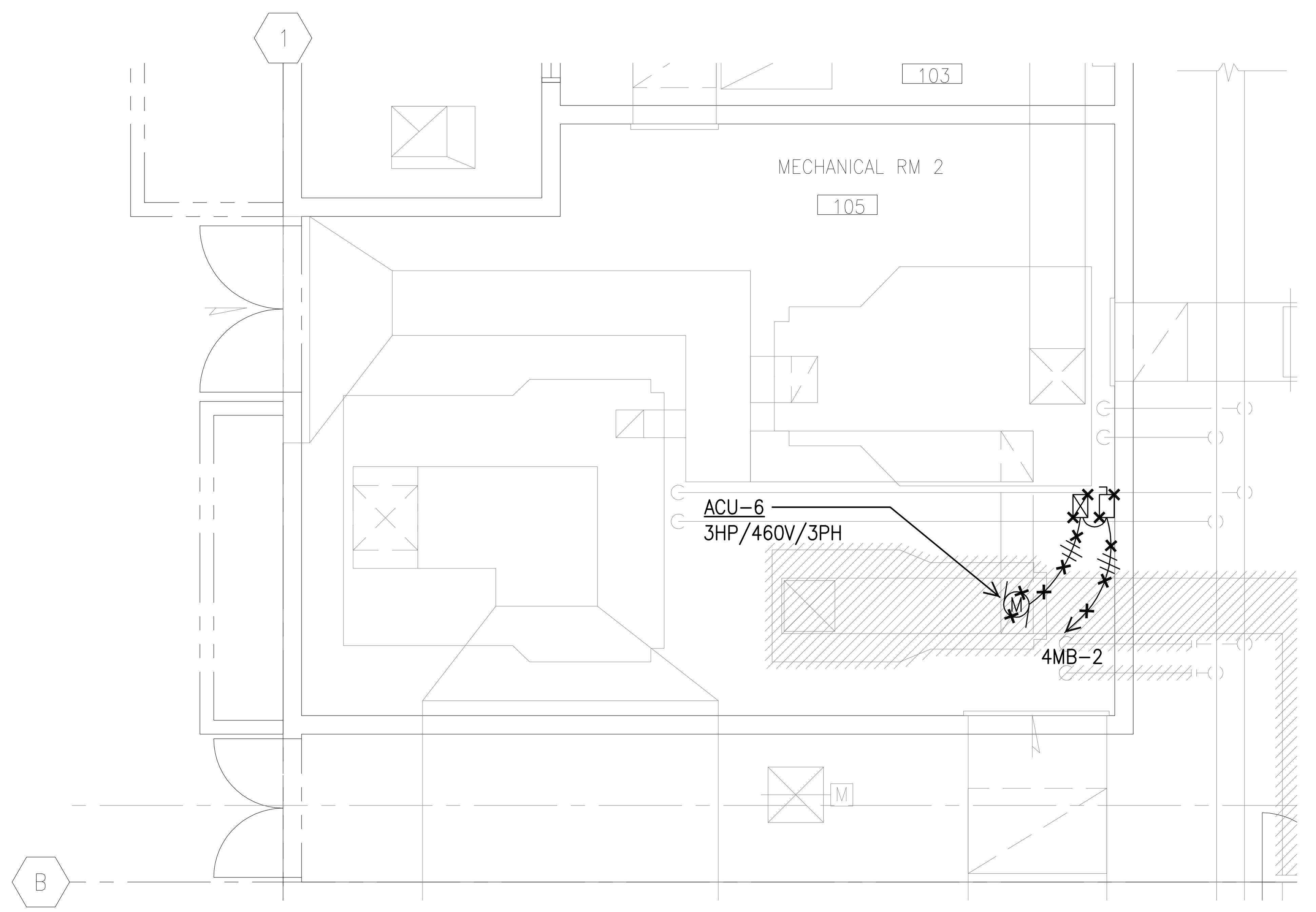
1 MECHANICAL YARD ELECTRICAL PLAN - DEMOLITION

E-1.0

SCALE: 1/8" = 1'-0"

NOTES:

1. ——— LIGHT LINES DENOTE EXISTING CONDITION
—x—x— "X" DENOTES REMOVAL WORK



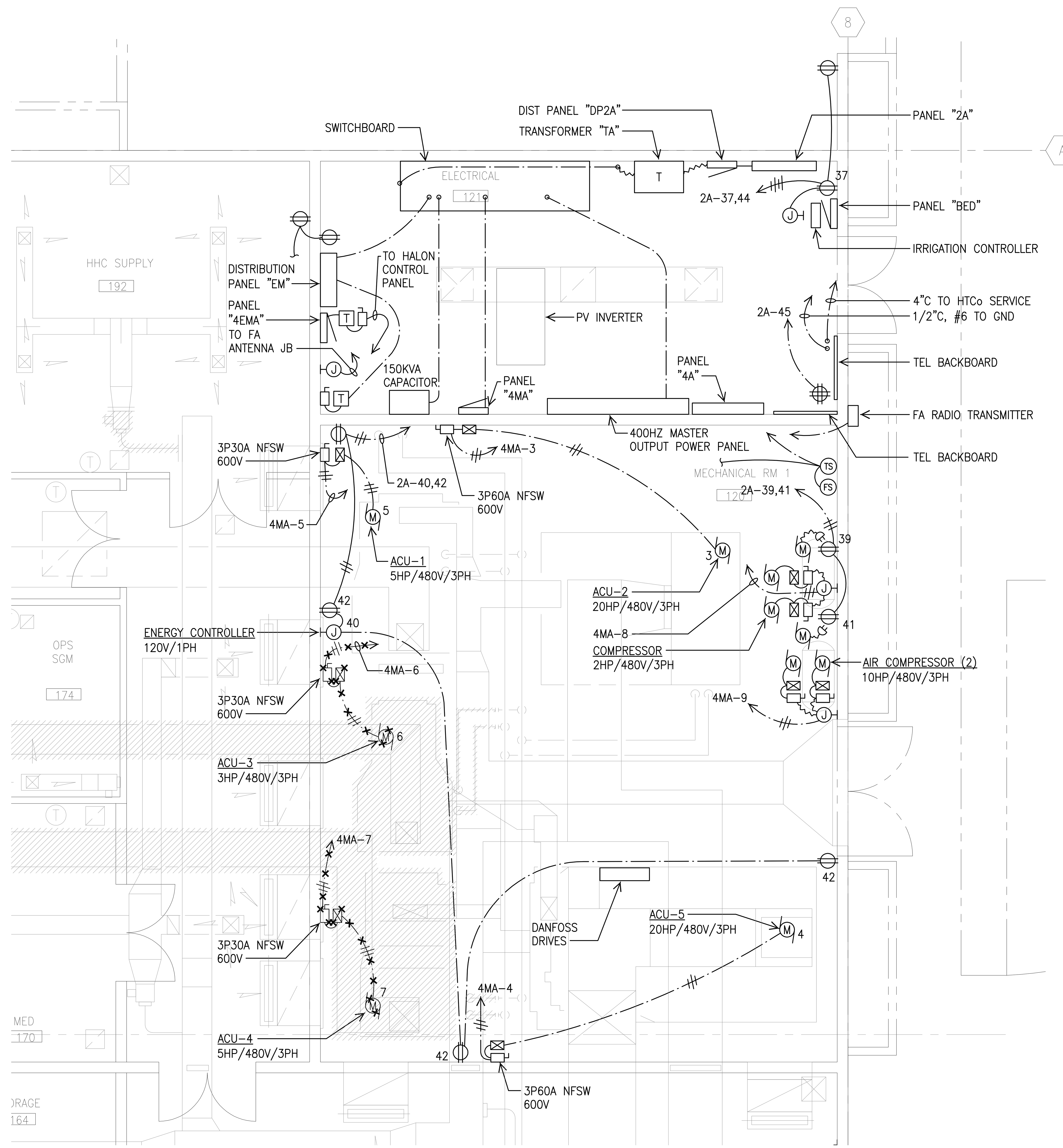
2 MECHANICAL ROOM #2 ELECTRICAL PLAN - DEMOLITION

E-1.0

SCALE: 1/4" = 1'-0"

NOTES:

1. ——— LIGHT LINES DENOTE EXISTING CONDITION
—x—x— "X" DENOTES REMOVAL WORK



3 PARTIAL ELECTRICAL PLAN - DEMOLITION

E-1.0

SCALE: 1/4" = 1'-0"

NOTES:

1. ——— LIGHT LINES DENOTE EXISTING CONDITION
—x—x— "X" DENOTES REMOVAL WORK

0' 4' 8' 16' 24'
1/8" = 1'-0"

0' 4' 8' 12'
1/4" = 1'-0"

13098

PAUL K. UYEDA
LICENSED PROFESSIONAL ENGINEER
No. 7646-E
HAWAII, U.S.A.
6/3/14
MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/16

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: 100% FINAL DESIGN
SUBMITTAL DATE: 06/05/14
DES CB | DRW MKE | CHK PKU

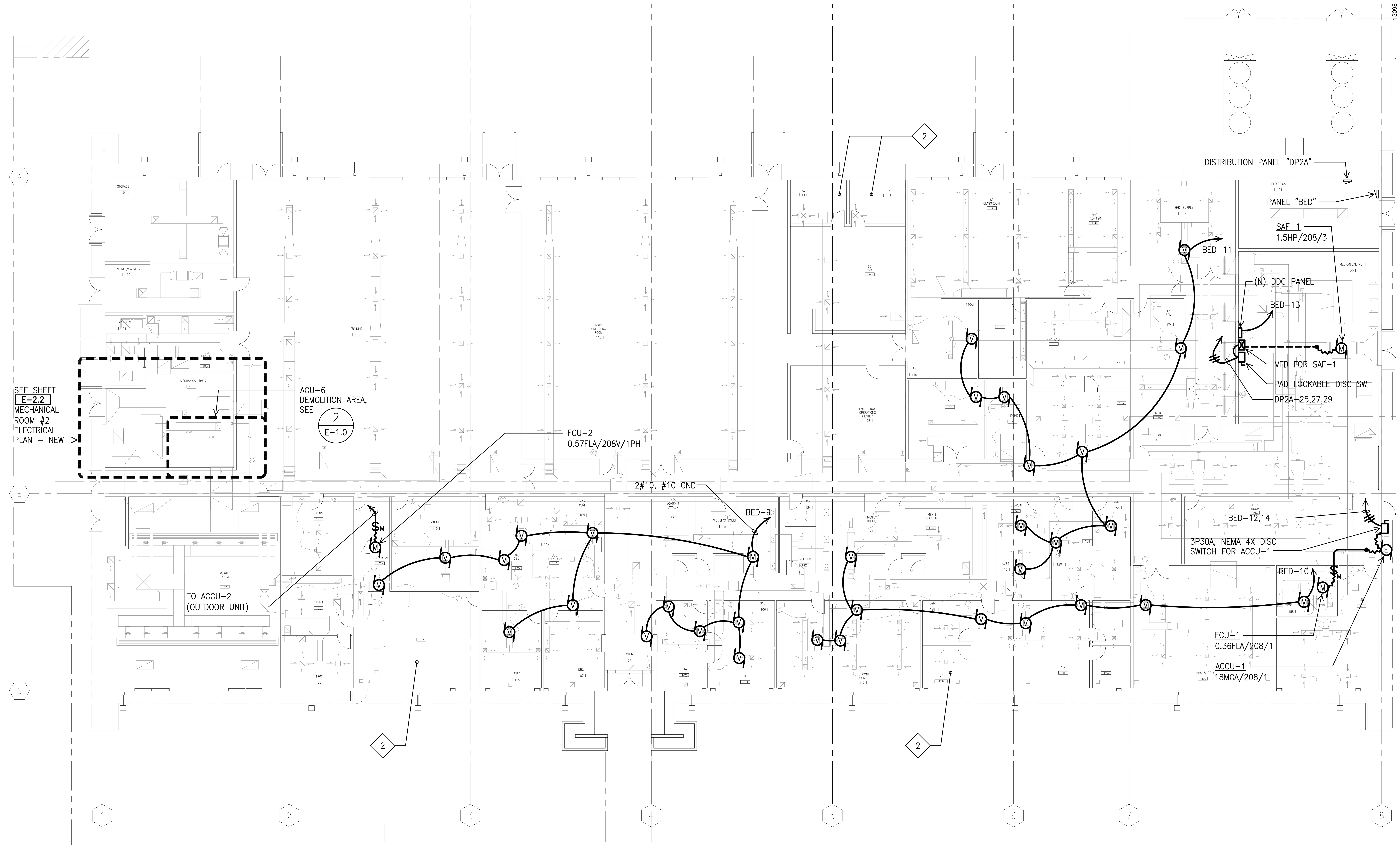
STATE OF HAWAII
DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
FACILITY MANAGEMENT OFFICE
DESIGN AND PROJECT MANAGEMENT BRANCH
BARBERS POINT BUILDING 1898
KALAELOA, HAWAII

HVAC REPAIRS

PARTIAL ELECTRICAL PLAN - DEMOLITION

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 27 OF 31

E1.0



ELECTRICAL PLAN - NEW

SCALE: 3/32" = 1'-0"

NOTES:

1. ———— LIGHT LINES DENOTE EXISTING CONDITION
   ━━━━ BOLD LINES DENOTE NEW WORK

◇2 REMOVE MANUAL MOTOR STARTER, CONDUIT AND CONDUCTORS OF REMOVED EXHAUST FANS.

0' 4' 8' 16' 24' 32'

3/32" = 1'-0"

PAUL K. UYEDA
LICENSED PROFESSIONAL ENGINEER
No. 7646-E
HAWAII, U.S.A.
6/5/14

MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/16

SUBMITTAL PHASE: 100% FINAL DESIGN

SUBMITTAL DATE: 06/05/14

DES CB | DRW MKE | CHK PKU

STATE OF HAWAII
DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
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DESIGN AND PROJECT MANAGEMENT BRANCH
BARBERS POINT BUILDING 1898
KALAELOA, HAWAII

HVAC REPAIRS

ELECTRICAL PLAN – NEW

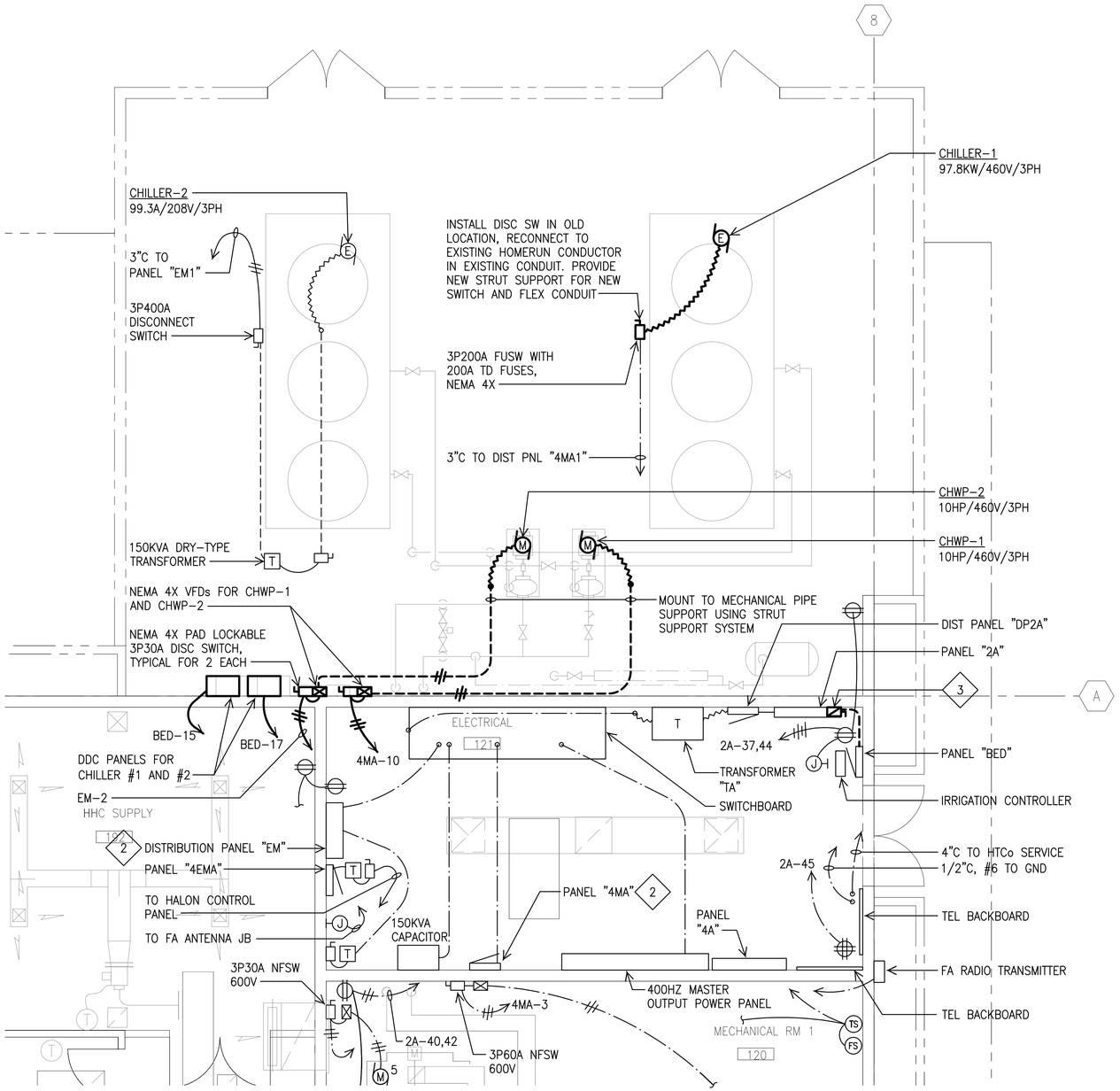
SCALE: AS NOTED

STATE JOB NO. CA-1332-C

FEDERAL PROJECT NO. 15140009

SHEET 28 OF 31

E2.0



PARTIAL ELECTRICAL PLAN - NEW

SCALE: 1/4" = 1'–0"

NOTES:

1. ——— LIGHT LINES DENOTE EXISTING CONDITION
   ——— BOLD LINES DENOTE NEW WORK

2 REPLACE EXISTING 3P40A CIRCUIT BREAKER FOR CHWP WITH NEW 3P30A CIRCUIT BREAKER.

3 PROVIDE NEW 3P100A MAIN BREAKER.

PANEL "BED"

VOLTAGE: 208Y/120V, 3 PH, 4W
TYPE: BOLT-ON
BUS RATING: 100
MOUNT: SURFACE
AIC: 22,000
ENCLOSURE: NEMA 1

KVA A	KVA B	KVA C	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	CKT BKR	CKT NO	CKT NO	CKT BKR	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	KVA A	KVA B	KVA C
2.5			SERVER RM 158-R	2P30A	1	2	2P30A	SERVER RM 158-R	2.5		
	2.5		----------	-------	3	4	-------	----------		2.5	
		2.5	SERVER RM 158-R	2P30A	5	6	2P30A	SERVER RM 158-R			2.5
2.5			----------	-------	7	8	-------	----------	2.5		
	0.7		VAV SET 1 (NEW)	1P20A*	9	10	1P20A	VAV SET 2 (NEW)		0.5	
		0.5	VAV SET 3 (NEW)	1P20A*	11	12	2P25A*	SPLIT SYSTEM ACCU-1 (NEW)			0.6
0.5			DDC-1 IN MECH RM1 (NEW)	1P20A*	13	14	-------	----------	0.6		
	0.5		DDC-2 IN MECH YARD (NEW)	1P20A*	15	16					
		0.5	DDC-3 IN MECH YARD (NEW)	1P20A*	17	18					
5.4	3.6	3.5	SUBTOTALS						5.5	2.9	3.1

23.9 TOTAL KVA
0.8 DEMAND FACTOR
19.1 DEMAND KVA
53 DEMAND AMPS 208 volts

NOTES:
1) * - PROVIDE NEW BREAKER IN EXISTING PFB
2) ** - PROVIDE DEDICATED NEUTRAL
3) + - PROVIDE ISOLATED GND CONDUCTOR W/BRANCH WIRING
3) ++ - PROVIDE WITH GFCI TYPE BREAKER

PANEL "DP2A"

VOLTAGE: 208Y/120V, 3 PH, 4W
MAIN BKR: 3P600
TYPE: BOLT-ON
BUS RATING: 600
MOUNT: SURFACE
AIC: 22,000
ENCLOSURE: NEMA 1

KVA A	KVA B	KVA C	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	CKT BKR	CKT NO	CKT NO	CKT BKR	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	KVA A	KVA B	KVA C
			SHOWER	3P	1	2	3P100A	PANEL 2C	10.0		
			----------	-------	3	4	-------	----------		11.0	
			----------	------	5	6	------	----------			7.0
7.3			BUS DUCT A	3P100A	7	8	3P100A	BUS DUCT B	6.1		
	7.3		----------	-------	9	10	-------	----------		6.1	
		7.3	----------	------	11	12	------	----------			6.1
2.6			BUS DUCT C	3P100A	13	14	3P100A	BUS DUCT D	2.2		
	2.6		----------	-------	15	16	-------	----------		2.2	
		2.6	----------	------	17	18	------	----------			2.2
2.6			BUS DUCT 3	3P100A	19	20	3P40A	CONVERTER PANEL G1	1.0		
	2.6		BUS DUCT 3	-------	21	22	-------	----------		1.0	
		2.6	BUS DUCT 3	------	23	24	------	----------			1.0
0.4			SAF-1 (NEW)	3P15A*	25	26	3P40A	CONVERTER PANEL G2	1.0		
	0.4		----------	-------	27	28	-------	----------		1.0	
		0.4	----------	------	29	30	------	----------			1.0
			PFB-PROV FOR FUTURE CB		31	32		PFB-PROV FOR FUTURE CB			
			PFB-PROV FOR FUTURE CB		33	34		PFB-PROV FOR FUTURE CB			
			PFB-PROV FOR FUTURE CB		35	36		PFB-PROV FOR FUTURE CB			
12.9	12.9	12.9	SUBTOTALS						20.3	21.3	17.3

97.5 TOTAL KVA
0.8 DEMAND FACTOR
78.0 DEMAND KVA
216 DEMAND AMPS 208 volts

NOTES:
1) * - PROVIDE NEW BREAKER IN EXISTING PFB
2) ** - PROVIDE DEDICATED NEUTRAL
3) + - PROVIDE ISOLATED GND CONDUCTOR W/BRANCH WIRING
3) ++ - PROVIDE WITH GFCI TYPE BREAKER

0' 4' 8' 12'
1/4" = 1'–0"

13098

A/E INFO

PAUL K. UYEDA
LICENSED PROFESSIONAL ENGINEER
No. 7646-E
HAWAII, USA
6/30/14

MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/16

SEAL

APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE
100% FINAL DESIGN

SUBMITTAL DATE 06/05/14

DES	CB	DRW	MKE	CHK	PKU

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
KALAELOA, HAWAII
BARBERS POINT BUILDING 1898

HVAC REPAIRS

PARTIAL ELECTRICAL PLAN – NEW

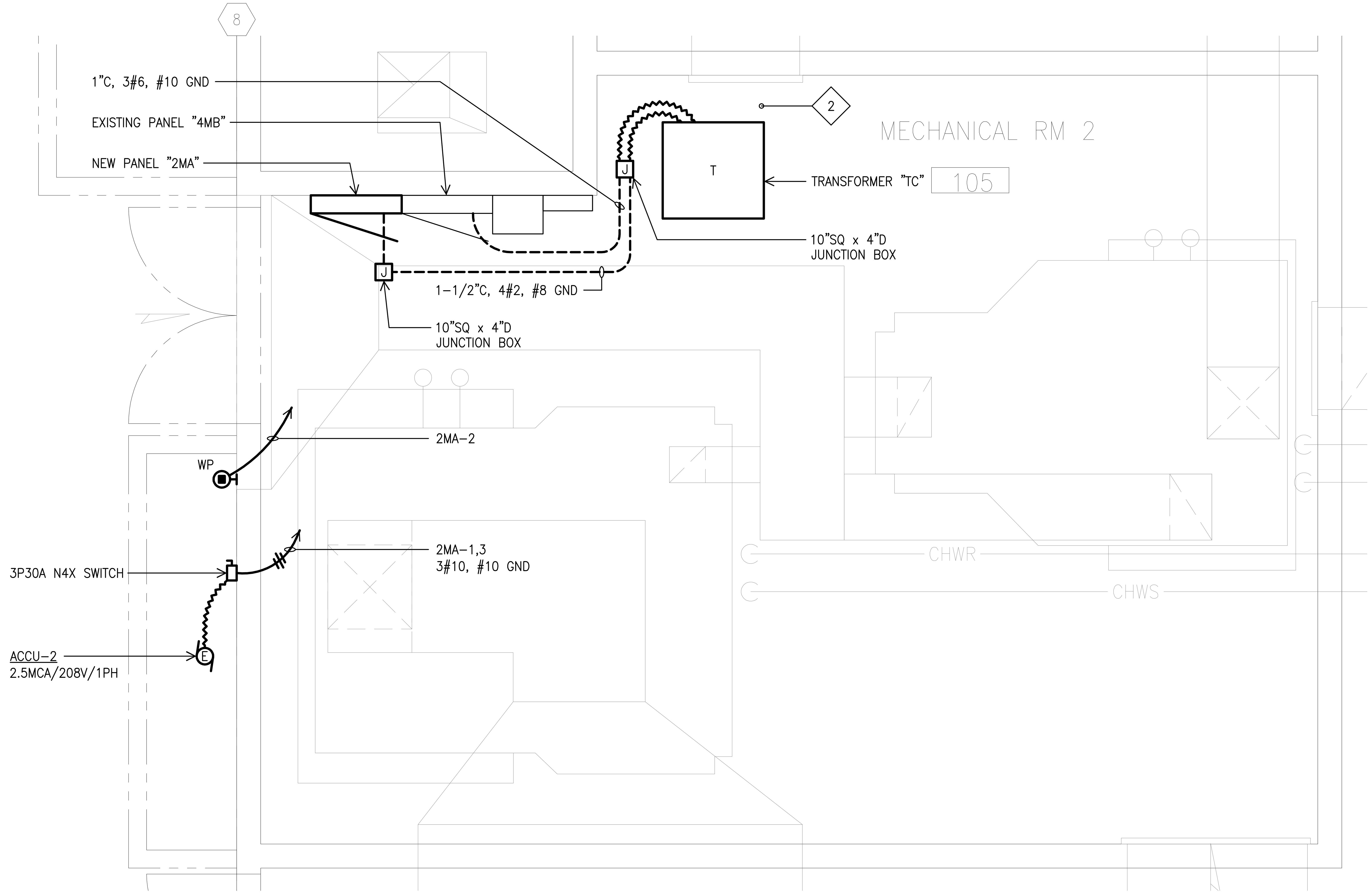
SCALE: AS NOTED

STATE JOB NO. CA–1332–C

FEDERAL PROJECT NO. 15140009

SHEET 29 OF 31

E2.1



MECHANICAL ROOM #2 ELECTRICAL PLAN - NEW

SCALE: 1/4" = 1'-0"

NOTES:

1. ———— LIGHT LINES DENOTE EXISTING CONDITION
———— BOLD LINES DENOTE NEW WORK

(2) REMOVE SPRAY ISOLATION ADJACENT TO DRY-TYPE TRANSFORMER AND MAINTAIN 12" CLEARANCE.

EXISTING PANEL "4MB"

VOLTAGE: 480/277V, 3 PH, 4W — MAIN BKR: 3P175A
TYPE: BOLT-ON
BUS RATING: 225A — MOUNT: SURFACE
AIC: 14000A — ENCLOSURE: NEMA 1

KVA A	KVA B	KVA C	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	CKT BKR	CKT NO	CKT NO	CKT BKR	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	KVA A	KVA B	KVA C
2.1			ACU 8	3P20A	1	2	3P20A	ACU 6	1.3		
	2.1		-------------	-----	3	4	----	-----------		1.3	
		2.1	------------	----	5	6	-------	----------			1.3
3.0			PANEL 2MA (NEW)	3P50A*	7	8	3P	PFB-PROV FOR FUTURE CB			
	3.0		-------------	-----	9	10	----	-----------			
		3.0	------------	----	11	12	-------	----------			
			PFB-PROV FOR FUTURE CB	3P	13	14					
			-------------	-----	15	16					
			------------	----	17	18					
5.1	5.1	5.1	SUBTOTALS						1.3	1.3	1.3

19.2 TOTAL KVA
0.8 DEMAND FACTOR
15.4 DEMAND KVA
18 DEMAND AMPS 480 volts

NOTES:
1) * - PROVIDE NEW BREAKER IN EXISTING PFB
2) ** - PROVIDE DEDICATED NEUTRAL
3) + - PROVIDE ISOLATED GND CONDUCTOR W/BRANCH WIRING
3) ++ - PROVIDE WITH GFCI TYPE BREAKER

PANEL "2MA"

VOLTAGE: 208Y/120V, 3 PH, 4W — MAIN BKR: 3P100A — EQUIPMENT GROUND BUS: YES
BUS: COPPER — TYPE: BOLT-ON — ISOLATED GROUND BUS: NO
BUS RATING: 225A — MOUNT: SURFACE — FEED THRU LUGS: NO
AIC: 10,000 — ENCLOSURE: NEMA 1 — U.L. LISTED AS SERVICE ENTRANCE EQUIPMENT: NO

KVA A	KVA B	KVA C	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	CKT BKR	CKT NO	CKT NO	CKT BKR	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	KVA A	KVA B	KVA C
2.5			SPLIT SYSTEM ACCU-2	2P30A	1	2	1P20A	ACCU-2 RECEPT.	0.2		
	2.5		-----------------------	------	3	4	1P	PFB			
			PFB	1P	5	6	1P	PFB			
			PFB	1P	7	8	1P	PFB			
			PFB	1P	9	10	1P	PFB			
			PFB	1P	11	12	1P	PFB			
			PFB	1P	13	14	1P	PFB			
			PFB	1P	15	16	1P	PFB			
			PFB	1P	17	18	1P	PFB			
			PFB	1P	19	20	1P	PFB			
			PFB	1P	21	22	1P	PFB			
			PFB	1P	23	24	1P	PFB			
			PFB	1P	25	26	1P	PFB			
			PFB	1P	27	28	1P	PFB			
			PFB	1P	29	30	1P	PFB			
			PFB	1P	31	32	1P	PFB			
			PFB	1P	33	34	1P	PFB			
			PFB	1P	35	36	1P	PFB			
			PFB	1P	37	38	1P	PFB			
			PFB	1P	39	40	1P	PFB			
			PFB	1P	41	42	1P	PFB			
2.5	2.5	0.0	SUBTOTALS						0.2	0.0	0.0

5.2 TOTAL KVA
0.8 DEMAND FACTOR
4.2 DEMAND KVA
12 DEMAND AMPS 208 volts

NOTES:
1) * - PROVIDE BREAKER WITH PADLOCKING DEVICE
2) ** - PROVIDE DEDICATED NEUTRAL
3) + - PROVIDE ISOLATED GND CONDUCTOR W/BRANCH WIRING
3) ++ - PROVIDE WITH GFCI TYPE BREAKER

0' 1' 2' 3' 4' 5' 6'
1/2" = 1'-0"

13098

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DES CB | DRW MKE | CHK PKU

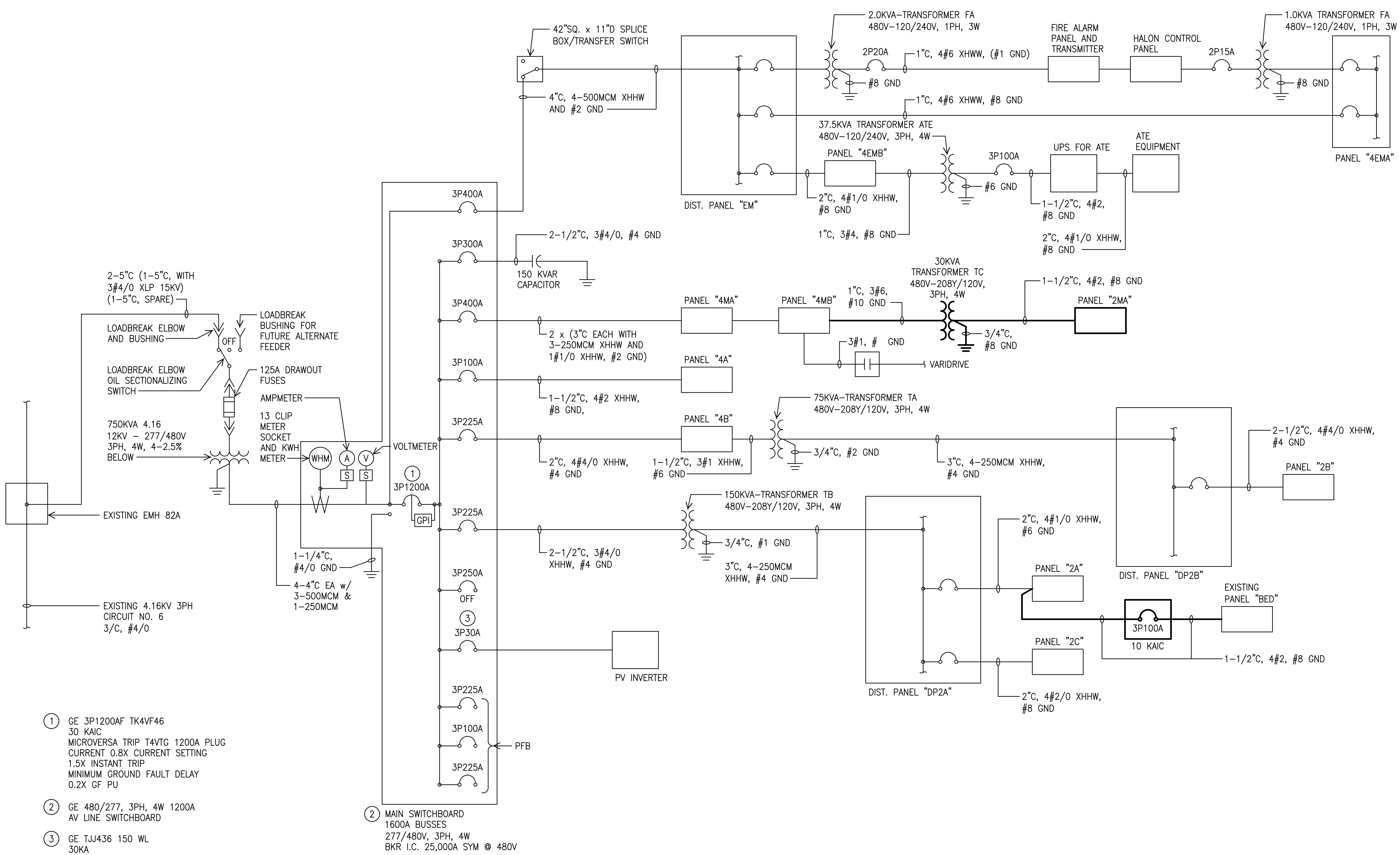
STATE OF HAWAII
DEPARTMENT OF DEFENSE
FACILITY MANAGEMENT OFFICE
DESIGN AND PROJECT MANAGEMENT BRANCH
HAWAII ARMY NATIONAL GUARD
BARBERS POINT BUILDING 1898
KALAELOA, HAWAII

HVAC REPAIRS

MECHANICAL ROOM #2 ELECTRICAL PLAN - NEW

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 30 OF 31

E2.2



ONE-LINE DIAGRAM

NO SCALE

NOTES:

1. ———— LIGHT LINES DENOTE EXISTING CONDITION
━━━━ BOLD LINES DENOTE NEW WORK

13098

PAUL K. UYEDA LICENSED PROFESSIONAL ENGINEER No. 7646-E HAWAII, U.S.A. 6/3/14

MK ENGINEERS, LTD. LICENSE EXPIRATION DATE: 4/30/16

SUBMITTAL PHASE: 100% FINAL DESIGN
SUBMITTAL DATE: 06/05/14
DES CB | DRW MKE | CHK PKU

STATE OF HAWAII, DEPARTMENT OF DEFENSE
FACILITY MANAGEMENT OFFICE, DESIGN AND PROJECT MANAGEMENT BRANCH
HAWAII ARMY NATIONAL GUARD
BARBERS POINT BUILDING 1898, KALAELOA, HAWAII

HVAC REPAIRS

ONE-LINE DIAGRAM

SCALE: AS NOTED
STATE JOB NO. CA-1332-C
FEDERAL PROJECT NO. 15140009
SHEET 31 OF 31

E3.0

DIVISION 9 - FINISHES

SECTION 09900

PAINTING

1 - GENERAL

1.01 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 new surfaces made bare or damaged during construction and existing surfaces as indicated. 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 are included in this section.

B. The work includes field painting of exposed bare and covered pipes, and of hangers, exposed steel and iron work.

C. “Paint” as used herein means all coating systems materials, including primers, enamels, sealers, 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 of finish is not designated, the State will select these from standard colors available for the materials systems specified.

1.02 PAINTING NOT INCLUDED

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.

A. Concealed Surfaces (Present and Future): Unless otherwise indicated, painting is not required on surfaces such as walls or ceiling in concealed areas and generally inaccessible areas, furred areas, and pipe spaces.

B. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, and similar finished materials will not require finish painting, unless otherwise indicated.

C. Labels: Do not paint over any code-required labels, such as Underwriters’ Laboratories, or any equipment identification, performance rating, name, or nomenclature plates.

1.03 SUBMITTALS

A. Submit in accordance with requirements of this section.

B. Schedule of Finishes: Submit four sets of the proposed painting finish schedule to the State for acceptance. The schedule shall indicate the wet film thickness (mils) at which the proposed paints/coatings will be applied that are necessary to achieve the final dry film thickness indicated on the Schedule of Finishes item entitled “SCHEDULE OF FINISHES” herein below.

C. Color Samples: Submit the following to the State for acceptance:

1. Four sets of each color finish sample.

2. After the color finish 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 painted as follows:

a. Prime 3 strips.

b. First coat bottom 2 strips.

c. Second coat bottom strip.

D. Schedule of Operations: Before work on the project is commenced, submit complete sets of a work schedule showing Contractor’s sequence of operations and dates.

E. Warranty: Submit warranty as stipulated in item entitled “WARRANTY” herein below.

F. Certifications: Submit copies of asbestos-free, lead-free, zinc-chromate-free, strontium-chromate-free, cadmium-free, and mercury-free paint certificates.

G. Manufacturer’s Product Data Sheets: Submit 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. Data sheets shall indicate thinning and mixing instructions, required film thickness (mil) and application instructions.

H. Manufacturer’s Material Safety Data Sheets for coatings, solvents, and other hazardous materials.

1.04 ANALYZING AND TESTING

A. All paints and their applied thickness shall be subject to testing whenever the State deems necessary to determine conformance to the requirements of these specifications. Should testing by a laboratory be required, the laboratory shall be selected by the State and the cost of testing shall be borne by the Contractor. However, should the test results show that the paint is in compliance with the specifications, the cost shall be borne by the State.

B. All rejected material 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 surfaces(s) shall be recoated as necessary to provide the required paint thickness at no additional cost to the State.

1.05 QUALITY ASSURANCE

A. Painting Terminology: Refer to ASTM D 16, “Standard Terminology for Paint, Related Coatings, Materials, and Applications”.

B. Gloss/Sheen Levels: ASTM D 523, "Specular Gloss", as follows:

Description	Units @ 60 degrees	Units @ 85 degrees
Matte or Flat	0 to 5	10 max
Velvet	0 to 10	10 to 35
Eggshell	10 to 25	10 to 35
Satin	20 to 35	35 min
Semi-Gloss	35 to 70	
Gloss	70 to 85	
High Gloss	more than 85	

C. Where the Contractor proposes to employ airless spraying, the applicator(s) shall have completed an accepted “Spray Applicator Certification Program” conducted by the Painting Industry of Hawaii.

D. As a minimum, the certification shall include material and equipment selection, use and maintenance, hands-on application, and safety training.

1.06 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 warranty 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.

1.07 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. Protective Covering: 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.

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.

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 State 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 State 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 State 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 State 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 acceptance of any phase of work for a work area may result in redoing the operation at no cost to the State.

1.08 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, and 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 and disposal of waste at the end of each work day.

E. Handle manufactured materials as recommended by the manufacturer.

2- PRODUCTS

2.01 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 Ace, Benjamin Moore, Cabot's, Carboline, Dupont, Dutch Boy, Fine Line Paint Corp., Henkel, Devoe, Devoe Coatings, Glidden, Glidden Professional, Martin Senour, General Polymers, Olympic Stain, Pervo, PPG Protective & Marine Coatings, Pittsburg, Porter Inti., Pratt & Lambert, Rust-Oleum, Sherwin-Williams, Smiland (Styletone), Spectra-Tone, Thoro Systems, Tnemec, United Paint and Coatings, 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.

2.02 SCHEDULE OF FINISHES

A. The Schedule of Finishes is made for the convenience of the Contractor and indicates the types and quality of finishes to be applied to the surfaces. Refer to Finish Schedule for symbols indicating location for various finishes. Provide additional systems for surfaces to be painted not listed hereinafter.

B. All paints unless otherwise noted, are the products of Benjamin Moore and Glidden Professional and are so named to establish desired quality and standard of materials. Painting materials, equal to those mentioned by trade name under the various treatments may be used, provided they meet with the acceptance of the State.

C. Treatments shall be applied on exposed surfaces of designated materials, in conformity with instructions of the paint product used.

D. Exterior Painting:

1. Galvanized Metal:
Prime coat: 169 Latex Exterior Primer
1.3 mils OFT @ 425 sf/gal.

2nd and 3rd coats: 170 Latex House & Trim Paint (Medium Gloss)
1.1 mils OFT@ 475 sf/gal./coat

2. Aluminum:
1st and 2nd coats: 170 Super Spec Latex House & Trim Paint (Medium Gloss)
1.1 mils OFT@ 475 sf/gal./coat

3. Wood:
Prime coat: 169 Latex Exterior Primer
1.3 mils OFT @ 425 sf/gal.

2nd and 3rd coats: 170 Super Spec Latex House & Trim Paint (Medium Gloss)
1.1 mils OFT@ 475 sf/gal./coat

4. Metal Roofing and Flashing (Top Exposed Surfaces):
Pretreatment: Ospho or MP-7 Rust Solution or Equal (For Rusted Areas)
Prime coat: ICI Paints 4020 DEVFLEX DTM Flat Interior/Exterior Waterborne Primer and Finish
2.2 to 3.5 mils OFT @ 275 - 350 sf/gal.

2nd and 3rd coats: ICI Paints 3018 ULTRA-HIDE Interior/Exterior 100% Acrylic Floor Enamel@ 300-350 sf/gal./coat

E. Interior Painting: Use low VOC/Iow odor paint to maximum extent possible.

1. Gypsum Wallboard:

Prime coat: 372 Eco Spec WB Interior Latex Primer
1.2 mils OFT @ 450 sf/gal.

2nd and 3rd coats: 374 Eco Spec WB Interior Latex Eggshell Finish
1.4 mils OFT @ 425 sf/gal./coat

2. Concrete Floor and Base: Chemical Resistant Urethane Floor Coating by Chern Master or pre-approved equivalent.

Prime coat: DuraGuard 100
200 sf/gal.

2nd coat: DuraGuard 120
80 - 110 sf/gal.

3rd coat: DuraGuard 320
300 sf/gal.

3. Exposed Concrete Masonry:

Filler coat: 285 Latex Block Filler
9.5 mils OFT@ 112 sf/gal.

2nd and 3rd coats:
376 Eco Spec WB Interior Latex Semi-Gloss Finish
1.5 mils OFT @ 425 sf/gal./coat

2.03 COMPATIBILITY OF PAINTING SYSTEMS AND SUBSTRATES

A. The Contractor shall ensure that painting systems specified are compatible with existing painted surfaces. Alkyd paints shall not be applied over existing latex coating. Alkyd paints shall be used over cementitious surfaces. Latex paints shall not be applied directly over alkyd paints without proper conditioner and accepted by the State.

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 a 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 State 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.

3 - EXECUTION

3.01 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 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, calking, 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 about 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.

4. Mildew Removal: Remove all mildew and sterilize the surface to be painted using one of the following methods: Apply a treatment solution composed of the following ingredients and in the noted proportions to the affected surface using a sponge of low-pressure sprayer:

   2/3 cup TSP (Trisodium Phosphate)
   1 quart household bleach
   3 quarts warm water

   Note: Household bleach shall not be mixed with ammonia or any detergents or cleaners containing ammonia as this will create a poisonous gas.

   Apply a commercial mildew treatment solution such as Purex, Jomax Remover or equal in strict accordance with the manufacturer's recommendations and instructions.

   Following treatment, the surface shall be cleaned with potable water and allowed to thoroughly dry before priming, painting or the applying of sealing and caulking compounds.

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 State of this fact in writing and he shall not apply any material until the unsuitable surfaces have been made satisfactory, or until the State 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. 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.

D. Unprimed galvanized metal shall be washed with a solution of chemical phosphoric metal etch and allowed to dry.

E. Metal surfaces shall be made clean and free of any defects or condition that may produce unsatisfactory finish. Touch-up any chipped or abraded places on surfaces that have been shop coated with the proper primer.

F. Wood Surfaces: Surfaces shall be free from dust and other deleterious substances and in a condition accepted by the State prior to receiving paint or other finish. Do not use water to clean uncoated wood.

3.02 PAINT APPLICATION

A. General:

1. Apply coating materials in accordance with SSPC-PA 1. SSPC-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. Work shall be done in a workmanlike manner by skilled and experienced mechanics and shall conform to the best painting practices.

3. Materials shall be applied in accordance with the manufacturer's specifications and the finished surfaces shall be free from runs, sags, 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 acceptance.

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. Mixing shall be done outside the buildings.

B. Application:

1. Paint application shall be by brush or roller. Airless spraying may be permitted only with the acceptance of the State for otherwise inaccessible areas.

2. 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.

3. Primers and Intermediate Coats: Do not allow primers or intermediate coats 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.

4. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in selected colors.

C. Colors: Each coat shall be tinted a different shade from the preceding coat. Colors shall match existing or as selected by the State.

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.

3.03 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.

3.04 CLEANUP

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, floor) shall be removed and the entire job left clean and acceptable.

END OF SECTION

DIVISION 15- MECHANICAL

SECTION 15000

MECHANICAL GENERAL REQUIREMENTS

1 - GENERAL

1.01 SUMMARY

A. This section applies to all sections of Division 15, MECHANICAL.

B. Scope of work shall be as described in the Technical Sections of Division 15, MECHANICAL.

C. Related Sections:
2. SECTION 09900 – PAINTING
3. SECTION 15650 – AIR CONDITIONING AND VENTILATION
4. SECTION 15900 – HVAC TESTING/ADJUSTING/BALANCING
5. SECTION 15950 – DIRECT DIGITAL CONTROL SYSTEMS

1.02 GENERAL REQUIREMENTS

A. There general mechanical requirements govern work specified under all sections of DIVISION 15 – MECHANICAL

B. The Contractor shall furnish all labor, materials, tools, and equipment and perform all work and services necessary for a complete and properly operational mechanical work, equipment and systems, as shown on drawings and as specified, in accordance with provisions of the Contract Documents and completely coordinated with work of all other trades.

C. The Contractor shall examine completely the Contract Documents and shall report to the Owner any error, inconsistency, or omission he discovers.

D. Furnish and install all supplementary of miscellaneous items, details, appurtenances and devices incidental to or necessary for a sound, secure, and complete mechanical system where work required is not specifically indicated.

E. Drawings and specifications shall be taken together. Provide work specified and not indicated or work indicated and not specified as though mentioned in both.

F. The Contractor shall warrant that all materials and equipment furnished under this Contract will be new and that all work will be good quality, free from faults and defects and in conformance with contract documents for a guaranteed period of one year. It shall be the Contractor's responsibility to obtain extended warranties for use of all new

equipment provided by the Contractor prior to project acceptance at no additional cost to the State.

G. The Contractor shall maintain at the site one copy of all Drawings, Specifications, Addenda, acceptable Shop Drawings, Change Orders, and other modifications, in good order and marked to record all changes made during construction. These shall be made available to the Owner.

H. The Contractor shall keep the premises free from accumulation of waste materials or rubbish caused by his operations at all times. At the completion of the work, he shall remove all his waste materials and rubbish from and about the project as well as his tools, construction equipment, machinery, and surplus materials and shall clean all new equipment and accessories.

I. The Contractor shall give the Owner timely notice of its readiness for testing any work including the data arranged so the Owner may observe such testing. The Contractor shall bear all cost of such tests.

J. The Owner shall have the right to accept or reject material, equipment, and/or workmanship and determine when the Contractor has complied with the contract documents.

1.03 INSPECTION OF SITE

The Contractor shall visit the site and examine the conditions affecting his work before submitting his proposal. The submission of the proposal shall be considered evidence that the Contractor has visited the site and no extra payments will be allowed to the Contractor on account of extra work made necessary by his failure to visit the site.

1.04 SUBMITTALS

A. Submittals required in this and other sections of Division 15, MECHANICAL, shall conform to the General Provision and Special Provisions and the following additional requirements. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimension, capacity, project specification and paragraph reference, applicable industry, and technical society reference standards, years of satisfactory service, and other information necessary to establish contract compliance of each item the Contractor proposes to provide. Photographs of existing installations are unacceptable and will be returned without approval. Submittals for each section of Division 15, MECHANICAL, shall be complete Incomplete submittals will be returned without review.

1. Manufacturer's Catalog Data: Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Each submittal shall clearly identify equipment to be provided. Information not pertaining to equipment shall be deleted or crossed out.

2. Shop Drawings:

a. Provide at least six sets of shop drawings for each Section of Division 15, MECHANICAL. Shop Drawings shall use a minimum scale of 1/4 inch per foot on drawing sheets the same size as contract drawings. Include floor plans, sectional views, wiring diagrams, and installation details of submitted equipment, and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. If equipment is disapproved, drawings shall be revised to show accepted equipment and resubmitted.

b. At least one set of shop drawings shall be produced on vellum the same size as contract drawings. These drawings shall include all revisions to the shop drawings. The contractor shall submit the original vellum shop drawings when submitting "AS-BUILT DRAWINGS".

c. When shop drawings have substantial changes from the design to the point that compliance with "AS-BUILT DRAWINGS" of this Section become impractical, the approved shop drawing shall be substituted for the contract drawing and the intent of "AS- BUILT DRAWINGS" paragraph implemented using the approved shop drawings.

d. Electronic files of mechanical design drawings may be made available if requested, and provided the General Contractor and subcontractors sign an agreement satisfactory to the Engineer indemnifying him of all liabilities. The electronic files will be in AutoCAD 2007 DWG format and will contain only drawing layers pertaining to the mechanical system design.

3. Manufacturer's Instructions: Where installation procedures or part of installation procedures are required to be in accordance with the manufacturer's instructions, submit printed copies of those instructions with product submittals. All products or items that carry manufacturer's warranty shall be installed in accordance with manufacturer's instructions. Installation of the item shall not proceed until the manufacturer's instructions are received. Failure to submit shall be cause for rejection of the equipment or material. When manufacturer's instructions and these specifications have different requirements, the more stringent requirement shall prevail. However, if the requirements are conflicting, it is the Contractor's responsibility to notify the Engineer in writing prior to procurement and installation.
All but not limited to, the following items shall be installed in accordance with the manufacturer's instructions and these bid documents.

Air Filter	Flexible Duct Connectors
Chilled Water & Condensate Piping	Flexible Pipe Connectors
Direct Digital Controls	Gauges and Thermometers
Duct Access Doors	Hi-Efficiency Motors
Duct Insulation	Pipe Insulation
Duct Sealer Duct Work	
Equipment Supports	Temperature Controls
Valves and Accessories	Vibration Isolators

4. Certificates of Compliance: Submit a certificate of compliance from the manufacturer for approval for products, finishes, and equipment as specified in the Technical Sections whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance. The certificates shall identify the manufacturer, the products, equipment, or materials, and the referenced standard and shall simply state that the manufacturer certifies that the product conforms to the requirements specified.

5. Reference Standards Compliance: Where equipment for materials are specified to conform to industry and technical society reference standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), American Society of Mechanical Engineers (ASME), American Gas Association (AGA), American Refrigeration Institute (ARI), and Underwriters Laboratories (UL), submit proof of such conformance. If an organization uses a label or listing to indicate compliance with a particular reference standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections.

6. Independent Testing Organization Certificate: In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing and approved by the Engineer.

7. Operation and Maintenance Manuals: When specified in subsequent Sections of Division 15, MECHANICAL, the Contractor shall submit 6 (six) complete sets of operating and maintenance manual on all equipment and the system as a whole. Each set shall be permanently bound with table of contents and shall have a hard cover. One complete set shall be furnished at the time the test procedure is submitted, and the remaining sets shall be furnished before the contract is completed. The following identification shall be inscribed on the covers: the words "OPERATING AND MAINTENANCE MANUALS," the project name, location of the building, name of the Contractor, telephone number, and date. Flysheet shall be provided for piece of equipment and each subject. The instruction sheets shall be approximately 8-1/2 by 11 inches, with large sheets of drawings folded in. The instructions shall include, but shall not be limited to the following:

   a. Identify each equipment with tag number, manufacturer's name, model, serial number, capacity, location, and area or rooms served.

   b. Manufacturer's Data

1) Approved equipment submittal.
2) Manufacturer's wiring and control diagrams, with data to explain the detailed operation and control of each component.
3) Manufacturer's operating and maintenance manuals for each piece of equipment, including lubrication instructions.
4) Parts lists and recommended spare parts.
5) Manufacturer's bulletins, cuts and descriptive data. Applicable data shall be indicated by highlight, arrows, or underlining. Non-applicable data shall be crossed-out.

b. System layout showing piping, valves, and controls.

c. Source of service and replacement parts.

d. A control sequence describing startup, operation, shutdown, restarting after power failure.

8. Operating Instructions: Submit text of posted operating instructions for each system and principal item of equipment as specified in the Technical Sections.

9. As-Built Drawings:

a. The Contractor shall maintain at the job site one (1) set of full size contract drawings, marking them in red to show all variations between the construction actually provided and that indicated or specified in the contract documents, including buried or concealed construction.

b. Where a choice of material or method is permitted herein or where variations in scope or character of work from that of the original contract is authorized, the drawings shall be marked to define the construction actually provided.

c. Where equipment installation is involved, the size, manufacturer's name, model number, power input or characteristic as applicable shall be shown on the as-built drawings.

d. The representation of such changes shall conform to standard drafting practice and shall include such supplementary notes, legends, and details as necessary to clearly portray the as-built construction.

e. The drawings shall be maintained and updated on a daily basis. The Contractor shall sign, and date each sheet to certify that the dimensions and details shown on the drawings reflect the dimensions and details, and specifications as constructed in the field.

f. Submit the following to the Engineer for review and approval:
1) Job site marked-up drawings.

2) Incorporate into electronic drawing files all construction variations and information required by subparagraph 1 through 5 above, and submit final as-built drawings plotted with ink on 16 pound vellum.
3) Electronic files of as-built drawings in AutoCAD 2007 DWG format on compact disc (CD).

10. Welders Qualifications: All welders shall be certified by an independent testing laboratory and certificates shall be submitted to the Engineer for approval. Testing of welders shall be in accordance with the welding section of ANSI B-31.09 "Building Services Piping".

11. Balancing Report and Maintenance Manuals: After installation, the new system shall be tested, balanced, and adjusted. Submit copies of the balancing report and operating and maintenance manuals for approval before final inspection.

12. Posted Operating Instructions: Submit in accordance to this section.

13. Warranty: Submit in accordance to this section.

1.05 LAWS, REGULATIONS AND CODES

A. All work shall be in accordance to government laws, ordinances, rules, and regulations and orders.

B. The following shall govern where applicable; City and County of Honolulu Plumbing Code, Building Code, Fire Code, Electrical Code, Hawaii Department of Health Regulations, U.S. Department of Health and Human Services, Applicable National Fire Protection Association Standards, OSHA, Rules and Regulations and all other codes and standards referenced in these specifications. Where requirements differ in these codes and standards, the more stringent shall apply.

1.06 PERMITS AND INSPECTIONS

A. Applications for permits will be done by the Contractor. The Contractor shall pay for all necessary permits and fees required for the mechanical work.

B. The Mechanical Contractor shall apply and pay for all necessary inspections required by any public authority having jurisdiction.

1.07 DISCREPANCIES

A. The Drawings and Specifications are intended to be cooperative. Any materials, equipment, or system related to this section and exhibited on the Architectural, Structural, Electrical or Mechanical Drawings but not mentioned in the Specifications are to be executed to the intent and meaning thereof, as if it were both mentioned in the Specifications and set forth on the Drawings.

B. In case of differences between the Drawings and Specifications, the Specifications shall govern first, and then the Drawings. Large-scale details shall take precedence over small scale Drawings as to the shape and details of construction. Specifications shall govern as to materials.

C. Drawings and Specifications are intended to be fully cooperative and to agree, but should any discrepancy or apparent difference occur between Drawings and Specifications or should error occur in the work of others affecting the work, the Contractors shall notify the Owner at once. If the Contractor proceeds with the work affected without instructions from the Owner, he shall make good any resultant damage or defect. All interpretations of Drawings and Specifications shall be clarified by the Owner.

1.08 TRADE NAME

Mentioning of a trade name in the plans and specifications indicates that the manufacturer is acceptable to the Owner. However, certain specified construction and details may not be regularly included in the manufacturer’s catalogued product. The Mechanical Contractor shall provide the material or equipment complete as specified.

1.09 WORKMANSHIP AND MATERIALS

A. Workmanship shall be of the best quality and none but competent mechanical workers skilled in their trades and thoroughly familiar with the work involved shall be employed. The Contractor shall furnish the services of an experienced superintendent, who will be constantly in charge of the erection of the work, until completed and accepted.

B. Unless otherwise hereinafter specified, each article of its kind shall be the standard product of a single manufacturer.

C. Whenever the words "or acceptable equal" or other words of similar intent or meaning are used, implying that judgment is to be exercised, it is understood that it is the judgment of the Owner that is referred to.

D. The Owner shall have the right to accept or reject material, equipment and/or workmanship and determine when the Contractor has complied with the requirements herein specified.

E. All manufactured materials shall be delivered and stored in their original containers. Equipment shall be clearly marked or stamped with the manufacturer's name and rating. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as acceptable by the Owner. Damaged or defective items, in the opinion of the Owner, shall be replaced.

F. Reference to standards is intended to be the latest revision of the standard specified.

1.10 MANUFACTURER'S RECOMMENDATIONS

Equipment installed under this Division of the Specifications shall be installed according to manufacturer's recommendations, unless otherwise shown on the drawings or herein specified. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Owner, prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.11 CONTINUITY OF SERVICES, PHASING

A. It is intended that interruption of utilities be kept to a minimum. Notice of service interruptions shall be submitted to the Owner for approval at least two weeks before intended date of service interruptions. Exact date and time of interruption allowed shall be determined by the Owner. Provide temporary valves, connections, piping, etc., as necessary to assure this continuity of service; they shall be furnished under this section without additional charge to the State and shall be removed when no longer necessary.

B. The Contractor shall submit to the Owner a copy of his work schedule indicating the date and area to be affected by his work.

C. Execute work using such methods, techniques, connections and tie-ins which will cause least interference with, and interruptions of, existing utilities and services. Keep roads clear of materials, debris, etc., to maximum extent possible. Schedule all arrangement for work which will cause interferences or interruptions, in advance with the Owner, all other affected trades and authorities having jurisdiction.

D. Examine site and become familiar with existing local conditions affecting work.

E. Examine all Drawings and Specifications, including electrical, and become familiar with the types and systems of construction to be used. Determine how such types and systems will affect the installation of mechanical work.

F. Investigate, determine and verify locations of any overhead utilities on or near site. Determine such locations in conjunction with all public and private utility companies and with all authorities having jurisdiction.

1.12 OPENINGS, CUTTING AND REPAIRING

A. The Mechanical Contractor shall cooperate with the work to be done under other sections in providing information as to openings required in walls and slabs for all piping including sleeves where required.

B. Belowground concrete jackets, drilling or cutting required for the performance of work under this Section shall be the responsibility of the Contractor and the cost there shall be borne by Contractor.

C. Holes in Concrete: The Mechanical Contractor shall pay all costs for cutting holes. All holes through existing concrete shall be either core drilled or saw cut. All holes required

shall have the approval of the Owner prior to cutting and drilling.

D. It shall be the responsibility of the Contractor to ascertain that all openings are properly located. Openings shall be coordinated with structural drawings, Engineers and Contractors. Provide sleeves and fire rated material through walls, slabs and beams as required by code.

1.13 ELECTRICAL WORK

A. Final hook-up power wiring to main mechanical equipment will be provided under DIVISION 16 - ELECTRICAL of Specifications. Control devices requiring control and related power wiring shall be provided by the Licensed Controls Contractor and to be wired by their Electrical Contractor. Mechanical Contractor shall not segregate or delineate the controls wiring including related power from the Licensed Contractor.

B. Electrical work under Electrical Division is based on the electrical rating of equipment indicated on the Mechanical Drawings. Additional electrical work caused by any deviation under the Mechanical Division shall be paid for by the Mechanical Contractor.

C. All control and power wiring is included under mechanical work and shall be in accordance with Code requirements specified in DIVISION 16 - ELECTRICAL, and where specified in DIVISION 15 - MECHANICAL.

D. The Mechanical Contractor shall furnish all starters for installation by the Electrical Contractor. The Mechanical Contractor shall turn over these items to the Electrical Contractor at the site after receipt of notice from the Electrical Contractor that he is ready to install said items. Mechanical Contractor shall be responsible for review of starters during Bid period. After bid period mechanical contractor shall provide all starters and related control power wiring for their equipment whether or not indicated on drawings.

1.14 ACCESS PANELS

Access panels in ceilings and walls required for access to valves, controls, fire and volume dampers; sensors, smoke detectors, control power J-Box, transformers and safety switches; thermostats, controllers, filters and other maintainable and code required accessible equipment, shall be provided by this contractor. The access panels shall be equal to the walls, floor and ceiling fire rating and painted to match. Contractor shall coordinate exact locations and sizes of access panels to insure that proper access to all items may be obtained.

1.15 PAINTING

Contractor shall paint all exposed work specified in DIVISION 15 - MECHANICAL equipment piping, ducts, supports and conduits. Paint shall match adjacent wall or ceiling; verify with Owner exact type, color, prime and number of coats of the paint required.

1.16 LABELING

Contractor shall label all mechanical equipment specified in DIVISION 15 – MECHANICAL with month and year of installation.

1.17 SEISMIC RESTRAINTS

Provide seismic restraints for mechanical systems in accordance with the Building Code.

2- PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Asbestos Prohibition: No asbestos containing materials shall be used under this section. The Contractor shall ensure that all materials incorporated in the project are asbestos-free.

B. Materials and equipment shall conform to the requirements of applicable Technical Sections, publications specified therein and shall be as shown. Materials and equipment shall be new and shall be the products of manufacturers regularly engaged in the manufacture of such products. All items shall essentially duplicate materials and equipment that have been in satisfactory use at least two (2) years prior to bid opening and shall be supported by a service organization that is, in the opinion of the Engineer, reasonably convenient to the site of installation.

3 - EXECUTION

3.01 PIPING IDENTIFICATION

A. Identification of all new pipe lines shall be by means of colored, waterproof, all temperature, self-adhering labels and directional arrow. Refer to SECTION 09901 - PAINTING for color coding of existing and new piping.

B. At Contractor's option, each and every system may be identified by painting with contrasting colors, using 3/4" high minimum stencil letters. Painting shall be done by the Mechanical Contractor or his Subcontractor.

C. All exposed pipes, whether insulated or not shall be identified. Labels may be piping where the use is obvious, due to its connection to equipment and where the appearance would be objectionable in finished rooms, as acceptable by direction.

D. Identification labels shall be placed as follows:

1. Near each valve and branch connection

2. Wherever piping merges or disappears from view from the floor of the room in which it is installed

3. Labels shall not be more than 50 feet apart

3.02 VALVE INDEX

A. The Mechanical Contractor shall provide brass or plastic tags on all valves with letters stamped or engraved thereon designating service of each valve.

B. Identify electrical panel and related circuit breaker for controls power wiring.

C. Valve, controllers and related power accessories identification shall be correlated with sequence of operation documents.

3.03 FIELD TEST

The Mechanical Contractor shall perform all tests of the installed work and shall provide all services, labor, equipment, materials and instruments needed for the tests. During pressure tests, all items in the system to be tested, not designed for test pressures shall be removed or isolated from the system and shall be reconnected or unblocked after tests are completed. Should operating tests require the presence of manufacturers' representatives, the Mechanical Contractor shall cooperate with them and shall place at their disposal all assistance, materials, and services required to perform such test. The Mechanical Contractor shall certify in writing that all work has passed all required tests.

3.04 OPERATION AND MAINTENANCE MANUAL

Furnish an operation and maintenance manual for each item of equipment. Furnish copies of the manual bound in hardback binders or an acceptable equivalent. Furnish one complete manual prior to the time that equipment tests are performed and furnish the remaining manuals before the contract is completed. Inscribe the following identification on the cover: The words OPERATION AND MAINTENANCE MANUAL, the name and location of the equipment or the building, the name of the Contractor and the contract number. The manual shall include the names, addresses and telephone numbers of each subcontractor installing equipment and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: Wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start-up, operation, and shut-down; description of the function of each principle item of equipment; the procedure for starting; the procedure for operating; shut-down instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade, temperature range and frequency; safety precautions, diagrams and illustrations; test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts and the service organization, which is reasonably convenient to the project site. The manual shall be complete in all respects for equipment, controls, accessories and associated appurtenances provided.

3.05 POSTED OPERATING INSTRUCTION

Furnish acceptable operation instructions for each principal item of equipment for the use of the operation and maintenance personnel. The operation instructions shall include wiring diagrams, control diagrams and control sequence for each principal item of equipment. Operating instruction shall be printed or engraved and shall be framed under glass or in

acceptable laminated plastic and posted where directed by the Owner. Operating instructions shall be attached to or posted adjacent to each principal item of equipment including start up, procedure in the event of equipment failure and other items of instruction as recommended by the manufacturer of each item of equipment. Operating instructions exposed to the weather shall be made of weather-resistant materials or shall be suitably enclosed to be weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

3.06 QUALITY ASSURANCE

The Mechanical Contractor shall have a local Hawaii office, staffed with factory trained engineers fully capable of providing instruction, routine maintenance and emergency maintenance service on all system components. The Mechanical Contractor shall have a three year experience record in the design and installation of chilled water plant systems similar in scope and performance to that specified herein, and shall be prepared to provide evidence of this history as condition of acceptance and approval.

3.07 INSTRUCTION TO HIARNG PERSONNEL

The Contractor shall furnish the services of competent instructors who will give full instruction to the designated personnel in the adjustment, operation and maintenance, including pertinent safety requirements, of the equipment or system specified. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular workweek after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of man-days (8 hours) of instruction furnished shall be as specified in other sections. When more than 4 man-days of instruction are specified, approximately half of the time shall be used for classroom instruction. All other times shall be used for instruction with the equipment or system. When significant changes or modifications in the equipment or systems are made under the term of the contract, additional instruction shall be provided to acquaint the operating personnel with the changes or modifications.

3.08 SAFETY REQUIREMENTS

Belts, pulley, chains, gears, couplings, projecting setscrews, keys and other rotating parts located so that any person can come in close proximity thereto shall be fully enclosed or properly guarded. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of a type as specified herein. Items such as catwalks, ladders, and guard rails shall be provided where required for safe operation and maintenance of equipment.

3.09 FINAL INSPECTION

Final inspection shall be requested by the Mechanical Contractor only after submittal of all required certificates. No final inspection will be made until all moving parts of equipment are properly guarded, all controls and safety devices tested and operative, all painting required is done and the site cleaned up.

3.10 WARRANTEE

All air conditioning and ventilation systems, plumbing, controls, and energy management systems shall be provided with a one year warranty from the date of acceptance of the project by the Owner against any defects due to faulty materials, equipment, workmanship, or installation. Upon notice of defect, the Mechanical Contractor shall correct or replace defective item at no additional cost to the State. The Contractor shall be advised that the Owner shall have the right for beneficial use of all new equipment prior to the project acceptance and guarantee period. The guarantee period shall be for one year after acceptance date. Start of beneficial use is not the start of the guarantee period.

END OF SECTION

SECTION 15650

AIR CONDITIONING AND VENTILATION

1 - GENERAL

1.01 SUMMARY

A. Work under this Section of the specifications includes all labor, materials, equipment and services necessary to complete mechanical work as shown on the drawings and herein specified including, but not limited to:

1. Chilled water piping and accessories.
2. Refrigerant piping and accessories.
3. Condensate drain piping.
4. Ductwork and accessories.
5. Insulation.
6. Air-cooled scroll chillers.
7. Chilled water pumps.
8. Direct expansion split-system air conditioning units.
9. Supply air fans.
10. Controls and control wiring.
11. Corrosion protection.
12. Adjusting, balancing, and testing.
13. Painting and finishing.
14. Operating and maintenance instructions.
15. Manufacturer’s literature, shop drawings, record drawings.

B. Related Sections:

1. SECTION 09900 – PAINTING
2. SECTION 15000 – MECHANICAL GENERAL REQUIREMENTS
3. SECTION 15900 – HVAC TESTING/ADJUSTING/BALANCING
4. SECTION 15950 – DIRECT DIGITAL CONTROL SYSTEMS
5. DIVISION 16 – ELECTRICAL

1.02 GENERAL REQUIREMENTS

A. There general mechanical requirements govern work specified under all sections of DIVISION 15 – MECHANICAL

B. The Contractor shall furnish all labor, materials, tools, and equipment and perform all work and services necessary for a complete and properly operational mechanical work, equipment and systems, as shown on drawings and as specified, in accordance with provisions of the Contract Documents and completely coordinated with work of all other trades.

C. The Contractor shall examine completely the Contract Documents and shall report to the Owner any error, inconsistency, or omission he discovers. Otherwise the Contractor shall furnish and install all omissions or discrepancies as if the same were specified and provided for.

D. Furnish and install all supplementary of miscellaneous items, details, appurtenances and devices incidental to or necessary for a sound, secure, and complete mechanical system where work required is not specifically indicated.

E. The Contractor shall warrant that all materials and equipment furnished under this Contract will be new and that all work will be good quality, free from faults and defects and in conformance with contract documents for a guaranteed period of one year. It shall be the Contractor's responsibility to obtain extended warranties for use of all new equipment provided by the Contractor prior to project acceptance at no additional cost to the State.

F. Drawings and Specifications:
The drawings and specifications are intended to cover the complete installation of systems to function as described. The omission of reference to any necessary item of labor or material does not relieve the Contractor from providing such labor or material. Drawings do not attempt to show exact details of piping and ductwork. Provide offsets as necessary to avoid local obstructions or interferences with other trades.

1. Contract Drawings: Mechanical plans are essentially diagrammatic, showing locations of ducts, and other mechanical equipment. Where locations are not dimensioned, they are approximate, and before installing, Contractor shall study existing conditions and make installation in most logical manner.

2. Shop Drawings: As soon as practical, and within 30 days after award of contract and before commencement of installation of any materials and equipment, six sets of shop drawings shall be submitted. Submittals shall consist of a complete list of equipment and materials, including manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions. Incomplete and partial submittals will be returned unreviewed. Shop drawings shall also be submitted which contain layout drawings of ductwork and piping showing locations of hangers and supports, capacity curves or ratings to assure balanced refrigeration at the design conditions, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Where piping and equipment are to be supported other than as indicated, the details shall include loadings and types of frames, brackets, stanchions, or other supports. Control diagrams shall be submitted which identify each component and show all interconnected or interlocked components and the control sequence.

3. Record Drawings: Contractor shall keep a record set of drawings available at the jobsite on which all changes and additions in the Mechanical Work are shown. Contractor shall furnish the Engineer with reproducible drawings of each installation showing the exact location of all items which are different from the original drawings.

1.03 WARRANTY

A. All work in this Section shall be under warranty for a period of one (1) year from the date of acceptance as a whole by the Owner. Should any equipment or material fail within this period, the Contractor shall replace or repair that item at no cost for material and/or services, if such is due to faulty workmanship or quality of material furnished.

B. The Contractor shall be responsible for all damage to any part of the premises caused by failure in the equipment furnished under this section for a period of one year after the final acceptance of the work as a whole.

2- PRODUCTS

2.01 MATERIALS

All materials delivered to the job site and installed shall be new, best of their respective grades and as specified on the drawings. Materials shall be of the same brand or manufacturer throughout for each class of material or equipment.

A. Chilled Water Piping, and Accessories:

1. Pipe (4" and Smaller): Black steel, schedule 40, ASTM 120, or copper tubing, hard drawn, Type L, ASTM B88.

2. Pipe (Over 4"): Black steel, schedule 40, ASTM A120.

3. Fittings, Steel Pipe: Threaded for 2" and smaller, malleable iron, 125 pound class, ANSI B16.3. Threaded or welded for 2" and 3". Butt-weld type over 3", ANSI B16.9. Flanges for steel pipe shall be welded neck type, ANSI B16.5. Fittings shall be suitable for 125 psi cold water service.

4. Fittings, Copper Tubing: Cast brass or wrought copper, solder joint type, ANSI B16.18 or B16.22. Solder shall be Type 95/5 tin-antimony, ASTM B32.

5. Valves: Valves 2 inches and smaller shall be bronze body, with threaded connections for black steel pipe and soldered connections for copper tubing. Valves 2-1/2 and 3 inches shall be either bronze or cast iron with threaded, soldered, or flanged ends as required. Valves 4 inches and larger shall be iron body bronze mounted with flanged ends. Valves shall be designed for 125 psi or 150 psi service and 250o F. Bronze gate valves and check valves shall conform to MSS SP-80. Cast iron gate valves shall conform to MSS SP-70.
   a. Butterfly valves shall be cast iron body, lug type, bubble-tight shut off, 150 pound class. Valves shall have corrosion resistant steel stems and corrosion resistant or bronze discs with molded elastomer seats. Operators shall be manual throttling handles with minimum seven locking positions.
   b. Check valves shall be cast iron body silent check type, wafer style, spring actuated, bronze trim, 125 pound class.

6. Strainers: Iron body Y-pattern type with monel, stainless steel, or brass screen and blowoff connection fitted with a bronze hose bibb.

7. Flexible Connections: Flexible neoprene connectors with control rods, Mason Type MFNC or approved equal.

8. Hangers: MSS SP-58 and SP-69, types 1, 6, 9, or 11 for suspended piping. Provide turnbuckles type 13 and 15 where required for vertical adjustment. Maximum spacing shall be as specified in SP-69.

9. Thermometers: Dial type, 3-1/2 inch diameter, chrome plated case, white face with black digits, 2-degree increments, 0 - 100oF range.

10. Pressure Gages: Bronze bourdon tube, 4-1/2 inch round face, scale 0-100 lbs. with bronze gage cocks.

11. Air Vent Valves: Automatic type, cast iron body with corrosion resistant steel float, linkage, and removable seat. Provide at all high points.

12. Dielectric Unions: Provide dielectric unions between ferrous and non-ferrous piping.

13. Backflow Preventer: Shall be reduced pressure type approved by State Health Department. Bronze body, 175 lb. pressure rating, Watts Model 909 or approved equal.

14. Expansion Tank: Welded steel, ASME labeled, 125 psig design pressure, with gage glass and air control fitting. Bell and Gossett Airtrol or approved equal.

15. Pressure Reducing Valve: Bronze body direct acting type, 150 psig maximum inlet pressure, and adjustable outlet pressure 10 to 50 psig. Watts Model U5B or approved equal.

16. Automatic flow control valves shall be factory set at indicated flows, designed to limit the rate of flow to the set value regardless of system pressure fluctuations. Valves shall have body tappings suitable for connecting instruments for verifying flow control performance. Valve bodies shall be brass or bronze with solder joint ends. Griswold, or approved equal. Provide with valve kit located outside of insulation, and hose fittings. Provide one portable measuring kit consisting of carrying case, instructions, hoses, connectors, push-button 3-way valve, and 4-1/2 inch pressure gage.

B. Refrigerant Piping and Accessories:

1. Copper tubing, ASTM B280, soft-annealed where bending is required and hard drawn where no bending is required. Soft annealed shall not be used larger than 1-3/8 inches. Joints shall be brazed.

2. Fittings: Wrought copper or forged brass sweat fittings, ANSI B16.22 and ASTM B75.

3. Solder: Silver solder conforming to AWS A5.8. Melting point not less than 1145°F.

4. Refrigerant Shut-Off Valves: Valves shall be designed for use with the refrigerant used and shall have pressure ratings compatible with system working pressures encountered. Valves for copper tubing shall be all-brass, hand wheel operated, diaphragm packless type globe or angle valves in sizes up to and including 5/8 inch. In sizes over 5/8 inch the valves shall be brass or bronze globe or angle type, wrench operated with ground-finish stems, packed especially for refrigerant service, back-seated, and provided with seal caps.

5. Supports: MSS-SP-58 and SP-69, types 1,5,6,7,9,10, or 11 for suspended piping. Provide turnbuckles type 13 and 15 where required for vertical adjustment. Maximum spacing shall be specified in SP-69.

6. Strainers: Brass or cast iron body, Y-pattern, cleanable, minimum 60-mesh non-corrodible screen with net free area not less than 10 times the pipe area, with pressure rating compatible with refrigerant service.

7. Solenoid Valves: The valves shall be of the 2 position, direct acting or pilot operated types, opened or closed, electrically as specified for use with liquid or gas refrigerant. The valves shall be designed for the required pressure drop and shall conform to ARI 760 and shall be listed by the Underwriters' Laboratories, Inc. for the service.

8. Thermostatic Expansion Valves: The expansion valves shall be of the diaphragm and spring loaded type with external equalizers, bulb and tubing, and external superheat adjustment with seal cap. The valve size and superheat adjustment shall be as recommended by the valve manufacturer. Valves shall be tested and rated in accordance with ANSI B60.1 and 750 for capacities up to 135,000 Btu per hour. Valves shall have brass, bronze or semi-steel bodies with stainless steel or non-corrosive non-ferrous internal parts. Valves shall have brazing connections. Thermostatic expansion valve bulb shall be stable, and non-migrating and shall be suitable for the refrigerant valve capacity and evaporator temperature and shall be as recommended by the valve manufacturer.

9. Liquid Line Driers: The liquid line drier shall be the solid desiccant type. Flow rate capacity shall be within the maximum allowable pressure drop, and safety shall conform to the requirements of ARI Standard 710. Drier body shall be of brass or steel and shall be provided with means for holding the desiccant securely in place and distributing the liquid refrigerant evenly throughout the desiccant. Driers shall be capable of withstanding a pressure of 350 psi. Driers may be of the combination drier-indicator type.

10. Moisture Indicators: The moisture indicators in the liquid line of refrigerant systems shall contain indicating material that will indicate moisture by varying degrees of color change, based on 100 degrees F and a moisture content in the range of 45 to 180 particles per million in refrigerant. Indicators shall be a brass or bronze or heavily copper plated steel fitting with the indicator material

located under a bulls-eye. Indicators shall be capable of withstanding a test pressure of 350 psig without damage.

11. Liquid Refrigerant Sight Glass: The sight glass shall be of the double-port see-through type with two bulls-eyes and part of the moisture indicator. Sight glass indicators shall be capable of withstanding a test pressure of 350 psig without damage. Sight glass body shall be forged brass or bronze with fittings as specified hereinbefore for refrigerant piping.

12. Liquid Receiver: Liquid receiver shall be the vertical or horizontal type, designed, fitted and rated in conformity with ARI 495, except as modified herein. The receiver shall be constructed and tested in conformity with Section VIII of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. Each receiver shall have a storage capacity not less than 20 percent in excess of that required for fully charged system. Each receiver shall be equipped with inlet, outlet drop pipes, drain plug, purging valve, relief valves of capacity and setting required by ANSI B9.1, and two bulls-eye liquid level sight glasses. Sight glasses shall be in same vertical plane, 90 degrees apart, perpendicular to axis of receiver.

C. Condensate Drain Piping:

1. Pipe and Fittings: Schedule 40 PVC socket joint pipe and fittings, ASTM D1785, with solvent cement joints.

2. Supports: As specified for [chilled water] [refrigerant] piping.

D. Ductwork and Accessories:

1. Sheet Metal Ductwork: Galvanized steel sheets, ASTM A527. Construction, gages, and reinforcement shall comply with SMACNA HVAC Duct Construction Standards, 1985 Edition.

2. Fittings: Vaned elbows, take-offs, branch connections, transitions, volume dampers, and flexible connections shall comply with SMACNA standards. Dampers shall be opposed blade type with locking quadrant. Provide turning vanes in all elbows and where indicated.

3. Supports: Galvanized steel straps or hanger rods in accordance with SMACNA Duct Construction Standards.

4. Flexible Connections: Neoprene coated glass fabric weighing approximately 30 ounces per square yard.

5. Flexible Ducts: UL Class 1 air duct insulated with fiberglass, Owens-Corning INL-25 Flexible Duct, or equal.

6. Acoustical Duct Liner: 1-inch thick fiberglass with flame retardant coating, 1.5 pcf density. UL listed with flame spread rating of 25 and smoke developed rating of 50. Owens-Corning, Certainteed, Manville or equal.

E. Variable Volume Terminal Units: Variable volume, single duct, terminal units shall be provided with a calibrated air volume sensing device, air valve or damper, actuator, and accessory relays. Units shall control air volume to within plus or minus 5 percent of each air set point volume as determined by the thermostat with variations in inlet pressures from 3/4- to 6-inch water gauge. Internal resistance of units shall not exceed 0.4 inch water gauge at maximum flow range. External differential pressure taps separate from the control pressure taps shall be provided for air flow measurement with a 0 to 1 inch water gauge range.

1. Diffusers: Louvered face type with surface flange, distribution pattern as indicated, volume control opposed blade damper, and extractor. Finish shall be off-white baked enamel. Material shall be aluminum. Face plate shall be removable.

2. Registers: Fixed pattern, surface mounted, all aluminum, 45 degree deflection.

3. Grilles: As specified for registers, without damper.

4. Backdraft Damper: Backdraft damper shall be factory fabricated unit with delicately balanced blades that open automatically when the fan starts and close by gravity when the fan stops. Edges of blades shall be provided with felt or rubber strips to prevent rattling and insure a tight seal.

5. Fire Dampers: Provide where indicated and where required by NFPA 90A. Dampers shall comply with UL 555 and installation shall comply with SMACNA Fire Damper Guide for Air Handling Systems. Provide duct access panel at each fire damper for accessibility.

6. Birdscreens: Two by two mesh, 0.063 inch diameter aluminum wire or .031 inch diameter stainless steel wire, with frame.

E. Insulation: Insulation, adhesives, coatings and accessories shall have surface burning characteristics as determined by ASTM E84, NFPA 255 and UL 723, not to exceed 25 for flame spread and 50 for smoke developed.

1. Chilled Water Piping:
   a. Cellular Glass: ASTM C552, Type II, Class 1 or 2, preformed.
   b. Flexible Unicellular: ASTM C534, Type 1.
   c. Polystyrene: Closed cell type, for outdoor use only.
   d. Mineral Fiber: ASTM C547 Class 1.

2. Refrigerant Suction Piping and Condensate Drain Piping:
   a. Flexible Unicellular: ASTM C534, Type 2.
   b. Polystyrene: Closed cell type, for outdoor use only.

3. Pipe Insulation Finishes:
   a. All Purpose Jacket: Provide factory applied all-purpose jacket with integral vapor barrier. Jackets in exposed locations shall have smooth, white surface suitable for painting. Jacket may be omitted on flexible unicellular insulation only.
   b. Vapor Barrier Material: Fed. Spec. HH-B-100, Type I.

c. Aluminum Jackets: ASTM C921, Type II, 0.016 inch thick, smooth.
d. Vinyl Lacquer: Provide two coats of vinyl lacquer finish or equal on flexible unicellular insulation located outdoors.

4. Duct Insulation: Flexible fiberglass blanket, ASTM C 553, Type 1, class B-4, 1-1/2 pcf.

5. Duct Insulation Finishes:
   a. Multi-Purpose Jacket: Provide factory applied jacket with integral vapor barrier.
   b. Vapor Barrier Material: Fed. Spec. HH-B-100B, Type I or II.

6. Equipment Insulation:
   a. Flexible Fiberglass, ASTM C 553, Type 1, Class B-3, with vapor barrier.
   b. Rigid Fiberglass, ASTM C 612, Class 2 with vapor barrier.
   c. Cellular Glass, ASTM C 552, Type I.

7. Chilled Water Pump Insulation: Bolted, two piece 22 gage galvanized sheet metal box lined with 1-1/2 inch thick cellular glass, ASTM C 552, Type 1.

F. Corrosion Protection

1. The finned coils shall be coated by an experienced and product manufacturer approved locally applied applicator who has developed the coating techniques necessary to apply uniform coating to all surfaces, avoiding excessive buildup on fin edges and other areas that would impair heat exchange. Coating shall be applied under shop conditions utilizing a clean, dry under-roof area with specialized equipment. Such an experienced and approved applicator with proper facilities is International A/C Coatings, Honolulu, Hawaii or other approved applicator.

2. The entire apparatus being coated shall be dismantled to the maximum degree without disturbing piping or wiring. Upon completion of the coating, the apparatus shall be reassembled with care so that the coating surface is not damaged.

3. Surface preparation and application shall be in strict accordance with the coating manufacturer's instructions.

4. Coating System for Finned Coils: Blygold Polual, or Thermoguard aluminum impregnated polyurethane coating. The coating shall provide inherent protection against ultraviolet radiation. The coating manufacturers shall provide a 3 year written conditional warranty for the coating within the contiguous United States and Hawaii.

5. Coating System for Other Surfaces: Epoxy, Thermoguard or Polysiloxane similar to Ameron PSX 700 Engineered Siloxane shall be properly modified and applied by the approved applicator.

6. All protective coatings shall be applied in accordance with the manufacturers' recommendations and by manufacturers' certified/ approved applicators.

7. Workmanship: Application of coating materials shall be done by skilled applicators. Criteria of good workmanship desired and neat appearance of the finished surfaces are: absence of sags, runs, and unnecessary brush marks. Other criteria are: thorough mixing of coatings, limited use of thinners, uniformity of film thickness, proper drying time between coats, and protection of surfaces not to be coated.

2.02 EQUIPMENT

A. Air Cooled Scroll Chillers

1. General

a. System Description:
Carrier 30RAP-090 or approved equal. Microprocessor controlled, air-cooled liquid chiller utilizing scroll compressors, low sound fans, electronic expansion valve, optional hydronic pump system, and fluid storage tank.

b. Quality Assurance:
1) Unit shall be rated in accordance with AHRI Standard 550/590, latest edition (U.S.A.) and all units shall be ASHRAE 90.1 compliant.
2) Unit construction shall comply with ASHRAE 15 Safety Code, UL latest edition, and ASME applicable codes (U.S.A. codes).
3) Unit shall be manufactured in a facility registered to ISO 9001:2000 Manufacturing Quality Standard.
4) Unit shall be full load run tested at the factory.

c. Delivery, Storage and Handling
1) Unit controls shall be capable of withstanding 150 F (66 C) storage temperatures in the control compartment.
2) Unit shall be stored and handled per unit manufacturer's recommendations.

2. Products

a. General:
Factory assembled, single-piece chassis, air-cooled liquid chiller. Contained within the unit cabinet shall be all factory wiring, piping, controls, refrigerant charge (R-410A), and special features required prior to field start-up.

b. Unit Cabinet:
1) Frame shall be of heavy-gage, galvanized steel.
2) Exterior panels shall be galvanized steel with a baked enamel powder or pre-painted finish.
3) Cabinet shall be capable of withstanding 500-hour salt spray test in accordance with the ASTM (U.S.A.) B-117 standard.

c. Fans:
1) Condenser fans shall be direct-driven, 9-blade airfoil cross-section, reinforced polymer construction, shrouded-axial type,

and shall be statically and dynamically balanced with inherent corrosion resistance.

2) Fan operation shall allow reduced sound levels during scheduled unoccupied operating periods. Manufacturers without unoccupied reduced sound capability shall submit 1/3 octave band data and sound power data as measured according to ARI 370 as confirmation of unit sound characteristics.
3) Air shall be discharged vertically upward.
4) Fans shall be protected by coated steel wire safety guards.

d. Compressor/Compressor Assembly:
1) Fully hermetic, direct-drive, scroll type compressors.
2) Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have either internal line break thermal and current overload protection or external current overload modules with compressor temperature sensors.
3) Compressors shall be mounted on rubber in shear vibration isolators.
4) Staging of compressors shall provide unloading capability. Digital compressor unloading control shall be available as an option.

e. Cooler:
1) Cooler shall be rated for a refrigerant working-side pressure of 505 psig (3482 kPa) on sizes 010-025 and 565 psig (3896 kPa) on sizes 030-060 and shall be tested for a maximum water-side pressure of 300 psig (2068 kPa) or 150 psig (1034 kPa) when optional hydronic package is installed.
2) Shall be single-pass, ANSI type 316 stainless steel, brazed plate construction.
3) Shell shall be insulated with 3/4-in. (19 mm) closed-cell, polyvinyl-chloride foam with a maximum K factor of 0.28.
4) Shall incorporate 2 independent refrigerant.
5) Cooler shall have an optional factory-installed heater, to protect cooler from ambient temperature freeze down to –20 F (–29 C).
6) Unit shall be provided with a factory-installed flow switch.
7) All connections shall use standard Victaulic-type fittings.

f. Condenser:
1) Coil shall be air-cooled Novation® heat exchanger technology with microchannel (MCHX) coils and shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coils shall consist of a two-pass arrangement. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a corrosion-resistant coating.
2) Tubes shall be cleaned, dehydrated, and sealed.
3) Assembled condenser coils shall be leak tested and pressure tested at 656 psig (4522 kPa).

g. Refrigeration Components:
Refrigerant circuit components shall include filter drier, moisture

indicating sight glass, electronic expansion device, and complete operating charge of both refrigerant R-410A and compressor oil.

h. Controls, Safeties, and Diagnostics:

1) Unit controls shall include the following minimum components:
   a) Microprocessor with non-volatile memory. Battery backup system shall not be accepted.
   b) Single terminal block for power and controls.
   c) Control transformer to serve all controllers, relays, and control components.
   d) ON/OFF control switch.
   e) Replaceable solid-state controllers.
   f) Pressure sensors shall be installed to measure suction and discharge pressure for each circuit. Thermistors shall be installed to measure cooler entering and leaving fluid temperatures, outdoor ambient temperature, and suction temperature. Provision for field installation of accessory sensor to measure compressor return gas temperature.

2) Unit controls shall include the following functions:
   a) Automatic circuit lead/lag for dual circuit chillers.
   b) Hermetic scroll compressors are maintenance free and protected by an auto-adaptive control that minimizes compressor wear.
   c) Capacity control based on leaving chilled fluid temperature and compensated by rate of change of return-fluid temperature with temperature set point accuracy to 0.1° F (0.06° C).
   d) Limiting the chilled fluid temperature pulldown rate at start-up to an adjustable range of 0.2° F to 2° F (0.11° C to 1.1° C) per minute to prevent excessive demand spikes at start-up.
   e) Seven-day time schedule.
   f) Leaving chilled fluid temperature reset from return fluid and outside air temperature.
   g) Chilled water pump start/stop control and primary/standby sequencing to ensure equal pump run time.
   h) Dual chiller control for parallel chiller applications without addition of hardware modules and control panels (additional thermistors and wells are required).
   i) Timed maintenance scheduling to signal maintenance activities for pumps, condenser coil cleanings, strainer maintenance and user-defined maintenance activities.
   j) Boiler enable signal to initiate system heating mode.
   k) Low ambient protection to energize cooler and hydronic system heaters.
   l) Periodic pump start to ensure pump seals are properly maintained during off-season periods.
   m) Single step demand limit control activated by remote contact closure.
   n) Nighttime sound mode to reduce the sound of the machine by a user-defined schedule.

3) Diagnostics:
   a) The control panel shall include, as standard, a scrolling marquee display capable of indicating the safety lockout condition by displaying a code for which an explanation may be scrolled at the display.
   b) Information included for display shall be:
      (1) Compressor lockout.
      (2) Loss of charge.
      (3) Low fluid flow.
      (4) Cooler freeze protection.
      (5) Cooler set point.
      (6) Chilled water reset parameters.
      (7) Thermistor and transducer malfunction.
      (8) Entering and leaving-fluid temperature.
      (9) Compressor suction temperature.
      (10) Evaporator and condenser pressure.
      (11) System refrigerant temperatures.
      (12) Chiller run hours.
      (13) Compressor run hours.
      (14) Compressor number of starts.
      (15) Low superheat.
      (16) Time of day:
         (a) Display module, in conjunction with the microprocessor, must also be capable of displaying the output (results) of a service test. Service test shall verify operation of every switch, thermistor, fan, and compressor before chiller is started.
         (b) Diagnostics shall include the ability to review a list of the 20 most recent alarms with clear language descriptions of the alarm event. Display of alarm codes without the ability for clear language descriptions shall be prohibited.
         (c) An alarm history buffer shall allow the user to store no less than 20 alarm events with clear language descriptions, time and date stamp event entry.
         (d) The chiller controller shall include multiple connection ports for communicating with the local equipment network, the Carrier Comfort Network® (CCN) system and access to chiller control functions from any point on the chiller.
         (e) The control system shall allow software upgrade without the need for new hardware modules.

4) Safeties:
   a) Unit shall be equipped with thermistors and all necessary components in conjunction with the control system to provide the unit with the following protections:

(1) Loss of refrigerant charge.
(2) Reverse rotation.
(3) Low chilled fluid temperature.
(4) Thermal overload.
(5) High pressure.
(6) Electrical overload.
(7) Loss of phase.

b) Factory pump motors shall have external overcurrent protection.

i. Operating Characteristics:
1) Unit shall be capable of operating down 32 F (0° C) as standard.
2) Unit shall be capable of starting and running at outdoor ambient temperatures up to 120 F (50 C) for all sizes. Unit shall additionally be able to stay online when running with a 125 F (52 C) ambient temperature.
3) Unit shall be capable of starting up with 95 F (35 C) entering fluid temperature to the cooler.

j. Motors:
Condenser-fan motors shall be totally enclosed single-speed, 3-phase type with permanently lubricated bearings and Class F insulation (except Motormaster® V control motors which shall be open type and shall have Class B insulation).

k. Electrical Requirements:
1) Unit/module primary electrical power supply shall enter the unit at a single location.
2) Unit shall operate on 3-phase power at the voltage shown in the equipment schedule.
3) Control points shall be accessed through terminal block.
4) Unit shall be shipped with factory control and power wiring installed.

l. Chilled Water Circuit:
1) Chilled water circuit shall be rated for 300 psig (2068 kPa). Units with optional pump package are rated for 150 psig (1034 kPa) working pressure.
2) Solid-state flow monitor with integral relay shall be factory installed and wired.
3) Brass body strainer with 40 mesh screen and ball type blow down.

m. Special Features:
1) Hot Gas Bypass:
Unit shall be equipped with factory or field installed, microprocessor-controlled, hot gas bypass that shall permit unit operation down below the minimum standard step of capacity.
2) Energy Management Module:
A factory or field-installed module shall provide the following energy management capabilities: 4 to 20 mA signals for leaving

fluid temperature reset, cooling set point or demand limit control; 2-point demand limit control (from 15% to 100%) activated by a remote contact closure; and discrete input for “Ice Done” indication for ice storage system interface.

3) Vibration Isolation:
Vibration isolation pads shall be supplied for field installation at unit mounting points. Pads shall help to reduce vibration transmission into the occupied space. CALDYN CH-6x6 neoprene waffle pads with 11-gauge and 16-gauge steel shims or approved equal.

3) BACnet Translator Control:
Unit shall be supplied with field-installed interface between the chiller and a BACnet Local Area Network (LAN, i.e., MS/TP EIA-485).

4) GFI Convenience Outlet:
Shall be factory or field installed to provide the chiller with a 4 amp GFI receptacle. The receptacle shall have independent fuse protection. The convenience outlet is a 115-v female receptacle.

5) Value Sound Fans:
Shall provide propeller-type fans for applications that are not highly sound-sensitive.

6) High SCCR (Short Circuit Current Rating):
The optional high SCCR (short circuit current rating) device shall allow the chiller to tolerate a 65 kA (208/230, 380 and 460-v units) or 25 kA (575-v units) short circuit current for a brief period of time while protecting downstream components. The high SCCR option shall provide a higher level of protection than the standard unit.

B. Chilled Water Pumps

1. Type: Pump shall be of the end-suction centrifugal base mounted type, Aurora 340 1 STG ENDSUC 2.5x3x9 or approved equal.

2. Capacity: Shall be as shown on the drawings.

3. Pump: Shall be end suction design as indicated on the drawings and shall be equipped with water tight, long life, self-lubricating mechanical seal. Pump construction shall be BF suitable for a maximum working pressure of 175 PSIG. The pump shaft shall be supported by two heavy duty ball bearings.

4. Motor: Shall be totally enclosed fan cooled (TEFC) rated for exterior installation. The current characteristics of the motor shall be as shown on the drawings. The horsepower of the motor shall be of such a size as to ensure non-overloading of the motor throughout the capacity range of the pump without considering motor service factor. Motor shall be premium efficiency and be VFD rated.

5. Installation: Construct concrete support base and install per manufacturer requirements.

C. Direct Expansion Split-System Air Conditioning Units

1. General: The air conditioning equipment shall be a split type system with a full charge of R-410A. The units shall be rated in accordance with ARI Standard 210 and bear the ARI label.

2. Fan Coil Unit: The indoor unit shall be completely factory assembled, and wired. The evaporator fan shall be an assembly of multiple, high performance, double inlet, forward curve line flow fans, direct drive by a single motor. The fans shall be statically and dynamically balanced and run on permanently lubricated bearings. An adjustable guide vane shall be provided with the ability to change the airflow from horizontal to vertical. A motorized swing flow louver shall provide an automatic change in airflow by directing the air from side to side for uniform air distribution. Return air shall be filtered by means of an easily removable washable filter. The evaporator coil shall be of nonferrous construction with smooth plates bonded to copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phoscopper or silver alloy. The coil shall be pressure tested at the factory. A condensate pan with drain shall be provided under the coil.

3. System Control: The control system shall consist of 2 microprocessors interconnected by a single non-polar 2-wire cable. One microprocessor shall be factory wired and located within the indoor unit. It shall have the capacity of sensing return air temperature and indoor coil temperature; receive and process commands from the remote controller; provide emergency operation; activate the indoor unit alarm lamp on any system failure; control the outdoor unit; and have self-diagnostic capabilities with lED lights and DIP switches. The microprocessor within the wall mounted remote controller shall sense room temperature; display set point and room temperature; control operation of the swing flow louvers; provide on-off and system/mode function switching; and provide access to the indoor unit diagnostic system for testing and analysis. The remote controller shall have the capability of 2 modes of control. Mode One shall provide individual system control at a distance from the unit. Mode Two shall provide control for a single or multiple number of systems from a single location in the same room. The control sequence shall provide a maximum of 15-second time delay at start-up. The control voltage between the remote controller and the indoor unit shall be 24 volts, D.C. The control voltage between the indoor unit and the outdoor unit shall be 12 volts, D.C.

4. Air-Cooled Condensing Unit: The outdoor unit shall be completely factory assembled, piped, wired, and corrosion coated. The casing shall be fabricated of galvanized steel, bonderized, and finished with baked enamel. The unit shall be furnished with one direct drive, propeller type fan arranged for horizontal discharge. Each fan motor shall have different running rpm for reduction in noise and harmonic vibration. The motors shall have inherent protection, be of the permanently lubricated type, and resiliently mounted for quiet operation. Each fan shall be provided with a raised wired guard to prevent contact with moving parts. The compressor shall be of the high-performance, serviceable rotary type with crankcase heater, accumulator, and internal thermal overloads. The compressor shall be internally isolated with rubber mounts so as to avoid the transmission of vibration. The refrigeration system shall be equipped with

high and low pressure switches. The refrigerant flow from the condenser shall be controlled by means of a capillary tube. The condenser coil shall be of nonferrous construction with smooth plate fins bonded to copper tubing. The tubing shall have inner groves for high efficiency heat exchange. The coil shall be protected with an integral metal guard. Provide factory applied corrosion protection for condenser coil and casing. The unit shall be controlled by the microprocessor located in the matching indoor unit. A built-in, low-ambient controller will allow cooling to 32 degrees Fahrenheit outdoor temperature.

5. Unit shall be as indicated on contract drawings.

D. Supply Air Fans
Centrifugal, inline, belt-drive fan. Sound rating per AMCA 300; statically and dynamically balanced, with air capacities, horsepower, fan types, fan arrangement, sound power level or loudness level, and static pressure, as indicated on contract drawings. Fan bearing shall have a minimum average 200,000 hours at design operating conditions. Motor shall be energy efficient type and rated for VFD. Greenheck BSQ 160-15 or approved equal.

E. Controls

1. General: Controls shall be electric, electronic, or solid-state electronic, or a combination that will provide the required sequence of operation control. Schematic control diagrams shall be submitted. All control work shall be performed by an experienced and licensed controls sub-contractor.

3. Automatic Dampers: Opposed blade type, galvanized or aluminum, with flanged frame for duct mounting. Provide replaceable neoprene edge seals on the top, bottom, and sides of the frame and each blade.

4. Automatic Valves: Sized by manufacturer for indicated flow and pressure drop, 125 psi rated, with close-off ratings exceeding maximum upstream pressure. Valves shall be 2-way or 3-way, modulating or 2 position, as indicated. Modulating valves shall have valve-stem indicators.

5. Valve and Damper Operators: Sized by manufacturer for the conditions to be encountered, full-proportioning or 2-position type, with spring return to normal position. Electric and electronic modulating operators shall be hydraulic or oil-immersed gear-train type.

6. Thermostats: Full proportioning or two-positioning type, as indicated. Thermostats shall respond to a change of not over 1-1/2o.

a. Space thermostats shall have exposed setpoint and exposed indicator.

b. Remote thermostats shall be duct, or immersion type, as required, with set point and throttling range adjustment in a remote metal case. Sensing elements, shall be secured in the duct or pipe to respond to the overall temperature.

3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Do not scale Drawings. Check all measurements at building and adjust work to fit space allotted. Close cooperation between all trades will be required. Any work done without regard for work of other trades shall be moved without extra charge, if necessary to permit proper installation of other work.

B. Provide seismic restraints for equipment per IBC 2006 Design Category D. Provide suspended equipment with approved lateral or sway bracing.

3.02 CUTTING AND PATCHING

A. Cut all holes necessary for installation of work under this Section.

B. Patching of all holes, etc., will be done under other sections of specification. Patch any holes cut unnecessarily.

3.03 ACCESS TO EQUIPMENT

A. Install all control devices, specialties, etc., to provide for easy access for operation, repair and maintenance.

B. If concealed, access doors and panels shall be provided. Coordinate installation of items where access door and panels are required for proper access. Access is required where valves or controls are installed behind walls or above non-removable ceilings.

3.04 TESTING AND BALANCING

A. All testing and balancing shall be performed by an independent balancing contractor retained by the Contractor. Promptly repair all defects disclosed as result of tests or operations, at expense of Contractor, to satisfaction of the Owner. Supply all instruments, labor and tools required by Tests. Any defective material or equipment shall be repaired, adjusted and replaced by new like material and equipment and retest before acceptance. See SECTION 15950 - HVAC TESTING/ADJUSTING/BALANCING.

B. Make operation tests on all machinery and devices to determine proper compliance with specifications. All equipment shall function quietly and efficiently; undue noise or vibration shall be promptly required and/or corrected before acceptance.

C. Should any apparatus, material or work fail in any test, remove it immediately and replace with new perfect material and retest and/or correct before acceptance.

D. Two weeks before expected completion date, put air conditioning, ventilation and exhaust systems and equipment into operation and continue operation of same during each working day, for not less than five eight-hour periods, until all adjusting, balancing, testing, demonstrations, instructions and cleaning of systems have been completed. Instructions and demonstrations required shall be given simultaneously with this operation.

E. Balance, adjust and test air moving equipment and air distributing systems, using procedure recommended by ASHRAE "Guide". All instruments used shall be accurately calibrated and maintained in good working order. IF requested, conduct tests in presence of the Contracting Officer. Balancing and adjusting shall consist of:

1. Adjusting all grilles, registers and diffusers for optimum air distribution and minimum noise and drafts, starting with all elements in wide-open position.

2. Adjusting all fan speeds and manually operated dampers to supply and/or return quantities of air specified or indicated.

3. Make any changes in pulleys, belts and dampers, or all dampers, necessary for correct balance at no additional cost to The State.

F. Balance air and water system and equipment using procedure recommended by ASHRAE guide. All instruments used shall be accurately calibrated and maintained in good working order. If requested, conduct tests in presence of Owner.

G. Test air conditioning equipment as in actual operation, and test and adjust all temperature controllers, safety devices and valves to operate smoothly and quietly.

H. Testing at Maximum and Minimum Loads:

1. Visit contract site for at least two testing work sessions for field measurements. Visit the contract site during the season of maximum cooling load and minimum cooling load to test system operational performance of the cooling system under their respective maximum and minimum outdoor environment-caused loading. Record the following:
   a. Outdoor dry and wet bulb temperature.
   b. Outdoor humidity.
   c. Indoor dry and wet bulb temperature.
   d. Indoor humidity.

2. Test air conditioning system through each cycle of operation, including simulation of each season by loading and unloading the compressor. Test compressor operation under full and partial loads. Record the following:
   a. Outdoor dry and wet bulb temperature.
   b. Outdoor humidity.
   c. Indoor dry and wet bulb temperature.
   d. Indoor humidity.
   e. Full load amps on condensing unit.

3. Testing of air conditioning system shall be done in the presence of Owner. Notify Owner 7 days prior to testing.

3.04 OPERATION AND MAINTENANCE MANUAL

Furnish an operation and maintenance manual for each item of equipment. Furnish copies of the manual bound in hardback binders or an acceptable equivalent. Furnish one complete manual prior to the time that equipment tests are performed and furnish the remaining manuals before the contract is completed. Inscribe the following identification on the cover: The words OPERATION AND MAINTENANCE MANUAL, the name and location of the equipment or the building, the name of the Contractor and the contract number. The manual shall include the names, addresses and telephone numbers of each subcontractor installing equipment and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: Wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start-up, operation, and shut-down; description of the function of each principle item of equipment; the procedure for starting; the procedure for operating; shut-down instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade, temperature range and frequency; safety precautions, diagrams and illustrations; test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts and the service organization, which is reasonably convenient to the project site. The manual shall be complete in all respects for equipment, controls, accessories and associated appurtenances provided.

3.05 CLEANING

Thoroughly clean all fixtures, materials and equipment.

3.09 FINAL ACCEPTANCE

A. The Contractor shall perform and complete his work according to the Contract Documents without fault or defect. In the absence of more specific directives, the work shall:

1. Be placed in a thoroughly clean and unmarred condition.

2. Be checked out in a step-by-step manner to ascertain that all fastenings, controls, valves safety devices, operating devices, and other required appurtenances have been provided and adjusted in accordance with the Contract Documents.

3. Be free of previously condemned or rejected parts and be properly restored to the extent thereof.

4. Be balanced for perfect operation wherever adjustments for balancing exist in the work, and submittals required under paragraph 3.07 submitted.

5. Contain no hidden faults, defects, and/or unsafe conditions.

B. Before calling for final inspection, the various systems shall be operated for a period of 48 hours continuously and show satisfactory operation.

C. If it develops at the time of this inspection that there are any discrepancies between the installation and the plans, specifications, shop drawings, details, etc., the Owner will notify the Contractor shall make necessary changes and adjustments to correct the installation in accordance with the Owner's instructions and then notify the Owner that each item has be adjusted.

D. The Owner or his representative will then inspect the installation and make any necessary re-tests. If the items mentioned in the Owner's letter have not been corrected, it will be necessary to make additional inspections and tests. All of these subsequent inspections by the Owner, his representative, or both, that are required for the Owner to pass on this work and to make final acceptance shall be paid for by the Contractor.

END OF SECTION

SECTION 15900

HVAC TESTING/ADJUSTING/BALANCING

1 - GENERAL

1.01 SUMMARY

A. The work includes test, adjust, and balance (TAB) of heating, ventilating, and air conditioning (HVAC) air distribution systems including equipment, ducts, and piping which are located within, on, under, between, and adjacent to buildings.

1. Air Distribution Systems: Systems shall be tested, adjusted, and balanced (TAB'd) in compliance with this section. Obtain Owner's written approval before applying insulation to exterior of air distribution systems under SECTION 15650 – AIR CONDITIONING AND VENTILATION.

B. Related Sections:

1. Requirements of DIVISION 1 – GENERAL REQUIREMENTS apply to this section.
2. SECTION 15000 – MECHANICAL GENERAL REQUIREMENTS
3. SECTION 15650 – AIR CONDITIONING AND VENTILATION
4. SECTION 15950 – DIRECT DIGITAL CONTROL SYSTEMS

1.02 REFERENCES

A. The latest editions of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. Associated Air Balance Council (AABC)

AABC MN-1	Testing and Balancing Heating, Ventilating and Air Conditioning Systems
AABC MN-4	Test and Balance Procedures

2. Air Movement and Control Association (AMCA)

AMCA 203	Field Performance Measurements

3. American National Standards Institute (ANSI)

ANSI S1.4	Sound Level Meters
ANSI S1.11	Octave- Band and Fractional-Octave-Band Analog and Digital Filters

4. American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE)

ASHRAE HA Handbook, HVAC Applications

5. National Environmental Balancing Bureau (NEBB)

NEBB MASV Measurements and Assessment of Sound and Vibration

NEBB TABES Testing, Adjusting, Balancing of Environmental Systems

6. Sheet Metal & Air Conditioning Contractors' National Association (SMACNA)
SMACNA Leakage

Test Manual HVAC Air Duct Leakage Test Manual

SMACNA HVACTAB HVAC Systems - Testing, Adjusting and Balancing

1.03 SUBMITTALS

A. Submit under provisions of SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS.

B. Standards Compliance:

1. Testing Agency.

2. Testing Agency Personnel

3. Instrument Calibration.

4. Schedules: Testing Agenda

5. Test Report: Submit in accordance to this section

6. Agenda: Submit in accordance to this section.

1.04 GENERAL REQUIREMENTS

A. The provisions of SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS apply to this section.

C. Definitions:

1. Adjust: To regulate the specified airflow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling, etc.).

2. Balancing: To proportion flows within the distribution system (submains, branches and terminals) in accordance with specified design quantities.

3. Procedure: Standardize approach and execution of sequence of work operations to yield reproducible results.

4. Report Forms: Test data sheets arranged for collection of test data in logical order to submission and review. This data should also form the permanent record which shall be used as the basis for any future testing, adjusting and balancing required.

5. Test: To determine quantitative performance of equipment.

1.05 TESTING AND BALANCING AGENCY

A. Agency Qualifications: Obtain the services of a qualified testing organization to perform the testing and balancing work as herein specified.

B. Air, Refrigerant and Water Systems Testing and Balancing: Upon completion of the installation and field testing, performance test and adjust the new and existing supply, return, outside, transfer and exhaust air systems, refrigerant and water systems to provide the air volume, refrigerant water flow quantities indicated and sound levels required. Accomplish work in accordance with the agenda and procedures specified in AABC 71679 and standards of the NEBS correct air refrigerant and water system performance deficiencies disclosed by the test before balancing the systems.

1.06 AGENDA

A. Preliminary Report: Review Drawings and specifications prior to installation of any of the affected system. Submit a written report to the Owner indicating any deficiencies in the system that would preclude the proper adjusting, balancing and testing of the systems.

B. Submittal: An agenda shall be submitted and approved by the Owner prior to start of testing and balancing work. Include the following:

1. General description of each new and existing air, refrigerant and water system with its associated equipment and operation cycles for ventilating and cooling systems. Where different cycles are used for day and night, they shall be described independently.

2. A complete listing of air, refrigerant and water flow and air terminal measurements to be performed.

3. Proposed selection points for sound measurements. List shall include typical spaces and sound sensitive areas.

4. Specific test procedures and parameters for determining specified quantities; e.g., flow drafts, sound levels, etc., from the actual field measurements to establish compliance with contract requirements.

5. Samples of forms showing applications of procedures and calculations to typical systems.

C. Procedure Reporting: Provide specific test procedures for measuring air quantities at terminals. Specify type of instrument to be used, method of instrument application (by sketch) and factors for:

1. Air terminal configuration.

2. Flow direction (supply return and exhaust).

3. Velocity corrections.

4. Effective area applicable to each size and type of air terminal.

5. Density corrections (unless applicable data are covered elsewhere).

D. Area and Application Factors: will not be required where pitot tubes are employed to determine terminal capacity.

1.07 PROCEDURES, GENERAL

A. Requirements: Adjust systems and components thereof that perform as required by drawings and specifications.

1. The Contractor shall provide a final balance of new and existing exhaust systems to satisfy specific occupant and Owner's recommendations after acceptance of balance report.

B. Instrumentations: Method of application of instrumentation shall be in accordance with the approved agenda. Furnish personnel, instruments and equipment for tests specified herein.

1. Accuracy of Instruments: Instruments used for measurements shall be accurate. Provide calibration histories for each instrument for examination. Calibrate each test instrument by an approved laboratory or by the manufacture. The Owner has the right to request instrument recalibration or the use of other instruments and test methodology, where accuracy of readings is questionable.

2. Application of Instruments: Comply with manufacturer's certified instructions.

2 - PRODUCTS (Not applicable)

3 - EXECUTION

3.01 AIR SYSTEM PROCEDURES

A. Adjustments: Adjust air systems to provide the required design air quantity to or through, each component.

B. Balance (New Exhaust Systems): Use flow adjusting (volume control) devices to balance air quantities only; i.e., proportion flow between various terminals comprising system and only to the extent that their adjustments do not create objectionable air motion or sound, i.e., in excess of specified limits.

1. Balancing Between Runs (submains, branch mains and branches): Use flow regulating devices at, or in, the divided - flow fitting. Minimize restriction imposed by flow regulating devices in or at terminals.

2. Final Measurements of Air Quantity: Make final measurements of air quantity, after the air terminal has been adjusted to provide the optimum air patterns of diffusion.

C. Fan Adjustment: Total air system quantities, generally, shall be varied by adjustment of fan speeds. For systems with direct-connected fans (without adjustable pitch blades), damper restrictions of a system's total flow may be used, only if system pressure is less than Y2-inch w.g. and sound level is criteria is met.

D. Air Measurement (New Exhaust Systems):

1. Pitot tube: Except as specifically indicated herein, make pitot tube traverses of each duct to measure air flow therein. Pitot tubes, associated instruments, traversed and techniques shall conform with the ASHRAE Fundamentals Handbook.

2. Pitot Tube Traverse: Except for ducts serving modular office areas with movable partitions, which are subject to change, Pitot-tube traverse may be omitted if the duct serves only a single room or space and its design volume is less than 2000 cfm. In lieu of Pitot-tube traverse, determine air flow in the duct by totaling volume of individual terminals served, measured as described herein.

3. Measurements of Air Quantity: Where duct's design velocity and air quantity are both less than 1000 (fpm/cfm), air quantity may be determined by measurements at terminals served.

4. Test Holes: Test holes shall be in a straight duct, as far as possible downstream from elbows, bends, take-offs and other turbulence generating devices, to optimize reliability of flow measurements.

5. Air Terminal Balancing: Measurement of flow rates by means of velocity meters applied to individual terminals, with or without cones or other adapters, shall be used only for balancing. Measurement of air quantities at each type of air terminal (inlet and outlet) shall be determined by the method approved for balancing agenda. Conduct laboratory tests to prove accuracy of methodology when so directed by the Owner. Perform such tests in conformance with applicable ASHRAE or ASME codes.

6. Air Motion and Distribution: As indicated. In addition to air motion measurements, shall make smoke tests shall be made wherever requested by the Owner, to demonstrate the air distribution from air terminals.

3.02 TEST REPORTS

A. Submittal: Submit six copies of the reports described herein, covering air system performance, air motion and sound pressure levels, to the Owner prior to final tests and inspection.

B. Instrument Records: Include types, serial numbers and dates calibration of instruments.

C. Reports: Reports shall identify conspicuous items not conforming to contract requirements or obvious mal-operation and design deficiencies.

3.03 AIR SYSTEM DATA

A. Report The report shall include for each system the data listed below:

1. Equipment
   a. Installation Data:
      1) Manufacturer and Model.
      2) Size.
      3) Arrangement, Discharge and Class.
      4) Motor H.P., Voltage, Phase, Cycles and Full Load Amps.
      5) Location and Local Identification Data.
   b. Design Data: Data listed in schedules on drawings and specifications.
   c. Fan Recorded (Test) Data:
      1) C.F.M.
      2) Static Pressure.
      3) R.P.M.
      4) Motor Operating Amps.
      5) Motor Operating S.H.P.
      6) Entering and leaving air temperature (D.B. & W.B.).
      7) Ambient Air Conditions; D.B. & W.B.
      8) System Total Static Pressure.

2. Duct systems (New and Existing):
   a. Duct Air Quantities (Maximum and Minimum): Main, Submains, Branches, Outdoor (Outside) Air, Total-Air and Exhaust.
      1) Number of Pitot-tube (pressure) Measurements.
      2) Sum of Velocity Measurement, excluding pressure measurements.
      3) Average Velocity.
      4) Recorded (Test) C.F.M.
      5) Design C.F.M.
      6) Recorded System Static Pressure.

3.04 OPERATION ACCEPTANCE TEST

A. Capacity and Performance Tests: Make tests to demonstrate that capacities and general performance of new and existing air, refrigerant and water systems comply with contract requirements.

1. Final Inspection: At the time of final inspection, the contractor shall recheck, in the presence of the Owner, random selections of data, water and air quantities, air motion and distribution recorded in the test report.

2. Points and Areas for Recheck: As selected by the Owner.

3. Measurements and Test Procedures: As approved for work forming basis of certified report.

4. Selection for Recheck (specific plus random): In general, selections for recheck will not exceed 25 percent of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.

B. Retests: If random tests elicit a measured flow deviation of ten percent or more from greater than that recorded in the test report listings, at ten percent or more of the rechecked selections, the report shall be automatically rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, new test reports submitted and new inspection tests made at no additional cost to the Owner.

C. Marking of Settings: Following final acceptance of certified reports by the Owner, the settings of valves, splitters, dampers and other adjustment devices shall be permanently marked by the Contractor, so that adjustment can be restored if disturbed at any time. Do not mark devices until after final inspection.

END OF SECTION

SECTION 15950

DIRECT DIGITAL CONTROL SYSTEMS

1 - GENERAL

1.01 SUMMARY

A. This section covers the furnishing, fabrication, delivery and installation of a new direct digital control (DDC) system for the control of the heating, ventilating and air conditioning (HVAC) systems. The DDC system shall be a multi-loop, standalone and distributed digital control system as manufactured by a company specializing in HVAC controls. The DDC system shall provide all hardware and software to control all HVAC control functions including input, logic, processing and output functions. Input functions shall include analog and digital (binary, on/off, open/close) control signals to the microprocessor based digital controllers.

B. Output shall be transmitted via interface ports to allow connection to other controllers, terminals, a portable computer or a central site computer. The interface equipment will not provide day to day control of the HVAC system but will allow the operator to enable and disable equipment, change setpoints, change operating schedules, receive trends and alarms and allows loading and downloading of control programs. The system shall communicate with graphic operator work station located in the building (direct connection to a communication LAN) or at a remote site (connected to the digital controller through a LAN or modems and a telephone line).

C. DDC System Description, Operator Interface: All new BACnet objects defined in this contract shall be mapped to the existing controls system user workstation. Controls shall provide all graphic creation and point mapping, and all necessary protocol interface hardware to interface into the existing controls system. The successful General Contractor shall in its bid, include costs for the work to be done by existing controls.

D. Related Sections:
1. Requirements of DIVISION 1 – GENERAL REQUIREMENTS apply to this section.
2. SECTION 15000 – MECHANICAL GENERAL REQUIREMENTS
3. SECTION 15650 – AIR CONDITIONING AND VENTILATION
4. DIVISION 16 – material and installation requirements for control wiring.

1.02 REFERENCES

A. The latest editions of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. ASME 831.1-2007 Power Piping.

2. NFPA 70-2005 National Electric Code.

3. ASHRAE 135-2004 Data Communication Protocol for Building Automation and Control Networks.

4. UL 916-1998 UL Standard for Safety; Energy Management Equipment

5. ANSI C12.10-2004 Standard for Electromechanical Watt-hour Meters.

6. ANSI C57.13.2-2005 Standard Conformance Test Procedures for Instrument Transformers

7. SMACNA DCS-2005 Duct Construction Standards

8. ASME B16.5-1996, Pipe Flanges and Flanged Fittings NPS: ½ Through NPS 24.

9. ASTM A 126-2004, Standard Specification for Grey Iron Castings for Valves, Flanges, and Pipe Fittings.

10. UL 1449-1996, UL Standard for Safety Transient Voltage Surge Suppressors.

11. NFPA 90A-2002, Standard for the Installation of Air Conditioning and Ventilation Systems.

12. UL 555S-1999 UL Standard for Safety Leakage Rated Dampers for Use in Smoke Control Systems.

13. ANSI B40.1 00-1998 Gauges – Pressure Indicating Dial Type – Elastic Element.

1.03 DEFINITIONS

A. BACnet: BACnet is a standard communication protocol developed by the American Society of Heating Refrigeration and Air Conditioning Engineers (ASH RAE). The controller manufacturer shall have a company policy to support the implementation of BACnet.

B. Digital Controller: A control module which is microprocessor based, programmable by the user, has integral 110, and performs stand-alone operations.

C. Direct Digital Control (DDC): A digital controller as defined in this Document. The controller directly senses building environment and makes control decisions based on user defined, controller resident programs. The controller outputs control signals that directly operate valves, dampers, and motor controllers. No conventional control devices, pneumatic or electronic, such as receiver-controllers, thermostats, and logic units are present within or interface with a direct digital control loop. Actuators are electric or pneumatic, and the controller output is converted to the appropriate type of signal.

D. DDC System: A system made up of one or more digital controllers. Required climate control and energy management functions for complete operation of an HVAC system are provided by DDC from digital controllers. No conventional control devices (pneumatic or electronic) such as receiver-controllers, thermostats, and logic units are

used. Digital controllers in a system are linked in a communication network composed of one or more levels of local area networks (LAN).

E. Distributed Control: The intent of distributed control is to install the controllers near the equipment being controlled, and to distribute the processing to each stand alone DDC panel. The control system is built up of stand-alone controllers, utilizing sensor inputs and control outputs.

F. Dynamic Control: A process that optimizes operation of HVAC systems (air handler units, converters, chillers, and boilers) by increasing and decreasing setpoints or starting and stopping equipment in response to heating and cooling needs of downstream equipment. A requirement of dynamic control is knowing the heating/cooling demand status of downstream equipment; therefore, dynamic control requires controllers connected in a communications network.

G. Firmware: Firmware is software programmed into read only memory (ROM) and erasable programmable read only memory (EPROM) chips. Software may not be changed without physically altering the chip.

H. Graphic Sequence of Operation: A drawing or graphic showing all interlocks and control loop sequences between the input and output points. Graphic sequence of operation is a graphical representation of the sequence of operation. The graphic sequence of operation will show all inputs, outputs, and logic blocks.

I. Hand-Held Terminal: A hand-held terminal is a portable device, control system manufacturer-specific, which can be connected directly to a communications port on a digital controller and through which the digital controller can be interrogated and, in some cases, programmed.

J. Input/Output (I/O): I/O refers to analog inputs (AI), digital inputs (01), analog outputs (AO), and digital outputs (DO) in a digital controller. Inputs are from analog sensors (temperature, pressure, humidity, flow) and digital sensors (motor status, flow switches, switch position, and pulse output devices). Outputs operate modulating and on/off control devices.

K. I/O Unit: An I/O unit provides additional point capacity to a digital controller and communicate with the stand-alone digital controller on LAN. An I/O unit is not standalone because the control program does not reside in the I/O units microprocessor.

L. Integration: The ability of control system components to have interoperability between different manufacturers to connect together and provide coordinated control via real-time data exchange and control functions through a common communications data exchange protocol. Integration shall extend to the operator's workstation software, which shall support user interaction with all control system components. Methods of integration include industry standard protocols such as: BACnet, ARCnet, LonMark/LonTalk, OLE for Process Control (OPC) or integrator interfaces between cooperating manufacturer's systems.

M. Local Area Network (LAN):

1. A communications bus that interconnects digital controllers for peer-to-peer communications. Different levels of LANs are possible within a single DDC system. In this case, a digital controller on a higher level LAN acts as a network controller to the controllers on the lower level LAN. The network controller, then, has at least two LAN communications ports. One port supports peer-to-peer communications with other digital controllers on the higher level LAN. The other port supports communications with the digital controllers on the lower level LAN.

2. LANs permit sharing global information, make it possible to apply building wide control strategies such as peak demand limiting, permit dynamic control strategies, allow coordinated response to alarm conditions, and permit remote monitoring and programming of digital controllers.

3. Facility-wide LAN refers to a commercially available local area network. These LANs allow the connection to an existing or new facility-wide LAN.

N. Microprocessor: A microprocessor refers to the central processing unit (CPU) that contains all the registers and logic circuitry that make it possible for digital controllers to do computing.

O. Open Protocol Bus (OPB): A pre-programmed communications integrator that allows devices from one manufacturer to communicate and interact with those of another.

P. Open System Port (OSP): A user programmable communications port that provides the ability to develop custom communications processes to integrate other operating systems with the DDC System.

Q. Output Signal Conversion: Output signal conversion refers to the changing of one kind of control output into a proportionally related signal appropriate for direct actuation of the controlled device. Signals are converted by a transducer which may be external to the digital controller originating the output.

1. Examples in modulating control of pneumatic actuators are conversion of 4-20ma signals into proportional 3-15 psig signals.

2. An example of output signal conversion in on/off or open/close control is a contact closure originating in a digital controller which activates a solenoid air valve which passes main air, thereby forcing a damper to open fully.

R. Optimum Start: Optimum start is a method of starting the HVAC equipment prior to occupancy time in order to have the building at setpoint at occupancy. Optimum start shall be based on the zone temperatures, zone setpoints, and outdoor temperature. Optimum start will bring the zone to setpoint at occupancy time.

S. Peer-to-Peer: Peer-to-Peer refers to controllers connected on a communications LAN that act independently, as equals and communicate with each other to pass information which facilitates control.

T. PID: PID refers to proportional, integral, and derivative control; the three types of actions that are used in controlling modulating equipment.

U. Resolution: Refers to the number of possible states an input value or output value can take and is a function of the digital controller 110 circuitry; the AID converter for input and the D/A converter for output. Ten bit resolution has 1024 possible states and eight bit resolution has 256 possible states.

V. Stand-Alone Control: Refers to the digital controller being able to perform required climate control, and energy management functions without connection to another digital controller or central site computer. Digital controller requirements for stand-alone control are a time clock, a microprocessor, microchip resident control programs, PID control, a communications port for interfacing with and programming the controller, firmware for interrogation and programming, and 1/0 for sensing and effecting control of its control environment.

W. Terminal Control Unit (TCU): An off-the-shelf, stand-alone digital controller equipped for communication on a lower level local area network. TCUs may deviate from stand-alone only in receiving energy management and time information from a stand alone digital controller. A TCU is commonly application specific and is used for distributed control of specific HVAC subsystems. A TCU communicates with the digital controllers. Typically, a TCU communicates on a lower level LAN. Examples where TCUs might be used to control of small air handling units (AHUs), variable air volume (VA V) boxes, fan coil units, and heat pumps.

1.04 SUBMITTALS

A. Submit under provisions of SECTION 15000 - MECHANICAL GENERAL REQUIREMENTS.

B. Manufacturer's Catalog Data
1. DDC hardware
2. DDC capabilities
3. Workstation software
4. Input devices
5. Output devices
6. Surge and transient protection
7. Hand-held terminal
8. Panel mounted display and keypad

C. Equipment and software for which specification compliance data shall be submitted include but not limited to the following:

D. 1. DDC Hardware
a. I/O; capable of supporting platinum RTD, precision thermistor, 4-20 ma, 0-10 VDC
b. Programs will reside in microprocessor; controllers are stand-alone
c. Communications ports; all communications ports as specified
d. Protected memory; minimum hours required by this specification
e. Operating temperature limits

2. DDC Capabilities
a. Communications; baud rate, communication ports, stand-alone

b. Trending; capable of trending every point
c. Alarming; capable of alarm generation as indicated
d. Messages; as indicated
e. Self diagnostics; identification of a failed module
f. PID control; capable of PID control

3. Workstation Software
   a. Mouse and keyboard operation
   b. Communications
   c. Program upload and download
   d. Dynamic point update
   e. Program modification
   f. Database modification
   g. Graphics and graphics modifications
   h. Penetration of graphics

4. Input Devices
   a. Transmitters; accuracy, 4-20 ma, 0-10 VDC
   b. Temperature sensors; accuracy, stability, 100 percent factory screening, platinum RTD or thermistor
   c. Humidity sensors; type of sensor, accuracy, range, and stability
   d. Pressure sensor; accuracy
   e. Flow or motor proof; type
   f. Sensor wells; type

5. Output Devices
   a. Dampers; types
   b. Valves; types
   c. Actuators.
   d. Control Relays

6. External Surge and Transient Protection
   a. Power line
   b. Communications links and/or devices (between buildings)

E. Drawings: Submit the following drawings:

1. Control system schematic

F. Design Data: Submit test data demonstrating the following installed components will meet specification requirements.

1. Temperature sensor accuracy: Submit manufacturer's specification of temperature sensor accuracy. Literature shall make clear sensor accuracy as specified.

2. Temperature sensor stability: Provide manufacturer's specification of five year stability of RTDs and thermistors. Literature shall make clear sensor stability as specified.

G. Schedules:

1. List of shop drawings.

2. List of symbols and abbreviations used on shop drawings.

3. List of I/O points: For each input and output physically connected to a digital controller on a controller by controller basis, provide the following:
   a. Point description: for example: mixed air temperature, supply fan start/stop, etc.
   b. Point type: AO, AI, D0, or 01.
   c. Point range: 4-20 ma, 3-15 psi, platinum RTD resistance ohm, thermistor.
   d. Sensor range associated with point range: for example 0-100 degrees F, 0-2 inches of water.
   e. Software name(s) associated with point, if any.
   f. Terminal number to which point is connected.

4. Equipment components list: Submit a listing of controllers and connected devices shown on control system schematic. List the following:
   a. Control system schematic component name
   b. Description
   c. Manufacturer of controller
   d. Controller's name
   e. Equipment part numbers
   f. Cv for valves
   g. For actuators:
      1) Motive force (such as pneumatic, or electric)
      2) Normal position
      3) Nominal operating range (such as 3-7 psi, 4-8 ma)

5. AC power table: Submit a table listing each controller and the circuit breaker number, panel box number, and physical location of each controller's source of AC power.

H. Statements

1. Contractors' qualifications: Submit statements required in Part 1, Quality Assurance, Qualifications.

2. Training: Submit schedule, syllabus, and training materials in accordance with Part 3, EXECUTION.

I. Records: Provide administrative and closeout submittals:

1. Training course Documentation: Training course Documentation shall include a manual for each trainee plus two additional copies and two copies of audiovisual training aids, if used. Documentation shall include an agenda, defined objectives for each lesson and detailed description of the subject matter of each lesson.

2. Service organization: Qualified service organization list that shall include the names and telephone numbers of organizations qualified to service the HVAC control systems

3. Contractor certification: Provide certification that the installation of the control system is complete and the technical requirements of this section have been met.

J. Operation and Maintenance Manuals

1. Controls and HVAC System Operators Manual: Construct and provide a Control and HVAC Systems Operators Manual. This manual is designed to Document the HVAC and control system. Construct this manual using a 3 ring binder with a minimum of the following 7 sections. Use tabs to divide each section.
   a. Section 1. Description of HVAC Systems: Provide a description of the HVAC system components and control system. Include sequences of operation and a complete points list.
   b. Section 2. Controls Drawings: Provide drawings as specified.
   c. Section 3. Control Program Listings: Provide listing of all control programs, including terminal equipment controller setup pages.
   d. Section 4. Current Operating Parameters: Provide printouts of input and output setup information, database setups. This section is intended to provide information such as point addresses, slopes and offsets for all points, database of points, etc.
   e. Section 5. Design Information: Provide tab, but leave this section blank.
   f. Section 6. Control Equipment Cut Sheets: Provide cut sheets of all controller hardware and accessories. Include temperature versus resistance charts for temperature sensors, and calibration charts for pressure transducers.
   g. Section 7. Control Program: Provide a fully operational control system disk (CD disk format preferred) identical to the original control program as installed. In addition, provide a restore - backup disk of the control program and backup copy of ACAD controls drawings on a 3.5 inch disk. It is understood that the software will be available to the base and used only for the buildings in this contract.

2. DDC Manufacturer's Hardware and Software Manuals:
   a. Section 1. Installation and Technical Manuals for all digital controller hardware.
   b. Section 2. Operators Manuals for all digital controllers.
   c. Section 3. Programming Manuals for all digital controllers.

1.05 QUALITY ASSURANCE

A. General

1. The Direct Digital Control (DDC) System herein specified shall be fully integrated and installed as a complete package by the Direct Digital Control System Contractor. The System shall include all wiring, piping, installation supervision, calibration, adjustments, and checkout necessary for a complete and fully operational system.

2. The Direct Digital Control System Contractor shall be regularly engaged in the engineering, programming, installation and service of Direct Digital Control systems of similar size and complexity.

3. The DDC Contractor shall have a local facility in Oahu. Emergency service shall be available on a 24-hour, 7 -day-a-week basis.

4. The DDC Contractor shall be responsible for all work fitting into place in a satisfactory and neat workmanlike manner acceptable to the State.

B. Experience Record

1. The DDC Contractor shall have a minimum of five years experience with the complete installation of Direct Digital Control systems of similar size and technical complexity. The DDC Contractor shall provide a list of three comparable projects that have Direct Digital Control Systems with the features as specified for this project. These projects must be on-line and functional.

2. The DDC Contractor shall employ specialists in the field of Direct Digital Control Systems including: Programming, Engineering, Field Supervision, and Installation. Specialists shall present factory training certification of the submitted equipment upon request.

C. Governing Code Compliance: The DDC Contractor shall comply with all current governing codes, ordinances and regulations, including UL, NFPA, the local Building Code, NEC, and so forth.

D. FCC Regulation: All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Section 15, Governing Radio Frequency Electromagnetic Interference, and be so labeled.

E. Standard Products

1. Materials and equipment shall be standard products of manufacturer regularly engaged in the manufacturing of such products, using similar materials, design and workmanship. The standard products shall have been in commercial or industrial use for 2 years prior to bid opening. The 2 year use shall include applications of similarly sized equipment and materials used under similar circumstances. The 2 year experience must be satisfactorily completed by a product which has been sold on the commercial market through advertisements, manufacturer's catalogs, or brochures.

2. The equipment items shall be supported by a service organization.

F. Nameplate and Tags

1. Nameplates bearing legends as shown and tags bearing device unique identifiers as shown shall be engraved or stamped. Nameplates shall be permanently attached to HVAC control panel doors.

2. For each field mounted piece of equipment, not in a finished area, a plastic or metal tag with equipment name and point identifier shall be attached.

G. Verification of Dimensions: The contractor shall become familiar with all details of the work, shall verify all dimensions in the field, and shall advise the State of any discrepancy before performing the work.

H. Drawings: Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. The Contractor shall carefully investigate the mechanical, electrical, and finish conditions that could affect the work to be performed, and shall finish all work necessary to meet such conditions.

I. Modification of References: The advisory provision in ASME B31.1 and NFPA 70 shall be considered mandatory. Substitute the work "shall" for "should" wherever it appears and interpret all references to the "authority having jurisdiction" and "owner" to mean the State.

J. Storage: Stored products shall be protected from the weather, humidity and temperature variations, dirt and dust, and other contaminants, within the storage condition limits published by the equipment manufacturer.

1.06 WORK INCLUDED

A. Installation of Direct Digital Control (DDC) System

1. The DDC Contractor shall furnish and install a complete Direct Digital Control (DDC) System for all mechanical systems and other facility systems as included in the project Documents. The DDC system will provide the functional features as defined in Part 1 - General Requirements, Part 2 - Products, and Part 3 - Execution of these Specifications. The DDC Contractor shall provide a complete and operational system to perform all sequences of operations stated within Part 3 or-shown on the control drawings.

2. The work under this Section shall include all materials and labor to perform all work required for the installation of the DDC as specified.

3. The drawings and specifications are complementary to one another - meaning that what is called for on one is to be considered called for in both. Where conflicts exist between the specifications and/or drawings, the more stringent requirement shall apply.

4. The DDC Contractor shall be responsible for field verification of site conditions and for gathering all necessary field data for all items to be provided under this contract prior to submitting his or her bid.

5. Where work specified under other Sections of this Specification connects to equipment or systems that are listed and described in this Section, the DDC Contractor shall provide proper connection(s) to such equipment including trade coordination.

1.07 COORDINATION

A. Divisions

1. The DDC Contractor shall cooperate with other divisions performing work on this project as necessary to achieve a complete and neat installation. The Contractor shall also consult the drawings and specifications of all trades to determine the nature and extent of others' work.

2. Contractors, Sub-contractors, Employees: It will be the duty of this Contractor to work in cooperation with other contractors, and with other sub-contractors and employees, rendering assistance and arranging his or her work so that the entire project.

1.08 MANUALS

All manuals shall be provided in hard copy format or on a single Compact Disk (CD) as part of an on-line Documentation system through the operator workstation.

2 - PRODUCTS (Not applicable)

2.01 SYSTEM ARCHITECTURE

A. First Tier Network

1. The first tier network shall be based on a PC industry standard of Ethernet TCP/IP, or ARCnet. PC Workstation LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.

2. The DDC system shall network multiple operator workstations, network controllers, system controllers, and application-specific controllers. The first tier network shall provide communications between operator workstations and first tier DDC (Direct Digital Control) controllers.

3. The first tier network shall operate at a minimum communication speed of 2.5 M baud, with full peer-to-peer network communication.

4. Network Controllers shall reside on the first tier.

B. First Tier Network Protocol Integration

1. The protocol used between two different vendor systems will be BACnet over Ethernet and comply with the ASHRAE BACnet Standard 135-2004.

2. The system installed under this contract shall allow bi-directional communications between the existing host system if applicable or a BACnet system over an Ethernet TCPIIP data link, or ARCnet. Supported media shall include fiber, 10base2, and 10baseT.

3. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.

4. The ability to share data and change of state (COS) between the existing designated host system and the system installed under this contract shall be provided.

C. Second Tier Network

1. The second tier network is used to communicate between the first tier DDC controllers and field controllers.

2. Second tier networks shall utilize either "Peer-to-Peer," Master-Slave, or Supervised Token Passing communications or LONWORKS.

D. Second Tier Controller Protocol Integration

1. Hardwired
   a. Analog and digital signal values shall be passed from one system to another via hardwired connections.
   b. There will be one separate physical point on each system for each point to be integrated between the systems.
   c. Analog points will be 4-20 mA signals originating at the "from system" and being received by the "to system".
   d. Digital points will be "dry contact" signals originating at the "from system" and being received by the "to system."

2. Direct Protocol
   a. The DDC system shall include appropriate hardware equipment and software to allow data communications between the DDC system and 3rd party manufacturers control panels. The DDC shall receive, react to, and return information from multiple building systems, variable frequency drives, power monitoring systems, etc.
   b. All data required by the application shall be mapped into the First Tier Network DDC Controller's database, and shall be transparent to the operator.
   c. Point inputs and outputs from the third-party controllers shall have real-time interoperability with DDC software features such as: Control Software, Energy Management, Custom Process Programming, Alarm Management, Historical Data and Trend Analysis, Totalization, and Dial-Up and Local Area Network Communications.
   d. Integration shall be via BACnet technologies.
   e. The system operator shall have the ability to verify, and diagnose communication messages and point information between third-party controllers and the DDC system.

2.02 DDC SYSTEM

A. Provide a DDC system as a distributed control system. The system shall have standalone digital controllers, a communications network (new or existing), and a separate workstation computer with workstation software.

B. Provide an operator programmable system, based on the user applications, to perform closed-loop, modulating and/or on-off control of building equipment. Connect all digital controllers through the communication network to share common data and report to workstation computers. The workstation computers will be capable of being programmed to supervise the digital controllers. The control system shall be capable of down-loading and up-loading of programs between the workstation and the digital controllers.

C. Provide the quantity of digital controllers indicated on the drawings that will perform required climate control, energy management, and alarm functions. The quantity of controllers shall be no less than the number shown on drawings. All material used shall be currently in production.

1. Direct Digital Controllers: DDC hardware shall be UL 916 rated.
   a. Distributed Control: Apply digital controllers in a distributed control manner.
   b. Environmental Operating Limits: Provide digital controllers that operate in environmental conditions between 32 and 120 degrees Fahrenheit.
   c. Stand-Alone Control: Provide stand-alone digital controllers.
   d. Internal Clock: Provide clock with each controller on the first tier local area network (LAN) and shall have its clock backed up by a battery or capacitor with sufficient capacity to maintain clock operation for a minimum of 72 hours during a line power outage.
   e. Memory:
      1) Provide sufficient memory for each controller to support required control and communication functions.
      2) Memory Protection: Programs residing in memory shall be protected either by using EEPROM or by an uninterruptible power source (battery or uninterruptible power supply (UPS)). The backup power source shall have sufficient capacity to maintain volatile memory in event of an AC power failure. Where the uninterruptible power source is rechargeable (a rechargeable battery), provide sufficient capacity for a minimum of seventy two hours back-up. The rechargeable power source shall be constantly charged by charging circuitry while the controller is operating under normal line power. Where a non-rechargeable power source is used, provide sufficient capacity for a minimum of two years accumulated power failure. Batteries shall be designed to allow replacement without soldering.
   f. Inputs: Provide input function integral to the direct digital controller. Provide input type as required by the DDC design.
      1) Analog Inputs: Allowable input types are three wire 100 ohm or higher platinum RTD's, stable 10,000 ohm thermistors, 0-10 VDC and 4 to 20 ma. Thermistor and direct RTD inputs must have appropriate conversion curves stored in controller software or

firmware. Analog to digital (A/D) conversion shall be a minimum of 10 bit resolution.

2) Digital Inputs: Digital inputs shall sense open/close, on/off, or other two state indications.

g. Outputs: Provide output function integral to the direct digital controller. Provide output type as required by the DDC design. Ensure that outputs of controllers are compatible with controlled devices.

1) Analog Outputs: Provide controllers with a minimum output resolution of 8 bits. Output shall be 4 to 20 ma or 3 to 15 psi or 0-10 VDC. Each pneumatic output shall have feedback for monitoring of the actual pneumatic signal. Feedback shall be integral to the output function.

2) Digital Outputs: Provide contact closure with contacts rated at a minimum of 1 ampere at 24 volts.

h. PID Control: Provide controllers with proportional, proportional plus integral, and proportional plus integral plus derivative control capability. Terminal controllers are not required to have the derivative component.

i. Digital Controller Networking Capabilities: The upper level digital controllers shall be capable of being networked with other similar upper level controllers. Upper level controllers shall also be capable of communicating over a network between buildings.

j. Communications Ports

1) Controller-to-Controller LAN Communications Ports: Controllers in the building DDC system shall be connected in a communications network. Controllers shall have controller to controller communication ports to both peer controllers (lower level controller). Network may consist of more than one level of local area network and one level may have multiple drops. Communications network shall permit sharing between controllers of sensor and control information, thereby allowing execution of dynamic control strategies and coordinated response to alarm conditions.

2) On-Site Interface Ports: Provide a RS-232, RS-485, or RJ-11, or RJ-45 communications port for each digital controller that allows direct connection of a computer or hand held terminal and through which the controller may be fully interrogated. Controller access shall not be limited to access through another controller. On-site interface communication ports shall be in addition to the communications port(s) supporting controller to controller communications. Communication rate shall be 56K Baud minimum. Every controller on the highest level LAN shall have a communications port supporting direct connection of a computer; a hand held terminal port is not sufficient. By connecting a computer to this port, every controller in the direct digital control system shall be able to be fully interrogated and programmed. The following operations shall be available: downloading and uploading control programs, modifying programs and program data base, and retrieving or accepting trend reports, status reports, messages, and alarms.

3) Remote Work Station Interface Port: Provide one additional direct connect computer port in each DDC system for permanent

connection of a remote operator's workstation, unless the workstation is a node on the LAN. All operations possible by directly connecting a computer to a controller at the highest level LAN shall be available through this port.

4) Telecommunications Interface Port: Provide one additional telecommunications port in each DDC system permitting remote communications via telephone. All operations possible by directly connecting a computer to a controller at the highest level LAN shall be available through the telecommunications port. A telecommunications port provided on a digital controller shall be in addition to the port required for directly connecting a computer to the controller. Telecommunication baud rate shall be 96K minimum.

k. Modem: Provide one modem per DDC system to communicate between the digital control system and the workstation.

l. Digital Controller Cabinet: Each digital controller cabinet shall protect the controller from dust and. be rated NEMA 1, unless specified otherwise. Controller cabinets, or enclosures the controller's is mounted in shall be provided with a lock.

m. Main Power Switch: Each controller on the highest level LAN shall have a main power switch for isolation of the controller from AC power. The switch shall be protected from tampering within the DDC cabinet.

2. Terminal Control Unit Controllers

a. TCU controllers shall be manufactured by the same company as the digital controllers.

b. TCU controllers shall automatically start-up on return of power after a failure, and previous operating parameters shall exist or shall be automatically downloaded from a digital controller on a higher level LAN.

c. TCU controllers do not require an internal clock, if they get time information from the digital controller.

3. DDC Software: Software resides in the digital controllers and performs control sequences.

a. Sequence of Control: Provide, in the digital controllers, software to execute the sequence control. Provide sequences of control written in both text and graphic format.

b. Database Modification: Provide software to modify the control program database. Database modification shall be accomplished through connected computer or hand held terminal or through a keypad integral to the controller. Database modification shall be accomplished without having to make changes directly in line-by-line programming. As a result of this requirement, when the control program is of the line-by-line type, database parameters in the following list that take real number values shall require assignment of variable names so parameters can be changed without modifying the line-by-line programming. Alternatively, block programming languages shall provide for modification of these database parameters in fill-in-the-blank screens. The following shall be modifiable in this way:

1) Setpoints

2) Deadband limits and spans

3) Reset schedules
4) Switchover points
5) PID gains and time between control output changes
6) Time
7) Timed local override time
8) Occupancy schedules
9) Holidays
10) Alarm points, alarm limits, and alarm messages
11) Point definition database
12) Point enable, disable, and override
13) Trend points, trend intervals, trend reports
14) Analog input default values
15) Passwords
16) Communications parameters including network and telephone communications setups

c. Differential: Where equipment is started and stopped or opened and closed in response to some analog input such as temperature, pressure, or humidity, include a differential for the control loop to prevent short cycling of equipment.

d. Motor and Flow Status Delay: Provide an adjustable delay between when a motor is commanded on or off and when the control program looks to the motor or flow status input for confirmation of successful execution of the command.

e. Runtime Accumulation: Provide resettable run time accumulation for each controlled electrical motor.

f. Timed Local Override: Provide user definable adjustable run time for each push of a momentary contact timed local override. Pushes shall be cumulative with each push designating the same length of time. Provide a user definable limit on the number of contact closures summed, such as 6, before the contact closures are ignored. Timed local overrides are to be disabled during occupancy periods.

g. Time Programs: Provide programs to automatically adjust for leap years, and make daylight savings time and standard time adjustments.

h. Scheduling
1) Each control output point shall be adjustable for selection of operation based on time of day, day of week, and day of year. Output points may be associated into groups. Each group may be associated with a different schedule. Changing the schedule of a group shall change the schedule of each point in the group. Points may be added to and deleted from groups. Groups may be created and deleted by the operator.
2) Provide capability that will allow current schedules to be viewed and modified in a seven day week format. When control program does not automatically compute holidays, provide capability to allow holiday schedules to be entered one full year at a time.

i. Point Override: I/O and virtual points shall be able to be software overridden in the software and commanded to any possible value from the main building digital controller.

j. Alarming: I/O points and virtual points shall be alarmable. Alarms may be enabled and disabled for every point. Alarm limits shall be adjustable on

analog points. Controllers connected to an external communications device such as a printer, terminal, or computer, shall download alarm and alarm message when alarm occurs. Otherwise alarms will be stored and automatically downloaded when a communications link occurs. The following conditions shall generate alarms:

1) Motor is commanded on or off but the motor status input indicates no change
2) Room temperature, humidity, or pressure strays outside selectable limits
3) An analog input takes a value indicating sensor failure
4) A module is "dead" to the LAN
5) A power outage occurs

k. Messages: Messages shall be operator defined and assigned to alarm points.
Messages shall be displayed when a point goes into alarm.

l. Trending: DDC system shall have the capability to trend I/O and virtual points. Points may by associated into groups. A trend report may be set up for each group. The period between logging consecutive trend values shall range from one minute to 60 minutes at a minimum. Trend data type shall be selectable as either averages over the logging period or instantaneous values at the time of logging. The minimum number of consecutive trend values stored at one time shall be 30 per variable. When trend memory is full, the most recent data shall overwrite the oldest data. Trend data shall be capable of being uploaded to computer. Trend data shall be available on a real time basis; trend data shall appear either numerically or graphically on a connected computer's screen as the data being processed from the DDC system data environment. Trend reports shall be capable of being uploaded to computer disc and archived.

m. Status Display: Current status of I/O and virtual points shall be displayed on command. Points shall be associated into functional groups, such as all the I/O and virtual points associated with control of a single air handling unit, and displayed as a group, so the status of a single mechanical system can be readily checked. A group shall be selectable from a menu of groups having meaningful names; such as AHU-4, Second Floor, and other such names.

n. Diagnostics: Each controller shall perform self-diagnostic routines and provide messages to an operator when errors are detected. DDC system shall be capable of recognizing a nonresponsive module on a LAN. The remaining, responsive modules on a LAN shall not operate ate in a degraded mode.

o. Power Loss: In event of a power outage, each controller shall assume a disabled status and outputs shall go to an user definable state. Upon restoration of power, DDC system shall perform an orderly restart, with sequencing of outputs.

p. Program Transfer: Provide software for download of control programs and database from a computer to controllers and upload of same to computer from controllers. Every digital controller in the DDC system shall be capable of being downloaded and uploaded to through a single controller on the highest level LAN.

q. Password Protection: Provide at least three levels of password protection to the DDC system permitting different levels of access to the system.

r. Energy Data Recording: Provide a resettable signal accumulation for each meter at the main building digital controller.

1) Record electrical energy in KWH and electrical demand in KW.

2.03 SENSORS AND INPUT HARDWARE

A. Field Installed Temperature Sensors

1. Thermistors: Precision thermistors may be used in temperature sensing applications below 200 degrees F. Sensor accuracy over the application range shall be 0.36 degree F or less between the range of 32 to 150 degrees F. Sensor manufacturer shall utilize 100 percent screening to verify accuracy. Thermistors shall be pre-aged, and inherently stable. Stability error of the thermistor over five years shall not exceed 0.25 degree F cumulative. Sensor element and leads shall be encapsulated. Bead thermistors are not allowed. AID conversion resolution error shall be kept to 0.1 degree F. Total error for a thermistor circuit shall not exceed 0.5 degree F, which includes sensor error and digital controller AID conversion resolution error. Provide thermistor and digital controller manufacturer Documentation and the Contractor's engineering calculations which support the proposed thermistor input circuit will have a total error of 0.5 degree F or less. Provide 18 gage twisted and shielded cable for thermistors.

2. Resistance Temperature Detectors (RTDs): Provide RTD sensors with 1000 ohm, or higher, platinum element that are compatible with digital controllers. Sensors shall be encapsulated in epoxy, series 300 stainless steel, anodized aluminum, or copper. Temperature sensor accuracy shall be 0.1 percent (1 ohm) of expected ohms (1000 ohms) at 32 degrees F. Temperature sensor stability error over five years shall not exceed 0.25 degree F cumulative. Direct connection of RTDs to digital controllers, without transmitters, is preferred provided controller supports direct connection of RTDs. When RTDs are connected directly to the controller, keep lead resistance error to 0.25 degree F or less. Provide 3 wire sensing circuits to not exceed the 0.25 degree F lead resistance error. Total error for a RTD circuit shall not exceed 0.5 degree F, which includes sensor error, lead resistance error or 4 to 20 milliampere transmitter error, and AID conversion resolution error. Provide manufacturer Documentation and the Contractor's engineering calculations which support the proposed RTD circuit will have a total error of 0.5 degree F or less for the specified application.

a. Wiring: Provide 18-gage twisted and shielded pair cable for direct connected RTDs. Provide 18-gage twisted and shielded pair cable for RTDs using 4 to 20 milliampere transmitters.

b. Transmitters: Provide 4 to 20 milliampere transmitters for RTDs where Digital controllers do not support direct connection of RTDs to controllers; Digital controllers do not meet temperature resolution requirement of 0.5 degree F

3. Temperature Sensor Details
   a. Room: Conceal element behind protective cover matched to the room interior. Room temperature sensor shall have integral pushbutton, digital input to the controller for system override, and a setpoint adjustment, analog input to the controller. Digital sensors that communicate directly with the terminal control unit are acceptable. Provide a connection to allow interrogation of the digital controller.
   b. Duct Averaging Type: Continuous averaging RTDs for ductwork applications shall be 1 foot in length for each 4 square feet of ductwork cross-sectional area with a minimum length of 6 feet. Probe type duct sensors of one foot length minimum are acceptable in ducts 12 feet square and less.
   c. Immersion Type: ~. 3 inches and 6 inches where needed total immersion for use with sensor wells, unless otherwise indicated.
   d. Sensor Wells: Brass materials; provide thermal transmission material compatible with the immersion sensor. Provide heat-sensitive transfer agent between exterior sensor surface and interior well surface.
   e. Outside Air Type: Provide element on the buildings north side with sunshade to minimize solar effects. Mount element at least 3 inches from building outside wall. Sunshade shall not inhibit the flow of ambient air across the sensing element. Shade shall protect sensing element from rain.

B. Transmitters: Transmitters shall have 4 to 20 ma, or 0-10 VDC output linearly scaled to the temperature, pressure, humidity, or flow range being sensed. Transmitter shall be matched to the sensor, factory calibrated, and sealed. Total error shall not exceed 0.1 percent of 20 milliampere (0.02 milliampere) at any point across the 4 to 20 ma span. Supply voltage shall be 24 volts ac or dc. Transmitters shall have non-interactive offset and span adjustments. For temperature sensing, transmitter stability shall not exceed 0.05 degree F a year.
   1. Spans and Ranges: Transmitter spans or ranges shall be the following and shall be suitable for the application:
      a. Temperature:
         1) 50 degree F span: Room, chilled water, cooling coil, discharge air, return air sensors
         2) 100 degree F span: Outside air, hot water, heating coil discharge air, mixed air sensors
         3) 200 degree F span: High temperature hot water, heating hot water, chilled/hot water system sensors
      b. Pressure
         1) 0 to 100 psi differential: Water differential range
         2) 0 to 5 inches water range: Duct static pressure

C. Relative Humidity Transmitters: Provide integral humidity transducer and transmitter. Output of relative humidity instrument shall be a 4 to 20 milliampere or 0 to 10 VDC signal proportional to 0 to 100 percent relative humidity input. Accuracy shall be 2 percent of full scale within the range of 20 to 80 percent relative humidity. Sensing element shall be chilled mirror type, polymer, or thin film polymer type. Supply voltage shall be 24 VDC. Transmitter shall meet specified requirements.

D. Pressure Transmitters: Provide integral pressure transducer and transmitter. Output of pressure instrument shall be a 4 to 20 milliampere or 0 to 10 VDC signal proportional to the pressure span. Span shall be as specified. Accuracy shall be 1.0 percent. Linearity shall be 0.1 percent. Supply voltage shall be 24 VDC. Transmitter shall meet specified requirements.

E. Current Transducers: Provide current transducers to monitor amperage of motors. Select current transducer range for normal amperage to be above 50 percent of the range. Current transducers shall have an accuracy of 1 percent and a 4 to 20 milliampere output signal.

F. Input Switches

1. Differential Static Pressure Switch: Provide diaphragm type differential static pressure switches for binary (two position) operation as specified in sequence of operation. Devices shall withstand pressure surges up to 150 percent of rated pressure. Contacts shall be single pole double throw and switch may be wired for normally open or normally closed operation. Trip set point shall be adjustable. Pressure switch shall be sized so that operating pressure trip point is approximately midpoint of pressure switch adjustable range. Repetitive accuracy shall be 2 percent.
2. Induced Current Operated Solid State Switches: Provide adjustable ranging to monitor continuous loads up to 200 amperes. Switch shall indicate whether it is normally open or normally closed. Limit off-state leakage to 2 milliampere or less.
3. Timed Local Override: Provide momentary contact push button override with override time set in controller software. Provide to override DDC time of day program and activate occupancy program for assigned units. Upon expiration of override time, the control system shall return to time-of-day program. Time interval for the length of operation shall be software adjustable and shall expire unless reset.

G. C02 sensors: Provide C02 sensors with integral transducers. Output signal shall be 4 to 20 mA or 0-10 VDC. Accuracy shall be +/- 5 percent.

H. Energy Metering

1. Electric Meters: Provide kilowatt-hour (kWh) meter for building as indicated. Integrate electric meter signal into DDC system.

2. Meter: ANSI C12.10. Provide watt-hour meter and socket corresponding to the ratios of the current transformers and transformer secondary voltage. Meter shall be selected for -volt, three-phase, three four-wire wye delta system, three-element type with three current transformers. Meters shall be complete with a box mounted socket having automatic circuit closing bypass. Provide watt-hour meter with not less than four pointer-type kWh registers, provisions for pulse initiation, and a universal Class 2 indicating maximum kW demand register, sweep pointer indicating type, with a 15 30 60 -minute interval. Meter accuracy shall be within plus or minus one percent. The correct multiplier shall be provided on face of meter.

3. Current Transformer: ANSI C57.13. Provide three current transformers with 600-volt insulation, rated for metering with voltage, BIL, momentary, and burden ratings coordinated with the ratings of the associated meters. Provide a butyl molded donut or window type transformers mounted on a bracket to allow secondary cables to connect to the transformer bushings. Identify the wiring of the current transformer secondary feeders to permit field current measurements to be taken with hook-on ammeters.

2.04 OUTPUT HARDWARE

A. Damper: Damper shall conform to SMACNA DCS.

1. A single damper section shall have blades no longer than 48 inches and shall be no higher than 72 inches. Maximum damper blade width shall be 8 inches. Larger sized damper shall be made from a combination of sections.

2. Dampers shall be steel, or other materials where shown. Flat blades shall be made rigid by folding the edges. Blades shall be provided with compressible seals at points of contact. The channel frames of the dampers shall be provided with jamb seals to minimize air leakage. Dampers shall not leak in excess of 20 cfm per square foot at 4 inches water gage static pressure when closed. Seals shall be suitable for an operating temperature range of minus 40 degrees F to 200 degrees F. Dampers shall be rated at not less than 2000 fpm air velocity. All blade-connecting devices within the same damper section will not be located directly in the air stream. Damper axles shall be 0.5 inch (minimum) plated steel rods supported in the damper frame by stainless steel or bronze bearings. Blades mounted vertically shall be supported by thrust bearings. Pressure drop through dampers shall not exceed 0.04 inch water gage at 1000 fpm in the wide open position. Frames shall not be less than 2 inches in width. Dampers shall be tested in accordance with AMCA 500.

3. Operating links external to dampers (such as crank arms, connecting rods, and line shafting for transmitting motion from damper actuators to dampers) shall withstand a load equal to twice the maximum required damper-operating force. Rod lengths shall be stainless steel. Working parts of joints and clevises shall be brass, bronze, or stainless steel. Adjustments of crank arms shall control the open and closed position of dampers.

B. Valves

1. Valve Assembly: Valves shall have stainless steel stems. Valve bodies shall be designed for not less than 125 psig working pressure or 150 percent of the system operating pressure, whichever is greater. Valve leakage rating shall be 0.01 percent of rated Cv. Class 125 copper alloy valve bodies and Class 150 steel or stainless steel valves shall conform to ASME/ANSI B16.5 as a minimum. Cast iron valve components shall conform to ASTM A 126 Class B or C as a minimum.

C. Actuator: Provide electric type with spring return so that, in the event of power failure, actuators shall fail safe in either the normally open or normally closed position as specified. Actuators shall be quiet operating and function properly within the range of 85 to 110 percent of the motive power. Provide a minimum of one actuator for each damper.

1. Electric Actuators: Provide direct drive electric actuators for all damper control applications. When operated at rated voltage, each operator shall be capable of delivering the torque required for continuous uniform movement of the valve or damper and shall have end switch to limit travel or shall withstand continuous stalling without damage. Operators shall function properly with range of 85 to 110 percent of line voltage. Provide gears of steel or copper alloy. Fiber or reinforced nylon gears may be used for torques less than 16 inch pounds. Provide hardened steel running shafts in sleeve bearing of copper alloy, hardened steel, nylon, or ball bearing. Provide two-position operators of the single direction, spring return, or reversing type. Provide proportioning operators capable of stopping at all points in the cycle and starting in either direction, from any point. Provide reversing and proportioning operators with limit switches to limit travel in either direction unless operator is stall type. Equip valve operators with a force limiting device such as spring yield so that, when in a relaxed position, device shall maintain a pressure on valve disc equivalent to system pressure at valve. Provide reversible shaded pole, split capacitor, synchronous, or stepped type electric motors.

D. Output Switches

1. Control Relays: Shall be double pole, double throw (DPDT), UL listed, with contacts rated to the application, and enclosed in a dustproof enclosure. Equip with a light indicator which is lit when coil is energized and is off when coil is not energized. Relays shall be socket type, plug into a fixed base, and be replaceable without need of tools or removing wiring.

2.05 ELECTRICAL POWER AND DISTRIBUTION

A. For control power, provide a new, 120 volts or less, 60 Hz, two-pole, three wire (black, white and green) circuit. Run green ground wire to panel ground. Conduit grounding will not be accepted.

B. Transformers: Transformers shall conform to UL 506. Power digital controllers and digital controllers serving terminal control units shall be fed from dedicated circuit breakers with surge protection specified. Transformers for digital controllers serving terminal equipment on lower level LANs may be grouped to have specified surge protection sized for the number of controllers on a single transformer. Provide a fuse cutout on the secondary side of the transformer.

C. Surge Protection: Surge and transient protection consist of devices installed externally to digital controllers.

1. Power Line Surge Protection: Surge suppressors external to digital controller, shall be installed on all incoming AC power. Surge suppressor shall be rated by UL 1449, and have clamping voltage ratings below the following levels:

a. Unit is a transient voltage surge suppressor (TVSS) 120VAC/single phase/2wire plus ground. Hard wire individual equipment protector.
b. Unit must react with 5 nanoseconds and automatically reset.
c. Voltage protection threshold, line to neutral, starts at no more than 21 volts peak on the 120 VAC line.
d. TVSS must have an independent secondary stage equal to or greater than the primary stage joule rating.
e. The primary suppression system components must be pure Silicon Avalanche Diodes.
f. Silicon Avalanche Diodes (SAC) or Metal Oxide Varistors (MOV) are acceptable in the independent secondary suppression system.
g. The Transient Suppression System shall incorporate an indicating light which denotes whether the primary and/or secondary transient protection components is/are functioning.
h. All system functions of the Transient Suppression System must be individually fused and not short circuit the AC power supply at any time.
i. The Transient Suppression System shall incorporate an EMI/RFI noise filter with a minimum attenuation of 13 db at 10kHz to 300 MHz.
j. The system must comply with IEEE C52.41, Class “B" requirement and be tested according to IEEE C62.45.
k. The system shall operate at -20 degrees C to +50 degrees C.

2. Telephone and Communication Line Surge Protection: Provide transient surge protection to protect the DDC controller and LAN related devices from surges that occur on the phone lines (modem and direct connect) and on inter-unit LAN communications. Devices shall be UL listed.
a. The surge protection shall be a rugged package with continuous, non-interrupting protection and not use "crowbar" circuiting. Instant automatic reset after safely eliminating transient surges, induced lightning and other forms of transient over voltages.
b. Unit must react within 5 nanoseconds using only solid-state silicon avalanche technology.
c. Unit shall be installed at the proper distance within system as recommended by the manufacturer.

3. Controller Input/Output Protection: Controller input/output points shall be surge protected with optical isolation, MOV or silicon avalanche devices. Fuses are not permitted for surge protection.

D. Wiring: Provide complete electric wiring for DDC system, including wiring to transformer primaries. Control circuit conductors which run in the same conduit as power wiring over 100 volts. Circuits operating at more than 100 volts shall be in accordance with Division 16 Electrical. Circuits operating at 100 volts or less shall be defined as low voltage and shall be run in rigid or flexible conduit, metallic tubing, metal raceways or wire trays, armored cable, or multi-conductor cable. Provide circuit and wiring protection as required by NFPA 70. HVAC plenums include the space between a drop ceiling and the architectural ceiling, within walls and within ductwork. Protect exposed wiring from abuse and damage.

E.

1. AC Control Wiring: Control wiring for 24 volt circuits shall be insulated copper 18 AWG minimum and shall be rated for 300 VAC service.

2. Wiring for 120 volt shall be 14 AWG minimum and shall be rated for 600 VAC service.

3. Analog Signal Wiring: Analog signal wiring shall be 18 AWG single or multiple twisted pair. Each cable shall be 100 percent shielded and have 20 AWG drain wire. Each wire shall have insulation rated to 300 VAC. Cables shall have an overall aluminum-polyester or tinned-copper (cable-shield tape), overall 20 AWG tinned copper cable drain wire and overall cable insulation rated to 300 VAC. Install analog signal wiring in conduit separate from AC power circuits.

2.06 FIRE PROTECTION DEVICES

A. Smoke Detectors: Provide smoke detectors in return and main supply air ducts on downstream side of filters in accordance with NFPA 90A, except as otherwise indicated. Provide UL listed or FM approved detectors for duct installation. Smoke detectors shall be compatible with the fire alarm system requirements.

B. Smoke Dampers and Combination Smoke/Fire Dampers: Smoke damper and actuator assembly as required in accordance with NFPA 90A shall meet the Class " leakage requirements of UL 555S. Dampers shall be factory fabricated, galvanized steel or stainless steel with lubricated bearing, linkage, and seals to withstand temperatures from minus 20 to plus 250 degree F. Provide seals that can easily be replaced. Combination smoke/fire dampers shall have UL 1.5 hour rating and shall be equipped with electric/thermal link which closes damper at 165 degrees F and then automatically resets after normal temperature is restored by cycling damper operator. Equip dampers with pneumatic or electric operators which close smoke dampers tightly when activated.

2.07 INDICATORS

A. Thermometers: Provide thermometers in locations as indicated. Thermometers shall have either 9 inch scales, or 3.5 inch dials and shall have insertion, immersion or averaging elements as indicated. Provide thermowells for liquid sensing applications. Select thermometer ranges so normal temperatures are approximately equal to midpoint readings on the scale, unless otherwise stated.

B. Pressure Gages: Provide pressure gages as indicated. Select gage range so normal pressures are approximately equal to the midpoint readings on the scale, unless otherwise specified. Accuracy shall be plus or minus 2 percent of the range. Gages shall conform to ANSI/ASME B40.1 00. Select Bourdon tube material in accordance with the recommendation by the manufacturer for the service flu id being measured. Provide shutoff cock for each gauge connection.

1. Gages indicating pneumatic outputs shall have 2 inch diameter faces. Scale shall be 0 to 30 psi, with 1 psi graduations.

2. Gages for low differential pressure measurements shall be 4-1/2 inches (nominal diameter) size with two sets of pressure taps, and shall have a

diaphragm actuated pointer, white dial with black figures, and pointer zero adjustment. Gage shall have ranges and graduations as shown. Accuracy shall be plus or minus 2 percent of scale range.

3. Gages for static pressure shall be 4-1/2 inches (nominal diameter) size with bottom threaded connection.

3 - EXECUTION

3.01 INSTALLATION

A. Perform installation under supervision of competent technicians regularly employed in the installation of DDC systems. Provide components for a complete and operational system.

B. Wiring Criteria

1. Input/Output identification: Permanently label each field wire, cable, or pneumatic tube at each end with unique identification.

2. Rigid or flexible conduit shall be terminated at all sensors and output devices.

3. Surge Protection: Install surge protection in accordance with the manufacturer's recommendations.

4. Grounding: Ground controllers and cabinets to a good earth ground. Ground controller to a ground in accordance with Division 16. Grounding of the green ac ground wire, at the breaker panel, alone is not adequate. Run metal conduit from controller panels to adequate building grounds. Ground sensor drain wire shields at controller end.

5. Contractor is responsible for correcting all associated ground loop problems.

C. Digital Controllers

1. Do not divide control of a single mechanical system such as an air handling unit, boiler, chiller, or terminal equipment between two or more controllers. A single controller shall manage control functions for a single mechanical system. It is permissible, however, to manage more than one mechanical system with a single controller.

2. Provide digital control cabinets that protect digital controller electronics from dust, at locations shown on the drawings.

3. Provide a main power switch at each highest level LAN digital controller within controller cabinet.

4. No multiplexing of points is allowed.

D. Temperature Sensors: Provide temperature sensors in locations to sense the appropriate condition. Provide sensor where they are easy to access and service without special tools. Calibrate sensors to accuracy specified. In no case will sensors designed for one application be installed for another application.

1. Duct Temperature Sensors
   a. Provide sensors in ductwork in general locations as indicated. Select specific sensor location within duct to accurately sense appropriate air temperatures. Do not locate sensors in dead air spaces or positions obstructed by ducts or equipment. Install gaskets between the sensor housing and duct wall. Seal duct and insulation penetrations.
   b. String duct averaging sensors between two rigid supports in a serpentine position to sense average conditions. Thermally isolate temperature sensing elements from supports. Provide duct access doors to averaging sensors.

2. Immersion Temperature Sensors: Provide thermowells for sensors measuring temperature in liquid applications or pressure vessels. Locate wells to sense continuous flow conditions. Do not install wells using extension couplings. Where piping diameters are smaller than the length of the wells, provide wells in piping at elbows to effect proper flow across entire area of well. Wells shall not restrict flow area to less than 70 percent of pipe area. Increase piping size as required to avoid restriction. Provide thermowells with thermal transmission material within the well to speed the response of temperature measurement. Provide wells with sealing nuts to contain the thermal transmission material.

3. Outside Air Temperature Sensors: Provide outside air temperature sensors on north side of the building, away from exhaust hoods, air intakes and other areas that may affect temperature readings. Provide sunshields to protect outside air sensor from direct sunlight.

E. Damper Actuators: Actuators shall not be mounted in the air stream.

F. Thermometers: Provide thermometers at locations indicated. Mount thermometers to allow readability when standing on the floor.

G. Pressure Sensors

1. Differential Pressure
   a. General - Install pressure sensing tips in locations to sense appropriate pressure conditions.
   b. Duct Static Pressure Sensing - Locate duct static pressure tip approximately two thirds of distance from supply fan to end of duct with the greatest pressure drop.

H. Control Drawings: Post laminated copies of as-built control system drawings in each mechanical room. Provide six (6) sets of as-built drawings to the activity.

3.02 ADJUSTMENTS

A. Calibrate instrumentation and controls and verify the specified accuracy using test equipment with test equipment accuracy. Adjust controls and equipment to maintain conditions indicated, to perform functions indicated, and to operate in the sequence specified.

3.03 FIELD QUALITY CONTROL

A. General

1. Demonstrate compliance of the heating, ventilation, and air conditioning control system with the contract Documents. Furnish personnel, equipment, instrumentation, and supplies necessary to perform calibration and site testing. Ensure that tests are performed by competent employees of the DDC system installer or the DDC system manufacturer regularly employed in the testing and calibration of DDC systems.

2. Testing will include the field tests and the performance verification tests. Field tests shall demonstrate proper calibration of input and output devices, and the operation of specific equipment. Performance verification test shall ensure proper execution of the sequence of operation and proper tuning of control loops.

3. Obtain approval of the plan for each phase of testing before beginning that phase of testing. Give to the University written notification of planned testing at least 45 days prior to test. Notification shall be accompanied by the proposed test procedures. In no case will the Contractor be allowed to start testing without written University approval of test procedures. The test procedures shall consist of detailed instructions for complete testing to prove performance of the heating, ventilating and air conditioning system and digital control system.

4. Before scheduling the performance verification. Test, furnish the field test Documentation and written certification to the University that the installed system has been calibrated, tested, and is ready for the performance verification test. Do not start the performance verification test prior to receiving written permission from the State.

3.04 TRAINING

A. The controls contractor shall provide the following training services:

1. One (1) day of on-site orientation by a field engineer 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 control system software layout and device locations.

2. General: Provide training course schedule, syllabus, and training materials 45 days prior to the start of training. Conduct training courses for designated personnel in the maintenance and operation of the HVAC and DDC system.

Orient training to the specific system being installed under this contract. Use operation and maintenance manual as the primary instructional aid. Operational and maintenance manuals shall be provided for each trainee with four additional sets, two sets delivered for archiving at the project site, one set for the mechanical contractor, and one set for the University. Training manuals shall include an agenda, defined objectives and a detailed description of the subject matter for each lesson. Furnish audio-visual equipment and all other training materials and supplies. A training day is defined as 8 hours of classroom or lab instruction, including two 15 minute breaks and excluding lunch time, Monday thru Friday, during the daytime shift in effect at the training facility. For guidance, assume the attendees will have a high school education and are familiar with HVAC systems. The minimum amount of training for this project shall be 24 hours.

3. Operator Training: Operator training shall include the detailed review of the control installation drawings, points list, and equipment list. The instructor shall then walk through the building identifying the location of the control devices installed. For each type of systems, the instructor shall demonstrate how the system accomplishes the sequence of operation.

4. From the workstation, the operator shall demonstrate the software features of the system. As a minimum, the operator demonstrate and explain logging on, setting passwords, setting up a schedule, trend, point history, alarm, and archiving the database.

5. Maintenance Training: The system maintenance course shall be taught at the project site within one month after the completion of the operators training. The course shall last for one 8 hour training day. The course shall include answering questions from the last training session, trouble shooting and diagnostics, repair, instructions, preventive maintenance procedures and schedules, and calibration procedures.

3.05 SEQUENCE OF OPERATION

A. Sequence of operations shall be as indicated.

3.06 SYSTEMS INTEGRATION DDC SPECIFIC REQUIREMENTS

A. DDC Remote Access: The Direct Digital Control (DDC) system provided shall include the capability for multiple users to access the -DDC simultaneously from remote locations. Interface shall be to the entire DDC and provide the capability to monitor all I/O and adjust parameters.

B. Open Systems Integrator

1. Chiller Integrator Interface:
   a. The BAS system shall include appropriate hardware equipment and software to allow two way data communications between the BAS system and the chiller manufacturer's chiller control panel.

b. It shall be the responsibility of the BAS Contractor to coordinate with the chiller manufacturer to provide a functional data communications connection.
c. All data supported by the air-cooled condensing unit communication protocol shall be mapped into the supervisory DDC controller's database and shall be displayed on an air-cooled condensing unit data screen at the Operator Workstation and shall be transparent to the operator.
d. The BAS Contractor shall furnish either the OSP or BACnet communications interface as required by the air-cooled condensing unit manufacturer.
e. The BAS Contractor shall provide all communications and power wiring and gateway panel installation for the DDC system. The air-cooled condensing unit manufacturer shall provide all hardware for connection of the manufacturer's processor.

f. The BAS Contractor shall provide all hardware and software required for the air-cooled condensing unit manufacturer's gateway interface.

2. VFD Integrator Interface
a. The BAS system shall include appropriate hardware equipment and software to allow two way data communications between the BAS system and the VFD manufacturer's control panel.
b. It shall be the responsibility of the BAS Contractor to coordinate with the VFD manufacturer to provide a functional data communications connection.
c. All data supported by the VFD communication protocol shall be mapped into the supervisory DDC controller's database and shall be displayed on data screens at the Operator Workstation and shall be transparent to the Operator Workstation and shall be transparent to the operator.
d. The BAS Contractor shall furnish either the OSP or BACnet communications interface as required by the VFD manufacturer.
e. The BAS Contractor shall provide all communications and power wiring and gateway panel installation for the DDC system. The VFD manufacturer shall provide all hardware for connection of the manufacturer's processor.
f. The BAS Contractor shall provide all hardware and software required for the VFD manufacturer's gateway interface.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 16000

ELECTRICAL WORK PROVISIONS

1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor under this Division shall provide all labor, materials, equipment, supervision and services required for the construction of the electrical systems. The finished installations shall be complete, operable, and shall include all work specified herein and shown on the Drawings.

B. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the systems and equipment. All systems shall be properly adjusted and in working order at time of final acceptance.

C. All concrete, steel reinforcement, miscellaneous metal-work, earthwork, painting, and grouting shall conform to the applicable requirements of the detailed equipment specifications as prescribed in appropriate sections.

D. It is the intent of these Specifications and other Contract Documents to require an installation complete in every detail. The Contractor shall be responsible for minor details or for any special construction which may be found necessary to properly furnish, install, adjust, test, and place in successful and continuous operation, the entire electrical system and the cost of same shall be included in the contract price.

1.02 APPLICABLE PUBLICATIONS

The publications cited within this specification form a part of this specification to the extent referenced. Unless otherwise indicated, the most recent edition of the publication with current revisions and amendments will be enforced.

1.03 DEFINITIONS

A. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.

B. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer

to this section for detailed description of submittal types.

C. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.04 SUBMITTALS

A. Each submittal package shall include a cover sheet with a complete itemized listing of the package contents. Submittals of shop drawings and catalog cuts shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable federal, military, industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without review.

All shop drawings and other required submittals shall be submitted in electronic PDF format.

Brand names, manufacturer's names and catalog numbers indicate a standard of design and quality desired. Equivalent materials may be used if pre-qualified by way of substitution request approval. Substitution requests shall be made and approval received prior to bid opening.

B. Provide submittals for the following equipment:

1. Overcurrent Protective Devices

2. Motors

3. Safety Switches

4. Manual Motor Starter

C. Provide one set of as-built drawings on reproducible media at the conclusion of the project.

1.05 QUALITY ASSURANCE

A. Material and Equipment Qualifications: Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-

year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

B. Regulatory Requirements: Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70.

C. Modification of References: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the County Building Department.

1.06 IDENTIFICATION OF APPARATUS AND MISCELLANEOUS EQUIPMENT

A. All equipment including panelboards, disconnect switches, and all apparatus used for the operation or control of power circuits, lighting appliances or other equipment shall be properly and permanently identified by means of descriptive engraved identification plates.

1. Plates shall be made of 3/32 inch thick laminated black Micarta with white core, engraved to core to produce white lettering on black background. Lettering to be 1/4 inch minimum size.

2. Disconnect switches, starters, and contactors shall identify the equipment being controlled.

1.07 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to ANSI C2, NFPA 70, and requirements specified herein.

A. Motors and Equipment: Provide electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, and other devices functioning to control mechanical equipment, including control wiring and conduit for circuits rated 100 volts or less, to conform with the requirements of the section covering the mechanical equipment. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be provided under Division 16.

B. Wiring and Conduit: Provide internal wiring for components of packaged equipment as an integral part of the equipment. Provide power wiring and conduit for field-installed equipment under this Section. Power wiring and conduit shall conform to this Section. Control wiring and conduit shall be provided under, and conform to the requirements of the section specifying the associated equipment.

1.08 PERMITS AND INSPECTION

A. Obtain and pay for all permits required by local ordinances.

B. After completion of the work, the State shall be furnished a certificate of final inspection and approval from the electrical inspection department of local authority having jurisdiction.

1.09 WARRANTY

Installation shall be complete in every detail as specified and ready for use. Items supplied by Contractor developing defects of design, construction, or quality within one (1) year of final acceptance by the State shall be replaced by such new materials, apparatus or parts to make such defective portion of the complete system conform to the true intent and meaning of the Drawings and Specifications at no additional cost to the Owner.

The warranty shall be countersigned by the General Contractor.

2 - PRODUCTS

2.01 GENERAL

A. Asbestos Prohibition: No asbestos containing materials shall be used under this section. The Contractor shall insure that all materials incorporated in the project are asbestos-free unless specifically approved in writing by the State.

B. Materials, equipment, and devices shall, as a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70.

C. Brand names, manufacturer's names and catalog numbers indicate standard of design and quality required. Acceptable manufacturers for electrical apparatus include General Electric, Siemens, Square D, and Cutler-Hammer. All apparatus supplied shall bear the name of the approved manufacturer on its nameplates. Substitute materials may be used if pre-qualified by the State prior to bidding.

D. Electrical equipment and luminaires shall be supplied through the manufacturer's designated representative by a local distributor.

E. Proof of compliance shall be furnished when shop drawings are submitted.

F. Where two or more similar type items are furnished, all shall be of the same manufacture, e.g., safety switches shall be of the same manufacturer unless otherwise noted.

2.02 CONDUIT AND FITTINGS

Shall be rigid steel (zinc-coated) conduit, intermediate metal conduit (IMC), electrical metallic tubing (EMT), plastic coated rigid steel and IMC conduit, flexible metal conduit, and liquid-tight flexible conduit, conforming to the following:

A. Rigid Steel Conduit (Zinc-Coated): ANSI C80.1, UL 6.

B. Intermediate Metal Conduit (IMC): UL 1242, zinc-coated steel only.

C. Electrical Metallic Tubing (EMT): UL 797, ANSI C80.3.

D. Plastic-Coated Rigid Steel and IMC Conduit: NEMA RN 1, Type 40 (40 mils thick).

E. Flexible Metal Conduit: UL 1.

F. Liquid-Tight Flexible Metal Conduit, Steel: UL 360.

G. Fittings for Metal Conduit, EMT, and Flexible Metal Conduit: UL 514B. Ferrous fittings shall be cadmium- or zinc-coated in accordance with UL 514B.

1. Fittings for Rigid Metal Conduit and IMC: Threaded-type. Split couplings unacceptable.

2. Fittings for EMT: Steel compression type.

2.03 OUTLET BOXES AND COVERS

UL 514A, zinc-coated, if ferrous metal; UL 514C, if nonmetallic.

2.04 CABINETS, JUNCTION BOXES, AND PULL BOXES

Volume greater than 100 cubic inches, UL 50, galvanized, zinc-coated, if sheet steel. NEMA 4X as called out on drawings and in exterior locations.

2.05 WIRES AND CABLES

Wires and cables shall meet applicable requirements of NFPA 70 and UL for type of

insulation, jacket, and conductor specified or indicated. Wires and cables manufactured more than 12 months prior to date of delivery to site shall not be used.

A. Conductors: Conductors No. 8 AWG and larger diameter shall be stranded. Conductors No. 10 AWG and smaller diameter shall be solid, except that conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated otherwise. Conductor sizes and ampacities shown are based on copper. All conductors shall be copper.

1. Minimum Conductor Sizes: Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; for Class 2 low-energy, remote-control and signal circuits, No. 16 AWG; and for Class 3 low-energy, remote-control, alarm and signal circuits, No. 22 AWG.

B. Color Coding: Provide for service, feeder, branch, control, and signaling circuit conductors. Conductors to be color coded throughout the project with the same color applying to the same phase throughout.

Color codes are as follows for the 208/120 volt, 3 phase, 4 wire system:

A - phase	black
B - phase	red
C - phase	blue

Neutral white; except where neutrals of more than one system are installed in the same raceway or box, other neutrals shall be white with colored (not green) stripe Equipment Ground green Isolated Ground green with yellow stripe

Color codes are as follows for the 480/277 volt, 3 phase, 4 wire system:

A - phase	brown
B - phase	orange
C - phase	yellow

Neutral white; except where neutrals of more than one system are installed in the same raceway or box, other neutrals shall be whit with colored (not green) stripe

Equipment Ground green

Where these colors cannot be provided in the wire and cable insulation or jacket, color coding tape of the designated color shall be continuously applied in sufficient quantity to ensure permanency at all switchboards, panelboard, exposed terminals of other apparatus, conductor loops and splices.

C. Insulation: Unless specified or indicated otherwise or required by NFPA 70 power and lighting wires shall be 600-volt, Type THWN-2, XHHW-2 or RHW-2. Provide only conductors with 90-degree C insulation or better.

D. Bonding Conductors: ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B 8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.06 SPLICES AND TERMINATION COMPONENTS

UL 486A for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires shall be insulated, pressure-type in accordance with UL 486A or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.07 DEVICE PLATES

Provide UL listed, one-piece device plates for outlets to suit the devices installed. For exposed metal outlet boxes and devices on unfinished walls, plates shall be of zinc-coated sheet steel or cast metal having round or beveled edges. Plates on finished walls shall be satin finish stainless steel unless otherwise indicated on drawings. Screws shall be machine-type with countersunk heads in color to match finish of plate. Sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed and UL listed for use in "wet locations" with plug connected in accordance with NEC 410-57(b).

2.08 SWITCHES

A. Disconnect (Safety) Switches: NEMA KS 1. Provide heavy duty-type switches. Fused switches shall utilize Class R fuseholders and fuses, unless indicated otherwise. Switches serving as motor-disconnect means shall be horsepower rated. Provide switches in NEMA 1 enclosures for interior installations and NEMA 4X enclosures for exterior installations per NEMA ICS 6.

2.09 RECEPTACLES

UL 498 and NEMA WD 1, specification grade, heavy-duty, grounding-type. Ratings and configurations shall be as indicated. Bodies shall be of ivory thermosetting plastic supported on a metal mounting strap. Dimensional requirements shall be per NEMA WD 6. Provide screw-type, side-wired wiring terminals. Connect grounding pole to mounting strap.

A. Weatherproof Receptacles: Provide in cast metal box with gasketed, weatherproof cover plate. Receptacle shall be UL listed for use in "wet locations with plug in use."

B. Ground-Fault Circuit Interrupter (GFCI) Receptacles: UL 943, duplex type for mounting in standard outlet box. Device shall be capable of detecting current leak of 6 milliamperes or greater and tripping per requirements of UL 943 for Class A GFCI devices.

C. Special Purpose Receptacles: Provide in ratings indicated.

2.10 CIRCUIT BREAKERS

A. UL 489, bolt-on, thermal magnetic-type having a minimum short-circuit current rating equal to the short-circuit current rating of the panelboard in which the circuit breaker shall be mounted. Breaker terminals shall be UL listed as suitable for type of conductor provided. Series rated circuit breakers and plug-in circuit breakers are unacceptable.

1. Multipole Breakers: Provide common trip-type with single operating handle. Breaker design shall be such that overload in one pole automatically causes all poles to open.

2. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.

B. Enclosed Circuit Breakers: UL 489. Individual molded case circuit breakers with voltage and continuous current ratings, number of poles, overload trip setting, and short circuit current interrupting rating as indicated. Enclosure type as indicated. Provide solid neutral where required.

C. Where oversized conductors (for voltage drop compensation) or multiple conductors cannot be terminated on the standard load terminals of the circuit breaker, provide one of the following:

1. A circuit breaker with optional load terminals capable of accepting the quantity and size of conductors installed. Where optional load terminals are not available, provide a larger frame size breaker with suitable rating plug capable of accepting the quantity and size of conductors installed.

2. Splice oversized or multiple conductors to a single conductor (pigtail) suitable for terminating on the standard circuit breaker load terminals. The ampacity of the pigtail conductor shall not be less than the rating of the circuit breaker. Splices shall be made in a suitable location in accordance with the NEC.

2.11 FUSES

NEMA FU 1. Provide one complete set, and one spare set, of fuses for each fusible

switch. Time-current characteristic curves of fuses serving motors or connected in series with circuit breakers shall be coordinated for proper operation. Fuses shall have voltage rating not less than circuit voltage.

A. Cartridge Fuses, Current Limiting Type (Class R): UL 198E, Class RK-1 or RK-5 time delay-type. Associated fuseholders shall be Class R only.

2.12 MANUAL MOTOR STARTERS (MOTOR RATED SWITCHES)

Single pole designed for surface mounting with overload protection.

2.13 FIRESTOPPING MATERIALS

Provide firestopping around electrical penetrations through fire rated walls and floors. Provide asbestos-free firestopping system capable of maintaining an effective barrier against flame and gases. System shall be UL listed and comply with ASTM E 814. Include UL system number UL listed print from manufacturer for each type of floor, wall and ceiling penetration.

2.14 HARDWARE, SUPPORTS, BACKING, ETC.

A. Provide all hardware, supports, backing and other accessories necessary to install electrical equipment. Wood materials shall be treated against termite, iron or steel materials shall be galvanized for corrosion protection, and non-ferrous materials shall be brass or bronze.

B. Bolts, nuts, washers, and screws used for exterior locations shall be stainless steel.

3 - EXECUTION

3.01 GENERAL

A. Cut, break, drill and patch as required to install electrical system. Repair surfaces damaged or marred by notching, drilling or other processes necessary for installation of electrical work. Patch damaged surfaces to match the existing surface.

B. All wiring and overcurrent devices for equipment furnished by other trades are sized for a contemplated equipment size. If equipment other than contemplated and indicated on the plan is provided, the Contractor shall be responsible for providing the required wiring, switches, and overcurrent devices at no additional cost to the State. Submit the proposed revisions to the electrical design to the State for approval.

C. Coordinate the work with other trades to avoid conflicts with mechanical, structural

and architectural elements of this project.

D. Visit the project site prior to bidding to determine nature and extent of demolition work required. The demolition drawings are intended to show the general limits of the work and may not show all the existing devices, conduit runs, etc. Maintain existing circuiting to lights, outlets and equipment outside of project area and not otherwise shown.

E. Comply with all federal (EPA), State and municipal laws, regulations, ordinances, and recommended procedures for handling, storage, packing, transportation and disposal of all hazardous materials and wastes.

3.02 JOBSITE CONDITIONS

A. These specifications are accompanied by construction drawings including building and site plans of all trades showing locations of all outlets, boxes, switches, service runs, feeder runs, devices, and other electrical equipment. The locations are approximate and before installing, study adjacent architectural, civil, structural, and mechanical details and make installation in most logical manner. Any device may be relocated within 10-0" before installation at direction of the State without additional cost to the Owner.

B. Before installing, verify all dimensions, ratings, overcurrent protection requirements, and sizes of equipment.

C. Verify that electrical system may be installed in strict accordance with the original design, the Drawings and Specifications and the manufacturer's recommendations.

D. In the event of discrepancy, immediately notify the State. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

E. Re-route all existing branch circuits and exposed cabling systems within the ceiling space to facilitate the installation of all new and/or relocated equipment. Field verify existing conditions and identify all loads impacted. Schedule and coordinate all power outages with the Owner.

3.03 INSTALLATION

Electrical installations shall conform to requirements of NFPA 70 and to requirements specified herein.

A. Wiring Methods: Provide insulated conductors installed in rigid steel conduit, IMC, EMT, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Grounding conductor shall be separate from

electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Minimum conduit size shall be 3/4 inch in diameter for low voltage lighting and power circuits.

1. Restrictions Applicable to EMT:

   a. Do not install underground.

   b. Do not encase in concrete, mortar, grout, or other cementitious materials.

   c. Do not use in areas subject to severe physical damage including but not limited to equipment rooms where moving or replacing equipment could physically damage the EMT.

   d. Do not use outdoors.

2. Restrictions Applicable to Flexible Conduit: Use only as specified in paragraph entitled "Flexible Connections."

B. Conduit Installation: Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be visible after completion of project. Run conduits in crawl space as if exposed.

Install sleeves for cable and raceway penetrations of concrete slabs and wall, except where core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and walls assemblies. Install sleeves during erection of concrete and masonry walls.

1. Conduit Support: Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Size supports for multiple conduits so capacity can be increased by a 25% minimum in the future. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Conduit and box systems must be supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts. Installation shall be coordinated with above-ceiling mechanical systems to assure maximum accessibility to all systems. Where conduit crosses building expansion joints, provide suitable expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. Use stainless steel hardware for all exterior

mounted conduit supports.

2. Fasteners: Fasten by wood screws to wood; by hollow wall anchors, toggle bolts or threaded drywall anchors in hollow wall construction; by toggle bolts or concrete screw anchors on hollow masonry units; by concrete insert-type anchors, concrete screw anchors, or expansion-type anchors in concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Fasteners shall be medium- or heavy-duty type only. Plastic insert-type fasteners are not acceptable. Load applied to fasteners shall not exceed one-fourth proof test load. Fasteners attached to concrete ceiling shall be vibration-resistant and shock-resistant. Holes cut to depth of more than 1 1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints shall not cut main reinforcing bars. Fill unused holes.

3. Directional Changes in Conduit Runs: Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

4. Locknuts and Bushings: Fasten conduits to sheet metal boxes and cabinets with two locknuts, one inside and one outside the box or enclosure. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

5. Flexible Connections: Provide flexible steel conduit between 3 and 6 feet in length for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for motors. Install flexible conduit to allow 20 percent slack. Minimum flexible steel conduit size shall be 1/2 inch diameter. Provide liquid-tight flexible conduit in wet and damp locations for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

C. Boxes, Outlets, and Supports: Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways shall be cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, and when specifically indicated. Boxes in other locations shall be sheet steel unless otherwise indicated. Each box shall have volume required by NFPA

70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures shall be minimum 4 inches square, or octagonal, except that smaller boxes may be installed as required by fixture configurations, as approved. Boxes for use in masonry-block or tile walls shall be square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature; fixtures shall be readily removable for access to boxes unless ceiling access panels are provided. Support boxes and pendants for surface-mounted fixtures on suspended ceilings independently of ceiling supports, or make adequate provisions for distributing load over ceiling support members in an approved manner. Fasten boxes and supports with wood screws on wood; by hollow wall anchors, toggle bolts or threaded drywall anchors in hollow wall construction; by toggle bolts or concrete screw anchors on hollow masonry units; by concrete insert-type anchors, concrete screw anchors, or expansion-type anchors in concrete or brick; and with machine screws or welded studs on steel. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from building structure or by bar hangers. Where bar hangers are used, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 inches from box.

1. Boxes: Boxes for use with raceway systems shall be minimum 1–1/2 inches deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets shall be minimum 4 inches square, except that 4- by 2-inch boxes may be used where only one raceway enters outlet.

2. Pull Boxes: Construct to minimum size required by NFPA 70 of code-gauge galvanized sheet steel unless otherwise indicated, except where cast-metal boxes are required in locations specified herein. Provide boxes with screw-fastened covers. Where several feeders pass through common pull box, tag feeders to indicate clearly electrical characteristics, circuit number, and panel designation.

D. Mounting Heights: Mount panelboards, enclosed circuit breakers, motor controller and disconnecting switches so height of operating handle at its highest position is maximum 78 inches above floor. Mount lighting switches, receptacles and other devices as indicated. Measure mounting heights of wiring devices and outlets to center of device or outlet.

E. Enclosed Circuit Breaker and Disconnecting Switch Installation: Mount enclosed circuit breakers and disconnect switches on walls or independent support structure as indicated. Do not mount enclosed circuit breakers or disconnect switches directly to equipment enclosures, ductwork, or piping.

F. Splices: Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller diameter with insulated, pressure-type connector. Make splices in conductors No. 8 AWG and larger diameter with solderless connector and cover with insulation material equivalent to conductor insulation.

G. Wiring at Outlets: Install with at least 6 inches of slack conductor at each outlet.

H. Covers and Device Plates: Install with edges in continuous contact with finished wall surfaces without use of mats or similar devices. Plaster fillings are not permitted. Install plates with alignment tolerance of 1/16 inch. Provide gasket for plates installed in wet locations.

I. Electrical Penetrations:

1. Seal openings around electrical penetrations (such as conduit penetrations or flush mounted equipment enclosures or junction boxes) through fire resistance-rated walls, partitions, floors, and ceilings to maintain fire resistive integrity. Utilize 3M CP25 caulk, Putty 303, Type MPP-4S moldable putty pads or equivalent material to maintain fire resistive integrity for conduit penetrations and flush mounted outlet box installations. Use other approved construction methods for larger enclosures.

2. Make all roof penetrations in the concrete base of mechanical equipment pads. Provide waterproofing collar, flashing, and elastomeric compound to seal the penetration.

J. Grounding and Bonding: In accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic and nonmetallic raceways, and neutral conductor of wiring systems. Make ground connection as indicated in the drawings.

K. Equipment Connections: Provide power wiring for the connection of motors and control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specifications but shall be provided under the section specifying the associated equipment.

3.04 EARTHQUAKE BRACING

Provide earthquake bracing for all electrical equipment, apparatus, luminaires and raceways. Bracing shall, as a minimum, comply with the County Building Code.

3.05 MISCELLANEOUS DETAILS

A. Workmanship: Lay out work in advance. Exercise care where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary for proper installation, support, or anchorage of conduit, raceways, or other electrical work. Repair damage to buildings, piping, and equipment using skilled craftsmen of trades involved.

B. Provide necessary foundations, supports, backing, etc., for all raceways and equipment. Attach to wood and steel by screws or bolts. Attach to concrete by expansion anchors. Powder charge driven studs and anchors shall not be used.

C. Clean all surfaces of enclosures and equipment.

D. Close all unused knockout holes.

E. Continuation of Service: Maintain continuity of existing circuits serving equipment to remain. Existing circuits serving equipment to remain shall remain energized. Circuits which are to remain but were disturbed during work shall have circuit wiring and power restored back to original condition.

3.06 PAINTING

A. Wipe clean of dirt, oil, grease, etc., with rag and solvent, prime and finish to match surrounding finish. Do not paint over nameplate.

B. All surface-mounted boxes, enclosures, and exposed raceways shall be enamel painted to match the color of surrounding.

C. Do not field-paint stainless steel circuit breakers, panelboards, and safety switches.

3.07 TESTING

A. Upon completion of this portion of work, and prior to its acceptance by the Owner, make all required tests and secure all required approvals from agencies having jurisdiction. Any deficiencies found shall be rectified and work affected by such deficiencies shall be completely re-tested at Contractor's expense. Written notification of all proposed tests shall be provided to the State a minimum of 14 days prior to the date of the test.

B. Perform an operational test after completion of the installation in the presence of the State, to assure proper operation of all items of work. Remove all grounds and shorts. Balance feeder loads.

C. Measure resistance of grounding system at service and furnish 3 copies of results to the State.

END OF SECTION