

BID DOCUMENTS AND SPECIFICATIONS FOR
BIRKHIMER EOC UPGRADES AND IMPROVEMENTS, OAHU,
STATE OF HAWAII, DEPARTMENT OF DEFENSE, HAWAI'I
EMERGENCY MANAGEMENT AGENCY, JOB NO. CA-202313-C

ISSUED BY:
STATE OF HAWAII
DEPARTMENT OF DEFENSE
3949 DIAMOND HEAD ROAD,
HONOLULU, HAWAII 96816-4495
TELEPHONE: 808-369-3567

MARCH 2024

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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, *"BIRKHIMER EMERGENCY OPERATIONS CENTER UPGRADES AND IMPROVEMENTS, STATE OF HAWAII, DEPARTMENT OF DEFENSE, JOB NO. CA-202313-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 PM on April 11, 2024**, 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.

Bidders are advised that the Department of Defense facility at 3949 Diamond Head Road is a secure facility. In order to access the property, Bidders and/or their authorized personnel shall present a current driver's license or other form of official identification (with photograph) to the security personnel at the entry gate, and shall inform the security personnel of the building and room number they require access to (State Contracting Section 808-369-3491). Lack of official identification or knowledge of the building and room to which access is needed are grounds for denial of access onto the property. Bidders should be aware and allow for security screening and random vehicle inspections. The state will not be responsible for late bids due to the afore mentioned reasons.

Proposed work consists of, but not limited to:

Building 303

1. Repave the existing parking lot.
2. Upgrade air conditioning systems.
3. Provide a new emergency generator and an aboveground fuel tank.
4. Provide new light fixtures throughout.

Public Services Building (PSB)

1. Provide new air conditioning systems

Birkhimer

1. Improve civil sanitary piping
2. Upgrade air conditioning systems
3. Provide a new emergency potable water systems
4. Replace an existing underground fuel tank with an aboveground fuel tank.

The estimated cost is between \$5,000,000 and \$10,000,000.

A site visit will be held on **March 19, 2024 at 9:00 am**. The pre-bid meeting / Site visit will be held at the Hawaii Emergency Management Agency Warehouse, 4204A Diamond Head Road, Honolulu Hawaii 96816. Please call Mr. Tad Nakayama at 808-369-3490 before **3:30 PM on March 15, 2024**, to register for the site visit. If no answer, please leave a message giving information of company name, name of all individuals that will attend, and contact phone number. After the call, you may assume you have been registered for the site visit. All interested bidders and subcontractors are welcome, but not required to attend.

Documents may 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 websites listed above, then bidders are responsible to register by sending their company name, address, telephone and facsimile number, and email address via email to jesper.h.andersen@hawaii.gov.

All requests for substitution, clarification of bidding documents and/or specifications must be received in the office listed above, via email, prior to **3:30 PM on March 20, 2024**. Questions shall be emailed to jesper.h.andersen@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 Hawai'i 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/>

The Hawai'i 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 Hawai'i Product shall submit a Certification for Hawai'i Product Preference (form SPO-38) by e-mail to jesper.h.andersen@hawaii.gov prior to 3:30 PM, fifteen (15) days prior to the bid opening date for this project. View the current Hawai'i Products List on the State Procurement office (SPO) website at <http://hawaii.gov/spo>.

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://hawaii.gov/spo>.

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 Hawai'i Contractor's license classification(s) **A** .

General Engineering Contractors holding an 'A' license and General Building Contractors holding a 'B' license are reminded that due to the Hawai'i 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.

Kenneth S. Hara
Major General
Adjutant General

Posted: March 8, 2024

Birkhimer Emergency Operation Center (EOC) UPGRADES AND IMPROVEMENTS
State of Hawai'i, Department of Defense,
Job No. CA-202313-C

Adjutant General
State Department of Defense
3949 Diamond Head Road
Honolulu, Hawai'i 96816-4495

Dear Sir:

The undersigned has carefully read and understands the terms and conditions specified in the Specifications, and all documents attached hereto, 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, Hawai'i 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 **Hawai'i business** incorporated or organized under the laws of the State of Hawai'i, **OR**
 A **Compliant Non-Hawai'i business** not incorporated or organized under the laws of the State of Hawai'i. Business shall be registered prior to award at the State of Hawai'i Department of Commerce and Consumer Affairs Business Registration Division to do business in the State of Hawai'i. State of incorporation: _____

Offeror is:

- Sole Proprietor Partnership Corporation Joint Venture
 Other _____

Federal I.D. No.: _____

Hawai'i General Excise Tax License I.D. No.: _____

Payment address (other than street address below): _____
City, State, Zip Code: _____

Business address (street address): _____
City, State, Zip Code: _____

Respectfully submitted:

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

Date: _____

Telephone No.: _____

Name and Title (Please Type or Print)

Fax No.: _____

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

E-mail Address: _____

(*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:

(*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 400 consecutive calendar days from the date of commencement specified by the written order of the Adjutant General including the date of said order.

The undersigned hereby provides a breakdown of the LUMP SUM amount of the base bid items and bid alternates.

Base Bid Item No.	Base Bid Item	Cost
	Building 303	
1	All work associate with providing a/c to state warning point room	
2	All work associate with replacing louvered windows in state warning point room with double pane windows	
3	All work associate with replacing existing ductboard ductwork and VAV conversion	
4	All work associate with repairing plumbing for kitchen sink	
5	All work associate with providing new generator, aboveground fuel tank and associated electrical work	
6	All work associate with replacing obsolete circuit breakers	
7	All work associate with repairing structural damages	
8	All work associate with replacing lighting in building with LED excluding the Admin section of B303	
	Public Services Building (PSB)	
9	All work associated with providing new larger primary a/c unit and upgrade existing generator	
10	All work associate with providing N+1 a/c units	
	Birkhimer	
11	All work associate with replacing civil drainage plumbing system	
12	All work associate with upgrades of men/women's bathrooms	
13	All work associate with providing emergency potable water system	
14	All work associated with providing new HVAC systems	
15	All work associated with replacing the existing underground fuel tank with a new aboveground tank	

	For All Buildings	Cost/Month	Cost
16	Warranty for Div 15 & 16 for 24 months.		
17	Allowance for one work stoppage up to 14 consecutive calendar days for an emergency event that might require the full, uninterrupted use of the Birkhimer Tunnel, PSB, and B303 facilities, including use of the access roads and parking lot, by HI-EMA.	N/A	55,300

Bid Alternates (see section 01230 – ALTERNATES for description)		
Bid alternate No	Description	Cost
A	All work associated with light fixture replacement in the Admin section of building B303	
B	All work associated with the installation of the new smart electric meter	
C	All work associated with the installation of the new smart water meter	
D	All work associated with the installation of the new smart electric meter	
E	All work associated with the installation of the new smart water meter	
F	All work associated with Bathroom plumbing upgrades	
G	All work associated with the installation of the new smart electric meter	

NOTE:

1. State wage rates apply to this contract.
2. Evaluating Bids: The lowest responsive, responsible bid is determined by the following procedures:
 - A. Chapter 103D, HRS, which provides for the preferences, shall apply.
 - B. The total lump sum bid price is adjusted to reflect the applicable preferences. For projects with alternates, the total lump sum base bid price and alternates will be adjusted to reflect the applicable preferences.
 - C. Project control budget is established prior to the submission of bids.
 - D. If there is more than one alternate for a project, the State will determine the precedence of the alternates for each project prior to the submission of bids.
 - E. The project will be evaluated based on the adjusted bid price.
 - F. 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.
3. The Surety shall not be held liable beyond two (2) years of the project acceptance date.

4. Should the State delete work from the contract scope to bring the project within the available funding in order to make an award, and should additional funding become available at any time after the award, the scope deleted from the contract scope at the prices negotiated, which had been previously deleted from the contract scope, may be restored back into the contract scope by the state, at its discretion, as the additional funding may accommodate. The Contractor shall not be entitled to any price increases from the original prices negotiated.
- 5 Contractor shall submit long lead items upon contract Award. See Section 01100 for further information.

HAWAI'I PRODUCTS PREFERENCE

In accordance with ACT 175, SLH 2009 the Hawai'i Products preference is applicable to this solicitation. Hawai'i products may be available for those items noted on the offer form.

The Hawai'i Products List is available on the State Procurement Office (SPO) website at <http://spo.hawaii.gov/> search for "Hawai'i Product Preferences".

Offeror offering a Hawai'i Product (HP) shall identify the HP on the solicitation offer pages. Any person desiring a Hawai'i product preference shall have the product(s) certified and qualified if not currently on the Hawai'i 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 Hawai'i Product list shall complete form SPO-38, *Certification for Hawai'i 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 Hawai'i Product

In the event of any change that materially alters the offeror's ability to supply Hawai'i 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 Hawai'i Product Schedule below whether the pre-approved Hawai'i Products are offered. Offerors offering a Hawai'i Product shall fill-in the quantity, unit measure, unit price and total price for the Hawai'i Product they desire to be considered for preference. Products not pre-approved shall not be considered. Hawai'i Products not meeting the requirements of the specification shall not be considered.

Offerors selecting the Hawai'i Product preference may be required to submit additional information on the cost basis of their selected Hawai'i Product preference items when requested after the bid opening to verify cost of the Hawai'i 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 Hawai'i Product Cost shall not include installation costs.

Hawai'i 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 Hawai'i 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 Hawai'i 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 Hawai'i 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, Hawai'i 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©, required as a prerequisite to entering into a contract, the contractor shall register on the Hawai'i 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.

LICENSE

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

1. 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.

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, Hawai'i 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, Hawai'i 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.

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

HAWAI'I GENERAL EXCISE TAX

Title _____

I.D. NO. _____

Name of Company

Address

LICENSE CLASSIFICATION
AND/OR SUBCLASSIFICATION
NO.

Telephone

Date

(CORPORATE SEAL)

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

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

FORM 1

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

I. Bidder's Identifying Information			
A. Legal Business Name: _____			
B. Project Bid Title & Reference No.: _____			
C. Contact Person's Name: _____			
1. Phone No.: _____		2. E-Mail: _____	
II. Apprenticeable Trades To Be Employed*	B. Apprenticeship Sponsor*	C. No. Enrolled	D. No. Completed
A. (List)	(One Sponsor Per Form)	(# of apprentices currently enrolled as of bidder's request date)	(# 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.

(Name of Corporation)
Corporate Resolution

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

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

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

Secretary

(Names and 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 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 Hawai'i 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, Hawai'i 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 and/or scope of work.

CONTENTS OF CONTRACT FORMS – The Statement of Work will provide 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 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 offer form shall be considered a part thereof and shall not be detached or altered when the bid is submitted.

The plans, specifications and other documents designated in the bid document package, 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 via email as directed in the Notice to Bidders and must be received by the Engineering Office, Department of Defense, no later than the date stated in the Notice to Bidders for submittal of questions. Any interpretation, if made, and any supplemental instructions will be in the form of written addenda. All addenda will be posted on the State Procurement Office website <http://spo.hawaii.gov> . 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, Hawai'i 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 \$25,000 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 Hawai'i, 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 sixty (60) 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, Hawai'i 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 may 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, Hawai'i 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.

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 and to include automotive liability, workers compensation and employers liability.

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.

The Certificate of Vendor Compliance should be applied for 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 prior to submittal of the final invoice.
 - 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 certification as required above, the Contractor and Subcontractors shall maintain records such as certified payrolls for laborers and mechanics who performed work at the site and time sheets for all other employees who performed work on the project. These records shall include the names, addresses and number of hours worked on the project by all employees of the Contractor and Subcontractor who performed work on the project to validate compliance with Act 68. The Contractor and Subcontractors shall retain these records and provide access to the State for a minimum period of four (4) years after the final payment, except that if any litigation, claim, negotiation, investigation, audit or other action involving the records has been started before the expiration of the four (4) year period, the Contractor and Subcontractors shall retain the records until completion of the action and resolution of all issues that arise from it, or until the end of the four (4) year period, whichever occurs later. Furthermore, it shall be the Contractor's responsibility to enforce compliance with this provision by any Subcontractor.
- e. A Contractor who fails to comply with this section shall be subject to any of the following sanctions:
 - 1. Temporary suspension of work on the project until the Contractor or its Subcontractor complies with Act 68.
 - 2. Withholding of payment on the contract until the Contractor or its Subcontractor complies with Act 68.

3. Permanent termination of the Contractor or Subcontractor from any further work on the project.
4. Recovery by the State, as applicable, of any moneys expended on the contract or subcontract as applicable; or
5. Proceedings for debarment or suspension of the Contractor or Subcontractor under Hawaii Revised Statutes §103D-702.

Conflict with Federal Law:

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

Davis-Bacon Act:

Davis-Bacon Act prevailing wage rates apply to all State of Hawaii Construction contracts over \$2,000.00.

**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 _____, 2011.

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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SAMPLE FORMS

Request for Substitution
Name of Corporation
Weekly Quality Control Report Form

ARTICLE 1 - Definitions

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

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

- 1.19_ CONSULTANT - A person, firm or corporation having a contract with the State to furnish services with respect to the project
- 1.20_ CONTRACT - The written agreement between the Contractor and the State of Hawaii by its Adjutant General, by which the Contractor is bound to furnish all labor, equipment, and materials and to perform the specified work within the contract time stipulated, and by which the State of Hawaii is obligated to compensate the Contractor therefore at the prices set forth therein. The contract shall include the Contract Documents and also any and all amendments and change orders which are required to complete the construction in an acceptable manner.
- 1.21_ CONTRACT COMPLETION DATE - The calendar day on which all work on the project, required by the contract, must be completed. See CONTRACT TIME and FINAL COMPLETION.
- 1.22_ CONTRACT DOCUMENTS - The Contract, Addenda (which pertain to the Contract Documents, Contractor's Proposal (including Wage Schedule, List of Subcontractors and other documentation accompanying the Bid and any post bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Contract, the Notice to Proceed, the Bonds, these GENERAL CONDITIONS, the SPECIAL CONDITIONS, the Specifications and the Drawings as the same are more specifically identified in the Contract together with all written Amendments, Change Orders, Field Orders, a written order for minor changes in the work and Engineer's written interpretations and clarifications issued on or after the effective date of the Contract.
- 1.23_ CONTRACT PRICE - The amount designated on the face of the contract for the performance of work including allowances for extra if any.
- 1.24_ CONTRACT TIME (or CONTRACT DURATION) - The number of calendar (or working) days provided for completion of the contract, inclusive of authorized time extensions. The number of days shall begin running on the effective date in the Notice to Proceed. If in lieu of providing a number of calendar (or working) days, the contract requires completion by a certain date, the work shall be completed by that date.
- 1.25_ CONTRACTOR - Any individual, partnership, firm, corporation, joint venture, or other legal entity undertaking the execution of the work under the terms of the contract with the State of Hawaii, and acting directly or through its agents, or employees.
- 1.26_ DEPARTMENT - The Department of Defense, State of Hawaii (abbreviated DOD).
- 1.27_ DRAWINGS (or Plans) - The contract drawings in graphic or pictorial form, which show the design, location, character, dimensions and details of the Work to be done and which shall be a part of the Contract Documents.
- 1.28_ ENGINEER - The Department of Defense Engineer, or the authorized person to act in the Engineer's behalf.
- 1.29_ EQUAL OR APPROVED EQUAL - Whenever this term is used in the drawings or specifications, it shall be interpreted to mean a brand or article, prequalified in accordance with Section 6.3 SUBSTITUTION OF MATERIALS AND EQUIPMENT, that may be used in place of the one specified.
- 1.30_ FIELD ORDER - A written order issued by the Engineer or the Engineer's authorized representative to the Contractor requiring the contract work to be performed in accordance with a change or changes in the work. A field order may (1) establish a price adjustment and/or time adjustment in an amount the Engineer believes is reasonable for the change; or (2) may declare that the Engineer does not intend to adjust contract time or price for the work; or (3) may request the Contractor to submit a proposal for an adjustment to the contract time and/or price by a certain date.
- 1.31_ FINAL COMPLETION - The date set by the Engineer that all work required by the contract and any amendments or changes thereto is in full compliance with the contract.
- 1.32_ FORCE ACCOUNT - Term used when Work is ordered to be done without prior agreements as to lump sum or unit price cost thereof and is to be billed for at cost of labor, materials and equipment, insurances, taxes, etc., plus an agreed percentage for overhead and profit.
- 1.33_ GUARANTEE - Legally enforceable assurance of the duration of satisfactory performance of quality of a product or Work
- 1.34_ GOODS - Materials. §103D-104

- 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 or non-adjustment of the contract time or contract price, the contractor shall file a notice of intent to claim within thirty days after the receipt of the written unilateral change order. Failure to file a protest within the time specified shall constitute agreement on the part of the contractor with the terms, conditions, amounts, and adjustment or non-adjustment of the contract time or the contract price set forth in the unilateral change order.

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

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

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

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

4.5 ALLOWANCES FOR OVERHEAD AND PROFIT HRS103D-501

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

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

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

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

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

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

4.6 PAYMENT FOR DELETED MATERIAL

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

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

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

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

4.7.1 Where the quantity of a major unit price item in this contract is estimated on the proposal form and where

the actual quantity of such pay item varies more than fifteen percent (15%) above or below the estimated quantity stated in this contract, an adjustment in the contract price shall be made upon demand of either party.

The adjustment shall be based upon any increase or decrease in costs due solely to the variation above one hundred fifteen percent (115%) or below eighty-five percent (85%) of the estimated quantity. The adjustment shall be subject to Section 4.4 PRICE ADJUSTMENT and Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT. If the quantity variation is such as to cause an increase in the time necessary for completion, the Engineer shall, upon receipt of a written request for an extension of time within thirty (30) days of the item's completion, ascertain the facts and make such adjustment to the completion date as the Engineer finds justified.

4.8 VARIATIONS IN BOTTOM ELEVATIONS

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

4.9 DIFFERING SITE CONDITIONS

§3-125-11 HAR

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

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

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

4.9.2 After receipt of written notice, the Engineer shall promptly investigate the site, and if it is found that such conditions do materially differ and cause an increase in the Contractor's cost of, or the time required to, perform any part of the Work, whether or not changed as a result

of such conditions, an adjustment shall be made and the contract modified accordingly. Any adjustment in contract price made pursuant to this Section 4.9 shall be determined in accordance with Sections 4.4 PRICE ADJUSTMENT and 7.25 DISPUTES AND CLAIMS.

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

4.10 UTILITIES AND SERVICES

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

4.10.1.1 Reviewing and checking all such information and data,

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

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

4.10.1.4 The safety and protection of all such underground and overhead utilities as provided in Section 7.17 PROTECTION OF PERSONS AND PROPERTY and repairing any damage thereto resulting from the work.

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

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

4.10.4 Restoration of Damaged Utilities - The Contractor shall repair and restore to pre-damaged

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

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

ARTICLE 5 - Control of Work

5.1 AUTHORITY OF THE ENGINEER

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

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

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

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

5.2 AUTHORITY OF THE INSPECTOR

5.2.1 The Inspector shall observe and inspect the contract performance and materials. The Inspector does

not have any authority vested in the Engineer unless specifically delegated in writing.

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

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

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

5.4 SHOP DRAWINGS AND OTHER SUBMITTALS

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

5.4.1.1 Shop Drawings

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

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

(3) All shop drawings as required by the contract, or as determined by the Engineer to be necessary to illustrate details of the Work shall be submitted to the Engineer with such promptness as to cause no delay in the work or in that of any other Contractor. Delay caused by the failure of the Contractor to submit shop drawings on a

timely basis to allow for review, possible resubmittal and acceptance will not be considered as a justifiable reason for a contract time extension. Contractor, at its own risk, may proceed with the work affected by the shop drawings before receiving acceptance; however the Department shall not be liable for any costs or time required for the correction of work done without the benefit of accepted shop drawings.

(4) It is the Contractor's obligation and responsibility to check all of its and its subcontractor's shop drawings and be fully responsible for them and for coordination with connecting and other related work. The Contractor shall prepare, and submit to the Engineer coordination drawings showing the installation locations of all plumbing, piping, duct and electrical work including equipment throughout the project. By approving and submitting shop drawings, the Contractor thereby represents that it has determined and verified all field measurements and field construction criteria, or will do so, and that it has checked and coordinated each shop drawing with the requirements of the work and the contract documents. When shop drawings are prepared and processed before field measurements and field construction criteria can be or have been determined or verified, the Contractor shall make all necessary adjustments in the work or resubmit further shop drawings, all at no change in contract price or time.

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

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

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

5.4.1.4 Descriptive Sheets and Other Submittals - When a submittal is required by the contract, the Contractor shall submit to the Engineer eight (8) complete sets of descriptive sheets such as shop drawings, brochures, catalogs, illustrations, calculation, material safety data sheets (MSDS), certificates, reports, warranty, etc., which will completely describe the material, product, equipment,

furniture or appliances to be used in the project as shown in the drawings and specifications and how it will be integrated into adjoining construction. When submittals are specified to be submitted under Web Based Construction Management System, the number of complete sets will be as specified or as directed by the Engineer. Prior to the submittal, the Contractor shall review and check all submittal sheets for conformity to the contract requirements and indicate such conformity by marking or stamping and signing each sheet. Where descriptive sheets include materials, systems, options, accessories, etc. that do not apply to this contract, non-relevant items shall be crossed out so that all remaining information will be considered applicable to this contract. It is the responsibility of the Contractor to submit descriptive sheets for review and acceptance by the Engineer as required at the earliest possible date after the date of award in order to meet the construction schedule. Delays caused by the failure of the Contractor to submit descriptive sheets as required will not be considered as justifiable reasons for contract time extension.

5.4.1.5 Material Samples and Color Samples – When material and color sample submittals are required by the contract, the Contractor shall submit to the Engineer no less than three (3) samples conforming to Section 6.6 MATERIAL SAMPLES. One sample will be retained by the Consultant, one sample will be retained by the State, and the remaining sample(s) will be returned to the contractor. Prior to the material and color submittal, the Contractor shall review and check all samples for conformity to the contract requirements and indicate such conformity by marking or stamping and signing each sample. It is the responsibility of the Contractor to submit samples for review and acceptance by the Engineer as required at the earliest possible date after the date of award in order to meet the construction schedule. Delays caused by the failure of the Contractor to submit material and color samples as required will not be considered as justifiable reasons for contract time extension.

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

5.4.2 Submittal Variances - The Contractor shall include with the submittal, written notification clearly identifying all deviations or variances from the contract drawings, specifications and other Contract Documents. The notice shall be in a written form separate from the submittal. The variances shall also be clearly indicated on the shop drawing, descriptive sheet, material sample or color sample. Failure to so notify of and identify such variances shall be grounds for the subsequent rejection of the related work or materials, notwithstanding that the submittal was accepted by the Engineer. If the variances are not acceptable to the Engineer, the Contractor will be

required to furnish the item as specified or indicated on the contract documents at no additional cost or time.

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

5.4.3.1 The acceptance by the Engineer of the Contractor's submittal relates only to their sufficiency and compliance with the intention of the contract. Acceptance by the Engineer of the Contractor's submittal does not relieve the Contractor of any responsibility for accuracy of dimensions, details, and proper fit, and for agreement and conformity of submittal with the contract drawings and specifications. Nor will the Engineer's acceptance relieve the Contractor of responsibility for variance from the contract documents unless the Contractor, at the time of submittal, has provided notice and identification of such variances required by this section. Acceptance of a variance shall not justify a contract price or time adjustment unless the Contractor requests such an adjustment at the time of submittal and the adjustment are explicitly agreed to in writing by the Engineer. Any such request shall include price details and proposed scheduling modifications. Acceptance of a variance is subject to all contract terms, stipulations and covenants, and is without prejudice to any and all rights under the surety bond.

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

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

5.5 COORDINATION OF CONTRACT DOCUMENTS - It is the intent of the Contract Documents to describe a functionally complete Project (or

part thereof) to be constructed in accordance with the Contract Documents. The Contract Documents are complementary: any requirement occurring in one document is as binding as though occurring in all. In the event of conflict or discrepancy the priorities stated in the following subparagraphs shall govern:

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

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

5.5.3 Specifications shall govern over drawings.

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

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

5.5.5 Drawings:

5.5.5.1 Schedules shall govern over all other notes and drawings.

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

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

5.5.5.4 Larger scale drawings shall govern over smaller scale drawings.

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

5.5.5.6 In cases of discrepancies in the figures or drawings, the discrepancies shall be immediately referred to the Engineer without whose decision said discrepancy shall not be corrected by the Contractor save at its own risk and in the settlement of any complications arising

from such adjustment without the knowledge and consent of the Engineer, the Contractor shall bear all extra expense involved.

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

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

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

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

5.7 EXAMINATION OF DRAWINGS, SPECIFICATIONS, PROJECT SITE

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

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

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

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

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

5.8 COOPERATION BETWEEN THE CONTRACTOR AND THE DEPARTMENT

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

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

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

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

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

5.8.3 Engineering Work - The Contractor shall properly and accurately lay out the work, perform all engineering work, and furnish all engineering materials and equipment required to establish and maintain all lines, grades, dimensions and elevations called for in the

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

5.8.3.1 The Engineer shall furnish the requisite bench elevations.

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

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

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

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

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

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

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

5.8.4.3 If the Department enters the structure for construction and / or occupancy and the Contractor is delayed because of interference by the Department or by extra work resulting from damage which the Contractor is not responsible for, or by extraordinary measures the Contractor must take to accommodate the Department, the Contractor shall be granted an extension of time in accordance with Section 7.21 CONTRACT TIME. However, if such use increases the cost or delays the completion of the remaining portions of work, the Contractor shall be entitled to such extra compensation or extension of time or both, as the State may determine to be proper. Any additional work necessary will be paid in accordance with Section 8.3 PAYMENT FOR ADDITIONAL WORK.

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

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

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

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

5.9.4 Federal Agency Inspection - Projects financed in whole or in part with Federal funds shall be subject to

inspection and corrective requirements at all times by the Federal Agency involved at no cost to the State.

5.10 REMOVAL OF DEFECTIVE, NON-CONFORMING AND UNAUTHORIZED WORK

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

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

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

5.11 VALUE ENGINEERING INCENTIVE

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

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

5.11.2 Value Engineering Change Proposal - All VECP must:

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

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

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

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

5.11.3.1 A description of the difference between the existing contract requirements and the VECP, and the comparative advantages and disadvantages of each including durability, service life, reliability, economy of operation, ease of maintenance, design safety standards, desired appearance, impacts due to construction and other essential or desirable functions and characteristics as appropriate;

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

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

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

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

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

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

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

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

5.11.6 Acceptance of VECP - The Engineer may accept in whole or in part any VECP submitted pursuant to this section by issuing a change order to the contract. Prior to issuance of the change order, the Contractor shall submit complete final contract documents similar to those of the original contract showing the accepted changes and the new design and features as well as the following:

5.11.6.1 Design calculations;

5.11.6.2 The design criteria used; and

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

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

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

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

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

both pertinent to the proposal as accepted in any manner and for any purpose whatsoever and have others so do.”

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

5.11.10 The Contractor shall submit with each VECP all required information and provide all additional information as may be required by the Engineer to evaluate and implement the VECP. The cost for preparing the VECP shall be the Contractor’s responsibility, and any part of the Contractor’s cost for implementing the change shall be due only when the proposal is accepted and a change order is issued.

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

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

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

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

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

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

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

5.12.1.2 Becomes insolvent; or

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

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

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

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

5.12.2 Notice of Replacing Subcontractor – The contractor shall provide a written notice to the Contracting Officer when it wishes to replace a subcontractor, including in the notice, the reasons for replacement. The contractor agrees to defend, hold harmless and indemnify the State against all claims, liabilities, or damages whatsoever, including attorneys fees arising out of or related to the replacement of a subcontractor. The contractor may not replace the subcontractor until the Contracting Officer approves of the replacement.

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

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

ARTICLE 6 - Control of Materials and Equipment

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

6.2 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

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

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

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

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

6.3 SUBSTITUTION AFTER CONTRACT AWARD

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

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

6.3.2 Substitution After Contract Award - Subject to the Contracting Officer's determination; material,

equipment, article or system with a variant feature(s) may be allowed as a substitution, provided it is in the State's best interest. The State may deny a substitution; and if a substitution is denied, the contractor is not entitled to any additional compensation or time extension.

6.3.2.1 The contractor shall include with the submittal, a notification that identifies all deviations or variances from the contract documents. The notice shall be in a written form separate from the submittal. The variances shall be clearly shown on the shop drawing, descriptive sheet, and material sample or color sample; and the contractor shall certify that the substitution has no other variant features. Failures to identify the variances are grounds to reject the related work or materials, notwithstanding that the Contracting Officer accepted the submittal. If the variances are not acceptable to the Contracting Officer, the contractor will be required to furnish the item as specified on the contract documents at no additional cost or time.

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

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

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

6.3.3 A substitution request after Contract Award shall be fully explained in writing. Contractor shall provide brochures showing that the substitute material and / or equipment is equal or better in essential features and also provide a matrix showing comparison of the essential features. Contractor shall justify its request and include quantities and unit prices involved, respective supplier's price quotations and such other documents necessary to fully support the request. Any savings in cost will be credited to the Department. Contractor shall absorb any additional cost for the substitute item(s) or for its

installation. Submitting a substitution request, does not imply that substitutions, for brand name specified materials and equipment, will be allowed. The Engineer may reject and deny any request deemed irregular or not in the best interest of the Department. A request for substitution shall not in any way be grounds for an extension of contract time. At the discretion of the Engineer, a time extension may be granted for an approved substitution.

6.4 ASBESTOS CONTAINING MATERIALS -

The use of materials or equipment containing asbestos is prohibited under this contract. Contractor warrants that all materials and equipment incorporated in the project are asbestos-free.

6.5 TEST SAMPLES

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

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

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

6.6 MATERIAL SAMPLES

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

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

6.6.3 Contractor shall furnish two (2) copies of a transmittal letter with each shipment of samples. The letter shall provide a list of the samples, the name of the building or work for which the materials are intended and the brands of the materials and names of the manufacturers. Also, each sample submitted shall have a label indicating the material represented, its place of origin, the names of the producer, the Contractor and the building or work for which the material is intended. Samples of finished materials shall be marked to indicate where the materials represented are required by the drawings or specifications.

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

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

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

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

covered to protect it from the weather and damage. Stored materials shall be located to allow prompt inspection.

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

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

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

7.1 PROSECUTION OF THE WORK

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

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

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

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

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

7.1.4.2 In the event the contract is not executed, the Contractor shall, at its own expense, do such work as is necessary to leave the site in a neat condition to the satisfaction of the Engineer. The Contractor shall not be reimbursed for any work performed.

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

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

7.2 COMMENCEMENT REQUIREMENTS - Prior to beginning work on site, the Contractor shall submit the following to the Engineer:

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

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

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

7.2.4 Schedule of Prices to be accepted for the agreed Monthly Payment Application. Unless the proposal provides unit price bids on all items in this project, the successful Bidder will be required, after the award of contract, to submit a schedule of prices for the various items of construction included in the contract. For projects involving more than a single building and / or facility, the breakdown cost shall reflect a separate schedule of prices for the various items of work for each building and/or facility. The sum of the prices submitted for the various items must equal the lump sum bid in the

Bidder's proposal. This schedule will be subject to acceptance by the Engineer who may reject same and require the bidder to submit another or several other schedules if in the Engineer's opinion the prices are unbalanced or not sufficiently detailed. This schedule of prices shall be used for the purpose of determining the value of monthly payments due the Contractor for work installed complete in place; and may be used as the basis for determining cost and credit of added or deleted items of work, respectively.

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

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

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

7.3 INSURANCE REQUIREMENTS

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

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

7.3.3 Certificate(s) of Insurance acceptable to the State shall be filed with the Engineer prior to commencement of the work. Certificates shall identify if the insurance company is a "captive" insurance company or a "Non-Admitted" carrier to the State of Hawaii. The best's rating must be stated for the "Non-Admitted" carrier. Certificates shall contain a provision that coverage's being certified will not be cancelled or materially changes

without giving the Engineer at least thirty (30) days prior written notice. If the State is to be an Additional Insured on any of the required insurance, it shall be so noted on the certificate. Should any policy be canceled before final acceptance of the work by the State, and the Contractor fails to immediately procure replacement insurance as specified, the State, in addition to all other remedies it may have for such breach, reserves the right to procure such insurance and deduct the cost thereof from any money due to the Contractor.

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

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

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

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

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

7.3.7.2 General Liability - The Contractor shall obtain General Liability insurance with a limit of not less than

\$2,000,000 per occurrence and in the Aggregates. The General liability insurance shall include the State as an Additional Insured. The required limit of insurance may be provided by a single policy or with a combination of primary and excess policies. Refer to SPECIAL CONDITIONS for any additional requirements.

7.3.7.3 Auto Liability - The Contractor shall obtain Auto Liability Insurance covering all owned, non-owned and hired autos with a combined single Limit of not less than \$1,000,000 per occurrence. The required limit of insurance may be provided by a single policy or with a combination of primary and excess policies. Refer to SPECIAL CONDITIONS for any additional requirements.

7.3.7.4 Property Insurance (Builders Risk)

- (1) New Building(s) - The Contractor shall obtain Property Insurance covering building(s) being constructed under this Contract. The limit shall be equal to the completed value of the building(s) and shall insure against all-loss excluding earthquakes and floods. The coverage shall be provided by a company authorized to write insurance in the State of Hawaii as an insurer.
- (2) Building Renovation and / or Installation Contract - The Contractor shall obtain Property Insurance with a limit equal to the completed value of the work or property being installed and shall insure against all-loss excluding earthquakes and floods. The coverage shall be provided by a company authorized to write insurance in the State of Hawaii as an insurer. Refer to SPECIAL CONDITIONS for any additional requirements.
- (3) The Contractor is not required to obtain property insurance for contracts limited to site development

7.4 PERMITS AND LICENSES

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

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

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

7.5 NORMAL WORKING HOURS - Prior to beginning operations, unless otherwise established by the State, the Contractor shall notify the Engineer in writing of the time in hours and minutes, A.M. and P.M. respectively, at which it desires to begin and end the day's work. If the Contractor desires to change the working hours, it shall request the Engineer's approval three (3) consecutive working days prior to the date of the change.

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

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

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

7.7 PREVAILING WAGES - (§ 104-2 HRS)

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

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

7.7.3 The Contractor or its subcontractor(s) shall pay all laborers and mechanics employed on the job site, unconditionally and not less often than once a week, and without deduction or rebate on any account except as allowed by law, the full amounts of their wages including overtime, accrued to not more than five (5) working days prior to the time of payment, at wage rates not less than those stated in the contract, regardless of any contractual relationship which may be alleged to exist between the Contractor and subcontractor and such laborers and mechanics. The wages stated in the contract shall not be less than the minimum prevailing wages (basic hourly rate plus fringe benefits), as determined by the Director of Labor and Industrial Relations and published in wage rate schedules. Any increase in wage rates, as determined by the Director of Labor and Industrial Relations and issued in the wage rate schedule, shall be applicable during the performance of the contract, in accordance with section 104-2(a) and (b), Hawaii Revised Statutes. Notwithstanding the provisions of the original contract, if the Director of Labor and Industrial Relations determines that prevailing wages have increased during the performance of the contract, the rate of pay of laborers and mechanics shall be raised accordingly.

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

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

7.8 FAILURE TO PAY REQUIRED WAGES (§ 104-4, HRS) - If the Department finds that any laborer or mechanic employed on the job site by the Contractor or any subcontractor has been or is being paid wages at a rate less than the required rate by the contract, or has not received their full overtime compensation, the Department may, by written notice to the Contractor, terminate its right, or the right of any subcontractor, to proceed with the work or with the part of the work on

which the required wages or overtime compensation have not been paid and may complete such work or part by contract or otherwise, and the Contractor and its sureties shall be liable to the Department for any excess costs occasioned thereby.

7.9 PAYROLLS AND PAYROLL RECORDS (§ 104-3 HRS)

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

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

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

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

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

7.9A.2 Monthly certification shall be made by completing the *Monthly Report of Contractor's Participation - Form 2* made available by the State Department of Labor and Industrial Relations, the original to be signed by the respective apprenticeship program sponsors authorized official, and submitted by the

Contractor to the Engineer with its monthly payment requests. The *Monthly Report of Contractor's Participation – Form 2* is available on the DLIR website at: <http://hawaii.gov/labor/wdd>.

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

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

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

7-9A.3.3 Proceedings to debar or suspend pursuant to HRS §103D-702.

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

7.10 OVERTIME AND NIGHT WORK

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

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

7.10.3 In the event that work other than that contained in the above notification is performed and for which the Engineer determines State inspection services were

necessary but not available because of the lack of notification, the Contractor may be required to remove all such work and perform the work over again in the presence of State inspection personnel.

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

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

7.11 OVERTIME AND NIGHT PAYMENT FOR STATE INSPECTION SERVICE

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

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

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

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

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

7.11.3 Payment for Inspection Services - The monies due the Department for staff and inspection work and use

of vehicles and equipment as determined in subsection 7.11.2 shall be deducted from the monies due or to become due the Contractor. In any and all events, the Contractor shall not pay the Department's employees directly.

7.12 LIMITATIONS OF OPERATIONS

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

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

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

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

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

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

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

Department for the completion of the work in the event that the Contractors should be in default therein.

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

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

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

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

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

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

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

7.14 LAWS TO BE OBSERVED

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

7.14.2 The Contractor shall defend, protect, hold harmless and indemnify the State and its Departments and Agencies and all their officers, representatives, employees

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

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

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

7.16 SANITARY, HEALTH AND SAFETY PROVISIONS

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

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

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

7.17 PROTECTION OF PERSONS AND PROPERTY

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

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

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

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

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

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

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

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

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

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

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

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

7.18 ARCHAEOLOGICAL SITES

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

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

shall remove the fencing upon completion of construction, or as directed by the Engineer.

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

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

7.19 RESPONSIBILITY FOR DAMAGE CLAIMS; INDEMNITY

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

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

7.19.3 The Contractor shall pay all just claims for materials, supplies, tools, labor and other just claims against the Contractor or any subcontractor in connection with this contract and the surety bond will not be released by final acceptance and payment by the Department unless all such claims are paid or released. The Department may, but is not obligated to, withhold or retain as much of the monies due or to become due the

Contractor under this contract considered necessary by the Engineer to cover such just claims until satisfactory proof of payment or the establishment of a payment plan is presented.

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

7.20 CHARACTER OF WORKERS OR EQUIPMENT

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

7.20.2 Character and Proficiency of Workers - All workers shall possess the proper license and / or certification, job classification, skill and experience necessary to properly perform the work assigned to them.

All workmen engaged in special work or skilled work such as bituminous courses or mixtures, concrete pavement or structures, electrical installation, plumbing installation, or in any trade shall have sufficient experience in such work and in the operation of the equipment required to properly and satisfactorily perform all work. All workers shall make due and proper effort to execute the work in the manner prescribed in these GENERAL CONDITIONS, otherwise, the Engineer may take action as prescribed herein.

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

7.20.3 Insufficient Workers - A sufficient number of workers shall be present to ensure the work is accomplished at an acceptable rate. In addition, the proper ratio of apprentice to journey worker shall be maintained to ensure the work is properly supervised and performed.

In the event that the Engineer finds insufficient workers are present to accomplish the work at an acceptable rate of progress or if a adequate number of journey workers are not present and no corrective action is taken by the Contractor after being informed in writing, the Engineer may terminate the contract as provided for under Section 7.27 TERMINATION OF CONTRACT FOR CAUSE.

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

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

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

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

7.21 CONTRACT TIME

7.21.1 Time is of the essence for this contract.

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

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

7.21.3.1 Extensions - For increases in the scope for work caused by alterations and additional work made under Section 4.2 CHANGES, the Contractor will be granted a time extension only if the changes increase the time of performance for the Contract. If the Contractor believes that an extension of time is justified and is not adequately

provided for in a Field Order, it must request the additional time sought in writing when the detailed cost breakdown required by Section 4.2 CHANGES, is submitted. The Contractor must show how the time of performance for the critical path will be affected and must also support the time extension request with schedules and statements from its subcontractors, suppliers, and/or manufacturers. Compensation for any altered or additional work will be paid as provided in Section 4.2 CHANGES.

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

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

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

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

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

7.21.5.3 The Contractor, if requested, submits to the Engineer within ten (10) work days after the request, a written statement describing the delay to the project. The extent of delay must be substantiated as follows:

(a) State specifically the reason or reasons for the delay and fully explain in a detailed chronology the effect of this delay to the work and/or the completion date.

(b) Submit copies of purchase order, delivery tag, and any other pertinent documentation to support the time extension request.

(c) Cite the period of delay and the time extension requested.

(d) A statement either that the above circumstances have been cleared and normal working conditions restored as of a certain day or that the above circumstances will continue to prevent completion of the project.

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

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

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

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

(a) State specifically the reason or reasons for the delay. Explain in a detailed chronology the effect of this delay to the other work and / or the completion date.

(b) Submit copies of purchase order(s), factory invoice(s), bill(s) of lading, shipping manifest(s), delivery tag(s) and any other pertinent correspondence to support the time extension request.

(c) Cite the start and end date of the delay and the days requested therefore. The delay shall not exceed the difference between the originally scheduled delivery date versus the actual delivery date.

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

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

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

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

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

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

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

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

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

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

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

7.22 CONSTRUCTION SCHEDULE

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

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

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

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

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

7.23 STATEMENT OF WORKING DAYS - For all contracts on a working day basis, the Contractor will submit a statement of the number of working days for each month together with the Monthly Payment Application. The Monthly Payment Application will not be processed without the statement of working days.

7.24 SUSPENSION OF WORK §3-125-7 HAR

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

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

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

7.24.1.3 Failure of the Contractor to:

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

(2) Carry out orders given by the Engineer;

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

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

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

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

7.24.1.6 The convenience of the State.

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

7.24.3 Payment §3-125-7 HAR

7.24.3.1 In the event that the Contractor is ordered by the Engineer in writing as provided herein to suspend all work under the contract in accordance with paragraphs 7.24.1.4 or 7.24.1.6, the Contractor may be reimbursed for actual direct costs incurred on work at the jobsite, as authorized in writing by the Engineer, including costs expended for the protection of the work. Payment for equipment which must standby during such suspension of work shall be made as described in clause 8.3.4.5. (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 Officer's decision. The Adjutant General's decision shall be final and conclusive, unless fraudulent or unless the contractor brings an action seeking judicial review of the Adjutant General's decision in an appropriate circuit court of this State within six months from the date of the Adjutant General's decision.

7.25.10.1 If the contractor delivers a written request for a final decision concerning the controversy, the Adjutant General shall issue a final decision within 90 days after receipt of such a request; provided that if the Adjutant General does not issue a written decision within 90 days or within such longer period as may be agreed upon by

the parties, then the contractor may proceed as if an adverse decision had been received. Both parties to this contract agree that the period of up to 30 days to appeal the Contracting Officer's decision to the Adjutant General shall not be included in the 90 day period to issue a final decision.

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

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

7.26 FAILURE TO COMPLETE THE WORK ON TIME

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

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 liquidated damages to the Department based upon the amount stated in the Offer Form. Liquidated damages shall accrue for all days after the Contract Completion Date or any extension thereof until the date the Punchlist 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 liquidated damages to the Department based upon the amount stated in the Offer Form. Liquidated damages shall accrue 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 liquidated damages in accordance with the amount stated in the Offer Form and provide written notice of such assessment to the Contractor.

7.26.2 Acceptance of Liquidated Damages -The assessment of 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 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 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 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.

- (1) 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 hereby incorporated and made a part of the General Conditions.

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 payments 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, ten 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.

CHANGES TO THE GENERAL CONDITIONS

1. Under ARTICLE 1 – DEFINITIONS, insert the following:

“1.70 CONTRACTING OFFICER REPRESENTATIVE (COR): The Department of Defense Project Manager (PM).”

2. Under ARTICLE 2 - PROPOSAL REQUIREMENTS AND CONDITIONS, modify section 2.6 - SUBSTITUTION OF MATERIALS AND EQUIPMENT BEFORE BID OPENING, by renaming section 2.6 - SUBSTITUTION BEFORE CONTRACT AWARD and deleting subsections 2.6.1, through 2.6.6 and substitute the following three new subsections and related paragraphs 2.6.1 through 2.6.3:

“2.6.1 For Substitutions after the Letter of Award is issued; refer to Section 6.3 SUBSTITUTION AFTER CONTRACT AWARD.

2.6.2 Unless specifically required otherwise in the contract documents, Offerors shall not submit products, materials, equipment, articles or systems for review or approval prior to submitting their Offers.

2.6.3 Offerors shall prepare their Offer forms based on the performance requirements of the materials, equipment, articles or systems noted on the drawings and specifications. If trade names, makes, catalog numbers or brand names are specified, Offerors 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 products and equipment of manufacturers listed throughout the specifications and other manufacturers are acceptable provided they meet or exceed the materials and construction requirements specified and are installed as specified.”

3. Under Article 6, delete subsections 6.3.2.4 and 6.3.3.

(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 and as stated on the Specifications, we hereby submit for substitution, _____ sets of technical brochures and statement of variances for your review and approval for the item(s) shown below.

<u>ITEM</u>	<u>SPECIFIED BRAND</u>	<u>SUBSTITUTE BRAND</u>	<u>MODIFICATION/VARIANT FEATURES</u>
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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: _____

GENERAL NOTES

THE FOLLOWING UNDERLINED TERMS AS USED HEREIN SHALL BE DEFINED AS:

- THE OWNER: DEPARTMENT OF DEFENSE
- THE OWNER'S REPRESENTATIVE: RM TOWILL CORP
- THE DESIGNER ON RECORD (DOR): INSYNERGY

1. LAWS AND ORDINANCES: AS USED HEREIN SHALL MEAN ALL COUNTY, STATE, AND NATIONAL CODES, ORDINANCES, STANDARDS, RULES, AND REGULATIONS OF ANY NATURE WHICH ARE PERTINENT TO, OR REGULATORY OVER, THE WORK COVERED BY THE CONTRACT DOCUMENTS OF THIS PROJECT. ALL CONTRACTORS SHALL COMPLY FULLY WITH ALL APPLICABLE LAWS AND ORDINANCES. ALL CONSTRUCTION SHALL CONFORM TO THE CURRENT BUILDING CODE AND THE LATEST STATE OF HAWAII AMENDMENTS OR THE RESPECTIVE CITY AND/OR COUNTY AMENDMENTS BY EACH AGENCY HAVING JURISDICTION OF THE PROJECT.

2. CONFLICT: IN THE CASE OF ANY CONFLICT WHEREIN THE METHODS, OR STANDARDS OF INSTALLATION, OR THE SPECIFIED MATERIALS ARE NOT IN COMPLIANCE WITH THE REQUIREMENTS OF THE LAWS OR ORDINANCES, THE LAWS OR ORDINANCES SHALL GOVERN. IN THE CASE OF A DISCREPANCY IN THE DRAWINGS OR SPECIFICATIONS, BUT NOT DIRECTLY RELATED TO THE PROVISIONS, CODES, OR ORDINANCES, THE CONTRACTOR SHALL 1) PROVIDE THE BETTER QUALITY, OR GREATER QUANTITY OF WORK, OR 2) COMPLY WITH THE MORE STRINGENT REQUIREMENT IN ACCORDANCE WITH THE DESIGNER ON RECORD'S INTERPRETATION, OR 3) REQUEST IN WRITING ADDITIONAL CLARIFICATION OR INFORMATION. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE OF ALL CONFLICTS IN WRITING.

3. CONDITIONS OF THE WORK: THE INFORMATION INDICATED ON THE DRAWINGS IS BASED ON LIMITED FIELD INVESTIGATION AND ON THE AVAILABLE RESOURCES AT THE TIME OF DOCUMENT PREPARATION. AS A RESULT, THE ACCURACY AND COMPLETENESS OF THE INFORMATION IS NOT GUARANTEED ON DATE OF COMMENCEMENT OF CONSTRUCTION. THEREFORE, THE CONTRACTOR SHALL VERIFY THE DIMENSIONS SHOWN ON THE DRAWINGS WITH ACTUAL FIELD MEASUREMENTS, EXAMINE THE JOB SITE, VERIFY ALL FIELD CONDITIONS AND PERTINENT DIMENSIONS PRIOR TO PREPARING LAYOUTS, SUBMITTALS, SHOP DRAWINGS, AND/OR ORDERING ANY MATERIAL, AND PROVIDE THE LABOR AND MATERIALS REQUIRED TO COMPLETE THE REQUIRED WORK.

4. WORKMANSHIP: ALL WORK SHALL BE PERFORMED IN A PROFESSIONAL MANNER. WORKMANSHIP SHALL BE REPRESENTATIVE OF THE BEST HAWAII INDUSTRY STANDARD OF THE RESPECTIVE TRADES. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IN WRITING PRIOR TO THE COMMENCEMENT OF WORK, IF THERE ARE ANY DIMENSIONAL DISCREPANCIES, OR IF THERE ARE ANY CONDITIONS THAT EXIST WHICH MAY PREVENT THE CONTRACTOR'S WORKMANSHIP AND PERFORMANCE OF WORK PER CONTRACT DOCUMENTS, AND/OR OF ANY AND ALL ADDITIONAL WORK THAT MAY BE REQUIRED AS A RESULT OF THE OBSERVED CONDITIONS.

5. OMISSIONS: OMISSIONS OF DRAWINGS, OR SPECIFICATIONS, OR THE OMISSIONS OF DETAILS OF WORK WHICH ARE MANIFESTLY NECESSARY TO CARRY OUT THE INTENT OF THE DRAWINGS AND SPECIFICATIONS, AND/OR WHICH ARE PER HAWAII INDUSTRY STANDARD CUSTOMARILY PERFORMED, 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 UPON DISCOVERY OF OMISSION SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE VERBALLY OF SUCH OMISSIONS AND PROVIDE A WRITTEN STATEMENT OF THE OMISSIONS WITHIN (2) WORKING DAYS OF VERBAL NOTIFICATION.

6. INTENT OF THE DRAWINGS: THE DRAWINGS ARE INTENDED TO DEFINE AND ESTABLISH THE PHYSICAL REQUIREMENTS OF THE PROJECT, I.E., THE DESIGN, LOCATIONS AND DIMENSIONS OF THE WORK, BASED ON RECOGNIZED STANDARDS EVEN IF NOT ACTUALLY SHOWN, BUT REASONABLY INFERRED. THE CONTRACTOR SHALL REVIEW AND VERIFY THE INFORMATION ON ALL DRAWINGS WITHIN A REASONABLE TIME BEFORE PERFORMING ANY WORK AND UPON DISCOVERY OF ANY OMISSION AND/OR CONFLICT IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE IN WRITING OF ANY OMISSIONS, CONFLICTS AND DISCREPANCIES. THE CONTRACTOR SHALL COORDINATE THE WORK OF ALL SUBCONTRACTORS/TRADES TO ACHIEVE THE DESIGN INTENT AND SPECIFIED REQUIREMENTS AND IS RESPONSIBLE TO COMPLETE ANY AND ALL WORK ASSOCIATED WITH SUCH COORDINATION.

7. TEMPORARY PROTECTION: THE CONTRACTOR SHALL ERECT AND MAINTAIN A TEMPORARY SAFETY BARRICADE A MINIMUM OF 5'-0" OUTSIDE THE PROJECT AREA AS APPLICABLE TO COMPLETELY ENCOMPASS THE PROJECT AREA TO PROTECT THE OCCUPANTS AND THE PUBLIC. THE BARRICADE SHALL REMAIN DURING THE DURATION OF THE PROJECT OR UNTIL APPROVAL IS GIVEN BY THE OWNER'S REPRESENTATIVE FOR ITS REMOVAL. THE TEMPORARY SAFETY BARRICADE MAY BE A DUST BARRIER, A DESIGNATED STAGING AREA WILL BE ALLOWED AT THE PROJECT SITE AS INDICATED ON THE DRAWINGS. STAGING AREA SHALL BE USED FOR MATERIALS, DUMPSTER, HEAVY EQUIPMENT, LIFT, ETC. THE CONTRACTOR SHALL ERECT CONSTRUCTION FENCING AROUND THEIR DESIGNATED STAGING AREA TO PREVENT UNAUTHORIZED PERSONS FROM ENTERING. THE CONSTRUCTION FENCING MAY BE CHAIN LINK OR WOOD. ANY EXTERIOR BARRICADES AND FENCING SHALL BE LOCATED AS REQUIRED AND IN SUCH A MANNER AS TO MAINTAIN AT ALL TIMES ALL REQUIRED FIRE LANES AND FIRE EXITS FROM THE PROJECT BUILDING/SITE AS WELL AS ADJACENT OCCUPIED BUILDINGS DURING THE CONSTRUCTION CONTRACT PERIOD.

8. COMPLETION OF THE WORK: THE CONTRACTOR SHALL IN THE EXECUTION OF WORK BY ALL TRADES, PERFORM ANY AND ALL CUTTING, PATCHING, REPAIRING, RESTORING AND THE LIKE NECESSARY TO COMPLETE THE WORK. THE CONTRACTOR SHALL RESTORE ANY DAMAGED OR AFFECTED SURFACES RESULTING FROM THE WORK OF THIS CONTRACT TO THEIR ORIGINAL CONDITION AND FINISH TO THE SATISFACTION OF THE OWNER. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION, INCLUDING, BUT NOT LIMITED TO SAFETY PRECAUTIONS, FASTENERS, ANCHORAGES, ETC. UNLESS NOTED OTHERWISE.

9. PERMITS: THE CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS REQUIRED.

10. RECORD DRAWINGS: THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A SET OF "AS-BUILT" DRAWINGS OF HIS WORK.

11. DIMENSIONS: UNLESS OTHERWISE NOTED IN THE CONSTRUCTION DOCUMENTS, ALL DIMENSIONS ARE TAKEN TO THE [FACE OF EXISTING STRUCTURE, OR] FACE OF FINISH CONSTRUCTION. WRITTEN DIMENSIONS PREVAIL. DO NOT SCALE DRAWINGS UNLESS GRAPHIC SCALE IS PROVIDED ON THE SPECIFIC DRAWING. SHOULD DIMENSIONAL DISCREPANCIES BE FOUND, CONTACT THE OWNER'S REPRESENTATIVE WITHIN 10 WORKING DAYS OF ACCEPTANCE OF PROJECT FOR CLARIFICATION PRIOR TO PROCEEDING WITH THE WORK.

12. CLEAN UP: THE CONTRACTOR SHALL CLEAN AND REMOVE ALL TRASH, DIRT, DEBRIS, AND SPILLAGE ARISING FROM THE WORK AREA DAILY TO THE SATISFACTION OF THE OWNER AND THE DESIGNER ON RECORD, INCLUDING BUT NOT LIMITED TO: CLEANING OF DIRT, PUTTY, PAINT, OVERSPRAY, DUST, ETC. FROM FLOORS, WORK AREAS, COUNTER TOPS, DOOR AND WINDOW FACES AND FRAMES.

13. SAFE OPERATIONS: THE CONTRACTOR SHALL ENSURE THAT ANY AND ALL CONSTRUCTION ACTIVITIES DO NOT IMPACT OR INTERFERE WITH NORMAL OR SAFE OPERATIONS AT THE PROJECT SITE. THE CONTRACTOR SHALL TAKE ALL SAFETY PRECAUTIONS NECESSARY TO PROTECT THE BUILDING OCCUPANTS AND THE PUBLIC THROUGHOUT THE DURATION OF THIS PROJECT.

14. PREVENT DAMAGE: THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO EXISTING AND COMPLETED STRUCTURES/LANDSCAPING/SITE IMPROVEMENTS OF THIS PROJECTS AS WELL AS ON ADJACENT PROPERTY(IES) TO THAT OF THIS CONTRACTED WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR LABOR/MATERIAL COSTS OF ANY DAMAGES TO ANY CONSTRUCTED WORK AND/OR EXISTING STRUCTURES/LANDSCAPING/SITE IMPROVEMENTS CAUSED BY HIS OPERATIONS. ANY DAMAGES SHALL BE REPAIRED WITHIN 10 WORKING DAYS OF NOTIFICATION. NO EXCEPTIONS.

15. DO NOT BLOCK EXITS: THE CONTRACTOR SHALL NOT BLOCK OR OBSTRUCT ANY FIRE LANES AND FIRE EXIT WAYS DURING THE EXECUTION OF WORK THROUGHOUT THIS PROJECT DURING THE CONSTRUCTION CONTRACT PERIOD.

16. SOUND AND NOISE CONTROL: THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE OWNER'S REPRESENTATIVE ALL WORK THAT WILL GENERATE EXCESSIVE NOISE WHICH MAY DISRUPT NORMAL OPERATING ACTIVITIES.

17. MATERIAL DISPOSAL: UNLESS NOTED IN THE DRAWINGS OR SPECIFICATIONS, MATERIALS RESULTING FROM THE DEMOLITION WORK SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL LAWS, RULES AND REGULATIONS OR AS SPECIFIED.

18. DEFINITIONS:
- a) "FURNISH" MEANS "FURNISH ONLY". MATERIALS OR ITEMS TO BE FURNISHED SHALL BE NEW AND CONSIGNED TO THE CONTRACTOR AND DELIVERED TO THE SITE.
 - b) "INSTALL" MEANS "INSTALL ONLY" FURNISHED MATERIALS OR ITEMS. SUCH MATERIALS OR ITEMS SHALL BE RECEIVED AT THE SITE, UNLOADED, STORED, PROTECTED, AND INSTALLED IN PLACE, INCLUDING FINAL CONNECTION, UNLESS SUCH WORK IS SPECIFICALLY EXCLUDED.
 - c) "PROVIDE" MEANS "FURNISH AND INSTALL" COMPLETE, IN PLACE AND READY FOR USE, INCLUDING FINAL CONNECTIONS. ALL WORK SHOWN IN THE DRAWINGS SHALL BE UNDERSTOOD AS "PROVIDE" WHETHER NOTES INDICATING "PROVIDE" ARE INDICATED OR NOT.
 - d) WORDS "CONTRACTOR SHALL" ARE IMPLIED AND SHALL BE SO UNDERSTOOD WHEREVER A DIRECTION IS STATED IN IMPERATIVE MOOD AND DIRECTION "PROVIDE" IS USED.
 - e) UNLESS SPECIFICALLY STATED AS "EXISTING", ALL MATERIALS SHALL BE NEW IN ALL CASES WHEN MATERIAL NOTES ARE ADDED TO DRAWINGS. USES OF "FURNISH" AND "PROVIDE" AUTOMATICALLY MEAN "NEW" UNLESS SPECIFICALLY STATED AS "EXISTING".

19. PRE-CONSTRUCTION ASSESSMENT: BEFORE STARTING ANY WORK ON ANY EXISTING CONSTRUCTION THE CONTRACTOR SHALL MAKE A THOROUGH AND COMPLETE INVESTIGATION OF ANY RECIPIENT SURFACES AND DETERMINE THEIR SUITABILITY TO RECEIVE REQUIRED ADDITIONAL CONSTRUCTION AND FINISHES. THE CONTRACTOR SHALL MAKE WHATEVER REPAIRS AND CONDITIONING REQUIRED TO PROPERLY PREPARE SUCH SURFACES.

20. EXISTING UTILITIES: PRIOR TO COMMENCING ANY CONSTRUCTION THE CONTRACTOR SHALL COORDINATE AND VERIFY THE LOCATIONS OF ALL UNDERGROUND OR OVERHEAD UTILITY LINES WITH THE OWNER'S REPRESENTATIVE TO AVOID CONFLICTS AND/OR SHUT DOWN DURING ALL STAGES OF CONSTRUCTION.

21. SUBCONTRACTORS: THE USE OF UNLICENSED CONTRACTORS IS STRICTLY PROHIBITED. THE CONTRACTOR IS RESPONSIBLE TO THE OWNER FOR ACTIONS OF THE CONTRACTOR'S EMPLOYEES, SUBCONTRACTORS AND THEIR AGENTS AND EMPLOYEES, AND OTHER PERSONS PERFORMING ANY PORTIONS OF WORK UNDER CONTRACT WITH THE CONTRACTOR.

22. HAZARDOUS MATERIALS: HAZARDOUS MATERIAL ABATEMENT MEASURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AS INDICATED IN THE DRAWINGS AND/OR SPECIFICATIONS. BURNING OF ANY DEBRIS IS NOT PERMITTED. EXPLOSIVES ARE NOT ALLOWED.

23. WOOD: ALL NEW WOOD SHALL BE TERMITE TREATED. ALL PAINT ON WOOD SURFACES SHALL CONTAIN A MILDEWCIDE ADDITIVE. PROVIDE WRITTEN CERTIFICATION OF TERMITE TREATMENT.

24. DISSIMILAR METAL PROTECTION: THE CONTRACTOR SHALL PROVIDE DISSIMILAR METAL PROTECTION.

25. MECHANICAL AND ELECTRICAL ITEMS: ALL NEW EXPOSED MECHANICAL AND ELECTRICAL PIPING, CONDUITS, DUCTWORK, SUPPORTS AND RELATED FITTINGS, AND FASTENERS ARE TO BE PAINTED THE SAME COLOR/SHEEN AS THE COLOR/SHEEN OF THE SURFACE IT IS ATTACHED TO UNLESS OTHERWISE NOTED.

26. PAINTING: PAINT ALL NEW WORK THAT IS COMPLETED AND LEFT EXPOSED TO VIEW, UNLESS OTHERWISE NOTED. PAINT PRODUCT(S) SHALL BE COMPATIBLE TO THE SUBSTRATE OR SURFACE IT IS APPLIED TO AND SHALL RECEIVE THE PROPER SURFACE PREPARATION AND COATINGS AS RECOMMENDED BY THE PAINT MANUFACTURER. THE CONTRACTOR SHALL CONFIRM WITH THE DESIGNER ON RECORD ALL FINISH PAINT COLOR AND SHEEN SELECTION(S).

27. SHORING WORK: THE CONTRACTOR SHALL PROPERLY SHORE ANY AND ALL BUILDING WALLS, CEILINGS AND ANY OTHER COMPONENTS AFFECTED BY THE WORK AS REQUIRED TO MAINTAIN A SAFE, STABLE AND STRUCTURALLY SOUND STRUCTURE.

28. PROTECTION OF PROPERTY DURING WORK: THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A WATERPROOF AND SECURE COVERING FOR ANY AND ALL BUILDING COMPONENTS EXPOSED TO WEATHER, THEFT, OR VANDALISM AFTER THE REMOVAL OF ANY EXTERIOR BUILDING COMPONENT INCLUDING BUT NOT LIMITED TO ROOFING, EXTERIOR WALLS, FLOORS, SIDING, WINDOWS, DOORS ETC.

29. BUILDING USER'S STORED ITEMS: THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE 24-HOUR PROTECTION OF ALL BUILDING USER'S ITEMS LEFT INSIDE THE BUILDING BY THE USER FOR THE DURATION OF THE CONSTRUCTION CONTRACT PERIOD. THE FOLLOWING BUT NOT LIMITED TO LOSS AND OR DAMAGE RELATED TO THEFT, FIRE, WATER, CLIMATE, FINISH, FORM/FUNCTION ETC SHALL BE COVERED.

30. TILE WORK: ALL CERAMIC, PORCELAIN, STONE AND GLASS TILE WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST TILE COUNCIL OF NORTH AMERICA (TCNA) HANDBOOK.

31. COMPATIBILITY OF MATERIALS: ENSURE COMPATIBILITY OF MATERIALS AND SYSTEMS UNLESS A SINGLE SOURCE MANUFACTURER OF MULTI COMPONENT SYSTEMS (I.E BUT NOT LIMITED TO WATERPROOFING, ROOFING, ETC.) IS USED.

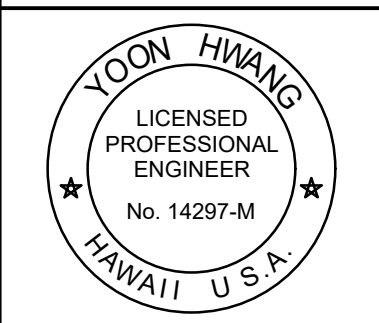
THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING IN WRITING FROM THE RESPECTIVE MANUFACTURER'S TECHNICAL DIRECTOR ON MANUFACTURER'S LETTERHEAD THAT THEIR RESPECTIVE PRODUCTS ARE COMPATIBLE TO EACH OTHER AND THEIR RESPECTIVE WARRANTIES WILL BE HONORED WHENEVER AND WHEREVER THE CONTRACTOR USES PRODUCTS THAT ARE APPLIED TO ANOTHER MANUFACTURER'S PRODUCT AND/OR BUILT UP ON A SUBSTRATE.

32. "EXISTING" VERSUS "NEW" WORK: ALL BUILDING, AND DETAIL COMPONENTS, SHOWN ON THESE DRAWINGS SHALL BE UNDERSTOOD AS "NEW" UNLESS PREFIXED BY THE WORD "EXISTING". IN THE EVENT THE CONTRACTOR DISCOVERS CONFLICTING INFORMATION, THE CONTRACTOR SHALL IMMEDIATELY SUBMIT IN WRITING, A FORMAL REQUEST FOR INFORMATION ("RFI") TO THE DESIGNER ON RECORD FOR A RESOLUTION TO THE RFI.

33. ALL UTILITIES AND APPURTENANCES SHALL BE PROTECTED AT ALL TIMES DURING CONSTRUCTION. IF DAMAGED, CONTRACTOR TO REPAIR AT NO COST TO THE GOVERNMENT.

34. NO WORK SHALL BE COVERED UP OR ENCLOSED UNTIL INSPECTED, TESTED, AND APPROVED BY THE AUTHORITY HAVING JURISDICTION.

BID ALTERNATES		
ADDITIVE BID ALTERNATES	LOCATION	DESCRIPTION
#1	B303	ALL WORK ASSOCIATED WITH LIGHT FIXTURE REPLACEMENT IN THE ADMIN SECTION OF BUILDING B303
#2	B303	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART ELECTRIC METER
#3	B303	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART WATER METER
#4	BIRKHMIMER	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART ELECTRIC METER
#5	BIRKHMIMER	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART WATER METER
#6	BIRKHMIMER	ALL WORK ASSOCIATED WITH BATHROOM PLUMBING UPGRADES
#7	PSB	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART ELECTRIC METER
#8	PSB	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART WATER METER



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 SIGNATURE: *[Signature]* EXPIRATION DATE: 4/30/2024

DATE	DESCRIPTION	BY

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE: 3/1/2024

STATE OF HAWAII

DEPARTMENT OF DEFENSE

DIAMOND HEAD STATE MONUMENT

TMK: 3-1-042:600

4204 DIAMOND HEAD RD HONOLULU, HI 96815

BIRKHMIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

ARCHITECTURAL GENERAL NOTES AND BID ALTERNATES

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 2 OF 123

G-001

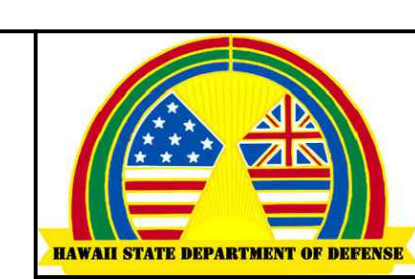
1 CODE INFORMATION

3 INDEX TO DRAWINGS

Table with 2 columns: GENERAL, CODES AND REFERENCES, PARCEL INFORMATION, DEVELOPMENT STANDARDS, BUILDING CODE - BUILDING 303, BUILDING CODE - BIRKHIMER, BUILDING CODE - PUBLIC SERVICE BUILDING. Includes project name, address, zoning, and building details.

Table with 3 columns: SHEET NO., SHEET ID., SHEET TITLE. Lists sheets 1-62 across various categories: CIVIL, STRUCTURAL, ARCHITECTURAL, MECHANICAL.

Table with 3 columns: SHEET NO., SHEET ID., SHEET TITLE. Lists sheets 63-123 across categories: PLUMBING, ELECTRICAL.



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Table with columns: INK, INK, SH, DATE, DESCRIPTION. Includes a grid for tracking document revisions.

CONSTRUCTION DOCUMENTS

DEPARTMENT OF DEFENSE

STATE OF HAWAII, DIAMOND HEAD STATE MONUMENT, 4204 DIAMOND HEAD RD HONOLULU, HI 96815, BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

SCALE: AS NOTED, STATE JOB NO. CA-202313-C, FEDERAL PROJECT NO., SHEET 3 OF 123, G-002

CONSTRUCTION NOTES:

- 1. ALL CONSTRUCTION WORK SHALL BE DONE IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, SEPTEMBER 1986, AND STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION, SEPTEMBER 1984, AS AMENDED, OF THE DEPARTMENTS OF PUBLIC WORKS, CITY & COUNTY OF HONOLULU, AND THE COUNTIES OF KAUAI, MAUI, AND HAWAII AND THE STANDARD PLANS OF THE STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION, HIGHWAYS DIVISION, INCLUSIVE DATED JULY 1, 1986, AS AMENDED AND PARK STANDARD DETAILS FOR PARKS AND RECREATION CONSTRUCTION, MAY 1990, AS AMENDED, OF THE DEPARTMENT OF PARKS AND RECREATION, CITY & COUNTY OF HONOLULU.
- 2. THE CONTRACTOR SHALL PROVIDE ACCESS TO AND FROM PUBLIC STREETS AT ALL TIMES.
- 3. WHEN TRENCH EXCAVATION IS ADJACENT TO OR UNDER EXISTING STRUCTURES OR FACILITIES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY SHEETING AND BRACING THE EXCAVATION AND STABILIZING THE EXISTING GROUND TO RENDER IT SAFE AND SECURE FROM POSSIBLE SLIDES, CAVE-INS AND SETTLEMENT AND FOR PROPERLY SUPPORTING EXISTING STRUCTURES AND FACILITIES WITH BEAMS, STRUTS OR UNDER-PINNING TO FULLY PROTECT THEM FROM DAMAGE.
- 4. BACKFILL UNDER EXISTING STRUCTURES OR FACILITIES SHALL BE SANDY OR GRANULAR MATERIAL COMPLETELY PLACED AS SOON AS THE PIPE IS LAID AND TESTED. THE BACKFILL MATERIAL SHALL BE RAMMED WITH PROPER TOOLS UNTIL COMPACTED TO A MINIMUM OF 90 PERCENT OF ITS MAXIMUM DENSITY.
- 5. ALL EXCAVATION WORK CALLED FOR ON THE PLANS AND NOT ITEMIZED IN THE PROPOSAL AND ALL EXCAVATION WORK NOT CALLED FOR BUT REQUIRED FOR THE CONSTRUCTION OF THIS PROJECT SHALL BE CONSIDERED INCIDENTAL TO UNCLASSIFIED TRENCH EXCAVATION.
- 6. ALL ABANDONED PIPE OPENINGS SHALL BE PLUGGED WITH CLASS DWS 2000 CONCRETE TO A DEPTH OF 1-1/2 TIMES THE DIAMETER OF THE PIPE.
- 7. VERIFY AND CHECK ALL DIMENSIONS AND DETAILS SHOWN ON THE DRAWINGS PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR DIRECTION.
- 8. NO CONTRACTOR SHALL PERFORM ANY CONSTRUCTION ACTIVITY SO AS TO CAUSE FALLING ROCK, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATER COURSES. SHOULD SUCH VIOLATIONS OCCUR, THE COSTS INCURRED FOR ANY REMEDIAL ACTION SHALL BE PAYABLE BY THE CONTRACTOR.
- 9. THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA. ALL DAMAGED PORTIONS SHALL BE REPLACED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE AFFECTED UTILITY COMPANY AND SHALL BE THE CONTRACTORS RESPONSIBILITY. PERSONAL INJURY RESULTING FROM CONTACT WITH EXISTING UTILITIES SHALL BE THE CONTRACTORS RESPONSIBILITY. WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR NEW LINES.
- 10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFORMANCE WITH THE APPLICABLE PROVISIONS OF CHAPTER 54, WATER QUALITY STANDARDS, AND CHAPTER 55, WATER POLLUTION CONTROL, OF TITLE 11, ADMINISTRATIVE RULES OF THE STATE DEPARTMENT OF HEALTH.
- 11. THE CONTRACTOR SHALL NOTIFY ALL AGENCIES TO VERIFY THE ACTUAL LOCATIONS OF ALL UTILITIES IN THE PROJECT AREA PRIOR TO EXCAVATING. THE CONTRACTOR SHALL COORDINATE ALL WORK.
- 12. THE CONTRACTOR SHALL RESTORE TO THEIR ORIGINAL CONDITION OR BETTER, ALL IMPROVEMENTS DAMAGED AS A RESULT OF THE CONSTRUCTION, INCLUDING PAVEMENTS, EMBANKMENTS, CURBS, SIGNS, LANDSCAPING, STRUCTURES, UTILITIES, WALLS, FENCES, ETC. UNLESS PROVIDED FOR SPECIFICALLY IN THE PROPOSAL. DEMOLITION AND RESTORATION OF EXISTING ITEMS SHALL BE INCIDENTAL AND INCLUDED WITHIN THE AMOUNT PAID FOR UNCLASSIFIED TRENCH EXCAVATION.
- 13. CONTRACTOR SHALL EXERCISE EXTREME CAUTION TO PRESERVE STREET MONUMENTS.
- 14. WHENEVER THE CENTER OF A STREET SURVEY MONUMENT IS LESS THAN THREE (3) FEET AWAY FROM THE EDGE OF TRENCH, THE CONTRACTOR SHALL RETAIN A LICENSED LAND SURVEYOR TO REFERENCE THE LOCATION OF SAID STREET MONUMENT. ALL REFERENCING WORK SHALL BE SUBMITTED TO THE DEPARTMENT OF DESIGN AND CONSTRUCTION, SURVEY BRANCH (527-5329), FOR REVIEW AND APPROVAL BEFORE COMMENCEMENT OF CONSTRUCTION ADJACENT TO STREET MONUMENT.
- 15. STREET MONUMENTS THAT ARE DISTURBED SHALL BE RESTORED UNDER THE LICENSED LAND SURVEYOR'S DIRECTION. ANY NEW DATA SUCH AS ELEVATIONS SHALL BE CERTIFIED BY THE SURVEYOR, AND SUBMITTED TO THE DEPARTMENT OF PLANNING AND PERMITTING.
- 16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING/RECONSTRUCTING ALL CONCRETE CURBS AND GUTTERS, CONCRETE SWALES, DRIVEWAYS AND SIDEWALKS DAMAGED DURING CONSTRUCTION.
- 17. DURING NON-WORKING HOURS, THE TRENCHES SHALL BE COVERED WITH NON-SKID STEEL PLATES AND ALL LANES MAINTAINED OPEN FOR TRAFFIC.
- 18. THE CONTRACTOR SHALL PROVIDE ACCESS TO AND FROM DRIVEWAYS AND PUBLIC STREETS AT ALL TIMES EXCEPT AS NOTED ON THE PLAN.
- 19. EXISTING TOPOGRAPHIC DATA WAS TAKEN FROM TOPOGRAPHIC MAP PREPARED BY CONTROL POINT SURVEYING, INC, DATED JANUARY 16, 2024.

CONSTRUCTION NOTES CONTINUED:

- 20. ALL WORK CALLED FOR ON THE PLANS AND NOT ITEMIZED IN THE PROPOSAL AND ALL WORK NOT CALLED FOR BUT REQUIRED FOR THE CONSTRUCTION OF THIS PROJECT, SHALL BE CONSIDERED INCIDENTAL.
- 21. UTILITIES SHALL BE INSTALLED PURSUANT TO THE PROVISIONS OF ORDINANCE NO. 2875 AS AMENDED BY ORDINANCE NO. 3357 (UNDERGROUND UTILITIES).
- 22. NO BLASTING SHALL BE ALLOWED ON THIS PROJECT.
- 23. THE CONTRACTOR SHALL NOTIFY THE ONE CALL CENTER AT (866) 423-7287 AT LEAST 5 DAYS PRIOR TO THE START OF EXCAVATION OR TRENCHING.
- 24. PURSUANT TO CHAPTER 14, ARTICLE 15, OF THE REVISED ORDINANCES OF HONOLULU 1990 AS AMENDED, THE PERMITTEE/CONTRACTOR SHALL RETAIN THE SERVICES OF:
 - A LICENSED PROFESSIONAL ENGINEER TO BE RESPONSIBLE DURING CONSTRUCTION AND PREPARE THE CERTIFICATION AND REPORT AFTER GRADING.
 - A LICENSED LAND SURVEYOR TO PERFORM A SURVEY OF THE FINISHED GRADING FOR THE PREPARATION OF AN AS BUILT GRADING PLAN IF REQUIRED BY DPP.

EROSION CONTROL NOTES AND BEST MANAGEMENT PRACTICES (BMPS):

- 1. CONTRACTOR SHALL REFER TO THE CITY AND COUNTY OF HONOLULU STORMWATER BEST MANAGEMENT PRACTICE, MANUAL, CONSTRUCTION DATED NOVEMBER 2011 FOR BEST MANAGEMENT PRACTICES DETAILS AND SPECIFICATIONS.
- 2. MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY CLEARING AND GRUBBING WORK IS INITIATED. THESE MEASURES SHALL BE PROPERLY CONSTRUCTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
- 3. CONSTRUCTION SHALL BE SEQUENCED TO MINIMIZE THE EXPOSURE TIME OF CLEARED SURFACE AREA.
- 4. ALL CONTROL MEASURES SHALL BE CHECKED AND REPAIRED AS NECESSARY.
- 5. PROVIDE CONSTRUCTION ENTRANCE FOR EACH INGRESS AND EGRESS.
- 6. PRE-CONSTRUCTION VEGETATIVE GRADE COVER SHALL NOT BE DESTROYED, REMOVED OR DISTURBED MORE THAN TWENTY (20) CALENDAR DAYS PRIOR TO SITE DISTURBANCE.
- 7. TEMPORARY SOIL STABILIZATION WITH APPROPRIATE VEGETATION SHALL BE APPLIED ON AREAS THAT WILL REMAIN UNFINISHED FOR MORE THAN FOURTEEN (14) CALENDAR DAYS.
- 8. STORM WATER FLOWING TOWARD THE CONSTRUCTION AREA SHALL BE DIVERTED BY USING APPROPRIATE CONTROL MEASURES AS PRACTICAL.
- 9. ALL BMPS SHALL BE CONSTRUCTED AND OPERATIONAL PRIOR TO GRADING PHASE.
- 10. ADDITIONAL DUST FENCE MAY BE REQUIRED AND THAT SPECIFIC LOCATIONS SHALL BE DETERMINED AT THE TIME THE PRE-CONSTRUCTION MEETING IS HELD.
- 11. CONTRACTOR SHALL PROVIDE TEMPORARY PROTECTION FOR EXISTING CATCH BASINS, DURING CONSTRUCTION AND UNTIL CONSTRUCTION AREA IS STABILIZED AND FINAL GRADES ARE ACHIEVED.
- 12. STOCKPILES SHALL NOT BE LOCATED IN DRAINAGE WAYS OR OTHER AREAS OF CONCENTRATED FLOWS. DURING PERIODS OF WET WEATHER, SUCH AS THE RAINY SEASON, STOCKPILES SHALL BE STABILIZED. COVER STOCKPILES IN PLASTIC WHEN NOT IN USE.
- 13. DUST CONTROL SHOULD BE APPLIED TO REDUCE DUST EMISSIONS. CONTRACTOR TO SPRAY WATER AS NECESSARY.
- 14. SEDIMENT TRAPPING DEVICES SUCH AS FENCES, TRAPS, BASINS OR BARRIERS SHALL BE USED DOWN SLOPE OF ALL DISTURBED AREAS AND AROUND THE BASE OF ALL MATERIAL STOCKPILES. COVER STOCKPILES WITH PLASTIC.
- 15. SURFACE FLOW FROM ABOVE AN EXPOSED SLOPE SHALL NOT BE ALLOWED TO FLOW OVER THE SLOPE WITHOUT PROTECTION. SLOPE PROTECTION SHALL BE USED ON AREAS WITH SLOPES GREATER THAN 50% AND ON AREAS OF MODERATE SLOPES THAT ARE PRONE TO EROSION. SLOPE PROTECTION SHALL ALSO BE USED ON GROUND SURFACES AND STOCKPILES EXPOSED DURING WET WEATHER. ANCHOR PLASTIC OVER RETAINING WALL EXCAVATION.
- 16. ALL STORM DRAIN INLETS ON SITE, AND THOSE OFFSITE WHICH MAY RECEIVE RUNOFF FROM THE SITE SHALL USE AN INLET PROTECTION DEVICE.
- 17. ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED PRIOR TO REMOVING EROSION AND SEDIMENT MEASURES. ALL TEMPORARY EROSION AND SEDIMENT MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED. TRAPPED SEDIMENT AND AREAS OF DISTURBED SOIL WHICH RESULT FROM THE REMOVAL OF THE TEMPORARY MEASURES SHALL BE IMMEDIATELY PERMANENTLY STABILIZED.
- 18. AREAS TO BE PERMANENTLY SEEDED/MULCHED WITHIN 14 DAYS OR FINAL GRADE EXCEPT HOUSE AREA WHICH WILL BE FORMED AND SLABBED WITHIN 14 DAYS.
- 19. CONTRACTOR TO PROVIDE TEMPORARY INLET PROTECTION UPON INSTALLATION OF DRAINAGE IMPROVEMENTS.

EROSION CONTROL NOTES AND BEST MANAGEMENT PRACTICES (BMPS) CONTINUED:

- 20. DISTURBED AREAS OF CONSTRUCTION SITES THAT WILL NOT BE REDISTURBED FOR TWENTY-ONE DAYS OR MORE WILL BE STABILIZED (GRASSED OR GRAVELED) BY NO LATER THAN THE FOURTEENTH DAY AFTER LAST DISTURBANCE.
- 21. CONTRACTOR SHALL COMPLETE THE CITY AND COUNTY OF HONOLULU "CONSTRUCTION SITE BMPs WEEKLY CHECKLIST" FORM EACH WEEK AND SUBMIT THE FORM TO THE DEPARTMENT OF PLANNING AND PERMITTING CIVIL ENGINEER BRANCH (CEB) INSPECTOR AT THE END OF EACH WEEK FOR ALL GRADING, GRUBBING AND STOCKPIILING PERMITS THAT RESULT IN THE DISTURBANCE OF ONE ACRE OR MORE OF TOTAL LAND AREA. REQUESTS FOR ADJUSTMENTS TO SUBMISSION SCHEDULE SHALL BE COORDINATED WITH THE CEB INSPECTOR. THE FORM SUBMITTAL CONCLUDES WHEN THE CEB INSPECTOR DETERMINES THAT THE WORK UNDER THE PERMIT IS COMPLETE.

PUBLIC HEALTH SAFETY AND CONVENIENCE NOTES:

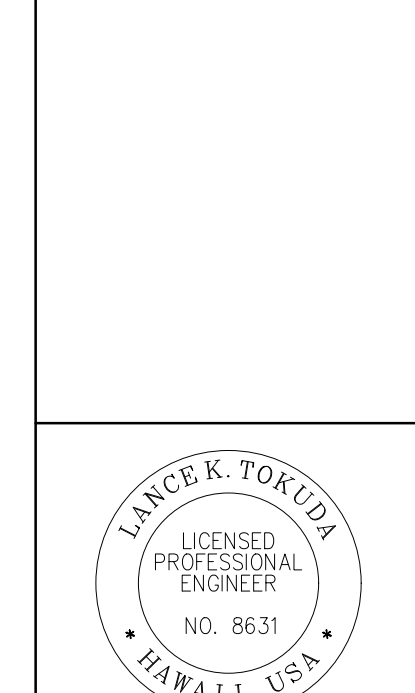
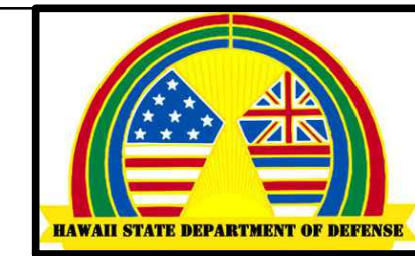
- 1. CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH, SAFETY AND ENVIRONMENTAL QUALITY.
- 2. THE CONTRACTOR AT HIS/HER EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM RUBBISH, DUST, NOISE, EROSION, ETC. THE WORK SHALL BE DONE IN CONFORMANCE WITH THE AIR AND WATER POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.
- 3. NO CONTRACTOR SHALL PERFORM ANY CONSTRUCTION OPERATION SO AS TO CAUSE FALLING ROCKS, SILT OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS AS NECESSARY.
- 4. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES, AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE AND SAFETY OF THE PUBLIC.
- 5. THE CONTRACTOR'S ATTENTION IS DIRECTED TO CHAPTER 46, PUBLIC HEALTH REGULATIONS, DEPARTMENT OF HEALTH, STATE OF HAWAII, "COMMUNITY NOISE CONTROL," IN WHICH MAXIMUM PERMISSIBLE NOISE LEVELS HAVE BEEN SET. IF THE CONSTRUCTION WORK REQUIRES A PERMIT FROM THE DIRECTOR OF HEALTH, THE CONTRACTOR SHALL OBTAIN A COPY OF CHAPTER 46 AND BECOME FAMILIAR WITH THE NOISE LEVEL RESTRICTIONS AND THE PROCEDURES FOR OBTAINING A PERMIT FOR THE CONSTRUCTION ACTIVITIES. APPLICATION AND INFORMATION ON VARIANCES ARE AVAILABLE FROM THE ENVIRONMENTAL PROTECTION AND HEALTH SERVICES DIVISION, 1250 PUNCHBOWL ST., HONOLULU, HI 96813 OR BY TELEPHONE (548-6455).

GRADING NOTES:

- 1. ALL GRADING WORK SHALL BE DONE IN ACCORDANCE WITH CHAPTER 14, ARTICLES 13, 14, 15 AND 16, AS RELATED TO GRADING, SOIL EROSION AND SEDIMENT CONTROL OF THE REVISED ORDINANCES OF HONOLULU, 1990, AS AMENDED, AND SOILS REPORT BY _____ DATED _____.
- 2. NO CONTRACTOR SHALL PERFORM ANY GRADING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
- 3. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 60.1, "AIR POLLUTION CONTROL".
- 4. THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA. WHEREVER CONNECTIONS OF NEW UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES.
- 5. ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE.
- 6. ALL SLOPES AND EXPOSED AREAS SHALL BE SODDED OR PLANTED AS SOON AS FINAL GRADES HAVE BEEN ESTABLISHED. PLANTING SHALL NOT BE DELAYED UNTIL ALL GRADING WORK HAS BEEN COMPLETED. GRADING TO FINAL GRADE SHALL BE CONTINUOUS, AND ANY AREA WITHIN WHICH WORK HAS BEEN INTERRUPTED OR DELAYED SHALL BE PLANTED.
- 7. FILLS ON SLOPES STEEPER THAN 5:1 SHALL BE KEYED.
- 8. THE CITY SHALL BE INFORMED OF THE LOCATION OF THE BORROW/DISPOSAL SITE FOR THE PROJECT WHEN THE APPLICATION FOR A GRADING PERMIT IS MADE. THE BORROW/DISPOSAL SITE MUST ALSO FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCE.
- 9. NO GRADING WORK SHALL BE DONE ON SATURDAYS, SUNDAYS AND HOLIDAYS AT ANY TIME WITHOUT PRIOR NOTICE TO THE DIRECTOR, D.P.P., PROVIDED SUCH GRADING WORK IS ALSO IN CONFORMANCE WITH THE COMMUNITY NOISE CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 46, "COMMUNITY NOISE CONTROL".

GRADING NOTES CONTINUED:

- 10. THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.
- 11. THE CONTRACTOR/DEVELOPER/OWNER OF THE PROJECT SHALL BE RESPONSIBLE FOR ALL GRADING OPERATIONS TO BE PERFORMED IN CONFORMANCE WITH APPLICABLE PROVISIONS OF THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS," AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL", AS WELL AS CHAPTER 14 OF THE REVISED ORDINANCES OF HONOLULU, AS AMENDED. BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING CONSTRUCTION.
 - IF REQUIRED, THE CONTRACTOR SHALL OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COVERAGE(S) FOR THE FOLLOWING:
 - 1.1. DISCHARGES OF HYDROTESTING EFFLUENT, DEWATERING EFFLUENT, AND WELL DRILLING EFFLUENT TO STATE WATERS.
- 1. IN ACCORDANCE WITH STATE LAW, ALL DISCHARGES RELATED TO PROJECT CONSTRUCTION OR OPERATIONS ARE REQUIRED TO COMPLY WITH STATE WATER QUALITY STANDARDS (HAWAII ADMINISTRATIVE RULES, CHAPTER 11-54). BEST MANAGEMENT PRACTICES SHALL BE USED TO MINIMIZE OR PREVENT THE DISCHARGE OF SEDIMENT, DEBRIS, AND OTHER POLLUTANTS TO STATE WATERS. PERMIT COVERAGE IS AVAILABLE FROM THE DEPARTMENT OF HEALTH, CLEAN WATER BRANCH AT HTTP://HEALTH.HAWAII.GOV/CWB. THE OWNER/DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR OBTAINING OTHER FEDERAL, STATE, OR LOCAL AUTHORIZATIONS AS REQUIRED BY LAW.
- 2. WHERE APPLICABLE AND FEASIBLE THE MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY EARTH MOVING PHASE OF THE GRADING IS INITIATED.
- 3. TEMPORARY EROSION CONTROLS SHALL NOT BE REMOVED BEFORE PERMANENT EROSION CONTROLS ARE IN-PLACE AND ESTABLISHED.
- 4. TEMPORARY EROSION CONTROL PROCEDURES SHALL BE SUBMITTED FOR APPROVAL PRIOR TO APPLICATION FOR GRADING PERMIT.
- 5. IF THE GRADING WORK INVOLVES CONTAMINATED SOIL, THEN ALL GRADING WORK SHALL BE DONE IN CONFORMANCE WITH APPLICABLE STATE AND FEDERAL REQUIREMENTS.
- 6. BUILDING PERMIT FOR RETAINING WALLS SHALL BE OBTAINED PRIOR TO COMMENCEMENT OF GRADING WORK ON SITE.
- 7. FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL NOTIFY THE CIVIL ENGINEERING BRANCH, D.P.P. AT 768-8084 TO ARRANGE FOR INSPECTIONAL SERVICES AND SUBMIT TWO (2) SETS OF APPROVED CONSTRUCTION PLANS SEVEN (7) DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION WORK. FOR CITY PROJECTS, THE CONTRACTOR SHALL COORDINATE INSPECTIONAL SERVICES WITH THE RESPONSIBLE CITY AGENCY.
- 8. PURSUANT TO CHAPTER 6E, HRS, IN THE EVENT ANY ARTIFACTS OR HUMAN REMAINS ARE UNCOVERED DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY SUSPEND WORK AND NOTIFY THE HONOLULU POLICE DEPARTMENT, THE STATE DEPARTMENT OF LAND AND NATURAL RESOURCES-HISTORIC PRESERVATION DIVISION (692-8015). IN ADDITION, FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL INFORM THE CIVIL ENGINEERING BRANCH, D.P.P. (768-8084); AND FOR CITY PROJECTS, NOTIFY THE RESPONSIBLE CITY AGENCY.
- 9. FOR ALL PROJECTS, WHICH WILL DISTURB ONE (1) ACRE OR MORE OF LAND, THE CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL A NOTICE OF GENERAL PERMIT COVERAGE (NGPC) IS RECEIVED FROM THE DEPARTMENT OF HEALTH, STATE OF HAWAII, AND HAS SATISFIED ANY OTHER APPLICABLE REQUIREMENTS OF THE NPDES PERMIT PROGRAM. ALSO, FOR NON-CITY AND OTHER NON-GOVERNMENTAL AGENCY PROJECTS, THE CONTRACTOR SHALL PROVIDE A WRITTEN COPY OF THE NGPC TO THE PERMITTING AND INSPECTION SECTION, CIVIL ENGINEERING BRANCH, D.P.P., AT LEAST SEVEN (7) CALENDAR DAYS BEFORE THE START OF THE CONSTRUCTION. FOR CITY OR OTHER GOVERNMENTAL PROJECTS, THE CONTRACTOR SHOULD PROVIDE A WRITTEN COPY OF THE NGPC TO THE APPROPRIATE CITY DEPARTMENT OR GOVERNMENTAL AGENCY PER THEIR REQUIREMENTS.
- 10. ALL GRADING AND CONSTRUCTION WORK SHALL IMPLEMENT MEASURES TO ENSURE THAT THE DISCHARGE OF POLLUTANTS FROM THE CONSTRUCTION SITE WILL BE REDUCED TO THE MAXIMUM EXTENT PRACTICABLE AND WILL NOT CAUSE OR CONTRIBUTE TO AN EXCEEDANCE OF WATER QUALITY STANDARDS.
- 11. NON-COMPLIANCE TO ANY OF THE ABOVE REQUIREMENTS SHALL MEAN IMMEDIATE SUSPENSION OF ALL WORK, AND REMEDIAL WORK SHALL COMMENCE IMMEDIATELY. ALL COSTS INCURRED SHALL BE BILLED TO THE VIOLATOR. FURTHERMORE, VIOLATORS SHALL BE SUBJECT TO ADMINISTRATIVE, CIVIL AND/OR CRIMINAL PENALTIES.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Lance K. Tokuda 4/30/2024
SIGNATURE EXPIRATION DATE

NO.	DATE	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 3/01/2024

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMMK: 3-1-042:600
BIRKHYMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
CIVIL NOTES
STATE OF HAWAII
SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 4 OF 123
C001

SEWER NOTES:

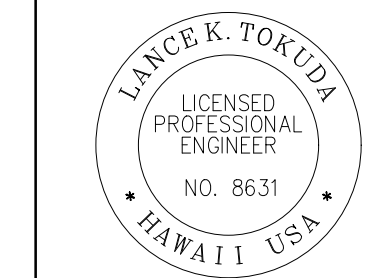
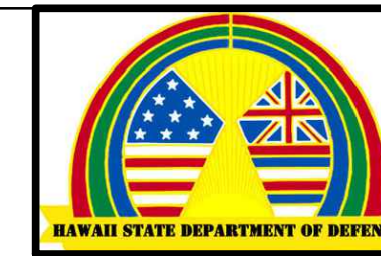
1. ALL SEWER CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE CITY'S "STANDARD SPECIFICATIONS," SEPT. 1986, THE DEPARTMENT OF ENVIRONMENTAL SERVICES "WASTEWATER SYSTEM DESIGN STANDARDS," JULY 2017, AND "WASTEWATER SYSTEM STANDARD DETAILS," JULY 2017, CURRENT CITY PRACTICES AND REVISED ORDINANCES OF HONOLULU, 1990 AS AMENDED.
2. IN THE EVENT THAT ANY CHANGE IN ALIGNMENT OR GRADE FOR THE PROPOSED SEWERS ARE REQUIRED DUE TO UNFORESEEN CONFLICT WITH OTHER UTILITIES, THE ENGINEER IN CHARGE OR THE MAKER OF THE PLANS SHALL BE RESPONSIBLE FOR THE REQUIRED CHANGES WHICH ARE TO BE PRESENTED TO THE DEPARTMENT OF PLANNING AND PERMITTING (DPP) FOR APPROVAL.
3. CRUSHED ROCK CRADLE IS PERMITTED WHERE SOIL IS STABLE. IN AREAS OF UNSTABLE SOIL, THE MAKER OF THE PLANS AND THE CONSTRUCTION ENGINEER WILL DETERMINE THE PIPE SUPPORT REQUIRED.
4. THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS RESEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF THE FACILITIES, INCLUDING AND AFFECTING SEWER LINES, IN THE PRESENCE OF THE WASTEWATER INSPECTOR AND EXERCISE PROPER CARE IN EXCAVATING THE AREA. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL PAY FOR ALL DAMAGED UTILITIES.
5. SEWER LATERALS SHALL BE CLEAR OF AND NOT CONFLICTING WITH ANY OTHER UTILITY. MINIMUM HORIZONTAL AND VERTICAL CLEARANCE SHALL BE STRICTLY OBSERVED AND FOLLOWED.
6. SLOPE FOR SEWER LATERALS SHALL BE A MINIMUM OF 2.00% UNLESS OTHERWISE NOTED.
7. BUILDING PLUMBING FACILITIES SHALL BE CONTROLLED BY SEWER LATERAL INVERTS.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING CONTINUOUS SEWER SERVICE TO ALL AFFECTED AREAS DURING CONSTRUCTION. MAXIMUM SHUTDOWN DURATION IS 6 HOURS WITH APPROVAL BY GOVERNMENT CONSTRUCTION MANAGER. PROVIDE ONE-WEEK ADVANCE NOTICE TO TENANT OPERATIONS MANAGER.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY SEWAGE SPILLS CAUSED DURING CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE STATE DEPARTMENT OF HEALTH AND UTILIZE APPROPRIATE SAMPLING AND ANALYZING PROCEDURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PUBLIC NOTIFICATIONS AND PRESS RELEASES.
10. THE CONTRACTOR SHALL INSTALL "RAINSTOPPER" MANHOLE INSERTS IN ALL SEWER MANHOLES WITH TYPE "SA" FRAME AND COVER.
11. CONFINED SPACE
FOR ENTRY BY INSPECTORS, INTO A PERMIT REQUIRED CONFINED SPACE AS DEFINED IN 29 CFR PART 1910.146(B), THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING:
 - 1.1. ALL SAFETY EQUIPMENT REQUIRED BY THE CONFINED SPACE REGULATIONS APPLICABLE TO ALL PARTIES OTHER THAN THE CONSTRUCTION INDUSTRY, TO INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING:
 - A. FULL BODY HARNESSSES FOR UP TO TWO PERSONNEL.
 - B. LIFELINE AND ASSOCIATED CLIPS.
 - C. INGRESS/EGRESS AND FALL PROTECTION EQUIPMENT.
 - D. TWO-WAY RADIOS (WALKIE-TALKIES) IF OUT OF LINE-OF-SIGHT.
 - E. EMERGENCY (ESCAPE) RESPIRATOR (10 MINUTE DURATION).
 - F. CELLULAR TELEPHONE TO CALL FOR EMERGENCY ASSISTANCE.
 - G. CONTINUOUS GAS DETECTOR (CALIBRATED) TO MEASURE OXYGEN, HYDROGEN SULFIDE, CARBON.
 - H. PERSONAL MULTI-GAS DETECTOR TO BE CARRIED BY INSPECTOR.
 - 1.2. CONTINUOUS FORCED AIR VENTILATION ADEQUATE TO PROVIDE SAFE ENTRY CONDITIONS.
 - 1.3. ONE ATTENDANT/RESCUE PERSONNEL TOPSIDE (TWO, IF CONDITIONS WARRANT IT).
12. WHEN CONNECTING TO A LIVE SEWER LINE, THE CONTRACTOR SHALL ABIDE BY ALL CONDITIONS THAT THE STATE DEPARTMENT OF HEALTH SETS FORTH TO MITIGATE ANY WASTEWATER SPILL THAT MAY OCCUR. THE CONTRACTOR SHALL INFORM THE CITY INSPECTOR FIVE (5) WORKING DAYS PRIOR TO THE ACTUAL CONNECTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY FINES AND PENALTIES DUE TO ANY SPILLS RESULTING FROM THE CONNECTION.
13. FOR SEWER MANHOLE ADJUSTMENTS UPWARD LESS THAN 3", SEE STD. DETAIL S-28. FOR SMH ADJUSTMENTS UPWARD GREATER THAN 3" OR FOR ANY ADJUSTMENTS DOWNWARD, RECONSTRUCT SMH TOP FROM BELOW THE CONE SECTION.
14. THE CONTRACTOR SHALL MAINTAIN VISIBILITY AND MAINTENANCE ACCESS TO LIVE SEWER MANHOLE LOCATIONS AT ALL TIMES, INCLUDING DURING NON-WORK HOURS AND PAVING OPERATIONS.
15. THE CONTRACTOR SHALL USE A MANHOLE DEBRIS CATCHING DEVICE WHEN PERFORMING MANHOLE HEIGHT ADJUSTMENT WORK AND REMOVE ANY CONSTRUCTION DEBRIS THAT HAS FALLEN INTO THE MANHOLE. DISPOSAL OF CONSTRUCTION DEBRIS IN THE SEWER SYSTEM IS STRICTLY PROHIBITED.
16. FOR PRECAST SEWER MANHOLES, THE CONSULTING ENGINEER SHALL SUBMIT FOUR (4) SETS OF SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL.

WATER NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL MATERIALS AND CONSTRUCTION OF WATER SYSTEM FACILITIES AND APPURTENANCES SHALL BE IN ACCORDANCE WITH THE CITY AND COUNTY OF HONOLULU, BOARD OF WATER SUPPLY'S "WATER SYSTEM STANDARDS", VOLUME 1 DATED 1985, AND THE "APPROVED MATERIAL LIST AND STANDARD DETAILS FOR WATER SYSTEM CONSTRUCTION", VOLUME 2, DATED 1985, AND THE "WATER SYSTEM EXTERNAL CORROSION CONTROL STANDARDS", VOLUME 3, DATED 1991, AND ALL SUBSEQUENT AMENDMENTS AND ADDITIONS.
2. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING ONE WEEK PRIOR TO COMMENCING WORK ON THE WATER SYSTEM.
3. PAYMENT FOR ITEMS OF WORK CALLED FOR IN THE PLANS, SPECIAL PROVISIONS AND SPECIFICATIONS FOR WHICH PAYMENT IS NOT SPECIFIED SHALL NOT BE MADE DIRECTLY BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS ITEMS OF THE PROPOSAL AND NO ADDITIONAL COMPENSATION SHALL BE MADE.
4. THE CONTRACTOR IS ALERTED TO THE ENCOUNTERING OF OBSTACLES WHETHER SHOWN ON THE PLANS OR NOT, OR WHICH MAY DIFFER IN LOCATION FROM THAT SHOWN ON THE PLANS WHICH MAY INTERFERE WITH HIS/HER NORMAL METHOD OF OPERATIONS. THE CONTRACTOR SHALL TAKE INTO ACCOUNT ANY ADDITIONAL COSTS ANTICIPATED DUE TO THESE CONDITIONS AND SHALL HAVE THESE COSTS INCLUDED IN THE BID ITEMS WHICH HE/SHE FEELS MOST APPROPRIATE. NO SEPARATE ADDITIONAL COMPENSATION SHALL BE MADE.
5. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL ASSUMPTIONS, DEDUCTIONS, OR CONCLUSIONS HE/SHE MAY MAKE OR DERIVE FROM THE SUBSURFACE INFORMATION OR DATA FURNISHED ON THE PLANS. THE CONTRACTOR MUST SATISFY HIMSELF/HERSELF THROUGH HIS/HER OWN INVESTIGATIONS AS TO WHAT SUBSURFACE CONDITIONS ARE TO BE ENCOUNTERED.
6. PRIOR TO THE START OF EXCAVATION, THE CONTRACTOR SHALL NOTIFY ALL AGENCIES AND UTILITIES AND HAVE THEM LOCATE THEIR RESPECTIVE LINES AFFECTED. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ALL OF HIS/HER CONSTRUCTION AND SHALL PAY FOR ALL DAMAGES TO AND FOR THE PROTECTION OF EXISTING UTILITIES AND STRUCTURES.
7. THE CONTRACTOR SHALL EXPOSE, VERIFY AND BACKFILL ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES AT CROSSINGS PRIOR TO EXCAVATION OF PIPELINE TRENCH. THE WATER MAIN ALIGNMENT AND GRADE MAY BE CHANGED IF THERE ARE ANY CONFLICTS WITH ANY EXISTING UNDERGROUND UTILITIES AND STRUCTURES, WHETHER SHOWN ON THE PLANS OR NOT. PAYMENT FOR WORK INCLUDED IN THIS PARAGRAPH SHALL BE CONSIDERED INCIDENTAL TO THE APPROPRIATE BID ITEMS OF THE PROPOSAL, AND NO ADDITIONAL COMPENSATION SHALL BE MADE.
8. EXISTING UTILITIES CROSSING THE WATER MAIN ARE TO REMAIN IN SERVICE AND IN PLACE. IF RELOCATED FOR THE CONTRACTOR'S CONVENIENCE, INTERRUPTION OF SERVICE SHALL BE FOR A MINIMUM PERIOD OF TIME AND SHALL BE DONE AT THE CONTRACTOR'S EXPENSE AND ONLY WITH THE APPROVAL OF THE ENGINEER.
9. IF THE CONTRACTOR ELECTS NOT TO EXPOSE AND VERIFY ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES AT CROSSINGS PRIOR TO PIPELINE EXCAVATION, HE/SHE FORFEITS HIS/HER RIGHTS FOR ANY CLAIMS FOR COMPENSATION CAUSED BY ANY CONFLICTS WITH EXISTING UTILITIES AND STRUCTURES.
10. ALL A.C. AND CONCRETE PAVEMENT TO BE TRENCHED (FOR PIPELINE OR ANY WATER SYSTEM INSTALLATION) SHALL BE "SAW-CUT" TO THE REQUIRED WIDTH PRIOR TO REPAVING.
11. RESTORATION OF PAVEMENT SHALL BE DONE IN ACCORDANCE WITH THE DETAILS SHOWN ON THE PLANS AND DONE WITH EQUIVALENT TO OR BETTER QUALITY MATERIALS.
12. UNLESS OTHERWISE SPECIFIED, CONNECTIONS TO EXISTING WATER MAINS AND CHLORINATION OF NEW WATER MAINS SHALL BE DONE BY THE CONTRACTOR.
13. WHENEVER CONNECTIONS TO EXISTING WATER MAINS ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING WATER MAINS PRIOR TO EXCAVATION OF MAIN TRENCH. THE REMAINING EXCAVATION FOR THE CONNECTION SHALL BE EXCAVATED WHEN THE CONTRACTOR IS READY TO MAKE THE CONNECTION.
14. THE BRIDGE DECKS FOR TEMPORARY BRIDGE INSTALLATIONS SHALL BE FLUSH WITH ADJOINING PAVEMENT OR SIDEWALK. NO BUMPS OR ELEVATED BRIDGE DECKS WILL BE ALLOWED.
15. ALL WATER MAIN TRENCHES SHALL BE BACKFILLED AS CALLED FOR UNDER PART III, SECTION 1.2.2, TRENCH BACKFILL, OF THE "WATER SYSTEM STANDARDS", DATED 1985. COMPACTION OF TRENCH BACKFILL SHALL MEET APPLICABLE REQUIREMENTS OF "THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION", SEPTEMBER 1986, OF THE COUNTIES OF THE STATE OF HAWAII.
16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER DISPOSAL OF ALL EFFLUENT ASSOCIATED WITH THE CONSTRUCTION ACTIVITY AND THE DISINFECTION AND HYDROTESTING OPERATIONS TO SAFEGUARD PUBLIC HEALTH AND SAFETY IN ACCORDANCE WITH APPLICABLE DEPARTMENT OF HEALTH REQUIREMENTS. ALL PERMITS AND LICENSES FOR CONSTRUCTION WATER DISPOSAL, INCLUDING ALL APPLICATIONS, CHARGES, FEES, AND TAXES, ARE THE RESPONSIBILITY OF THE CONTRACTOR.
17. SHOULD MAJOR TREE ROOTS 2" AND GREATER BE ENCOUNTERED DURING CONSTRUCTION THESE ROOTS SHALL BE CUT AND SEALED WITH ASPHALTIC PAINT.
18. DURING NON-WORKING HOURS, THE TRENCHES SHALL BE COVERED WITH NON-SKID STEEL PLATES AND ALL LANES MAINTAINED OPEN FOR TRAFFIC.

WATER NOTES CONTINUED:

19. UNLESS OTHERWISE SPECIFIED, ALL ABANDONED LINES SHALL BE CUT AND PLUGGED WITH CLASS DWS 2000 CONCRETE. PAYMENT FOR CUTTING AND PLUGGING WILL NOT BE MADE DIRECTLY BUT WILL BE CONSIDERED INCIDENTAL TO THE VARIOUS ITEMS OF THE PROPOSAL. THE CONTRACTOR SHALL VERIFY THE SIZE AND TYPE OF LINE TO BE PLUGGED.
20. ALL WATER MAINS AND APPURTENANCES INCLUDING SERVICE LATERALS AND SERVICE CONNECTIONS SHALL BE SUBJECT TO A HYDROSTATIC TEST PRESSURE OF 150 PSI BY THE CONTRACTOR IN THE PRESENCE OF THE ENGINEER.
21. ALL LATERALS (1 INCH TO 2-1/2 INCHES) SHALL BE REPLACED OR RECONNECTED WITH COPPER OR PLASTIC TUBING.
22. THE CONTRACTOR SHALL FURNISH AND INSTALL DIELECTRIC COUPLINGS FOR ALL SERVICE LATERAL CONNECTIONS. PAYMENT FOR DIELECTRIC COUPLINGS SHALL NOT BE MADE DIRECTLY, BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS ITEMS OF THE PROPOSAL.
23. PAYMENT FOR SERVICE LATERALS AND SERVICE CONNECTIONS SHALL BE MADE AT THE UNIT PRICE BID IN THE PROPOSAL. PAYMENT SHALL INCLUDE TAPS INTO MAINS, RECONNECTIONS TO EXISTING SERVICES, TRANSFERAL OF METERS, AND INSTALLING PIPE LATERALS, FITTINGS, BALL CORPS, BALL STOPS, GLOBE VALVES, METER SPLICES, BRASS PIPES, CAPS AND ALL APPURTENANCES, AS REQUIRED, IN PLACE COMPLETE. PAYMENT FOR METER BOXES, INCLUSIVE OF C.I. FRAMES AND COVERS AND TYPE "A" VALVE BOXES SHALL BE MADE AT THE RESPECTIVE UNIT PRICE BID IN THE BID.
24. DEMOLISH AND BACKFILL ALL ABANDONED MANHOLES, VALVE BOXES AND METER BOXES. SALVAGE ALL CAST IRON FRAMES AND COVERS.
25. AFTER INSTALLATION OF TAPPING SLEEVE AND TAPPING VALVE AND PRIOR TO TAPPING THE EXISTING WATER MAIN, THE ASSEMBLY SHALL BE PRESSURE TESTED AT 150 PSI ON BOTH SIDES OF THE VALVE AND IN ACCORDANCE WITH THE WATER SYSTEM STANDARDS DATED 1985.
26. MECHANICAL JOINT GLANDS SHALL BE "STRAIGHT-SIDED" AND POLYGON IN SHAPE AS DESCRIBED IN AWWA C111 AND SHALL BE APPLICABLE TO BOTH CAST IRON AND DUCTILE IRON GLANDS OR AN APPROVED EQUAL ON A JOB TO JOB BASIS.
27. ALL AIR RELIEF VALVES SHALL HAVE A MINIMUM WORKING PRESSURE RANGE OF 0 TO 150 PSI.
28. PIPE CUSHION SHALL BE OF HIGH RESISTIVITY MATERIAL. THE CONTRACTOR SHALL SUBMIT A SOIL CERTIFICATION THAT HIGH RESISTANT CUSHION MATERIAL HAS A RESISTIVITY GREATER THAN 5,000 OHM-CM. REMAINDER OF BACKFILL MATERIAL SHALL BE AS SPECIFIED IN CITY AND COUNTY OF HONOLULU, BOARD OF WATER SUPPLY'S "WATER SYSTEM STANDARDS", VOLUME 1, DATED 1985. PIPE CUSHION AND BACKFILL MATERIAL SHALL CONTAIN NO HAZARDOUS SUBSTANCES ABOVE REGULATORY ACTION LEVELS INCLUDING BUT NOT LIMITED TO LEAD, ASBESTOS, MERCURY, CHROMIUM, CADMIUM, ZINC, STRONTIUM, AND POLYCHLORINATED BIPHENYLS (PCB).
29. BALL CORPS AND BALL STOPS SHALL BE INSTALLED IN LIEU OF THE CORPORATION STOPS AND STOPCOCKS, RESPECTIVELY.
30. TRAFFIC CONTROL PLAN: AFTER THE AWARD OF THE CONSTRUCTION CONTRACT, THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN TO THE ENGINEER FOR REVIEW AND OBTAIN APPROVAL BEFORE COMMENCING CONSTRUCTION PAYMENT FOR THE PREPARATION AND IMPLEMENTATION OF THE APPROVED TRAFFIC CONTROL PLAN SHALL NOT BE MADE DIRECTLY BUT SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS ITEMS OF THE BID.
31. THE CONTRACTOR SHALL COORDINATE THE SECURING OF THE EXISTING WATER SYSTEM WITH THE ENGINEER PRIOR TO EXCAVATING BEHIND OR REMOVING ANY EXISTING THRUST BLOCKS, STRUCTURAL STRUTS OR REACTION BEAMS, OR ANY FITTINGS SUCH AS TEES, PLUGS, CAPS, BENDS, OFFSETS, AND VALVES, OR ANY OTHER PIPELINE APPURTENANCE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASSOCIATED DAMAGES RESULTING FROM FAILURE TO ADEQUATELY SECURE THE EXISTING SYSTEM.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Lance K. Tokuda 4/30/2024
SIGNATURE EXPIRATION DATE

NO.	DATE	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
CIVIL NOTES

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 5 OF 123
C002

1

2

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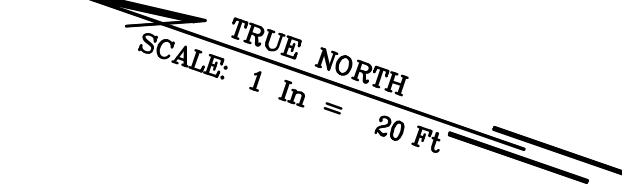
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DIAMOND HEAD RESERVATION
C.S.F. 22,444
(E.O. 1997)


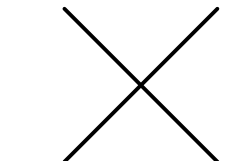

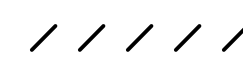
TOPOGRAPHIC SURVEY MAP
HAWAII STATE CIVIL DEFENSE
BIRKHMIR EMERGENCY OPERATIONS CENTER
UPGRADES AND IMPROVEMENTS
AT DIAMOND HEAD CRATER, HONOLULU, OAHU, HAWAII

TMK: (1) 3-1-042: FOR 106
SCALE: 1 in = 20 ft. DRAWN: 16, 2024
JOB NO. 23034-14 FIELD BOOK: 305; 66
DRE: SM-W RLS: SS

CONTROL POINT SURVEYING, INC.
110 HOLEI DRIVE, SUITE 104
HONOLULU, HAWAII 96813



LEGEND:

-  EXIST UNDERGROUND TANKS AND TRENCH GRATE TO BE DEMOLISHED
-  EXISTING TREES TO BE REMOVED
-  EXIST. UTILITY LINE(S) TO BE DEMOLISHED
-  EXIST. A.C. CURB AND CMU WALL TO BE DEMOLISHED

REMOVE EXISTING UNDERGROUND
WATER TANK INCLUDING METAL
COVER & CONCRETE PAD

REMOVE EXISTING
3" WATERLINE

REMOVE
EXISTING CO

REMOVE
EXISTING SMH

REMOVE EXISTING
TRENCH DRAIN

REMOVE EXISTING
SMH

REMOVE EXISTING FUEL
TANK AND LINES

DEMOLISH EXISTING
CMU WALL -- 37 LF

REMOVE EXISTING
SANITARY SEWER

EXISTING SMH
TO REMAIN

REMOVE EXISTING A.C CURB

REMOVE EXISTING TREES

EXISTING SMH
TO REMAIN

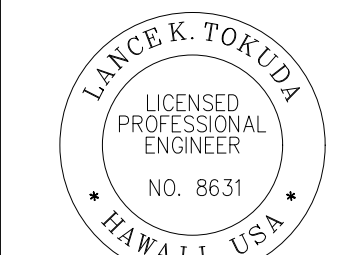
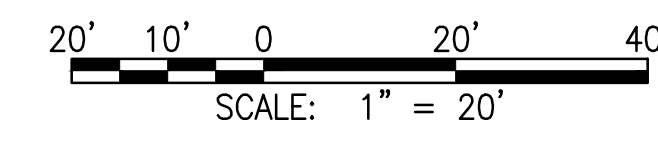
REMOVE EXISTING SMH

EXISTING SMH
TO REMAIN

EXISTING CONDITIONS AND DEMOLITION PLAN

SCALE: 1" = 20'

GRAPHIC SCALE:



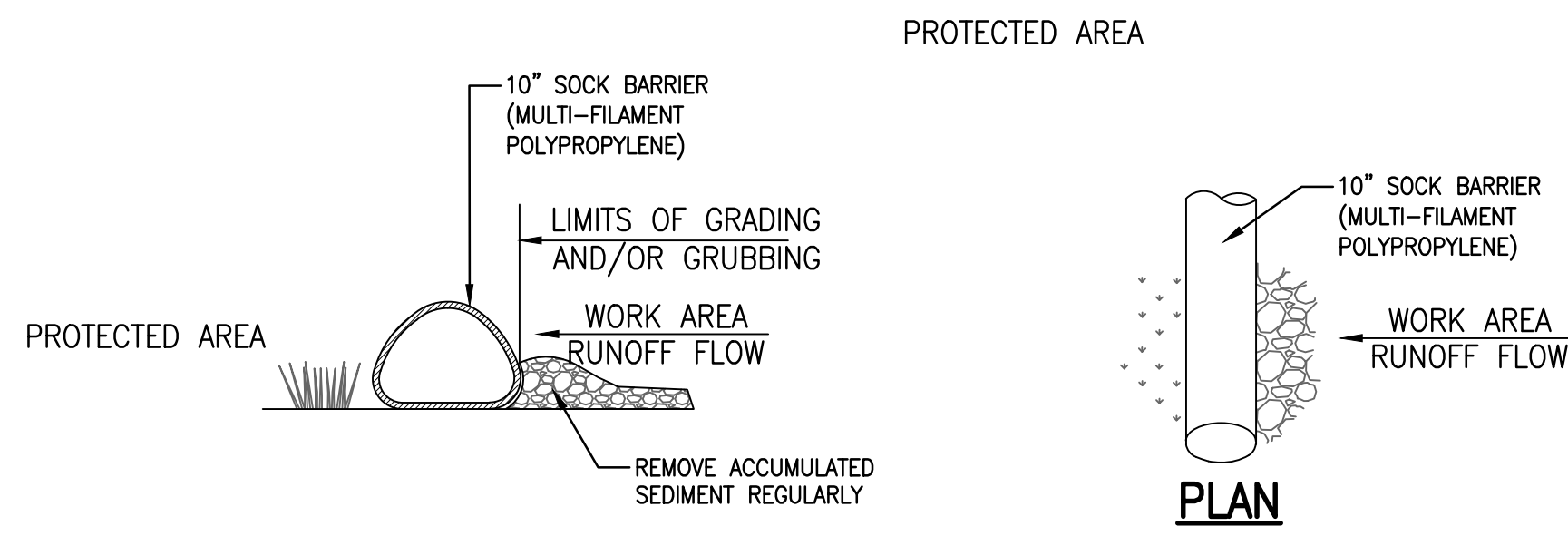
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION
Lance K. Tokuda
SIGNATURE DATE 4/30/2024

DATE	APPR.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 3/01/2024

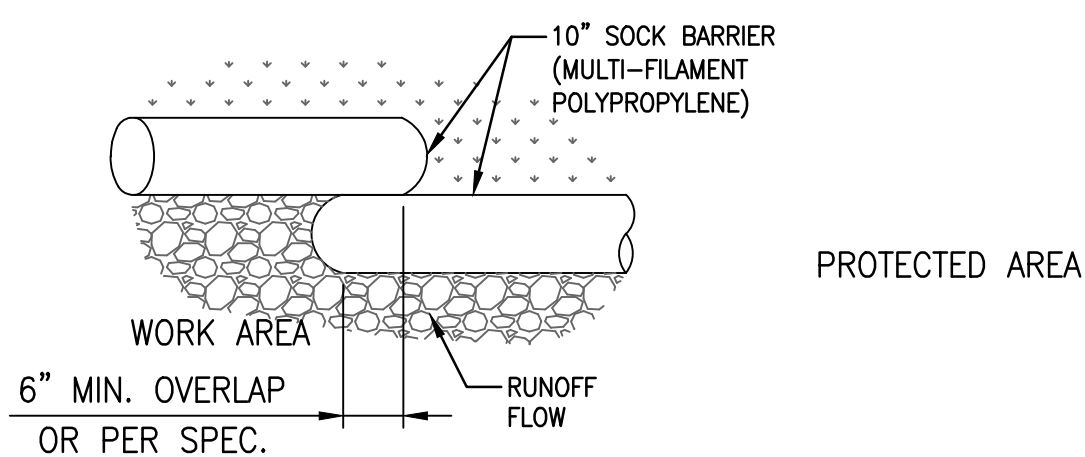
STATE OF HAWAII
DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
**BIRKHMIR EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS**
EXISTING CONDITIONS AND DEMO PLAN

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 6 OF 123
C101



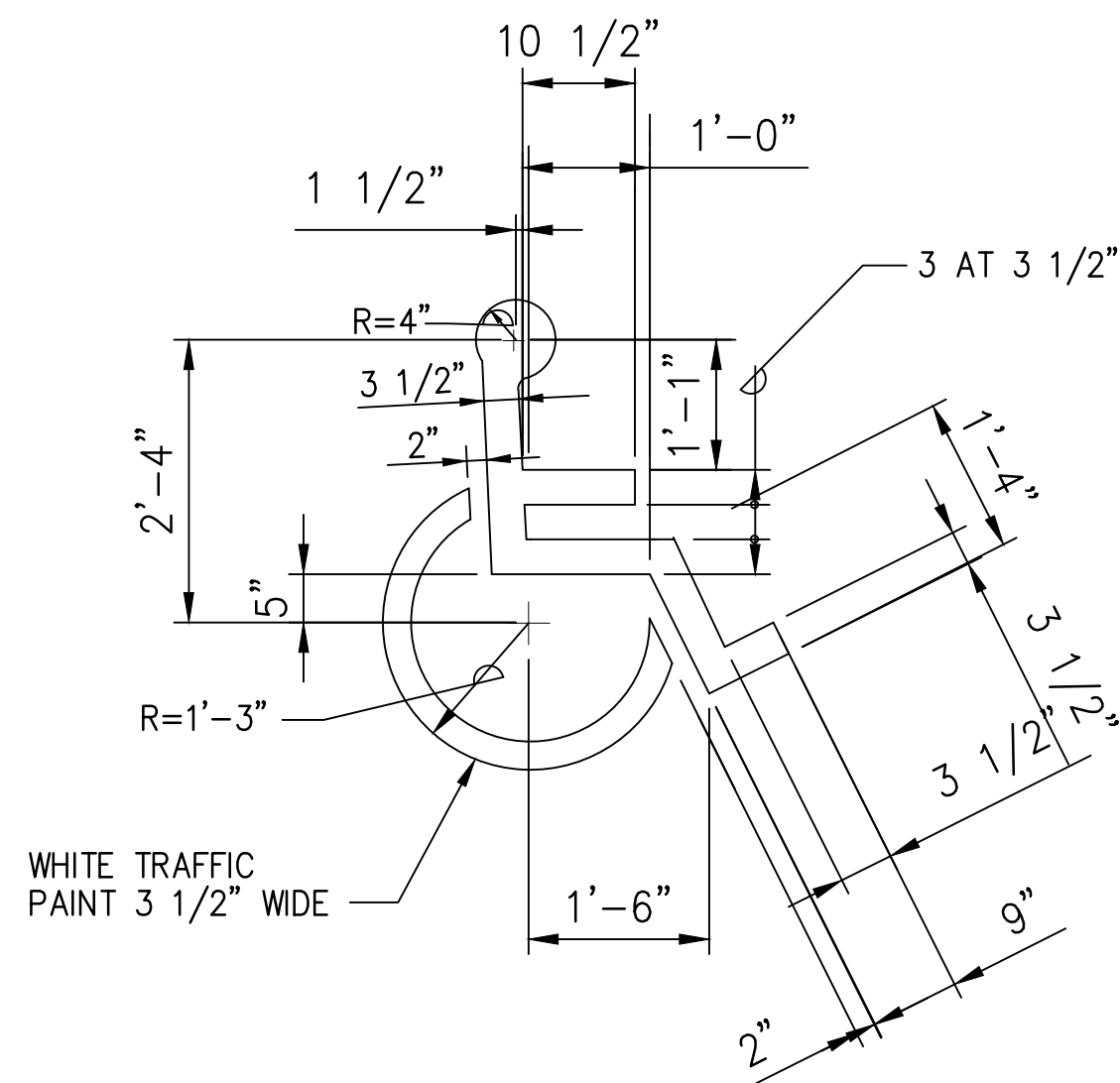
SECTION

PLAN

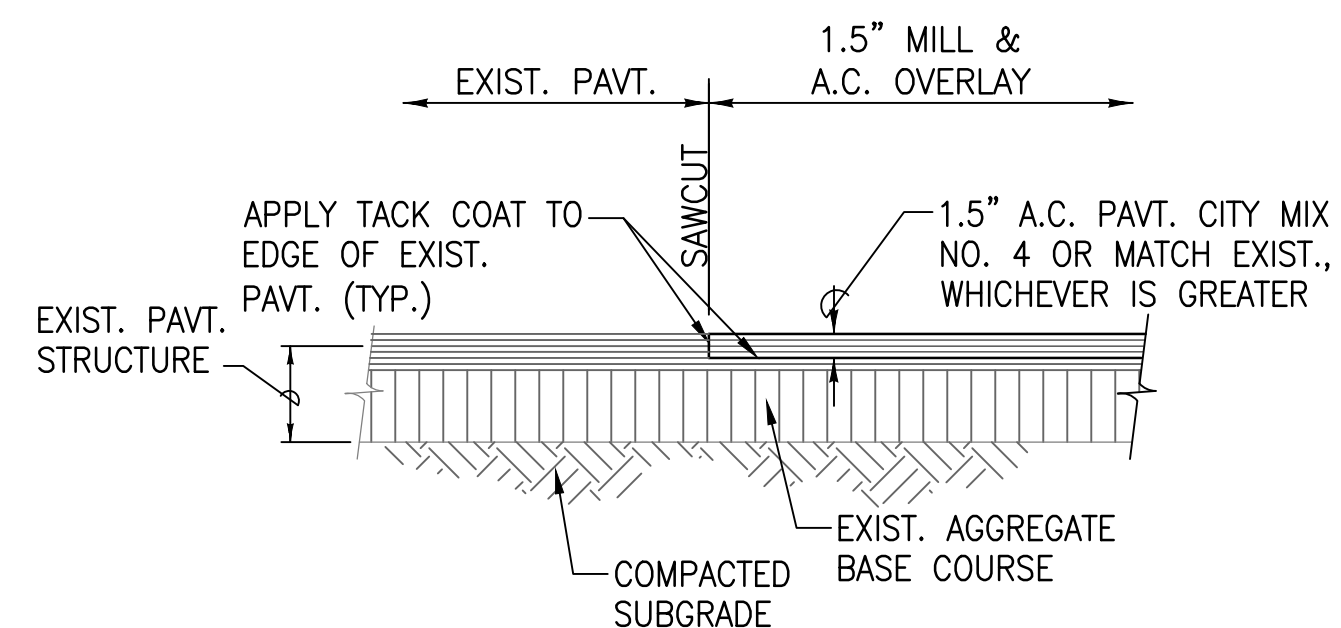


OVERLAP

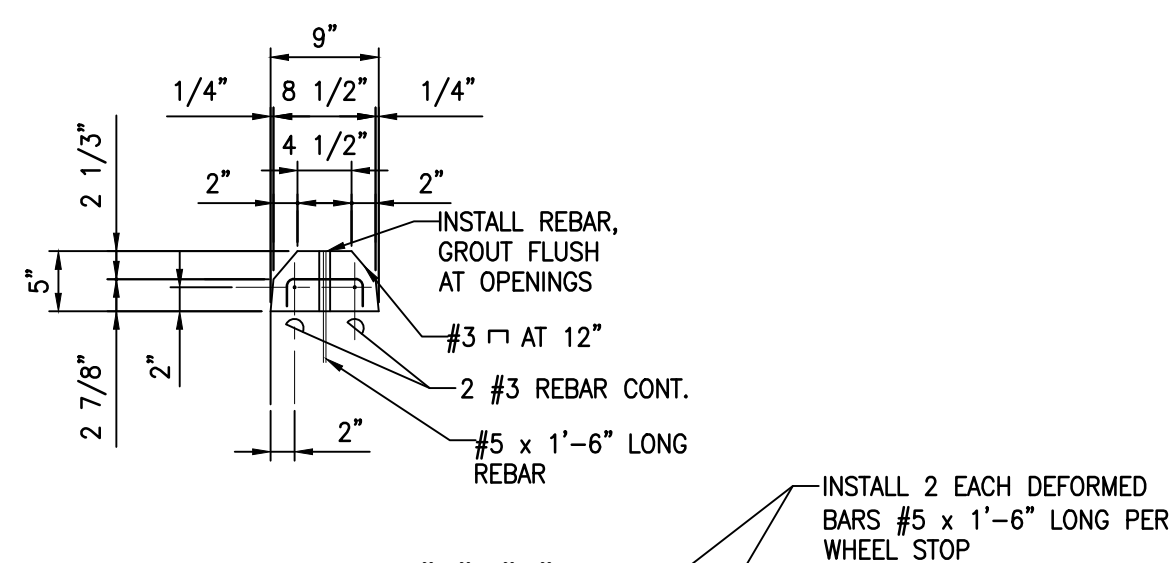
1 SILT SOCK BARRIER DETAIL
CS501 NOT TO SCALE



2 ACCESSIBLE PAVEMENT MARKING
CS501 NOT TO SCALE



3 MILL AND OVERLAY DETAIL
CS501 NOT TO SCALE



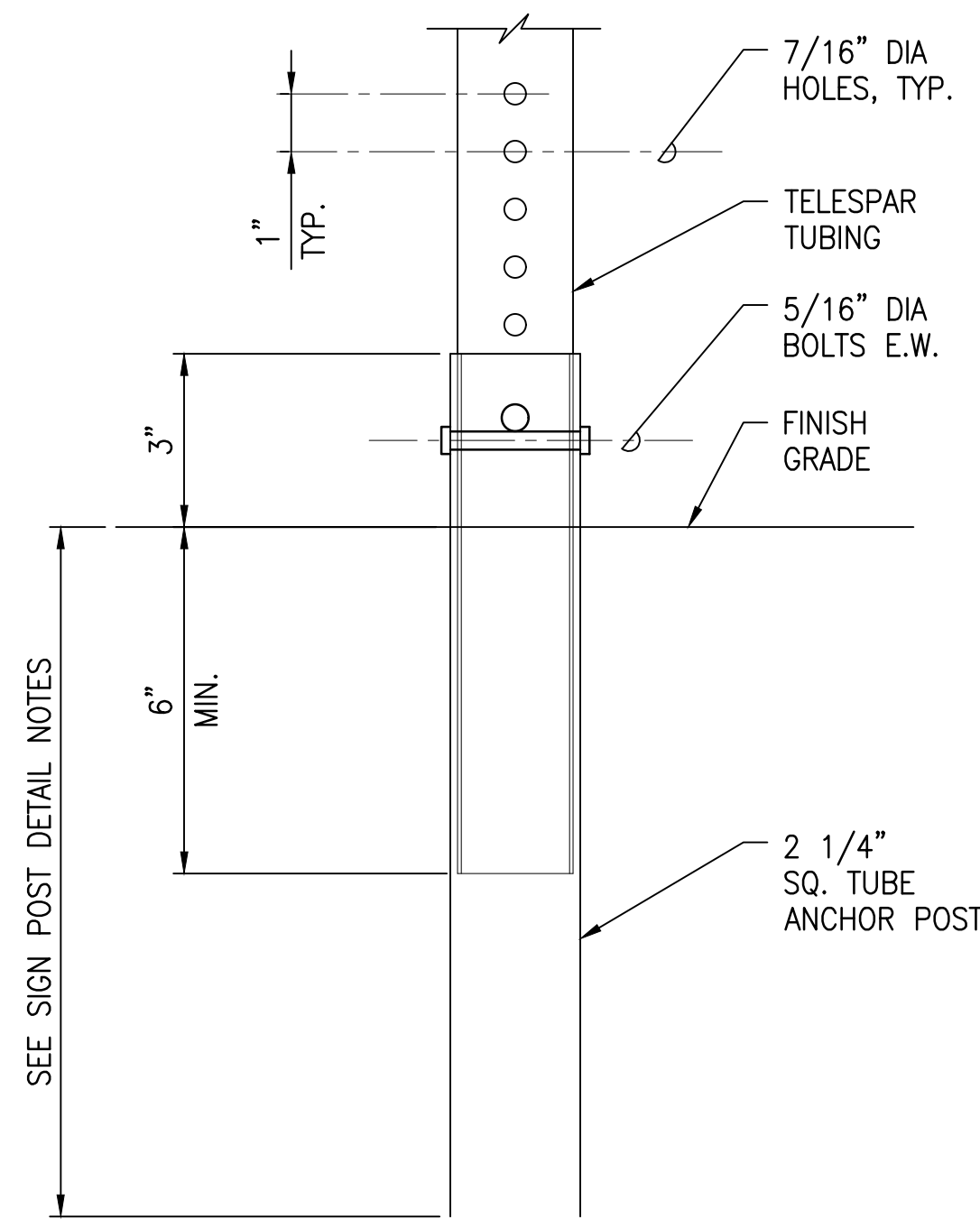
TYPICAL SECTION "X-X"

9" x 6'-0" WHEEL STOP

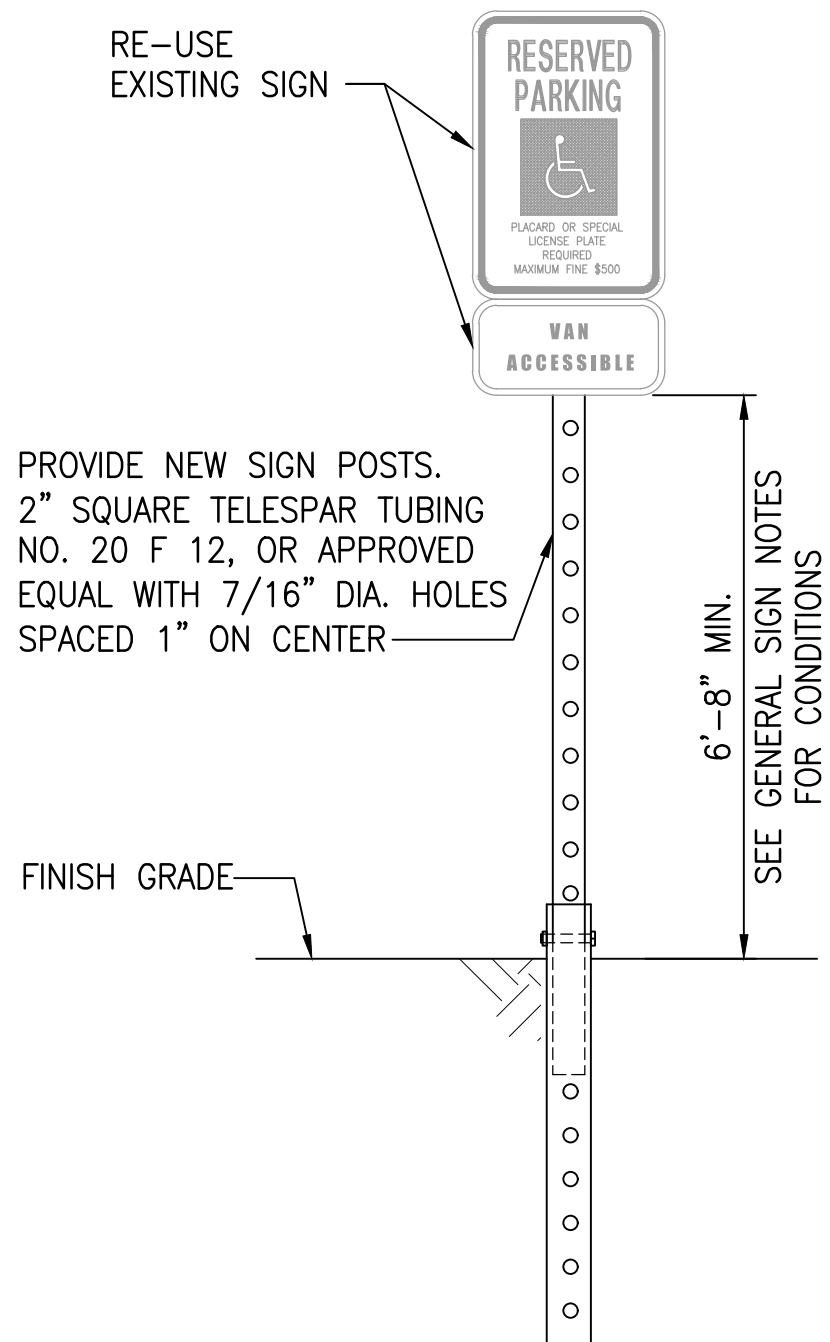
4 CONCRETE WHEEL STOP DETAIL
CS501 NOT TO SCALE

SIGN POST DETAIL NOTES:

1. THE INSIDE OF THE 2-1/4" ANCHOR POST MUST BE KEPT FREE OF IMPEDIMENTS TO ASSURE EASY INSERTION OF THE 2" SIGN POST.
2. SQUARE TUBE POST SHALL BE TELESCOPING PERFORATED.
3. THE 2-1/4" ANCHOR POST SHALL BE 4'-0" LONG FOR NORMAL OR POOR CONDITIONS AND 2'-6" FOR ROCKY CONDITIONS.
4. SIGN POST MUST BE FIRM AND NOT SHAKY, OTHERWISE CONCRETE MUST BE USED TO STABILIZE THE ANCHOR POST.

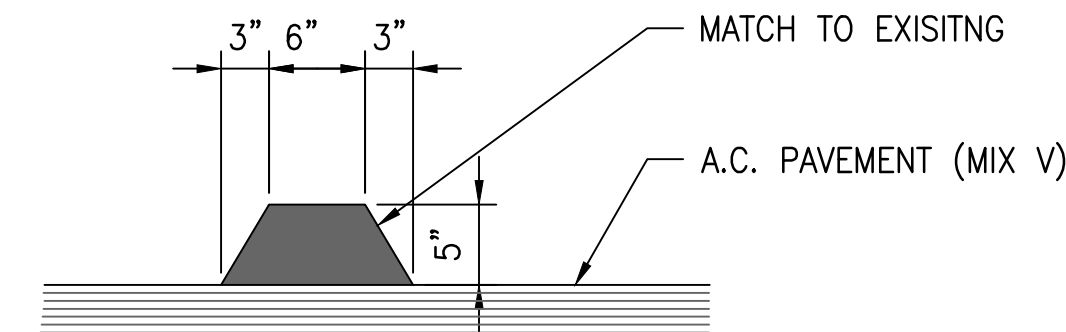


5 SIGN POST DETAIL
CS501 NOT TO SCALE

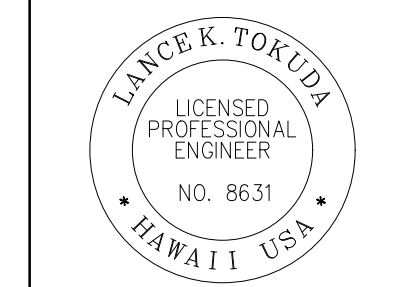
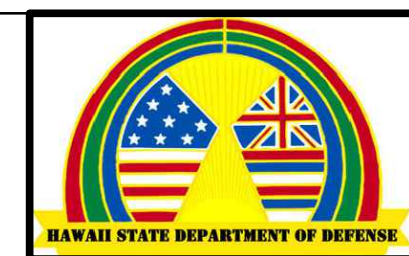


SIGN NOTES:

1. SIGNS SHALL CONFORM TO THE LATEST EDITION OF FHWA PUBLICATIONS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", "STANDARD ALPHABETS FOR HIGHWAYS SIGNS", AND THE AMERICANS WITH DISABILITIES ACCESSIBILITY GUIDELINES (ADAAG) SECTION 4.30, AND AS AMENDED.
2. SIGNS SHALL BE MINIMUM T6061 SHEET COVERED WITH ENGINEERING GRADE REFLECTIVE SHEETING.
3. ALL SIGNS SHALL HAVE 3/8" DIA BOLT HOLES PRE-DRILLED AT APPROPRIATE LOCATIONS.
4. SIGN LETTERING SHALL BE UPPERCASE LETTERS OF THE TYPE APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION.



6 AC CURB RESTORATION DETAIL
CS502 NOT TO SCALE



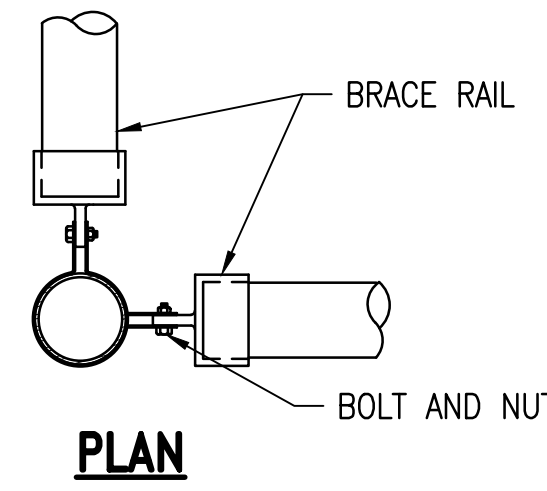
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 Lance K. Tokuda 4/30/2024
 SIGNATURE EXPIRATION DATE

DATE	APPR.	DATE	APPR.	DATE	APPR.	DATE	APPR.

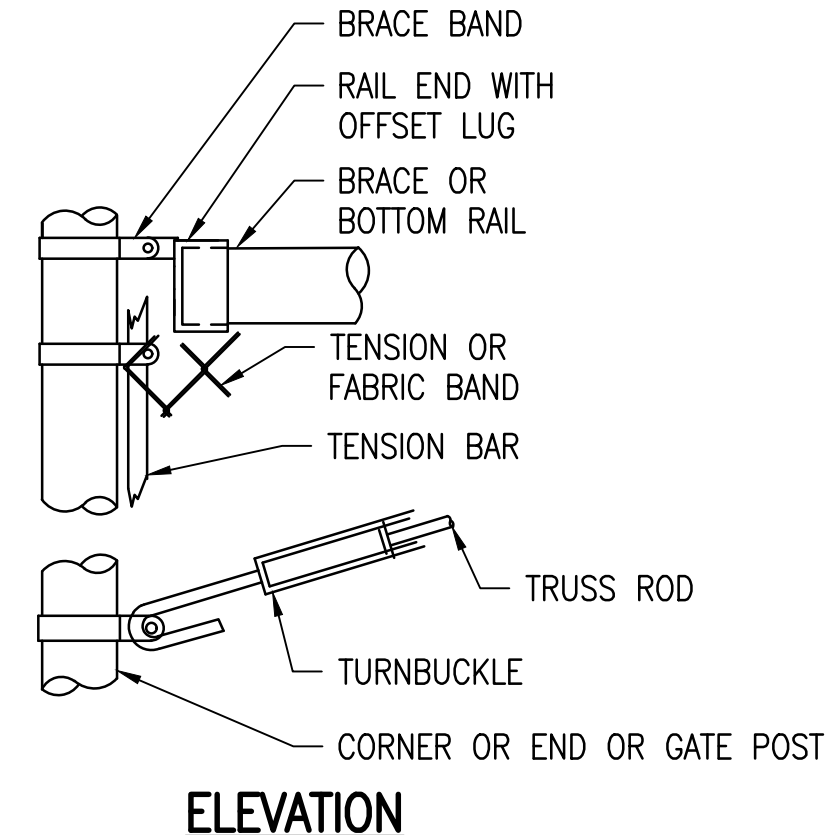
SUBMITTAL PHASE
 CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:800
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 BIRKHYMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS
 SITE DETAILS

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 9 OF 123
 CS501

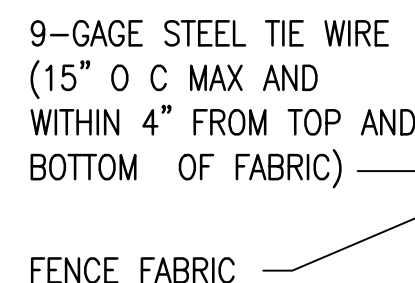


PLAN

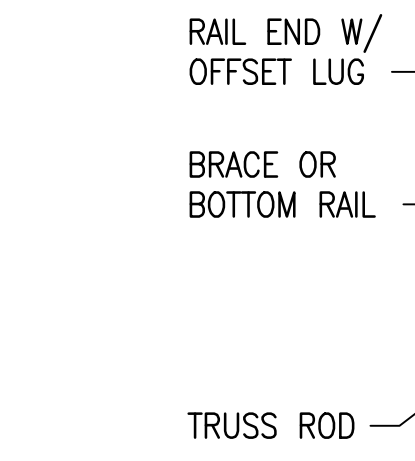


ELEVATION

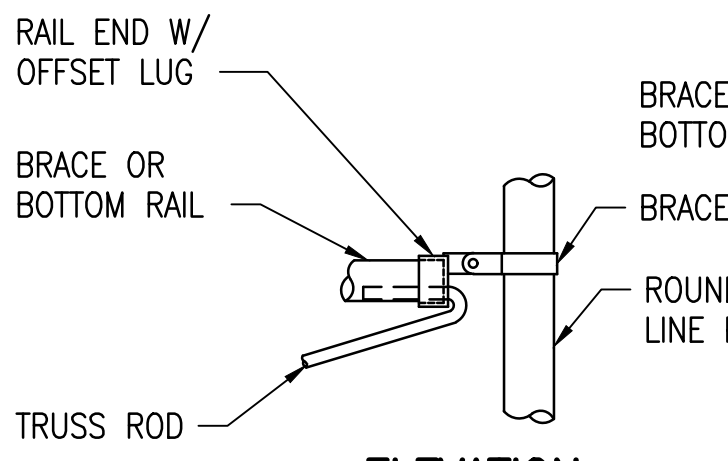
PLAN - "H" POST



ELEVATION - ROUND POST

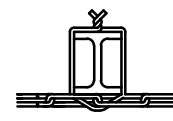


PLAN - ROUND POST

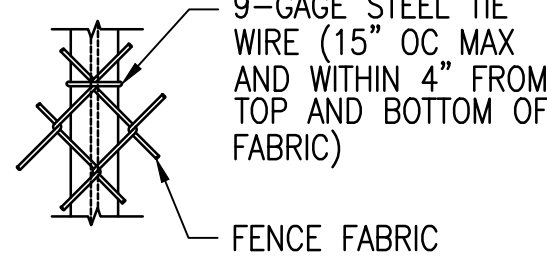


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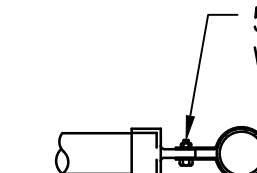
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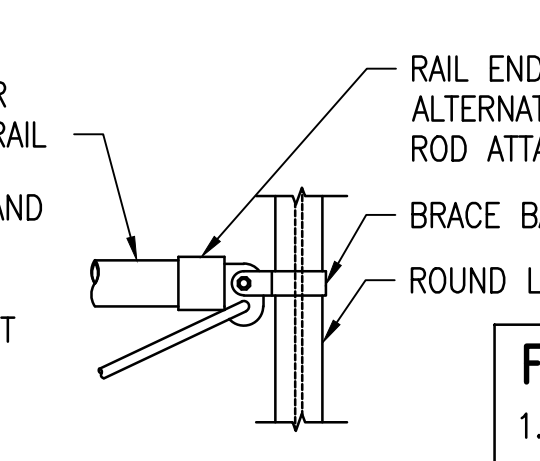
PLAN - "H" POST



ELEVATION - "H" POST



PLAN - ROUND POST



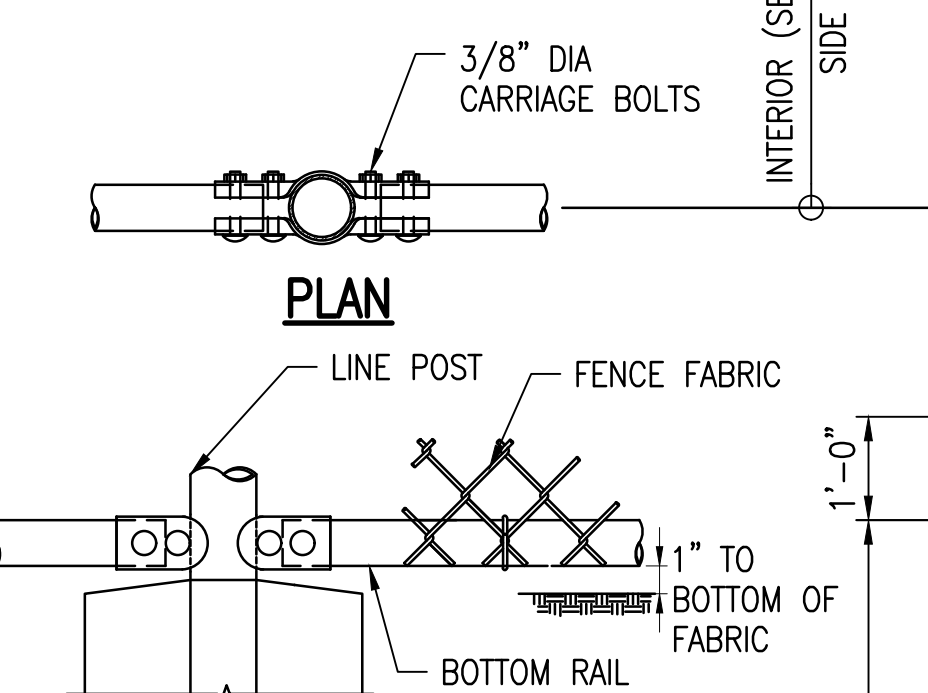
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FITTINGS NOTES

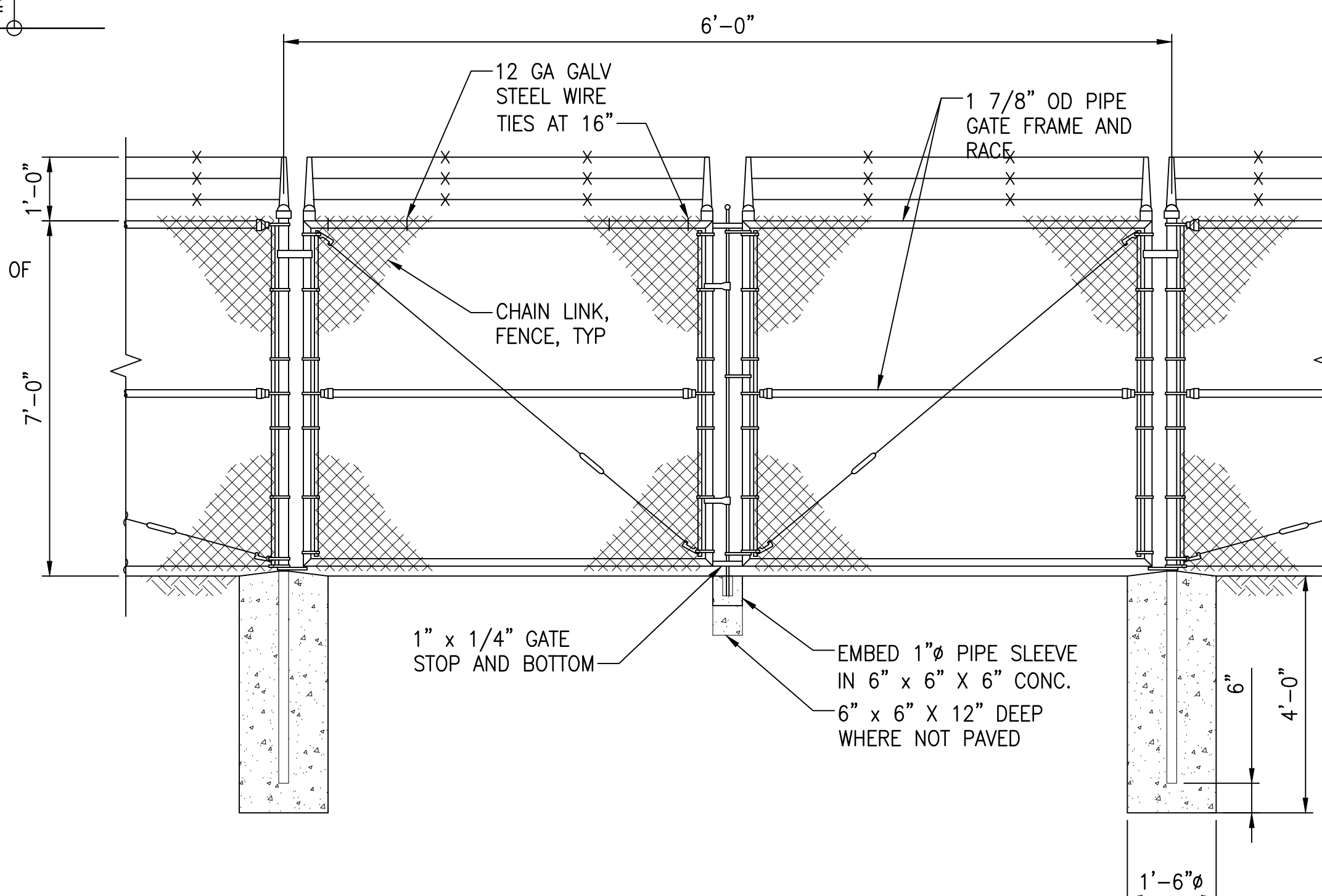
1. METRIC DIMENSIONS ARE NOMINAL EQUIVALENTS TO U.S. DIMENSIONS.
2. ALL FITTINGS MATERIAL MUST BE AS SPECIFIED.

CHAIN LINK FENCING NOTES

1. **FABRIC:** THE STANDARD FENCE FABRIC MUST BE STEEL WIRE CHAIN LINK WITH MESH OPENINGS NOT LARGER THAN TWO INCHES PER SIDE AND A TWISTED AND BARBED SELVAGE AT TOP AND BOTTOM IN ACCORDANCE WITH THE SPECIFICATIONS. UTILIZE 6-GAUGE FOR BASE PERIMETER OR HEIGHTENED SECURITY ZONES AND 9-GAUGE FOR BASE INTERIOR OR WHEN JOINING AN EXISTING FENCE WHICH IS ALREADY 9-GAUGE.
2. **FABRIC TIES:** ONLY 12-GAUGE STEEL TIES MUST BE USED. COATING OR PLATING WILL BE ELECTROLYTICALLY COMPATIBLE WITH THE FENCE FABRIC TO INHIBIT CORROSION.
3. **REINFORCEMENT:** TENSION WIRES MUST BE INSTALLED AND INTERWOVEN (OR AFFIXED WITH FABRIC TIES) ALONG THE TOP AND BOTTOM OF THE FENCE FOR STABILIZATION OF THE FENCE FABRIC.
4. **FENCE HEIGHT:** CHAIN LINK FABRIC MUST BE 7' HIGH WITH AN ADDITIONAL 1' IN HEIGHT COMPOSED OF 3 STRANDS OR BARBED WIRE AS REQUIRED. THE TOTAL FENCE HEIGHT MUST BE 8'.
5. **GROUND CLEARANCE:** BOTTOM OF THE FENCE FABRIC MUST BE WITHIN TWO INCHES OF FIRM SOIL.
6. **TOP GUARD:** A TOP GUARD IS AN OVERHANG OF BARBED WIRE ALONG THE TOP OF A FENCE, FACING OUTWARD (AWAY FROM PROTECTED SITE) AND UPWARD AT APPROX. 45° ANGLE. TOP GUARD SUPPORTING ARMS WILL BE PERMANENTLY AFFIXED TO THE TOP OF FENCE POSTS TO INCREASE THE OVERALL HEIGHT OF THE FENCE AT LEAST 1 FOOT. THREE STRANDS OF 12-GAUGE BARBED WIRE, EQUALLY SPACED, MUST BE INSTALLED ON THE SUPPORTING ARMS.
7. **FENCE POSTS:** MUST BE ASTM F1043 OR F1083 ROUND PIPE OR SQUARE TUBE AND MUST BE ORGANIZED IN ACCORDANCE WITH THE SPECIFICATIONS. FENCE POST SPACING AND SIZE (DIAMETER) MUST BE DETERMINED IN ACCORDANCE WITH CHAIN LINK FENCE MANUFACTURER'S INSTITUTE (WLG 2445). SPACING MUST NOT EXCEED 10'-0" O.C. SIZE (DIAMETER) MUST NOT BE LESS THAN THAT SPECIFIED.

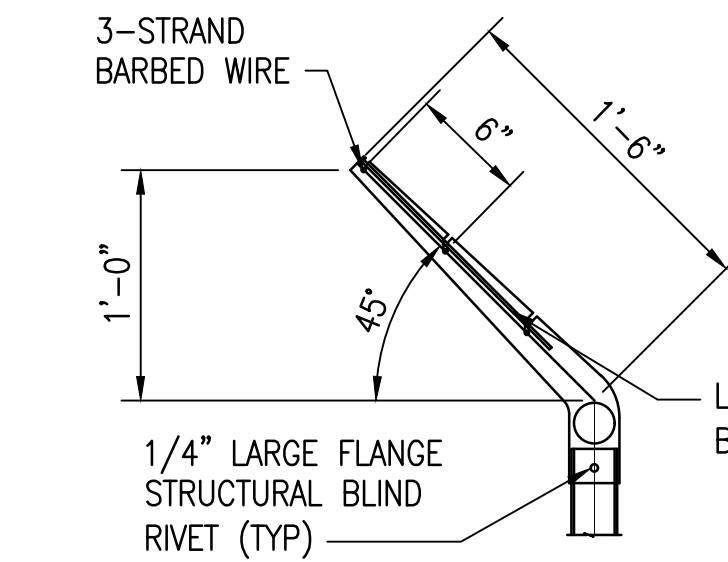


ELEVATION - BOTTOM RAIL OPTION

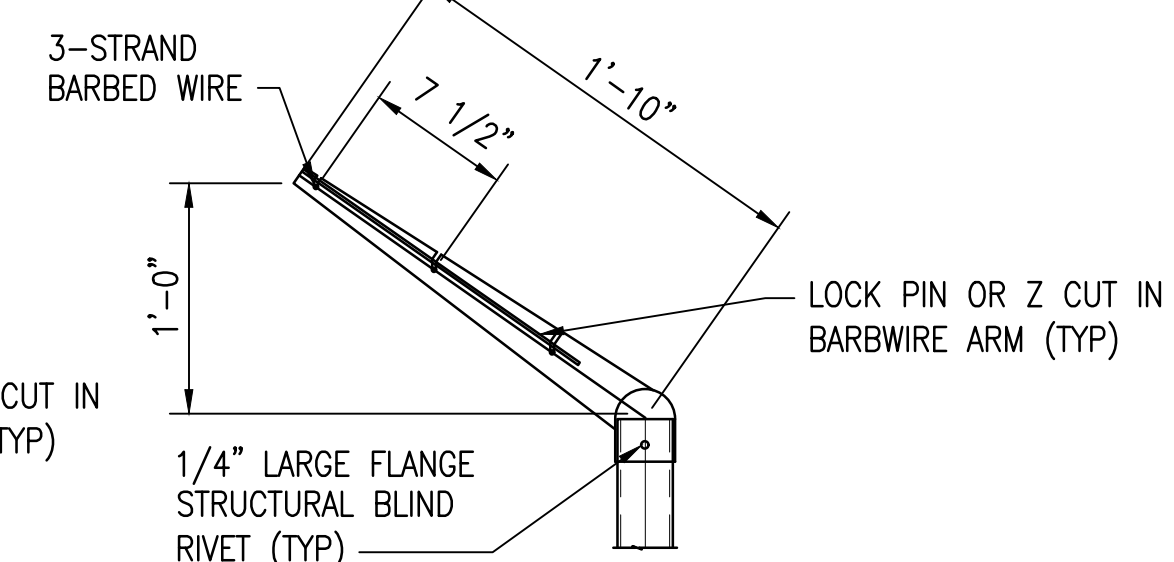


C3 DOUBLE SWING GATE DETAIL
NOT TO SCALE

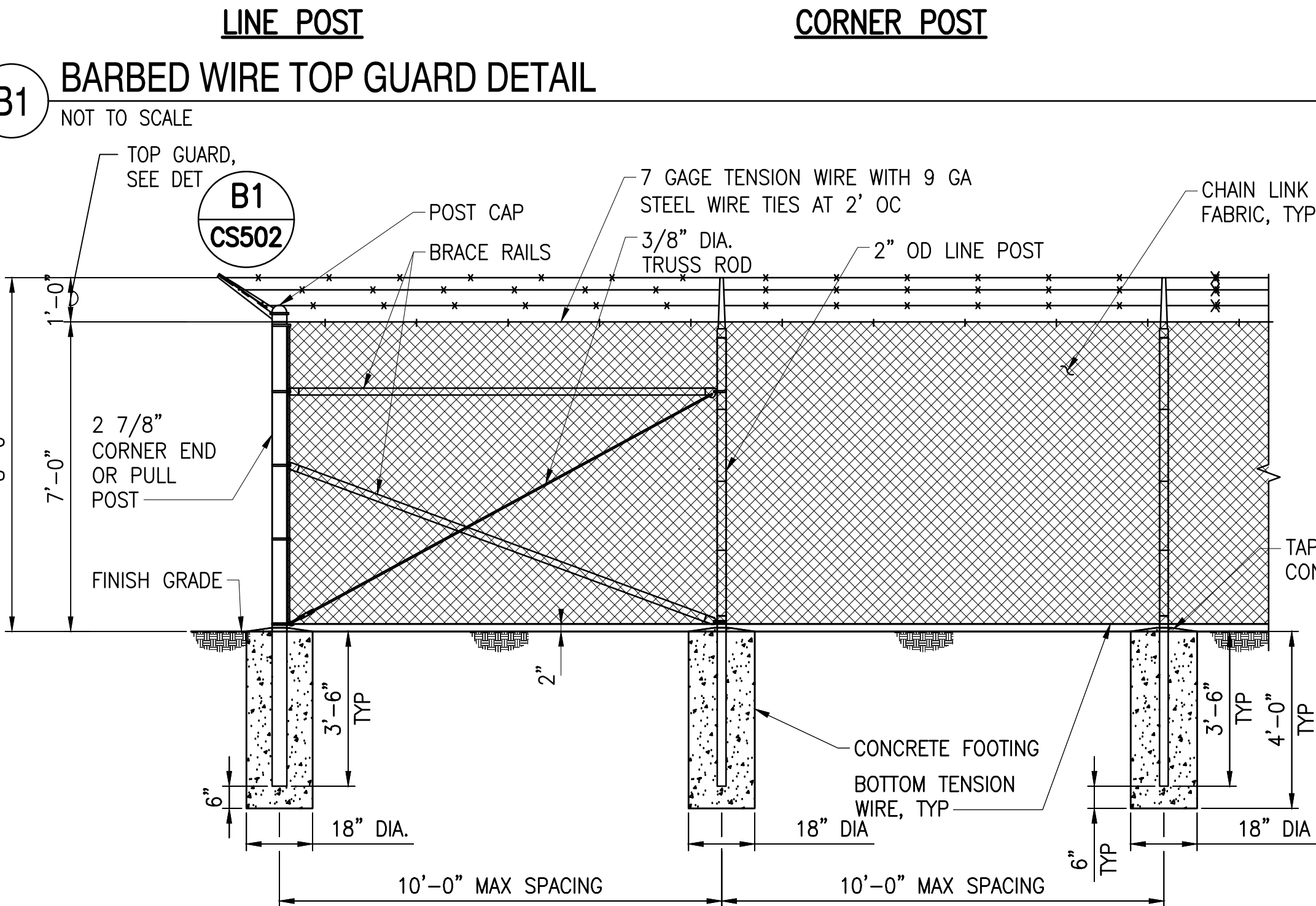
C1 CORNER OR END POST DETAILS
NOT TO SCALE



B1 BARBED WIRE TOP GUARD DETAIL
NOT TO SCALE



C2 LINE POST DETAILS
NOT TO SCALE



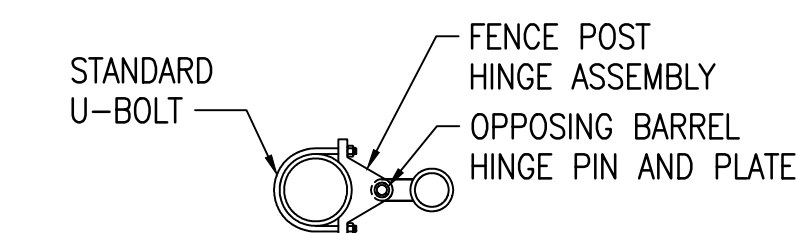
A1 8FT HIGH SECURITY CHAINLINK FENCE DETAIL
NOT TO SCALE

NOMINAL HEIGHT (H)	UPRIGHT HEIGHT (U)	FRAME HEIGHT (F)
NOMINAL HEIGHT INCLUDING BARB WIRE	ACTUAL DIMENSION	ACTUAL DIMENSION
8'-0"	7'-10"	6'-8 1/2"

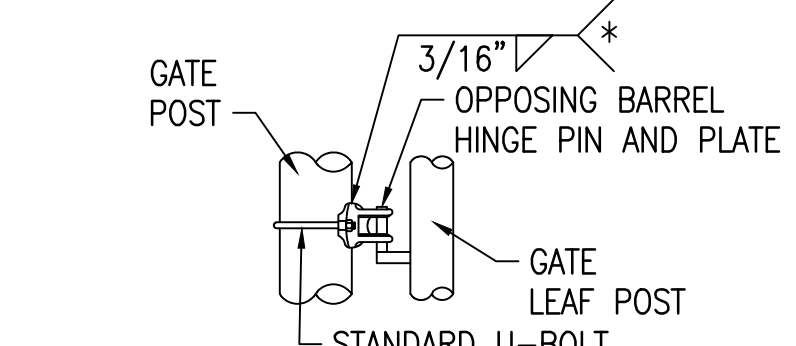
OPENING FACE TO FACE	GATE POSTS ROUND SIZES	HINGE SPACE (S) POST TO UPRIGHT
3'-0" THROUGH 6'-0"	2.875" OD	2 1/4"
6'-0" THROUGH 12'-0"	4" OD	2 1/4"
12'-0" THROUGH 19'-0"	6.625" OD	2 1/4"
19'-0" THROUGH 23'-0"	8.625" OD	2 1/4"

GATE POSTS & FOUNDATIONS: GATE POST SIZE AND ASSOCIATED FOOTING DIAMETER TO BE DETERMINED BY MANUFACTURER, BASED ON LEAF WEIGHT & DIMENSION, BUT NOT LESS THAN DIAMETER SHOWN ON THESE DRAWINGS. MINIMUM FOOTING DIAMETERS (TO BE FILLED W/4000 PSI CONC): 40" ϕ FOR 8" POST; 36" ϕ FOR 6" POST; 24" ϕ FOR 4" POST; OTHER SIZES TO BE DESIGNATED BY MFR OF KTR. NO FOOTING WIDTH MUST BE LESS THAN 4(x) THE POST WITH.

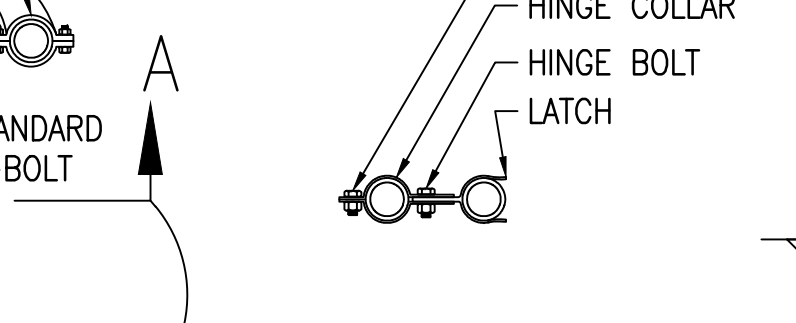
NOTE: IF GATE HINGES ARE NOT OPPOSING (AS SHOWN ABOVE) OR LEAF IS NOT LOCKED MECHANICALLY TO THE HINGES, WELD AN ANGLE, PLATE, OR BLOCK ABOVE HINGE TO RESTRICT LEAF FROM BEING REMOVED OR LIFTED OFF. RESTRICTION MUST NOT HINDER OPERATION OF GATE.



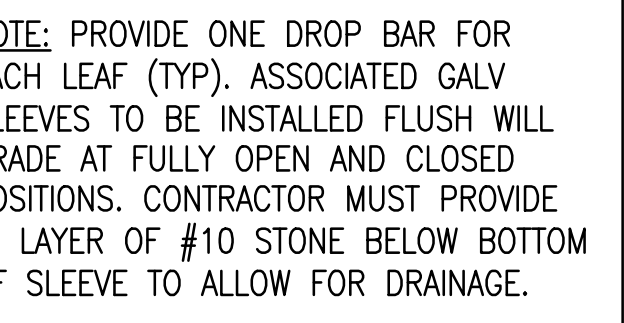
GATE HINGE



GATE LATCH DETAIL



OFFSET HINGE DETAIL



FULCRUM LATCH DETAIL



DROP BAR DETAIL

A4 DOUBLE SWING GATE ACCESSORIES DETAIL
NOT TO SCALE

- NOTES:**
1. ALL FENCING MATERIAL INCLUDING GATE HARDWARE MUST BE GALVANIZED STEEL.
 2. POSTS, BRACES AND GATE FRAMES MUST BE SCHEDULE 40 (STANDARD WEIGHT) PIPE. SIZES SPECIFIED ARE OUTSIDE DIAMETER.
 3. GATE MUST BE PROVIDED WITH TUBULAR PLUNGER BAR, 1 LOCK KEEPER GUIDE, 2 LATCH FORKS, 2 FORK CATCHES, 1 CATCH FOR PLUNGER BAR, AND 2 GATE STOPS LOCATED AS DIRECTED BY THE ENGINEER.
 4. CORNER FITTINGS FOR GAIN FRAMES MAY BE USED IN LIEU OF WELDING.
 5. GATE MUST HAVE KNUCKLED SELVAGE TOP AND BOTTOM.
 6. TOP OF CONCRETE FOOTING MUST BE CROWNED TO SHED WATER.



LANCE K. TOKUDA
LICENSED PROFESSIONAL ENGINEER
NO. 8631
HAWAII USA

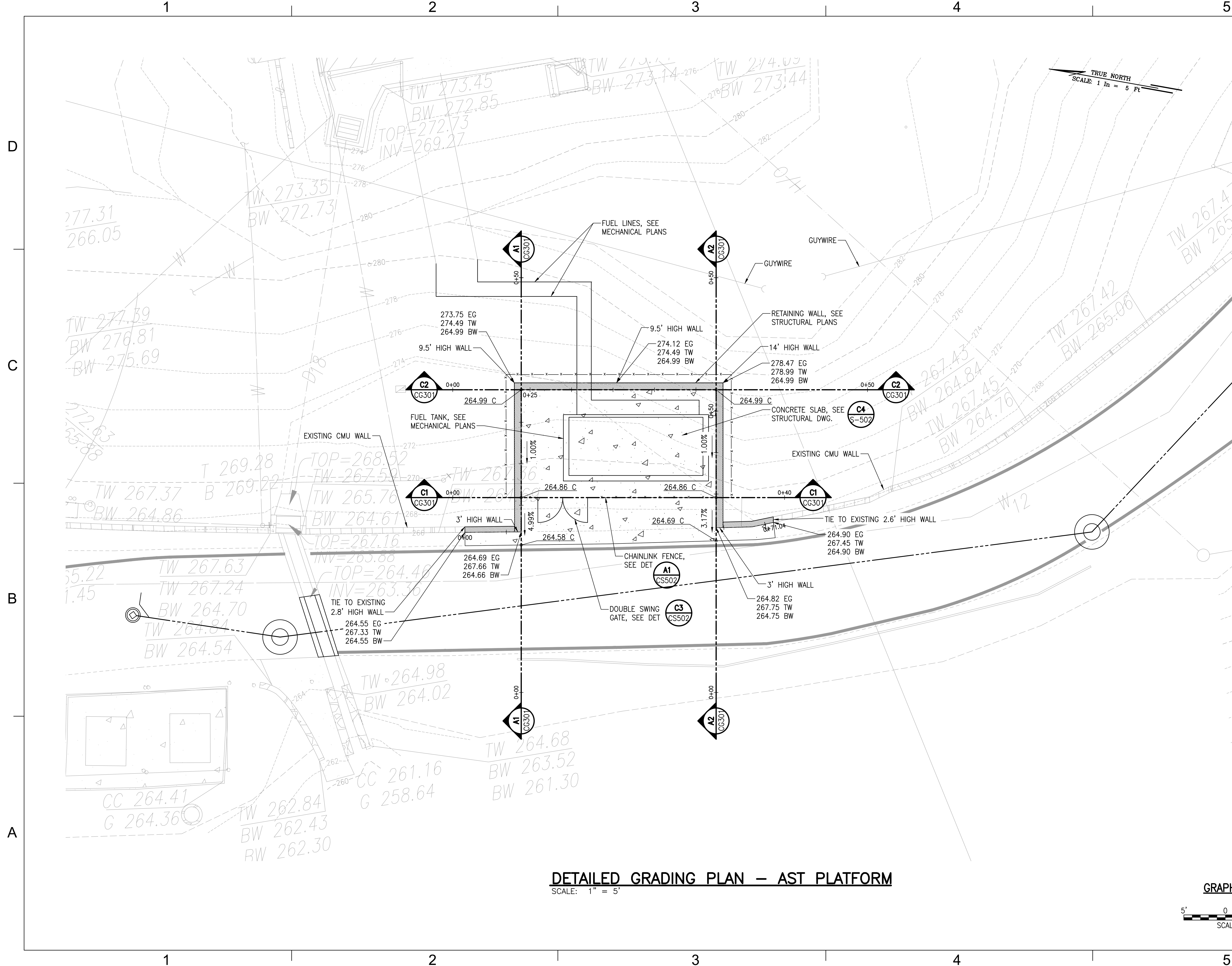
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SIGNATURE EXPIRATION DATE

DATE	DESCRIPTION

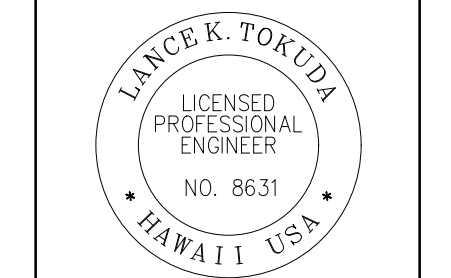
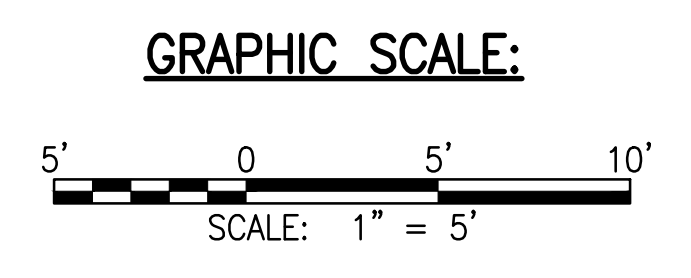
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 3/01/2024

DEPARTMENT OF DEFENSE
STATE OF HAWAII
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
FENCE DETAILS

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 10 OF 123
CS502



DETAILED GRADING PLAN - AST PLATFORM
 SCALE: 1" = 5'



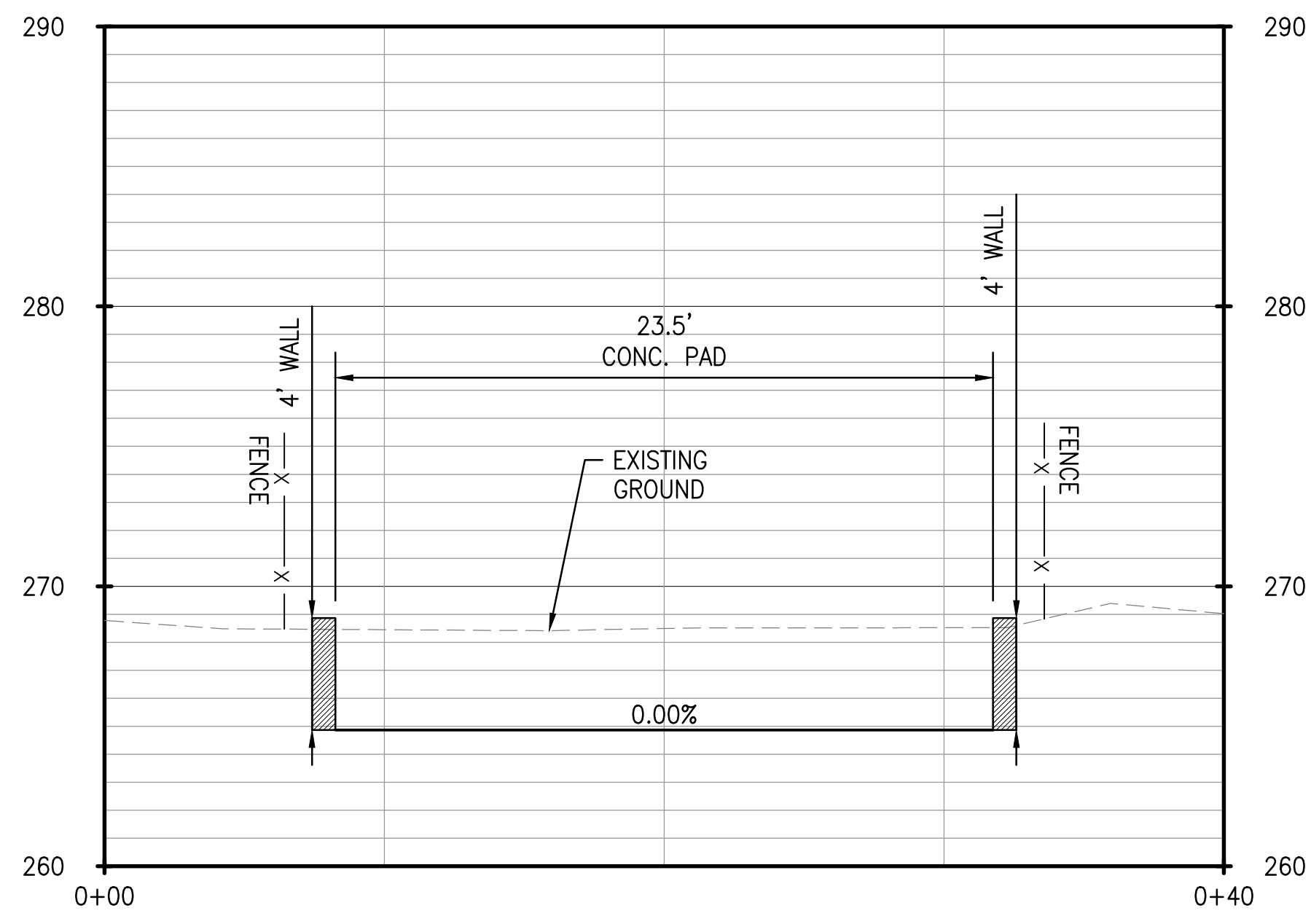
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 Signature: Lance K. Tokuda 4/30/2024
 EXPIRATION DATE

DATE	APPR.	DESCRIPTION

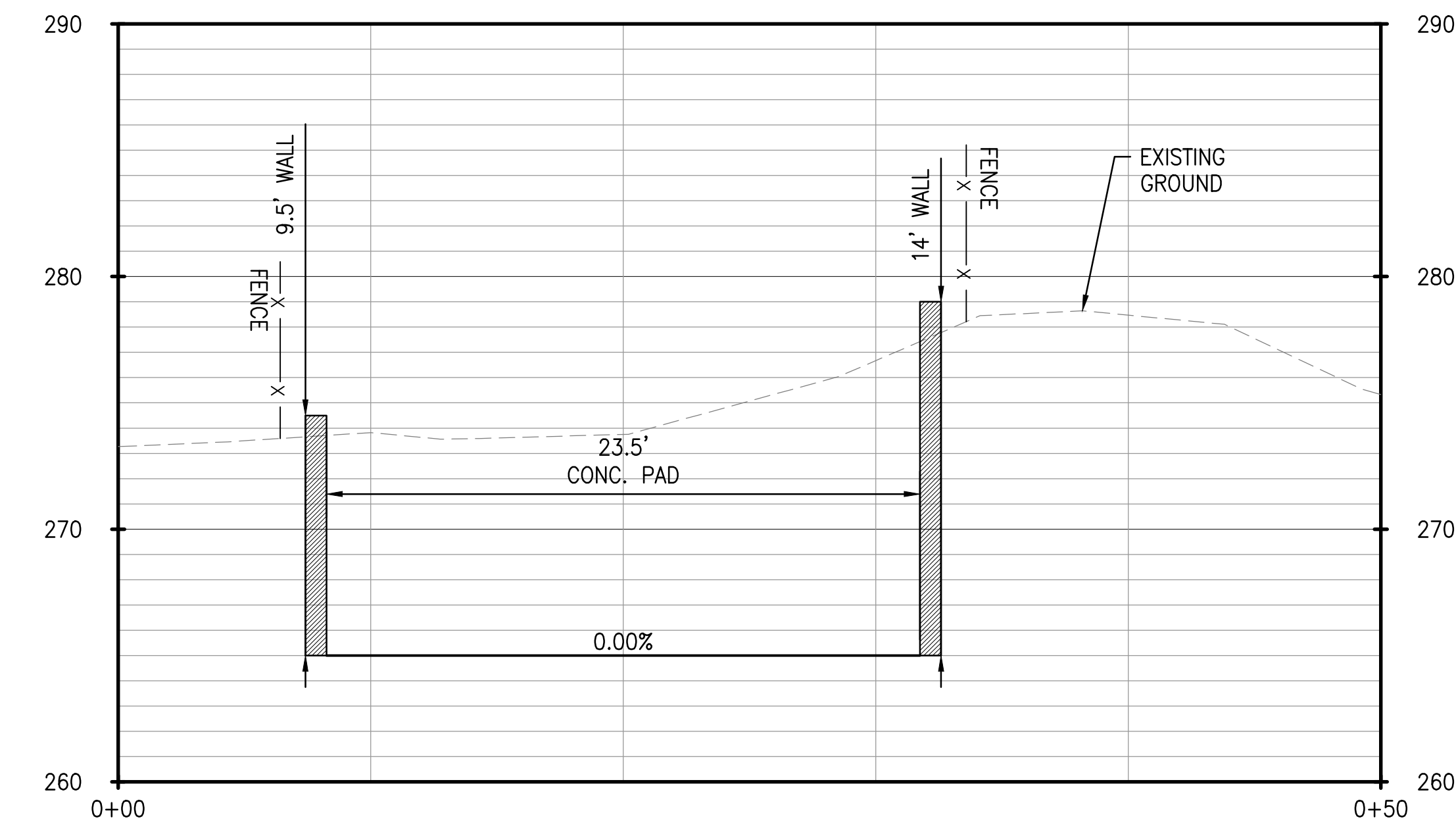
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CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
**BIRKHIRER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS**
 DETAILED GRADING PLAN - AST PLATFORM

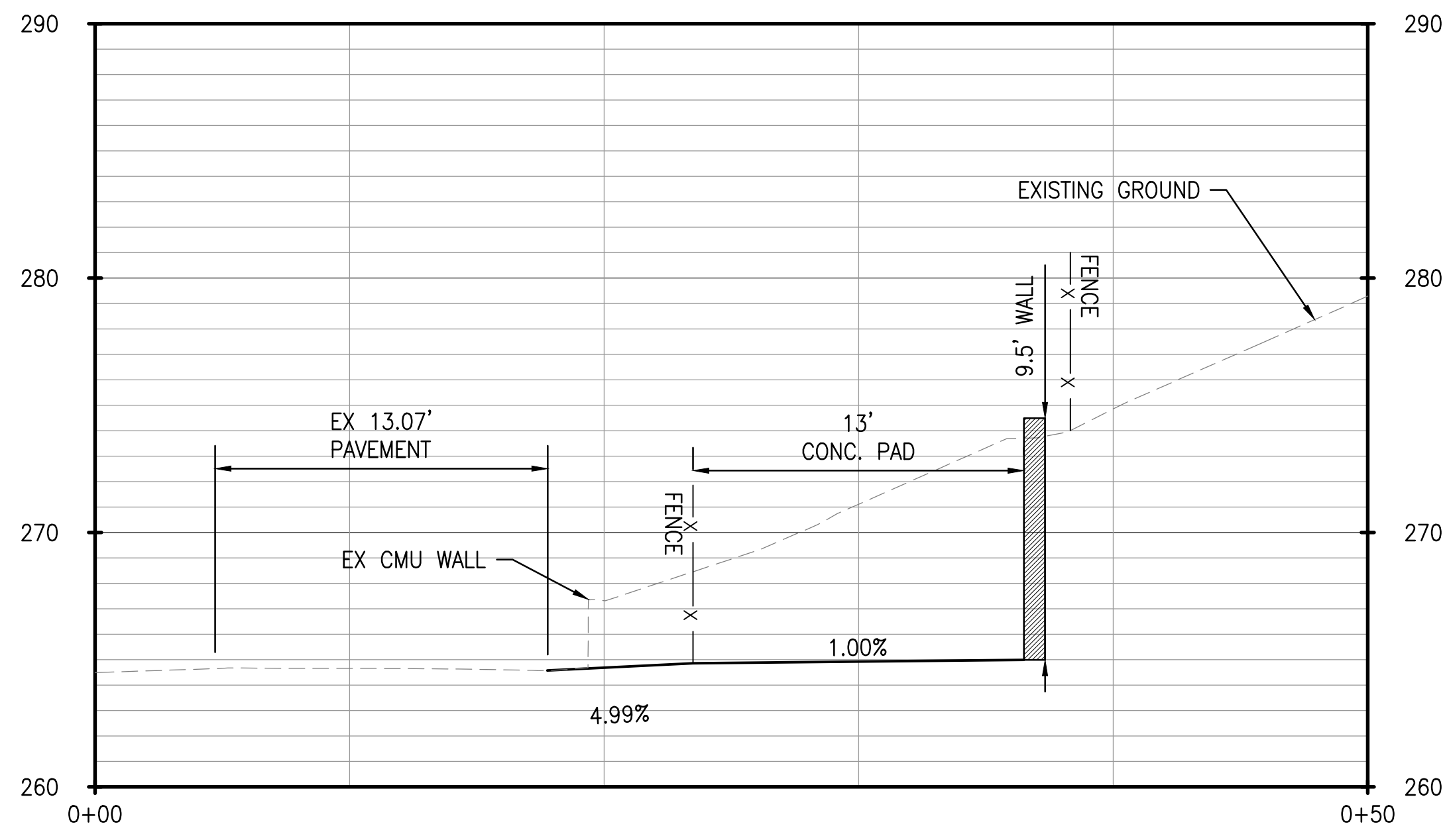
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 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 11 OF 123
CG101



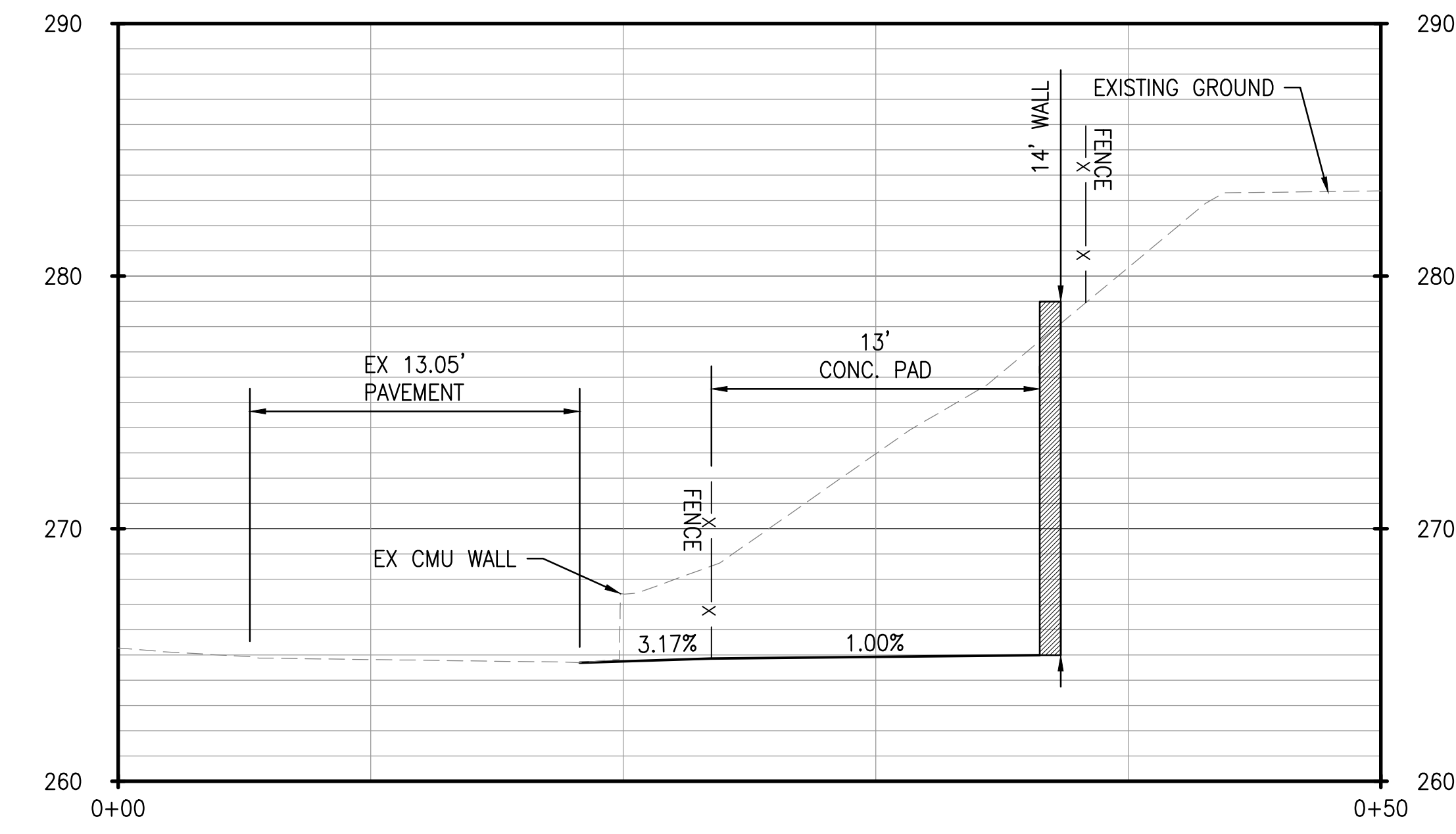
C1 GRADING SECTION
 SCALE: HORIZ. 1" = 5' / VERT. 1" = 5'



C2 GRADING SECTION
 SCALE: HORIZ. 1" = 5' / VERT. 1" = 5'

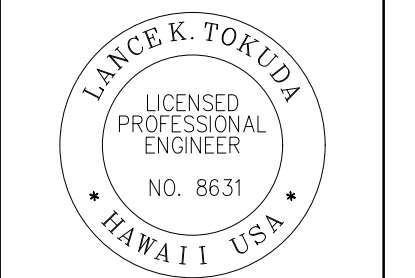
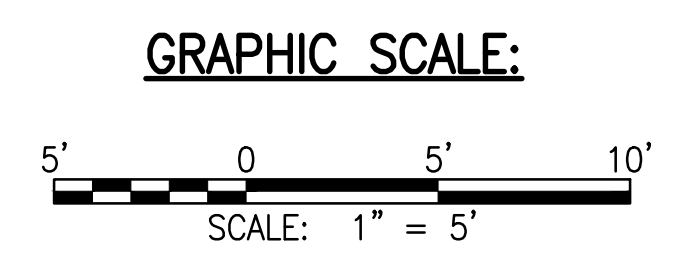


A1 GRADING SECTION
 SCALE: HORIZ. 1" = 5' / VERT. 1" = 5'



A2 GRADING SECTION
 SCALE: HORIZ. 1" = 5' / VERT. 1" = 5'

NOTES:
 1. SEE SHEET CG101 FOR SECTION LOCATIONS.



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DATE	APPR.	SYN.	DESCRIPTION

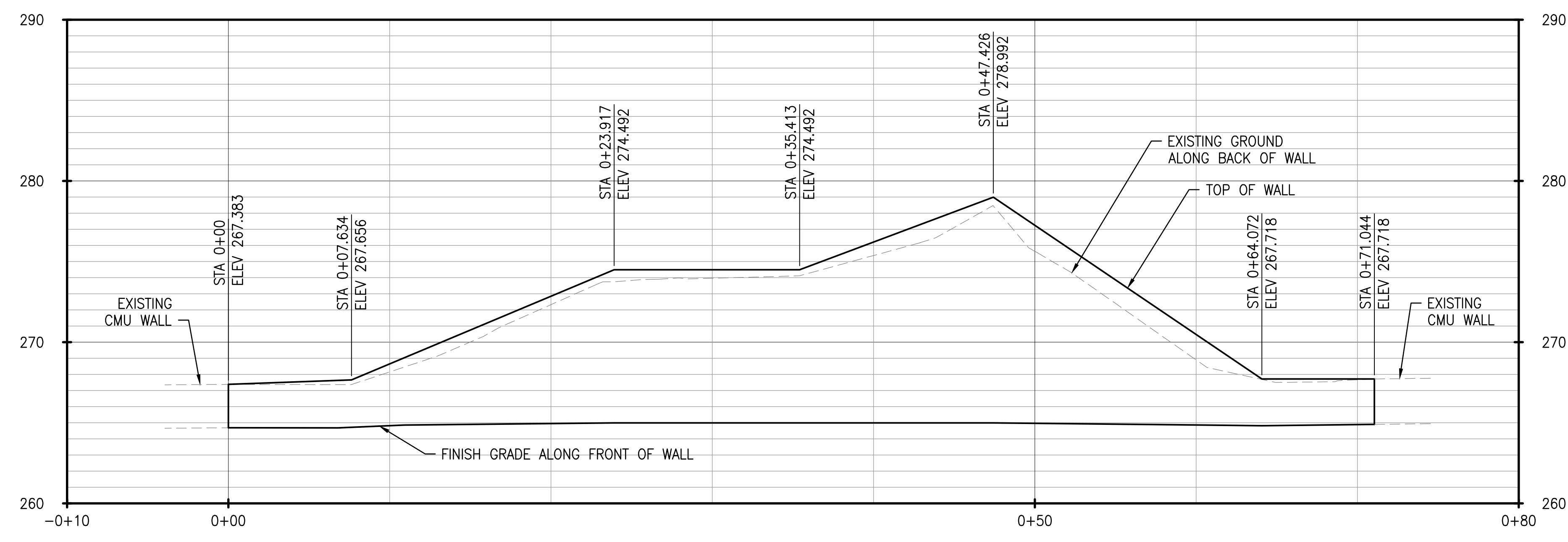
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CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600
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 GRADING SECTIONS - AST PLATFORM

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 12 OF 123
CG301

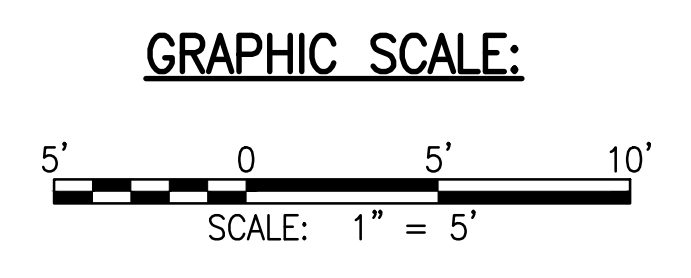
1 2 3 4 5

D
C
B
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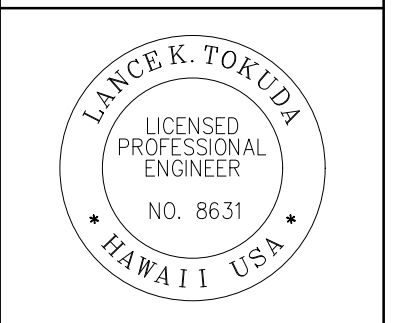


RETAINING WALL PROFILE

SCALE: HORIZ 1" = 5'
VERT 1" = 5'



1 2 3 4 5



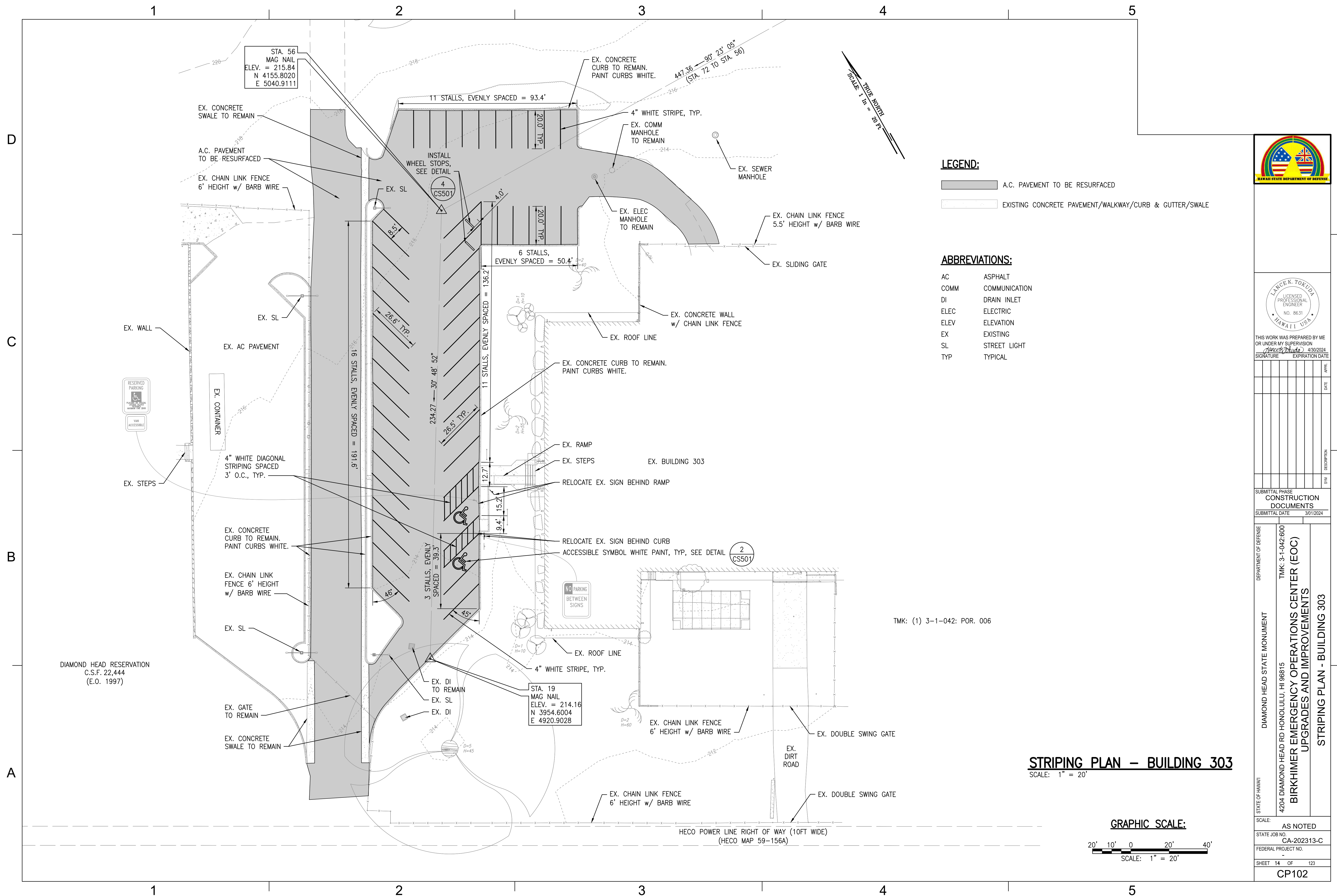
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Lance K. Tokuda 4/30/2024
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DATE	APPR.	SYN.	DESCRIPTION

SUBMITTAL PHASE
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SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
TMK: 3-1-042:600
4204 DIAMOND HEAD RD HONOLULU, HI 96815
**BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS**
RETAINING WALL PROFILE

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 13 OF 123
CG302



LEGEND:

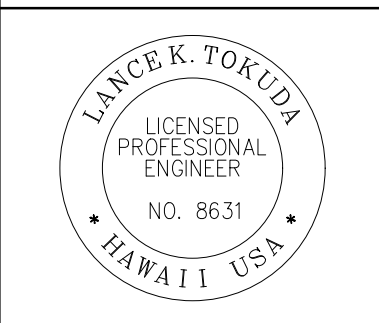
- A.C. PAVEMENT TO BE RESURFACED
- EXISTING CONCRETE PAVEMENT/WALKWAY/CURB & GUTTER/SWALE

ABBREVIATIONS:

- AC ASPHALT
- COMM COMMUNICATION
- DI DRAIN INLET
- ELEC ELECTRIC
- ELEV ELEVATION
- EX EXISTING
- SL STREET LIGHT
- TYP TYPICAL



HAWAII STATE DEPARTMENT OF DEFENSE



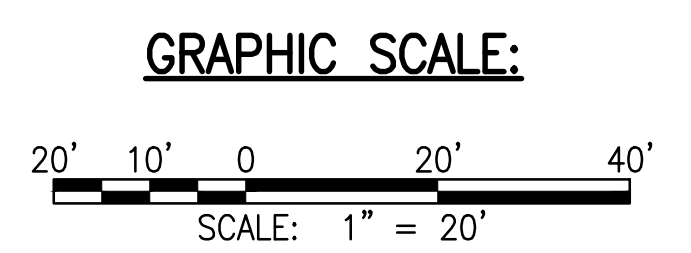
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DATE	APPR.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
STRIPING PLAN - BUILDING 303
 SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 14 OF 123
CP102

STRIPING PLAN - BUILDING 303
 SCALE: 1" = 20'



TMK: (1) 3-1-042: POR. 006

DIAMOND HEAD RESERVATION
 C.S.F. 22,444
 (E.O. 1997)

STA. 19
 MAG NAIL
 ELEV. = 214.16
 N 3954.6004
 E 4920.9028

STA. 56
 MAG NAIL
 ELEV. = 215.84
 N 4155.8020
 E 5040.9111

1

2

3

4

5

TABLE 1 FOR TRAFFIC CONTROL PLAN

POSTED SPEED LIMIT (M.P.H.)	SIGN SPACING (D) FEET	TAPER LENGTH (T) (FEET)		LONGITUDINAL BUFFER SPACE (B) (FEET)	SPACING OF CONES OR DELINEATORS (FEET)		
		W=12' OR LESS (1)	W>GREATER THAN 12' (1)		TAPER	TANGENT	WORK AREA
20	250	200	W X 17	35	20	20	10
25	250	200	W X 17	55	25	25	10
30	250	250	W X 20	85	30	30	10
35	250	250	W X 20	120	35	35	10
40	500	350	W X 30	170	40	40	10
45	500	550	W X 45	220	45	45	10
50	1000	600	W X 50	280	50	50	10
55	1000	700	W X 55	335	55	55	10

GENERAL NOTES FOR TRAFFIC CONTROL PLAN

- TRAFFIC CONES AND DELINEATORS SHALL BE A MINIMUM OF 18 INCHES IN HEIGHT WITH A BROADENED BASE AND MAY BE MADE OF VARIOUS MATERIALS TO WITHSTAND IMPACT WITHOUT DAMAGE TO THEMSELVES OR TO VEHICLES. TWENTY-EIGHT INCHES SHOULD BE THE MINIMUM HEIGHT OF CONES DURING HOURS OF DARKNESS.
- TRAFFIC CONES AND DELINEATORS SHALL BE REFLECTORIZED OR EQUIPPED WITH LIGHTING DEVICES FOR MAXIMUM VISIBILITY DURING NIGHT TIME USE.
- REFLECTORIZATION OF TUBULAR MARKERS SHALL BE A MINIMUM OF TWO, THREE-INCH WIDE WHITE BANDS PLACED MAXIMUM OF 2 INCHES FROM THE TOP WITH A MAXIMUM OF 6 INCHES BETWEEN THE BANDS. REFLECTORIZATION OF CONES SHALL BE PROVIDED BY A MINIMUM 6-INCH-WIDE BAND PLACED A MINIMUM OF 3 INCHES BUT NO MORE THAN 4 INCHES FROM THE TOP. WHEN THE 28-INCH OR LARGER SIZE CONES ARE USED THE STANDARD 6-INCH BAND SHALL BE SUPPLEMENTED WITH AN ADDITIONAL 4-INCH WHITE BAND SPACED A MINIMUM OF 2 INCHES BELOW THE 6-INCH BAND.
- THE PERMITTEE SHALL MAKE MINOR ADJUSTMENTS AT INTERSECTION, DRIVEWAYS, BRIDGES, STRUCTURES, ETC., TO FIT FIELD CONDITIONS.
- CONES OR DELINEATORS SHALL BE EXTENDED TO A POINT WHERE THEY ARE VISIBLE TO APPROACHING TRAFFIC.
- TRAFFIC CONTROL DEVICES SHALL BE INSTALLED SUCH THAT THE SIGN OR DEVICE FARTHEST FROM THE WORK AREA SHALL BE PLACED FIRST. THE OTHERS SHALL THEN BE PLACED PROGRESSIVELY TOWARD THE WORK AREA.
- REGULATORY AND WARNINGS SIGNS WITHIN THE CONSTRUCTION ZONE THAT ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLANS SHALL BE REMOVED OR COVERED. ALL SIGNS SHALL BE RESTORED UPON COMPLETION OF THE WORK.
- FLAGGERS AND/OR POLICE OFFICERS SHALL BE IN SIGHT OF EACH OTHER OR IN DIRECT COMMUNICATION AT ALL TIMES.
- WHEN REQUIRED BY THE ISSUING OFFICE, THE PERMITTEE SHALL INSTALL A FLASHING ARROW SIGNAL AS SHOWN ON THE TRAFFIC CONTROL PLANS.
- SIGN SPACINGS, (D) TAPER LENGTHS (T) AND SPACING OR CONES OR DELINEATORS SHALL BE AS SHOWN IN TABLE 1, UNLESS OTHERWISE NOTED ON THE TRAFFIC CONTROL PLANS.
- ALL TRAFFIC LANES SHALL BE A MINIMUM OF 10 FEET WIDE.
- ALL CONSTRUCTION WARNING SIGNS SHALL BE PROMPTLY REMOVED OR COVERED WHENEVER THE MESSAGE IS NOT APPLICABLE OR NOT IN USE.
- THE BACKS OF ALL SIGNS FOR TRAFFIC CONTROL SHALL BE APPROPRIATELY COVERED TO PRECLUDE THE DISPLAY OF INAPPLICABLE SIGN MESSAGES (I.E., WHEN SIGNS HAVE MESSAGES ON BOTH SIDES).
- AT THE END OF EACH DAY'S WORK OR AS SOON AS THE WORK IS COMPLETED, THE PERMITTEE SHALL REMOVE ALL TRAFFIC CONTROL DEVICES NO LONGER NEEDED TO PERMIT FREE AND SAFE PASSAGE OF PUBLIC TRAFFIC. REMOVAL SHALL BE IN REVERSE ORDER OF INSTALLATION.
- REPLACE PERMANENT PAVEMENT MARKINGS AND TRAFFIC SIGNS UPON COMPLETION OF EACH PHASE OF WORK.
- CONTRACTOR SHALL EXCAVATE WHAT HE CAN INSTALL IN ANY GIVEN DAY.
- OPEN TRENCH WILL NOT BE ALLOWED UNLESS ROAD PLATE IS INSTALLED.
- TEMPORARY PATCH ACCEPTABLE, HOWEVER, PERMANENT REPAIR SHALL BE DONE IN 7 DAYS.
- TRENCH SHALL BE MAINTAINED REGULARLY.
- STEEL TRACK EQUIPMENT NOT PERMITTED ON PAVEMENT. DAMAGED PAVEMENTS DUE TO EQUIPMENT(S) SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER, INCLUDING RESURFACING, RECONSTRUCTION, ETC.
- CONTRACTOR SHALL SUBMIT VIDEOTAPE OF PROPOSED ROUTE SHOWING CONDITION OF EXISTING PAVEMENT.

D

C

B

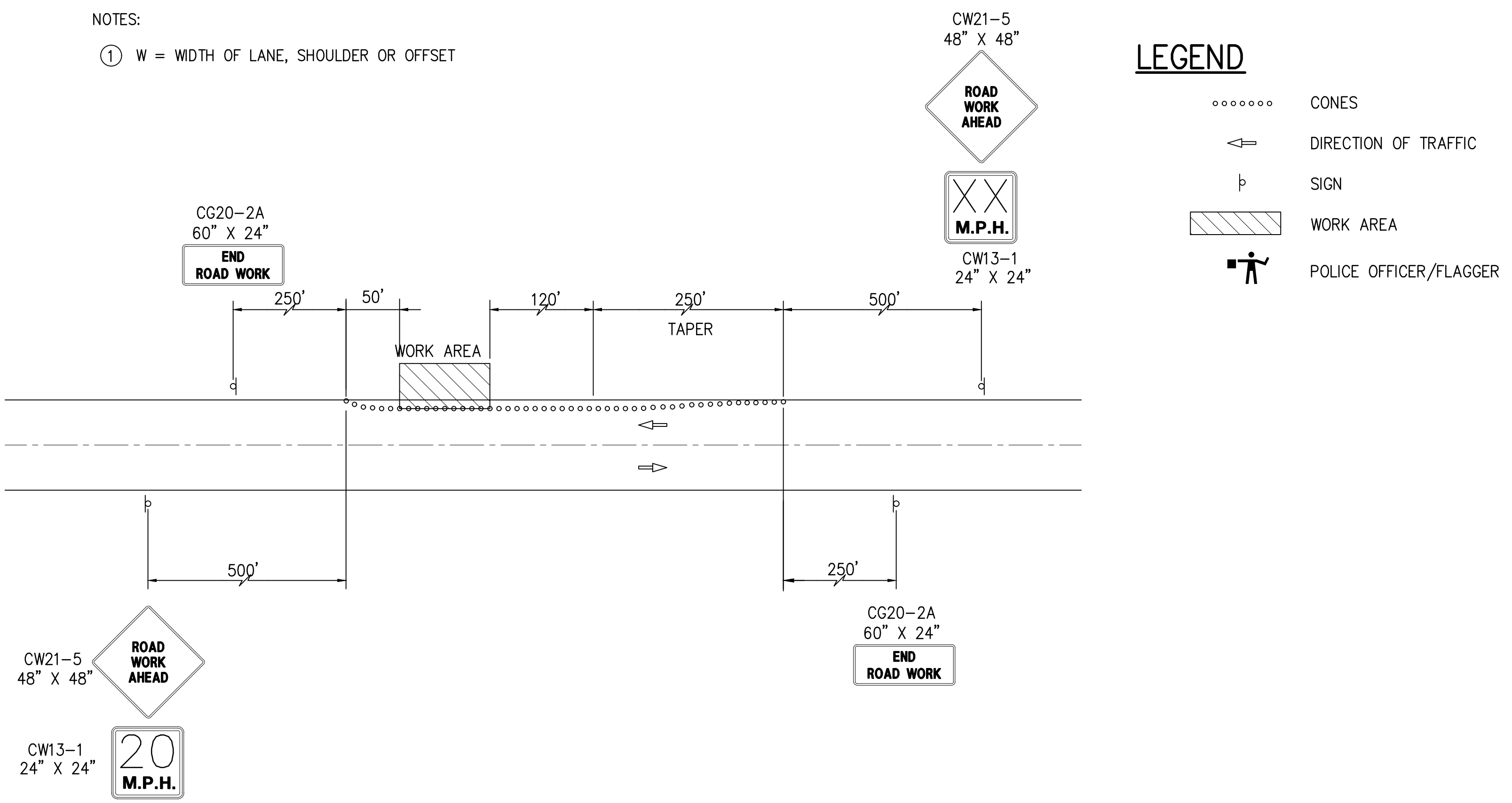
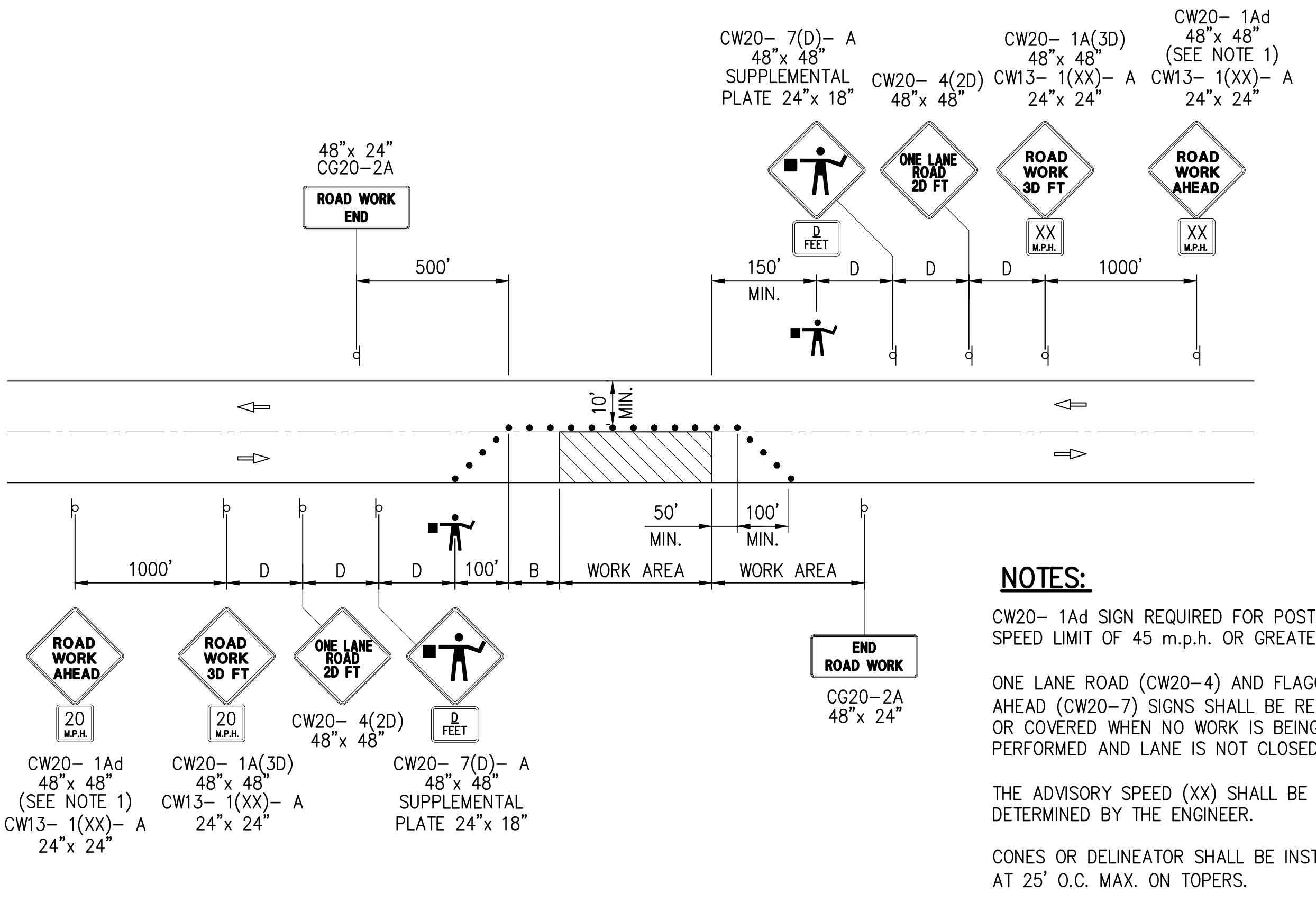
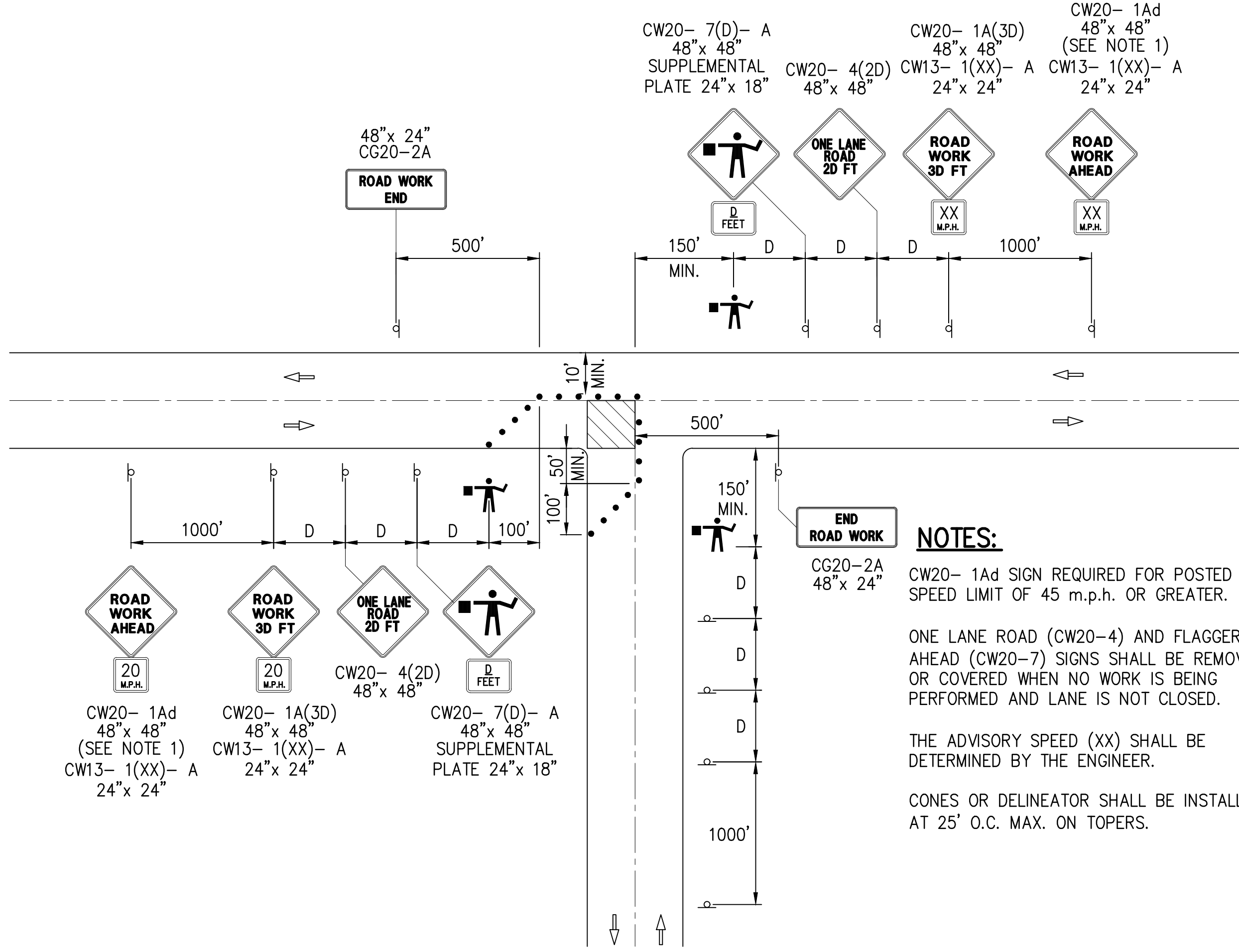
A

D

C

B

A

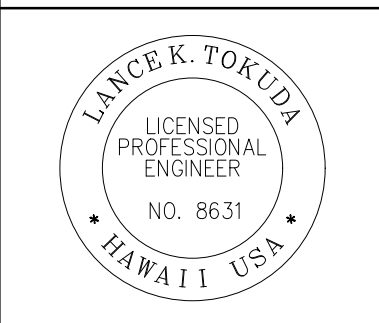


LEGEND

- CONES
- ← DIRECTION OF TRAFFIC
- ↳ SIGN
- [Hatched Box] WORK AREA
- [Stick Figure] POLICE OFFICER/FLAGGER

NOTES:

- (1) W = WIDTH OF LANE, SHOULDER OR OFFSET



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 Signature: Lance K. Tokuda 4/30/2024
 EXPIRATION DATE: _____

SYN	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE: 3/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 TRAFFIC CONTROL PLAN

1

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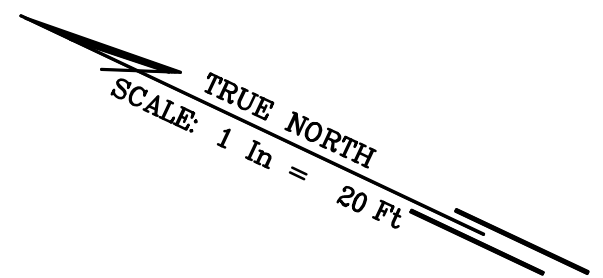
C

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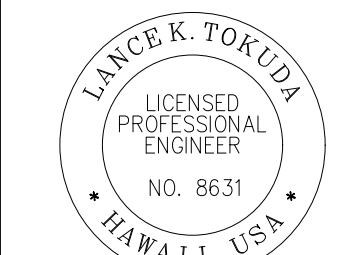
DIAMOND HEAD RESERVATION
C.S.F. 22,444
(E.O. 1997)

DIAMOND HEAD RESERVATION
C.S.F. 22,444
(E.O. 1997)



SEWER CONSTRUCTION NOTES:

1. SEWER SERVICE SHALL BE MAINTAINED AT ALL TIMES. MAXIMUM ALLOWED SHUTDOWN DURATION IS 6 HOURS WITH APPROVAL BY GOVERNMENT CONSTRUCTION MANAGER. PROVIDE ONE-WEEK ADVANCE NOTICE TO TENANT OPERATIONS MANAGER.
2. CHECK EXISTING UTILITY CROSSINGS AND PIPE JOINTS. CONSIDER PIPE BURSTING METHOD.
3. ADD BURIED REINFORCED CONCRETE PIPE SUPPORT BLOCKS WITHIN SLOPED AREA.
4. THERE IS ONE KNOWN 6" PIPE FAILURE ALONG THE SLOPED AREA.



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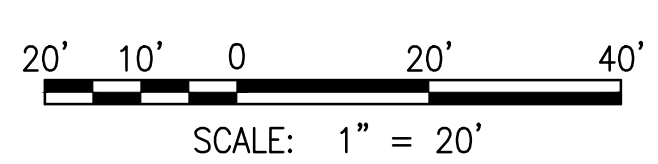
DATE	APPR.	SYN.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
OVERALL UTILITY PLAN

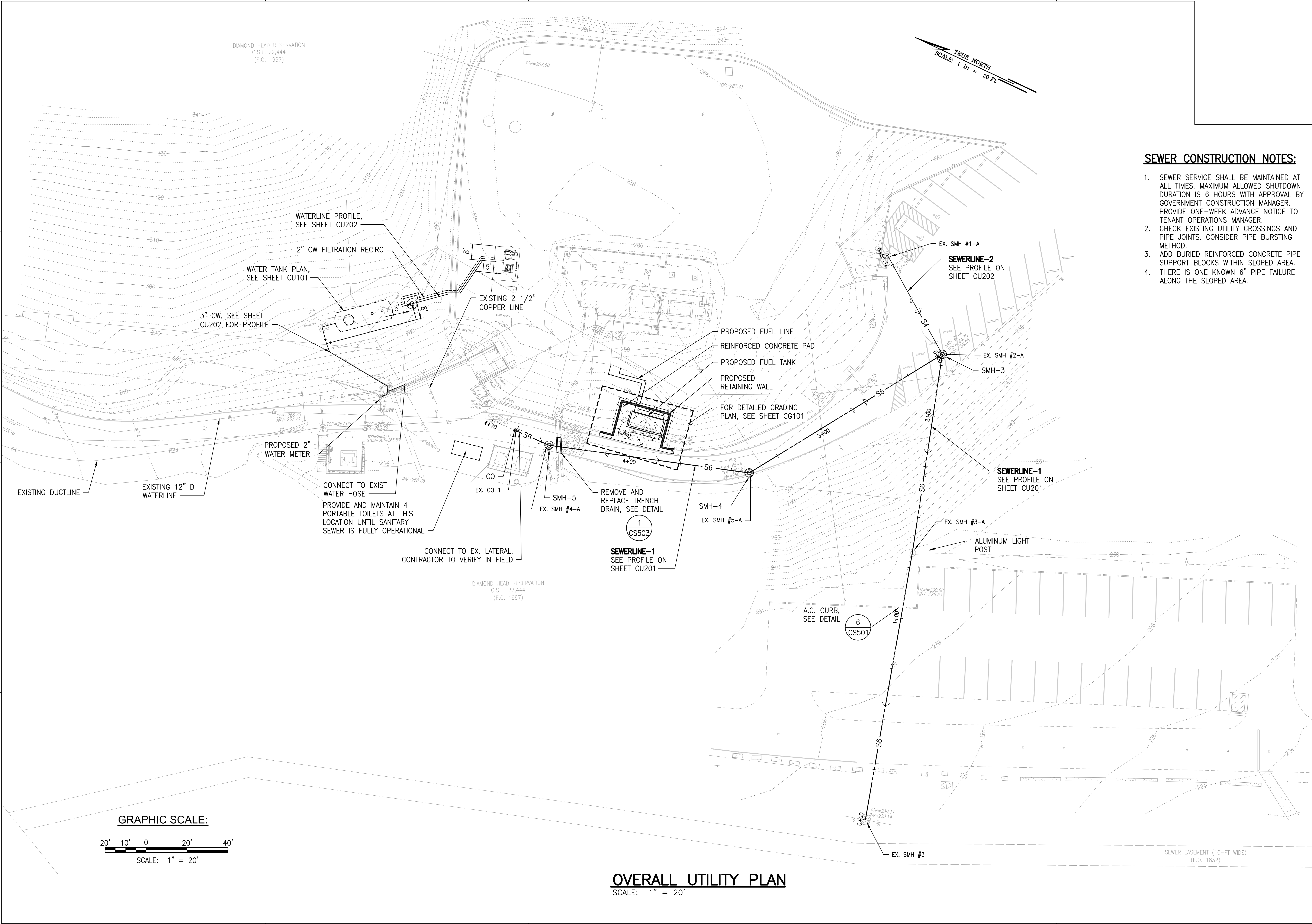
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STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 16 OF 123
CU100

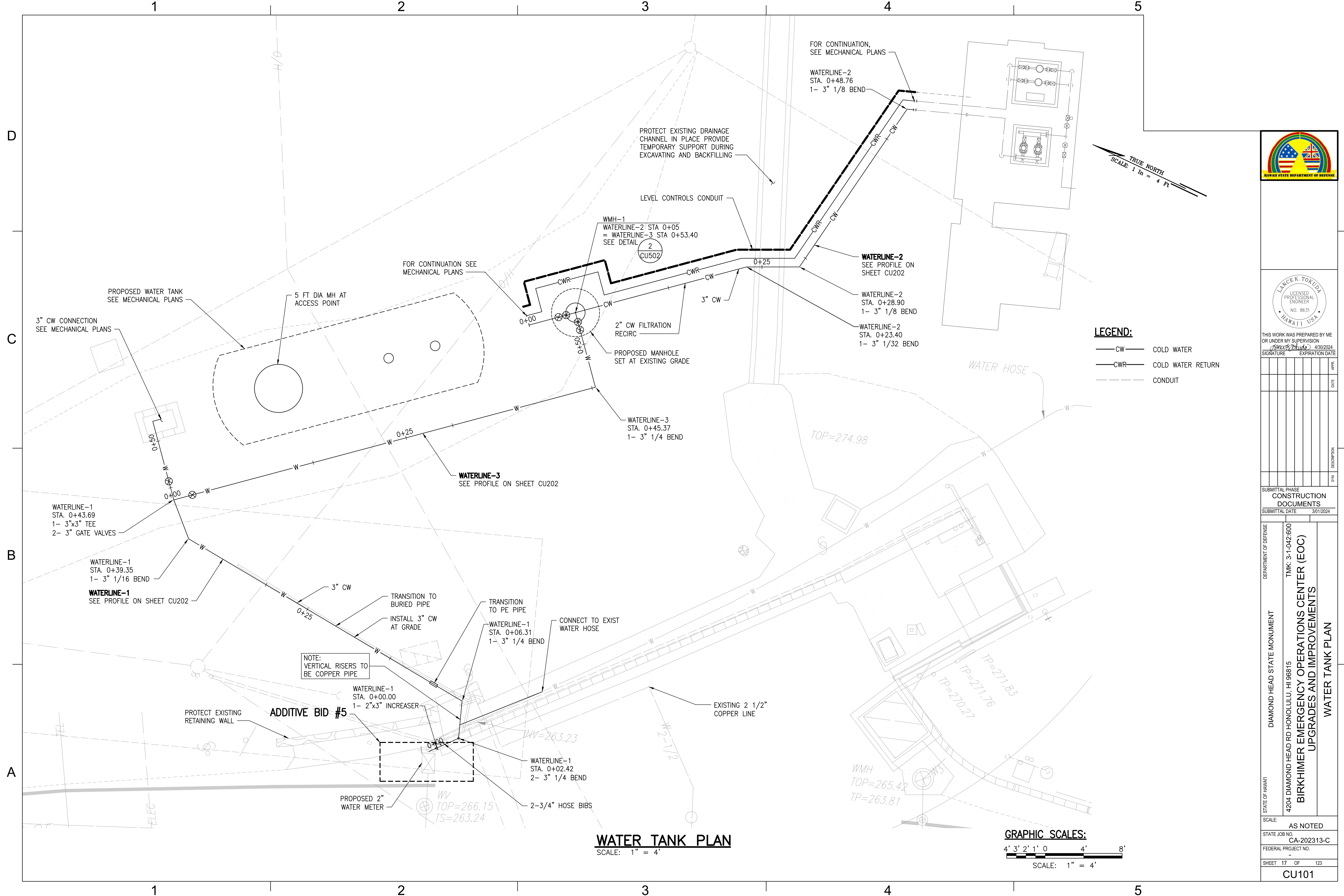
GRAPHIC SCALE:



OVERALL UTILITY PLAN

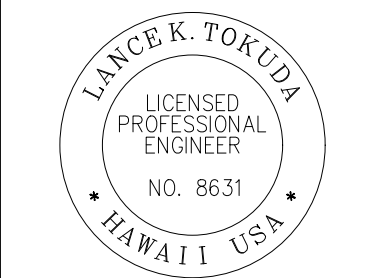
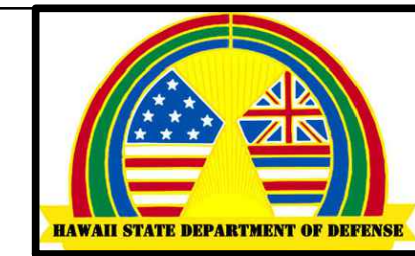
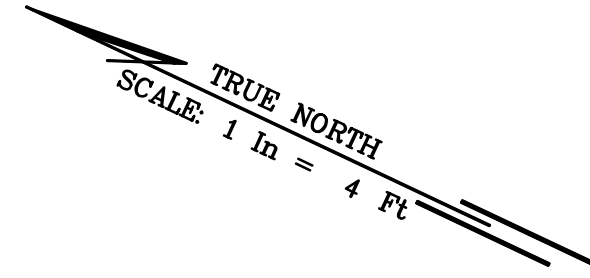
SCALE: 1" = 20'





WATER TANK PLAN
SCALE: 1" = 4'

GRAPHIC SCALES:
 4' 3' 2' 1' 0' 4' 8'
 SCALE: 1" = 4'

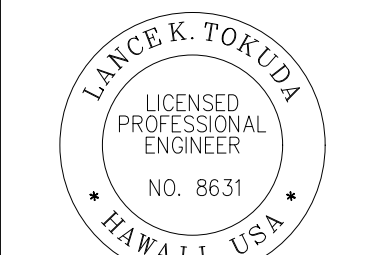
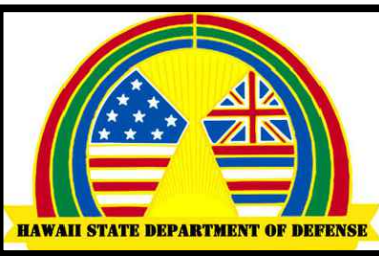
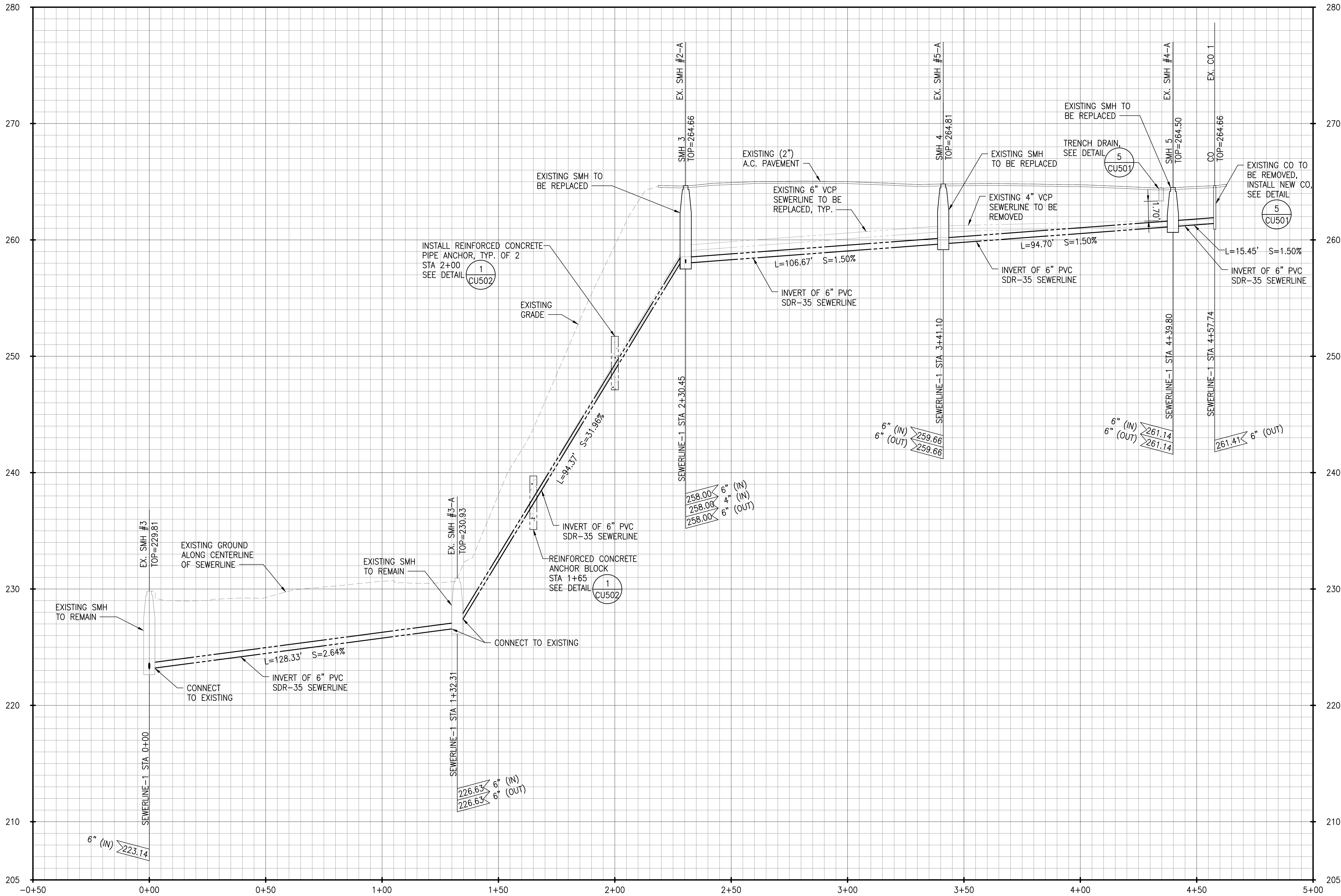


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SYN	DESCRIPTION	DATE	APP'R

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 3/01/2024

STATE OF HAWAII	DEPARTMENT OF DEFENSE	TMK: 3-1-042:600	WATER TANK PLAN
	DIAMOND HEAD STATE MONUMENT		
4204 DIAMOND HEAD RD HONOLULU, HI 96815			
SCALE: AS NOTED			
STATE JOB NO. CA-202313-C			
FEDERAL PROJECT NO.			
SHEET 17 OF 123			
			CU101



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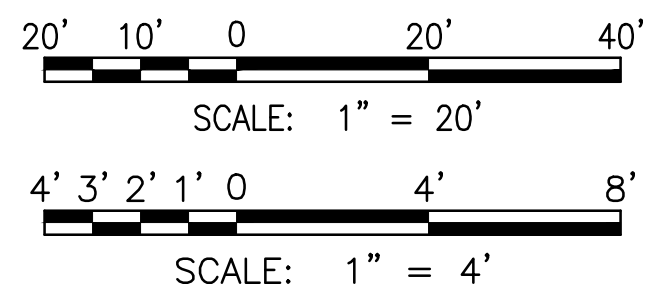
SYN	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 SEWERLINE-1 PROFILE

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 18 OF 123
CU201

GRAPHIC SCALE:



SEWERLINE-1 PROFILE

SCALE: HORIZ 1" = 20'
 VERT 1" = 4'

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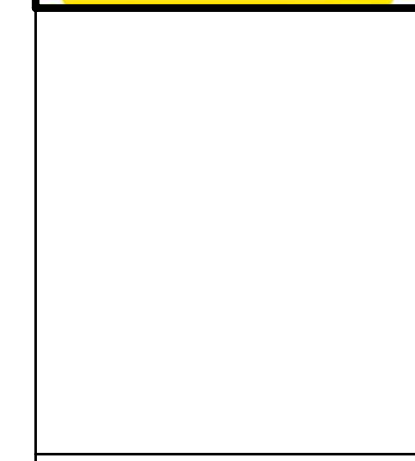
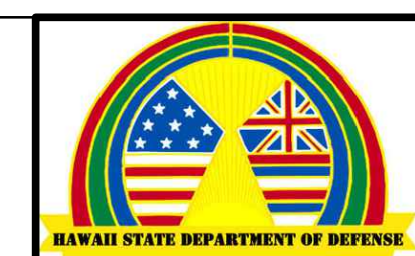
A

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C

B

A



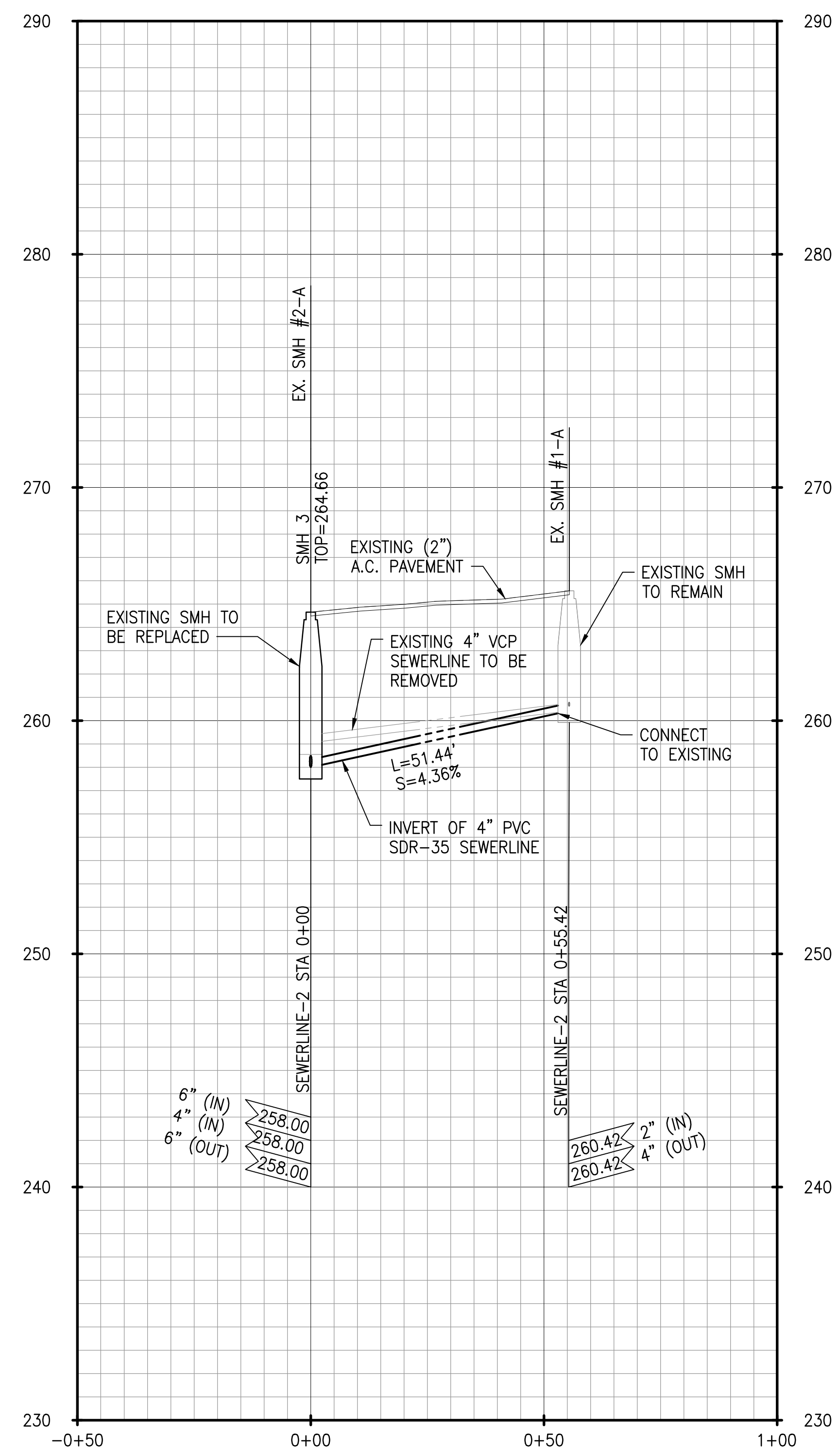
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Lance K. Tokuda 4/30/2024
 SIGNATURE EXPIRATION DATE

DATE	APPROVAL	SYMBOL	DESCRIPTION

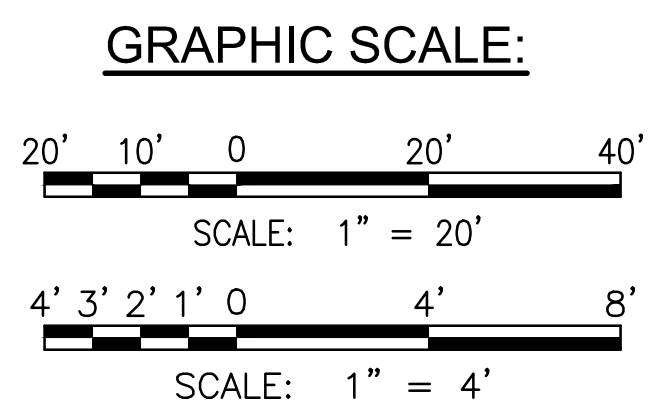
SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMK: 3-1-042:600
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
SEWERLINE-2 PROFILE

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 19 OF 123
CU202



SEWERLINE-2 PROFILE
 SCALE: HORIZ 1" = 20'
 VERT 1" = 4'



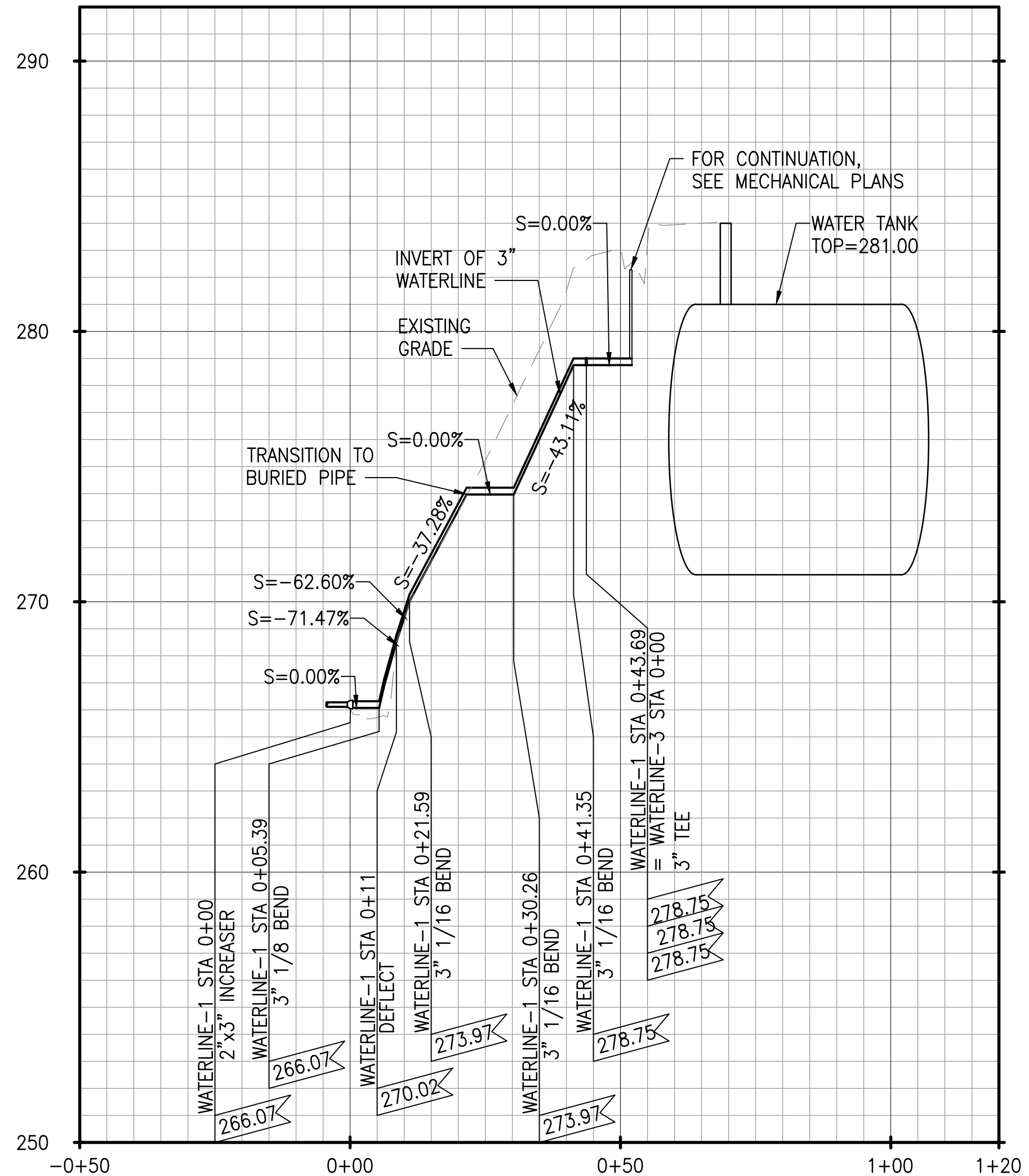
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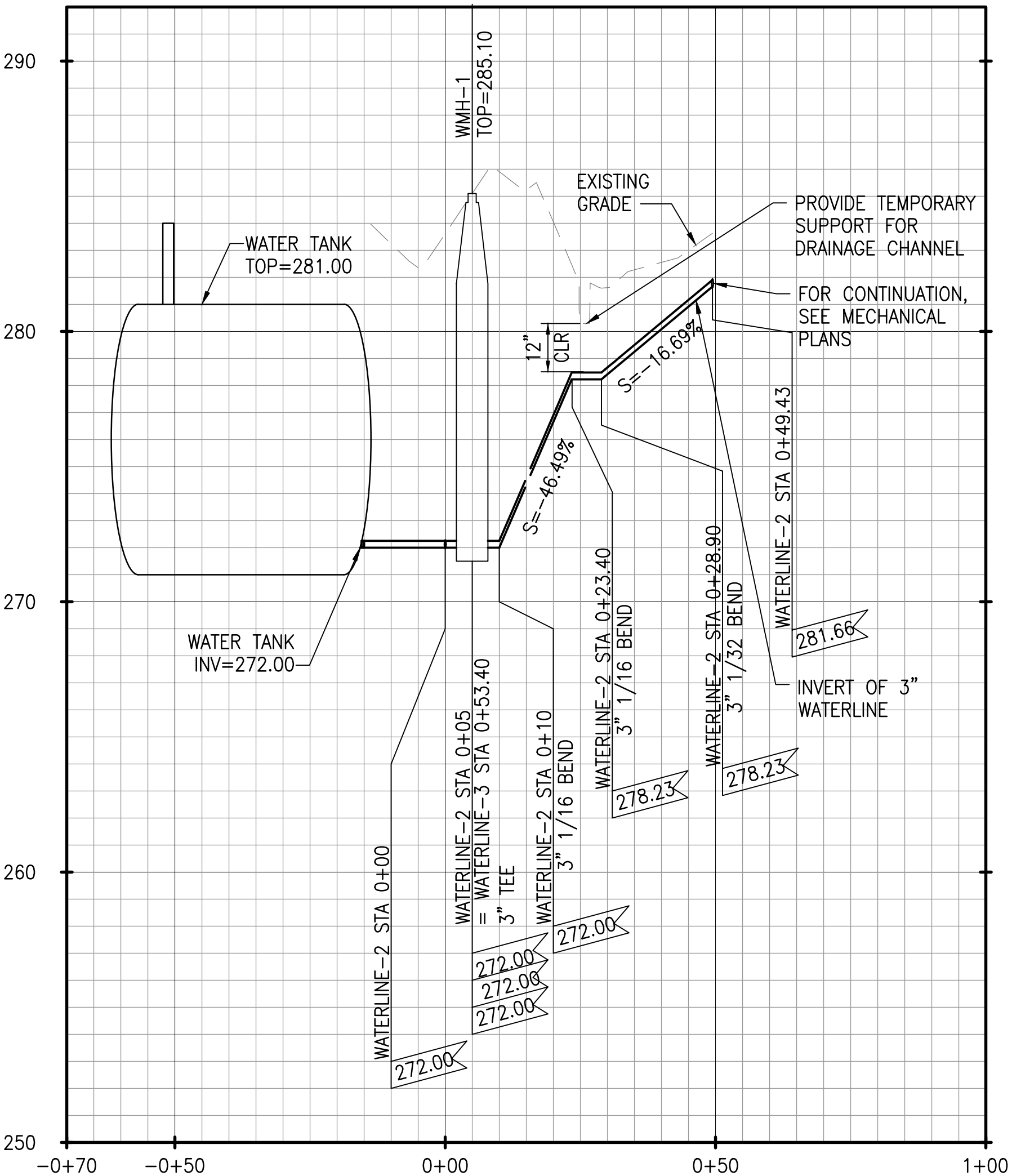
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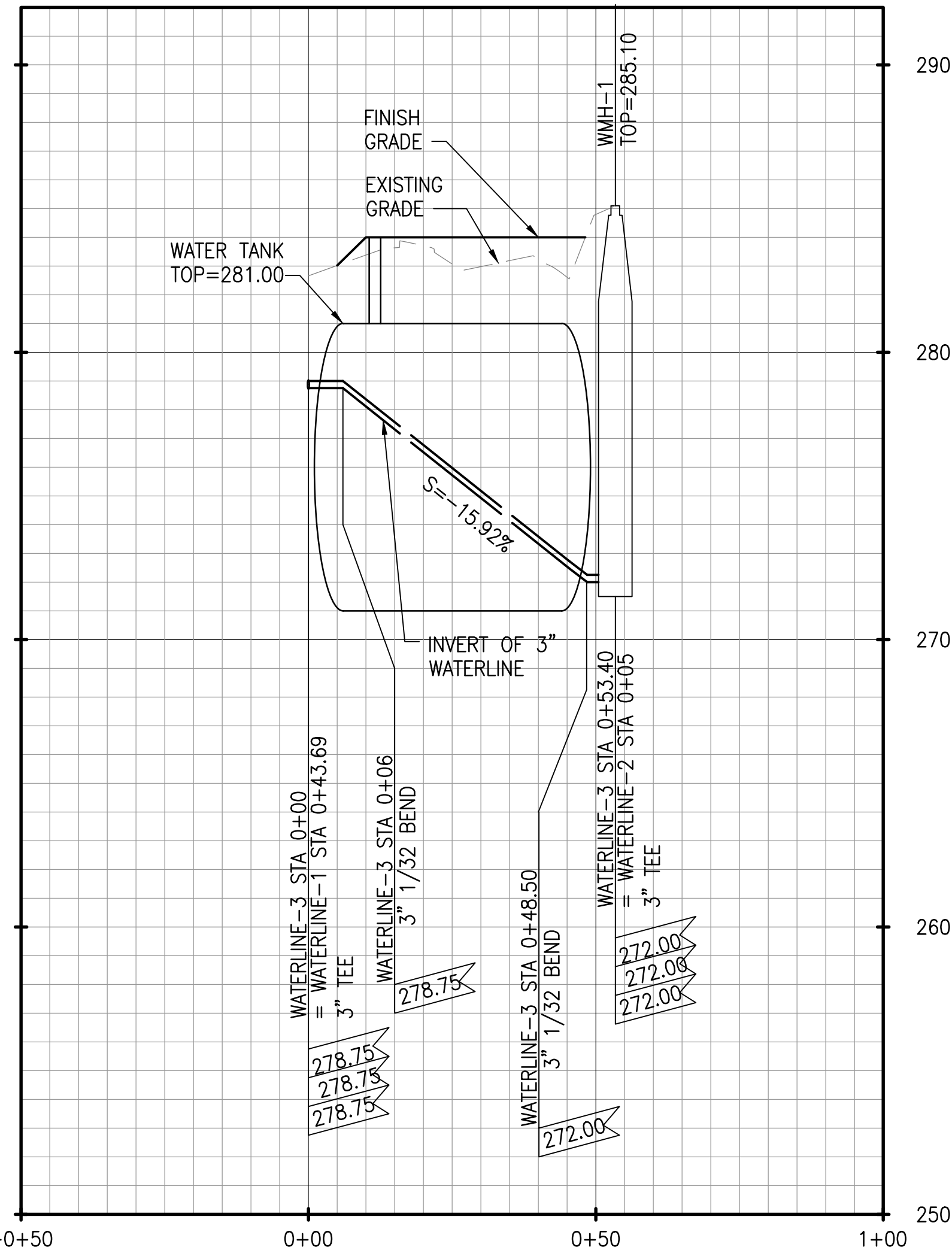
WATERLINE-1 PROFILE

SCALE: HORIZ 1" = 20'
VERT 1" = 4'



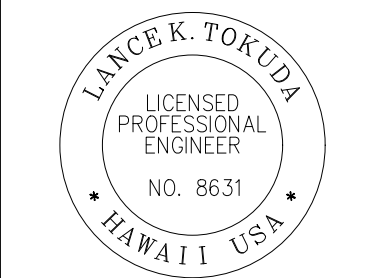
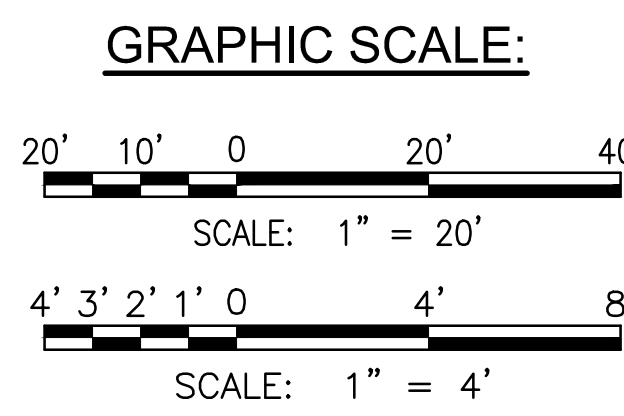
WATERLINE-2 PROFILE

SCALE: HORIZ 1" = 20'
VERT 1" = 4'



WATERLINE-3 PROFILE

SCALE: HORIZ 1" = 20'
VERT 1" = 4'



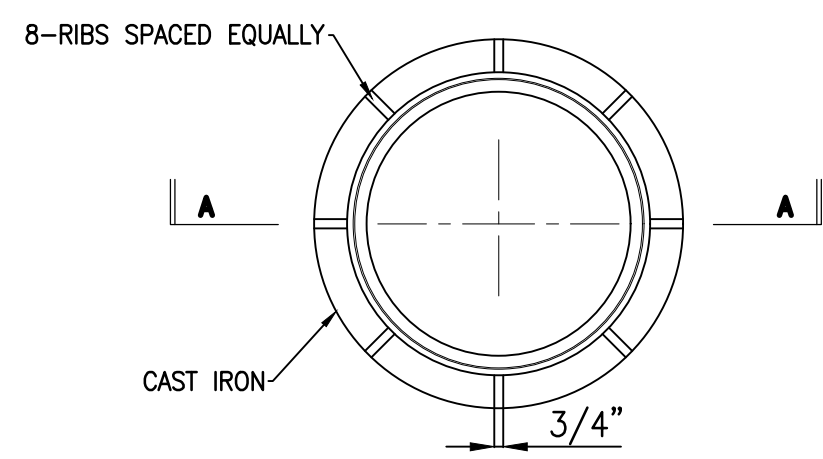
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DATE	APPR.	DESCRIPTION

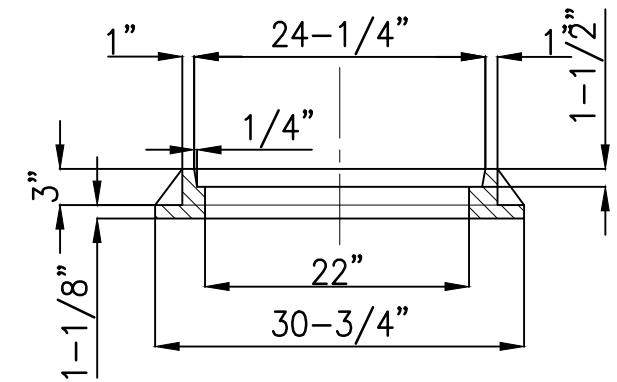
SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/01/2024

DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHYMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 WATERLINE PROFILE

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 20 OF 123
CU203



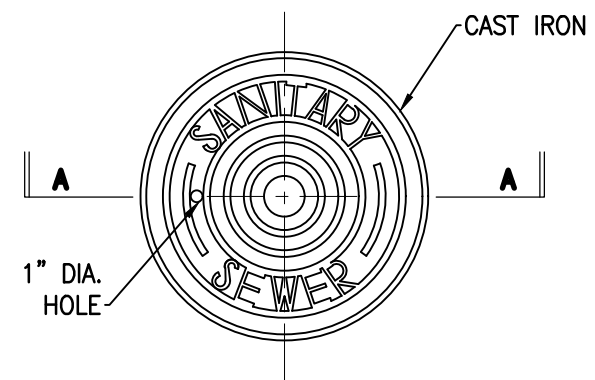
PLAN OF MANHOLE FRAME



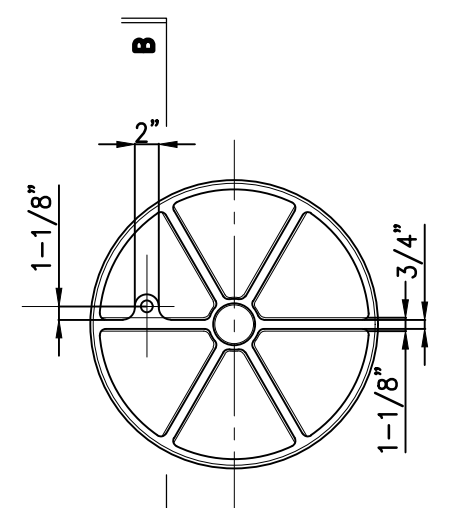
SECTION A-A

- NOTES:**
1. TYPE "SA" COVER IS USED WITH THIS FRAME.
 2. APPROXIMATE WEIGHT = 156 POUNDS.

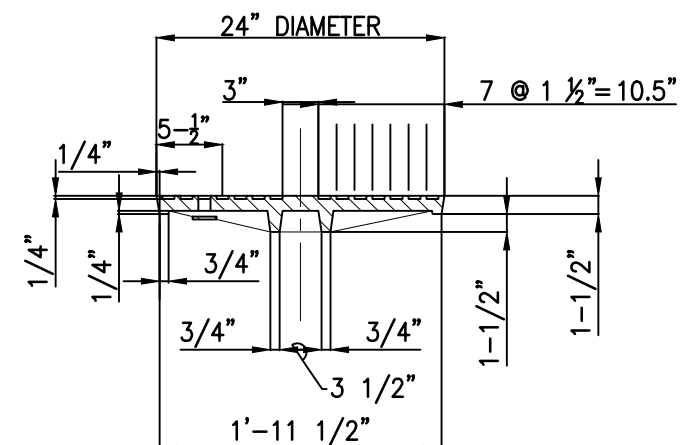
1 MANHOLE FRAME - TYPE SA
CU501 NOT TO SCALE



PLAN OF MANHOLE COVER



PLAN - COVER BOTTOM

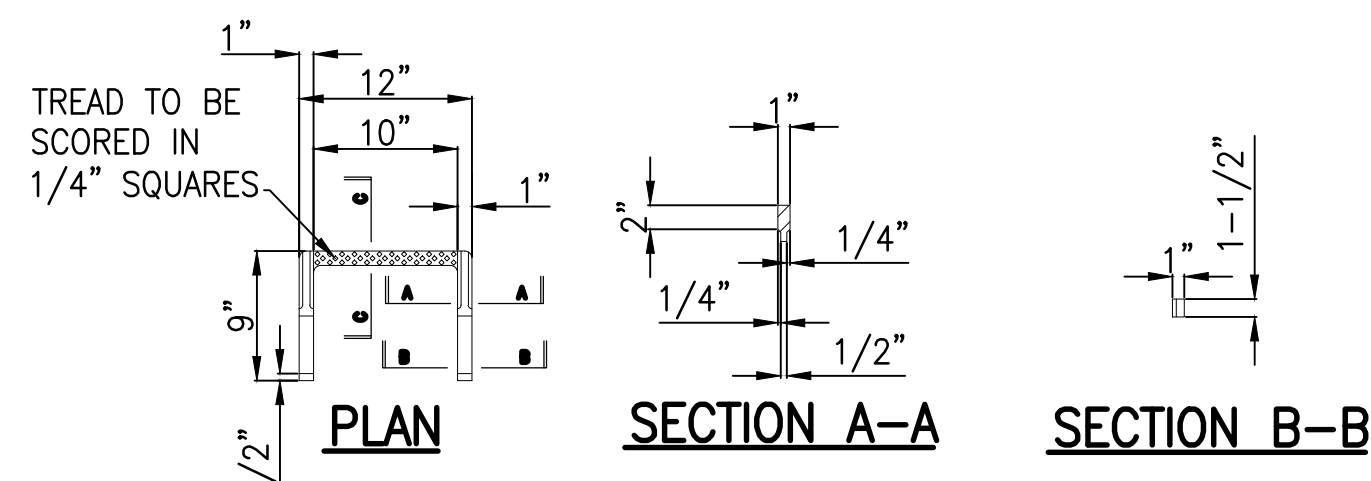


SECTION A-A

SECTION B-B

- NOTES:**
1. THIS COVER IS USED WITH THE TYPE SA FRAME.
 2. APPROXIMATE WEIGHT = 158 POUNDS.
 3. COVER SHALL CONFORM TO ASTM A48, CLASS NO. 30.

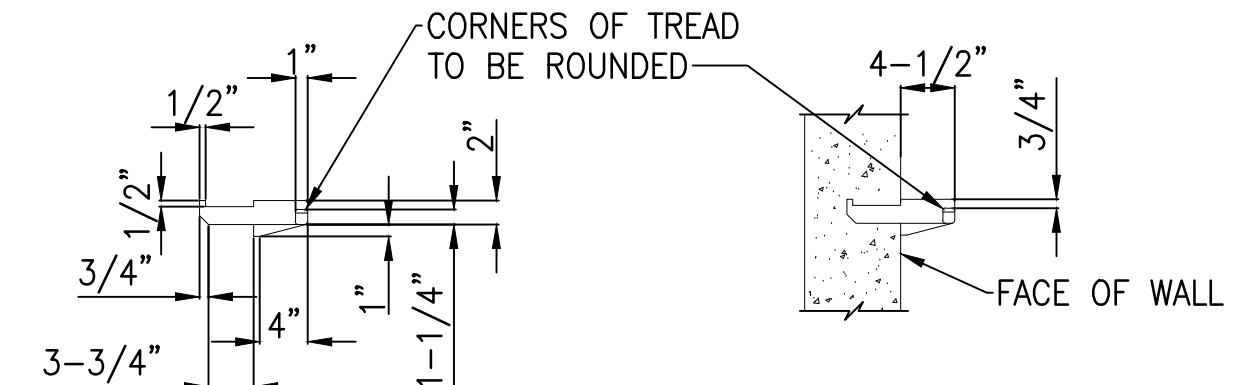
2 MANHOLE COVER - TYPE SA
CU501 NOT TO SCALE



PLAN

SECTION A-A

SECTION B-B

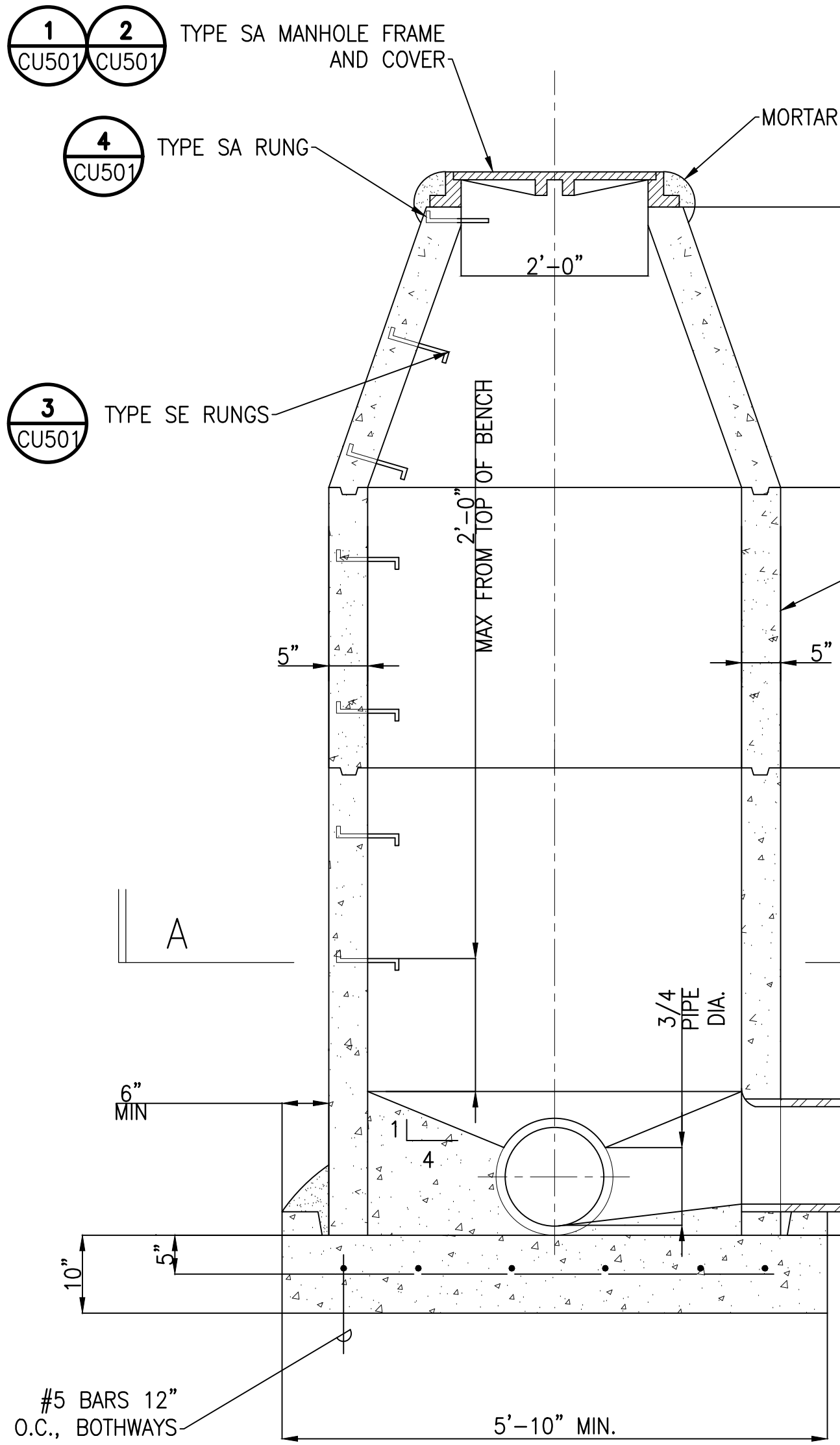


SECTION C-C

METHOD OF INSTALLATION

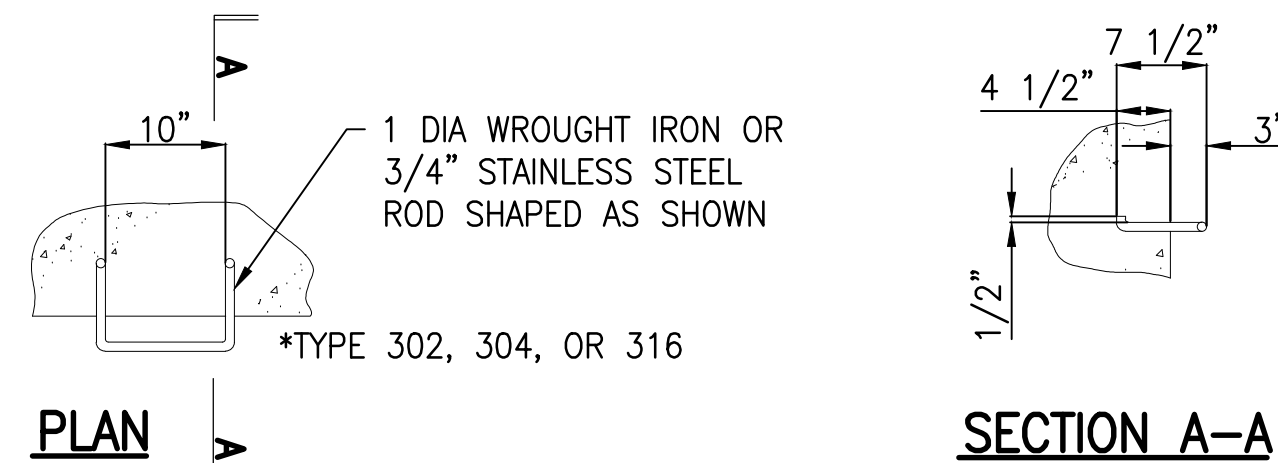
**TYPE SE MANHOLE RUNGS
CAST IRON OR DUCTILE IRON**

3 MANHOLE RUNG DETAILS - TYPE SE
CU501 NOT TO SCALE



**PLAIN MANHOLE
PRE-CAST CONCRETE**

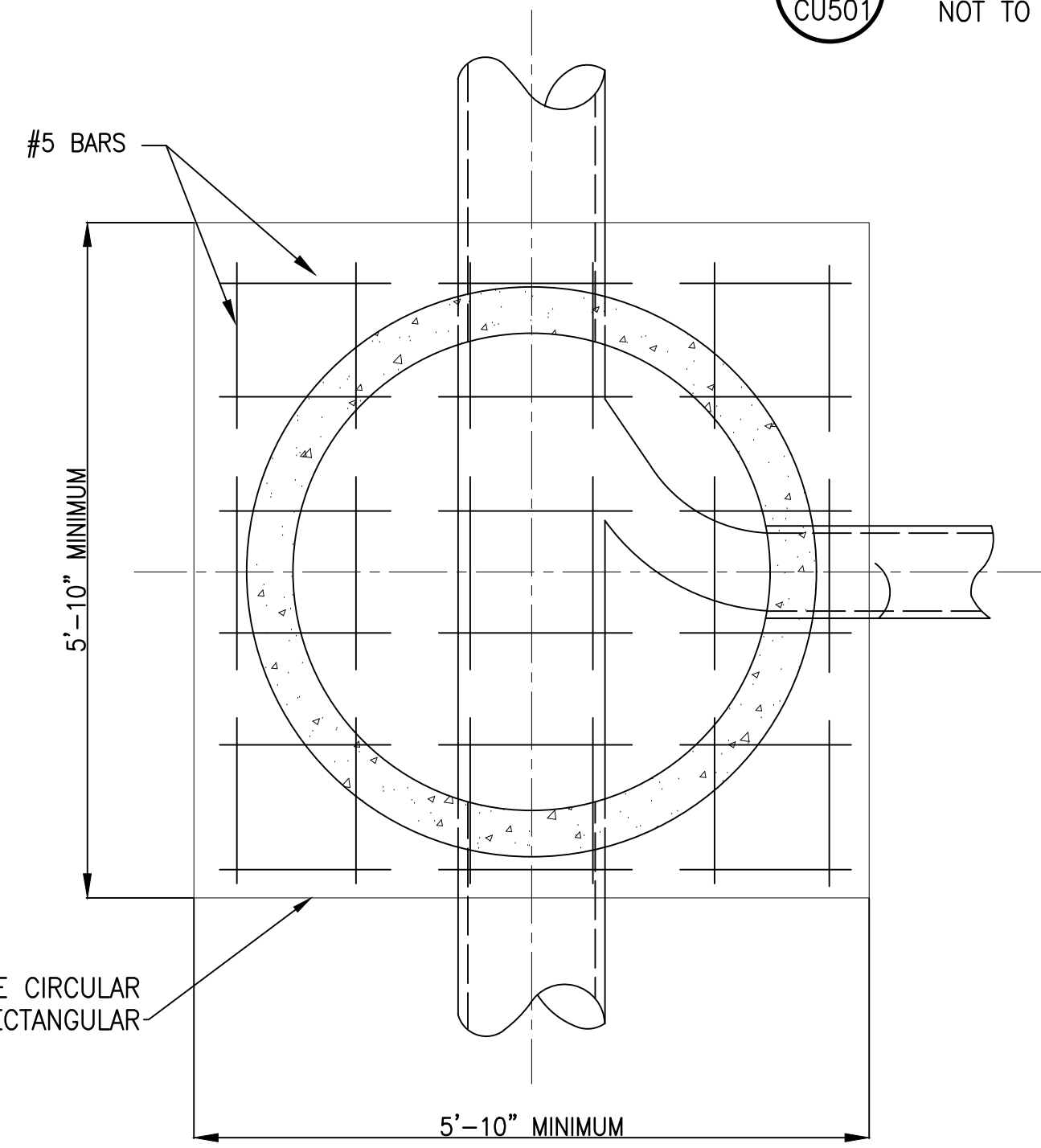
6 PRE-CAST CONCRETE PLAIN MANHOLE
CU501 NOT TO SCALE



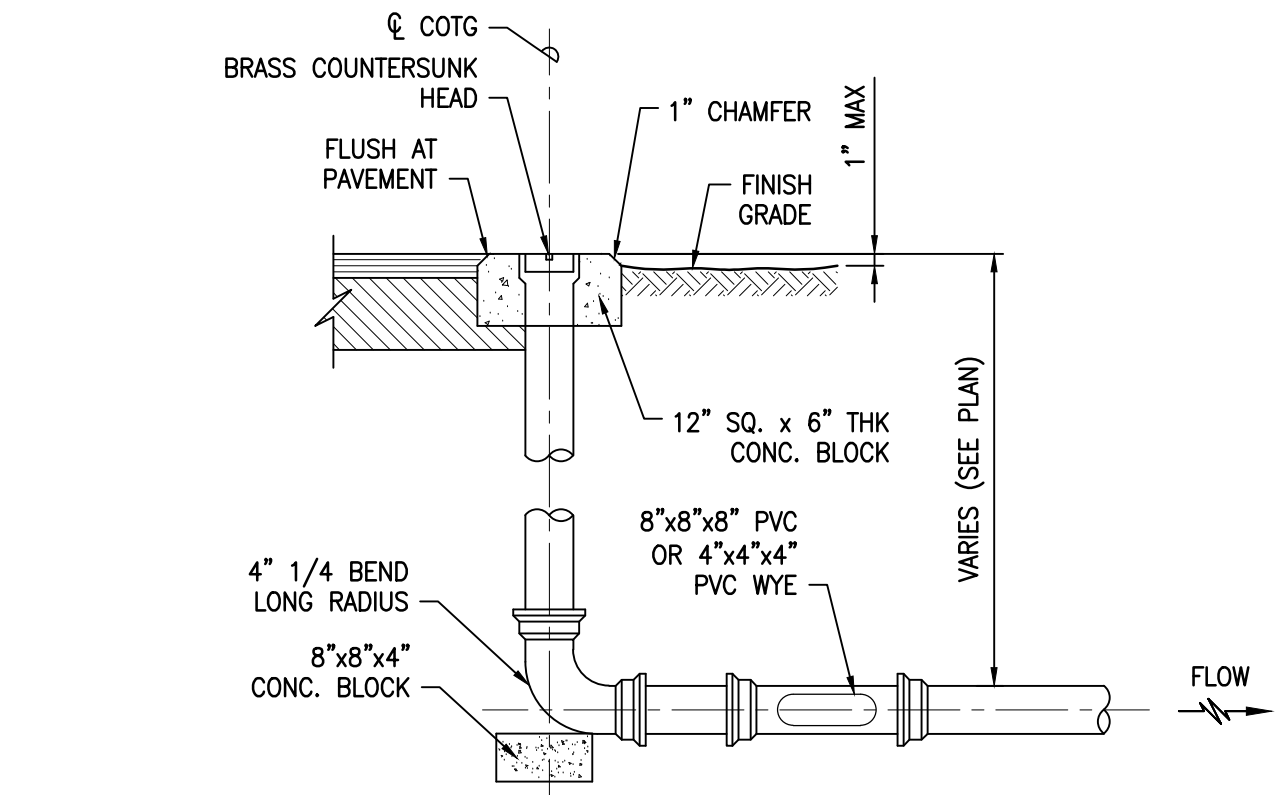
PLAN

SECTION A-A

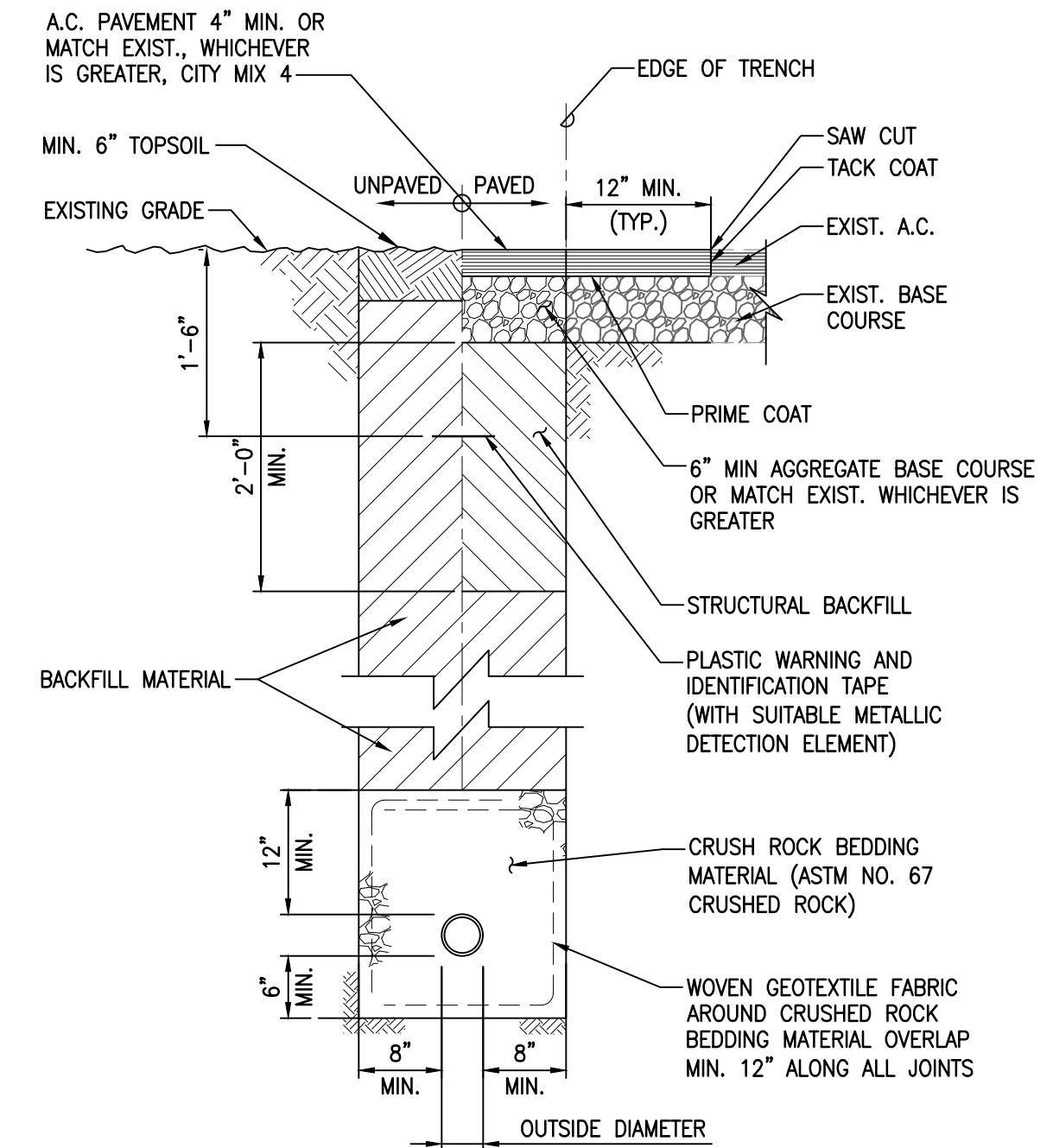
4 MANHOLE RUNG DETAILS - TYPE SA
CU501 NOT TO SCALE



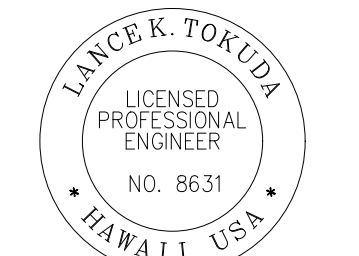
SECTION A-A



5 CLEANOUT TO GRADE DETAIL
CU501 NOT TO SCALE



7 TRENCH RESTORATION PAVED/UNPAVED
CU501 NOT TO SCALE



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DATE	APPR.	DATE	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/01/2024

DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600

DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
**BIRKHYMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS**
 SEWER DETAILS

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 21 OF 123
 CU501

SPACING FOR ANCHOR BLOCK FOR ALL SIZES

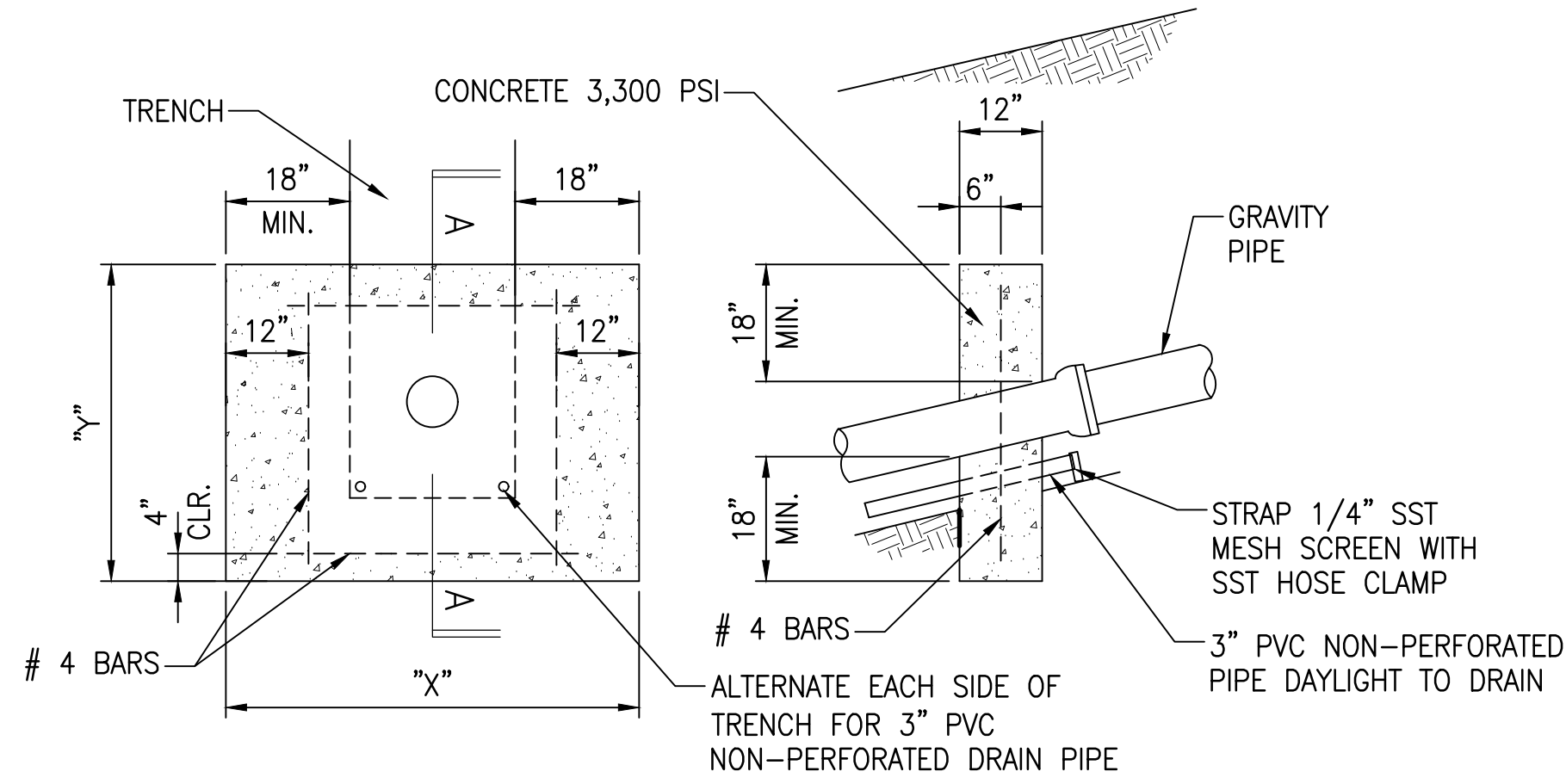
SLOPE %	MINIMUM SPACING (FT)
0-15	NO ANCHOR REQUESTED
15-35	35'
35-50	25'
> 50	BY DESIGN ENGINEER

ANCHOR BLOCK DIMENSION TABLE

PIPE DIA	"X" MIN. (FT)	"Y" MIN. (FT)
6"-10"	5'	4'
12"-15"	6'	5'
> 15"	BY DESIGN ENGINEER	

NOTES:

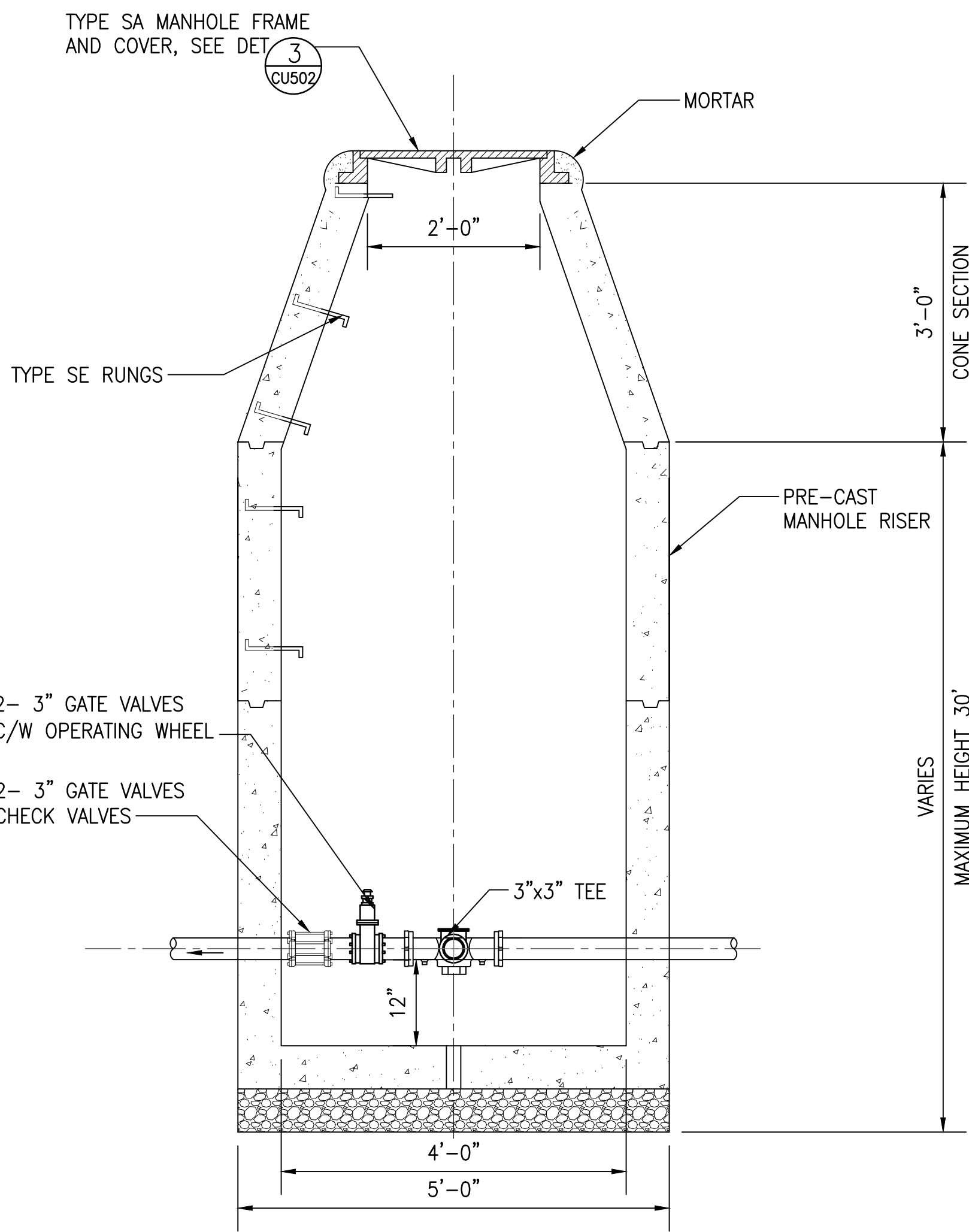
1. CONCRETE GRAVITY PIPE ANCHOR BLOCK SHALL BE CONSTRUCTED USING FORMS WHEN SANITARY SEWERS, STORM DRAINS, AND OTHER PIPELINES ARE CONSTRUCTED WITH SLOPES OVER 18%. REMOVE FORMS PRIOR TO BACKFILLING TRENCH.
2. FOR PIPES LARGER THAN 18", ANCHOR BLOCK SHALL BE DESIGNED BY THE DESIGN ENGINEER.
3. ANCHOR BLOCK SHALL ALWAYS BE LOCATED ALONG THE BARREL OF THE PIPE AND NOT AT THE JOINT.
4. INSTALL ONE 3" PVC NON-PERFORATED DRAIN PIPE AT BOTTOM OF TRENCH SECTION DOWN THE SLOPE. ALTERNATE 3" DRAIN ON EACH SIDE OF TRENCH SECTION AND DAYLIGHT TO DRAIN. INSTALL 1/4" STAINLESS STEEL MESH SCREEN USING STAINLESS STEEL HOSE CLAMPS OVER UPSTREAM END.



ELEVATION

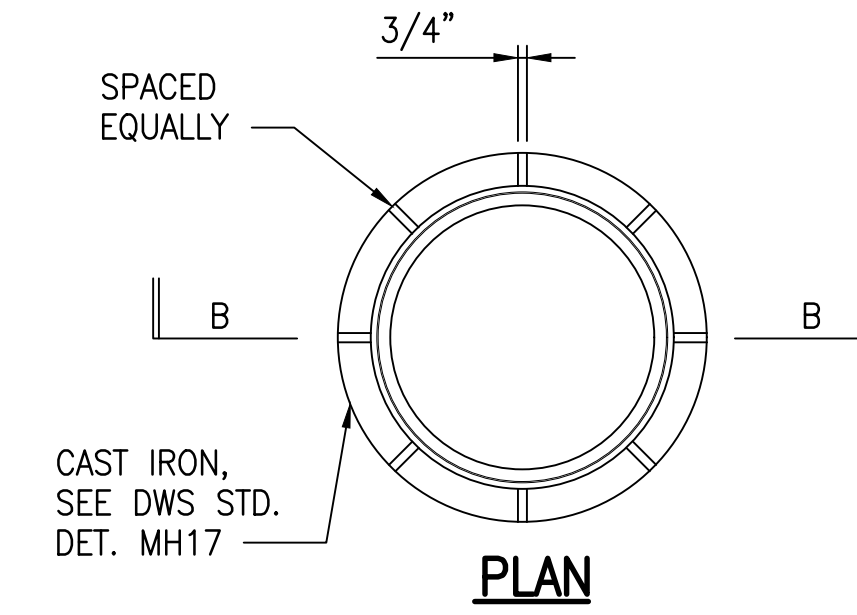
SECTION A-A

1 TYPICAL GRAVITY PIPE ANCHOR BLOCK DETAIL
CU502 NOT TO SCALE

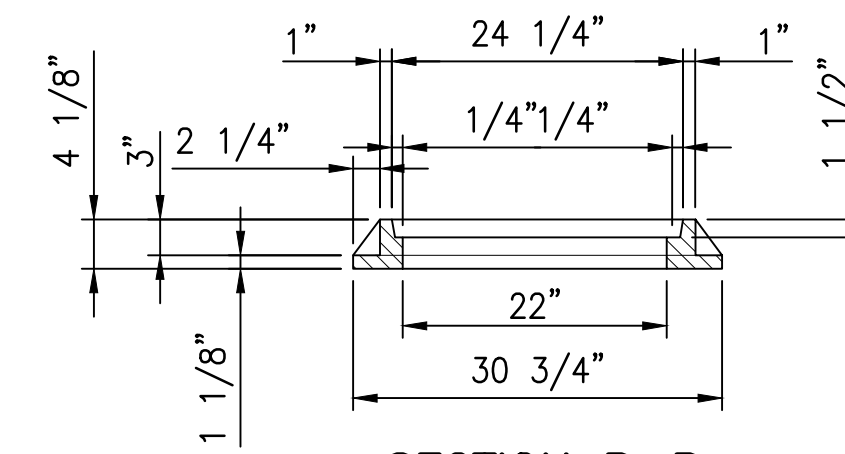


SECTION A-A

2 WATER MANHOLE DETAIL
CU502 NOT TO SCALE



PLAN

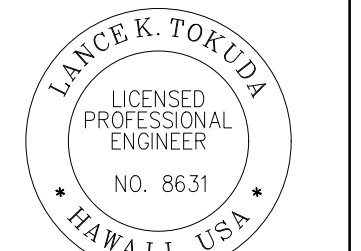


SECTION B-B

MANHOLE FRAME AND COVER NOTES:

1. ALL CASTINGS SHALL BE MADE ACCURATELY TO THE DIMENSIONS SHOWN. SEAT AND COVER SHALL BE MACHINED, NOT GROUND TO SECURE FLAT AND TRUE SURFACES. THE COVER SHALL NOT RATTLE IN ANY POSITION.
2. MANHOLE COVER SHALL BE H-20 RATED.

3 MANHOLE FRAME AND COVER
CU502 NOT TO SCALE



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 SIGNATURE DATE 4/30/2024 EXPIRATION DATE

DATE	APPROVED	SYMBOL	DESCRIPTION

SUBMITTAL PHASE	CONSTRUCTION DOCUMENTS
SUBMITTAL DATE	3/01/2024

STATE OF HAWAII DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMK: 3-1-042:600
 BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 WATER DETAILS

SCALE:	AS NOTED
STATE JOB NO.	CA-202313-C
FEDERAL PROJECT NO.	
SHEET 22 OF 123	
CU502	

REPAIR NOTES:

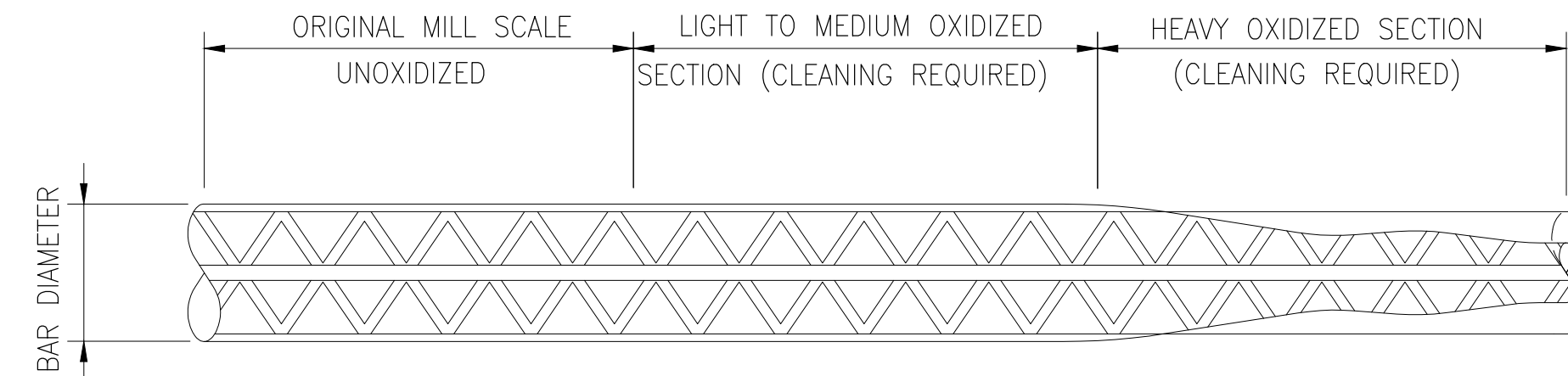
- A. SPALLS AND DELAMINATIONS ARE CALLED OUT AS SPALLS ON PLANS, AND NO SEPARATE DISTINCTION IS MADE SINCE REPAIRS ARE THE SAME.
- B. REMOVE ALL DELAMINATED OR DETERIORATED CONCRETE OR CMU UNTIL SOUND CONCRETE OR CMU IS ENCOUNTERED. CHIPPED OUT AREA MUST EXTEND AN ADDITIONAL 2 INCHES ALL AROUND. SOUND CONCRETE OR CMU MUST BE SPALL FREE WITHOUT CRACKS, DELAMINATIONS, VOIDS AND MUST BE FIRMLY BONDED TO SURROUNDING CONCRETE OR CMU. WHEN STRUCK WITH A HAMMER, SOUND CONCRETE OR CMU WILL NOT PRODUCE A HOLLOW SOUND.
- C. CHECK SURFACES TO ENSURE THAT IT IS FREE FROM LOOSE AGGREGATE OR ADDITIONAL DELAMINATIONS.
- D. CHIPPED OUT AREA MUST NOT BE LESS THAN 1 INCH CLEAR BELOW, ABOVE, OR BEHIND EXPOSED REINFORCING BARS.
- E. EDGES OF CHIPPED OUT AREA MUST BE SAW CUT PERPENDICULAR TO CONCRETE OR CMU SURFACE FOR A MINIMUM DEPTH OF AT LEAST 3/4 INCH. DO NOT SAW CUT THROUGH EXISTING REINFORCING BARS.
- F. EXPOSED REINFORCING STEEL BARS MUST BE CLEANED OF SCALE, RUST, DIRT, OIL OR ANY OTHER DELETERIOUS MATERIAL. ABRASIVE AND HYDROBLASTING IS PROHIBITED.
- G. AFTER REINFORCING STEEL BAR HAS BEEN CLEANED BY HAND TOOLS OR WIRE BRUSH, MEASURE DIAMETER OF EXPOSED REINFORCING STEEL BARS AT EDGE OF CHIPPED OUT AREA TO DETERMINE ORIGINAL BAR SIZE. COMPARE BAR DIAMETERS WITHIN CHIPPED OUT AREA WITH ALLOWABLE BAR DIAMETER CHART AND SPLICE BARS AS REQUIRED.
- H. SPALL REPAIRS TWO SQUARE FEET OR LESS, WITH MAXIMUM REPAIR THICKNESS 2 INCHES OR LESS MAY BE ACCOMPLISHED WITHOUT FORMWORK BY USING REPAIR MORTAR.
- I. REMOVE EXCESS CEMENT AND PARTICULATE SLURRY BEFORE CURING.
- J. DO NOT FEATHER EDGES OF REPAIR.
- K. AFTER REPAIRS HAVE BEEN CURED A MINIMUM OF 14 DAYS, REPAIRED AREAS MUST BE CLEANED AND COATED WITH A CONCRETE SEALER. COATED AREA MUST EXTEND A MINIMUM OF 6 INCHES AROUND THE REPAIR AREA.
- L. VERIFY WITH CONTRACTING OFFICER REPAIR TYPES THAT DIFFER FROM CONTRACT DRAWINGS. DO NOT PROCEED WITH WORK UNTIL APPROVED BY CONTRACTING OFFICER.

REPAIR MATERIAL:

- A. REPAIR MORTAR MUST BE POLYMER-MODIFIED, CEMENTITIOUS REPAIR MORTAR FOR VERTICAL SURFACES HAVING A MINIMUM COMPRESSIVE STRENGTH OF 6,000 PSI AT 28 DAYS.

REINFORCING STEEL:

- A. REINFORCING STEEL BARS MUST CONFORM TO ASTM A706/A706M GRADE 60.
- B. MINIMUM CONCRETE COVER FOR REINFORCING STEEL BARS AS INDICATED.
 - 1. CAST AGAINST AND PERMANENTLY IN CONTACT WITH GROUND.....3"
 - 2. EXPOSED TO WEATHER OR IN CONTACT WITH GROUND.....2"
- C. WELDING OF REINFORCING BARS MUST BE IN ACCORDANCE WITH AWS D1.4/1.4M STRUCTURAL WELDING CODE-REINFORCING STEEL.
- D. WHEN WELDING TO EXISTING REINFORCING STEEL BARS, REPRESENTATIVE SAMPLES OF THE BARS MUST BE ANALYZED TO DETERMINE WELDING REQUIREMENTS.

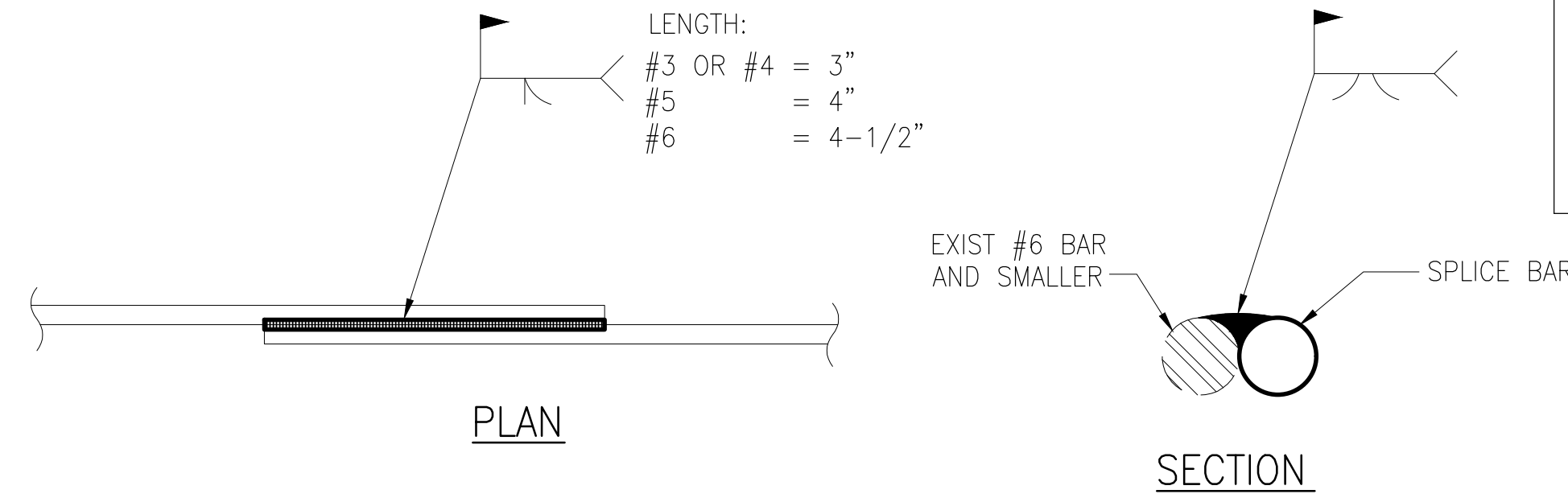


ALLOWABLE BAR DIAMETER NOTES:

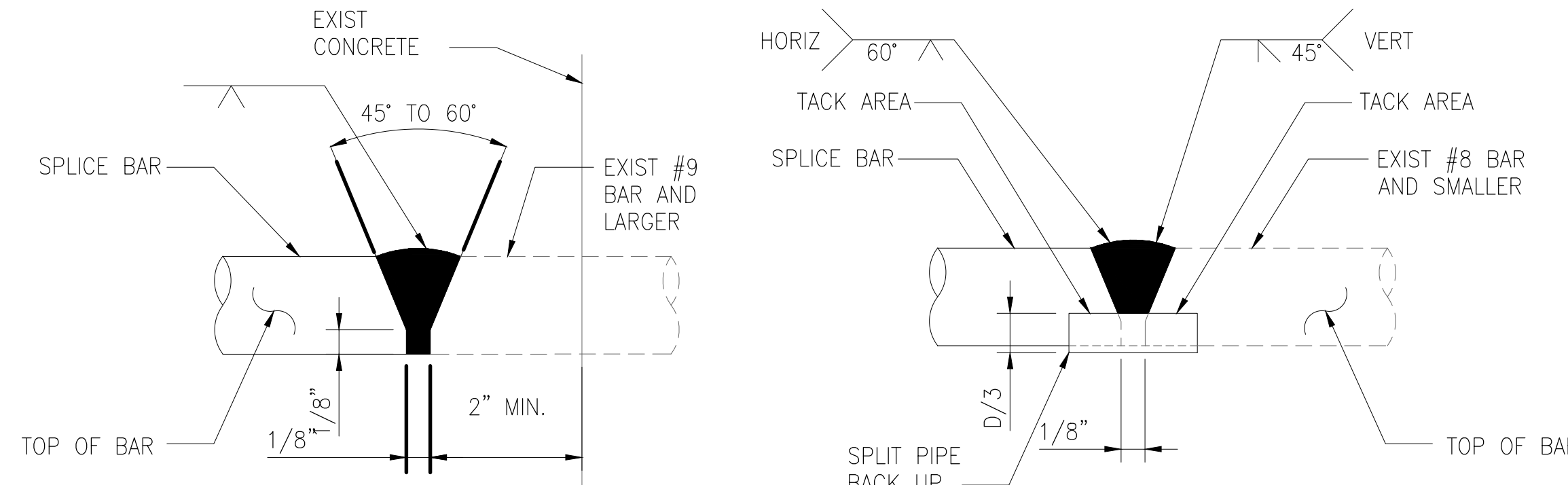
- 1. REMOVE HEAVY CORROSION AND SCALE FROM REINFORCING STEEL BARS.
- 2. IF REINFORCING STEEL BAR SIZE, AFTER CLEANING IS LESS THAN MINIMUM DIAMETER SHOWN IN ALLOWABLE BAR SIZE CHART, REPAIR PER

ALLOWABLE BAR SIZE CHART		
ORIGINAL DIAMETER	BAR SIZE	MINIMUM DIAMETER
3/8"	#3	5/16"
1/2"	#4	7/16"
5/8"	#5	1/2"
3/4"	#6	5/8"
7/8"	#7	3/4"
1"	#8	7/8"
1-1/8"	#9	1"
1-1/4"	#10	1"

A2
S-501



C4
S-501
ALTERNATE LAP WELD SPLICE DETAIL
NOT TO SCALE

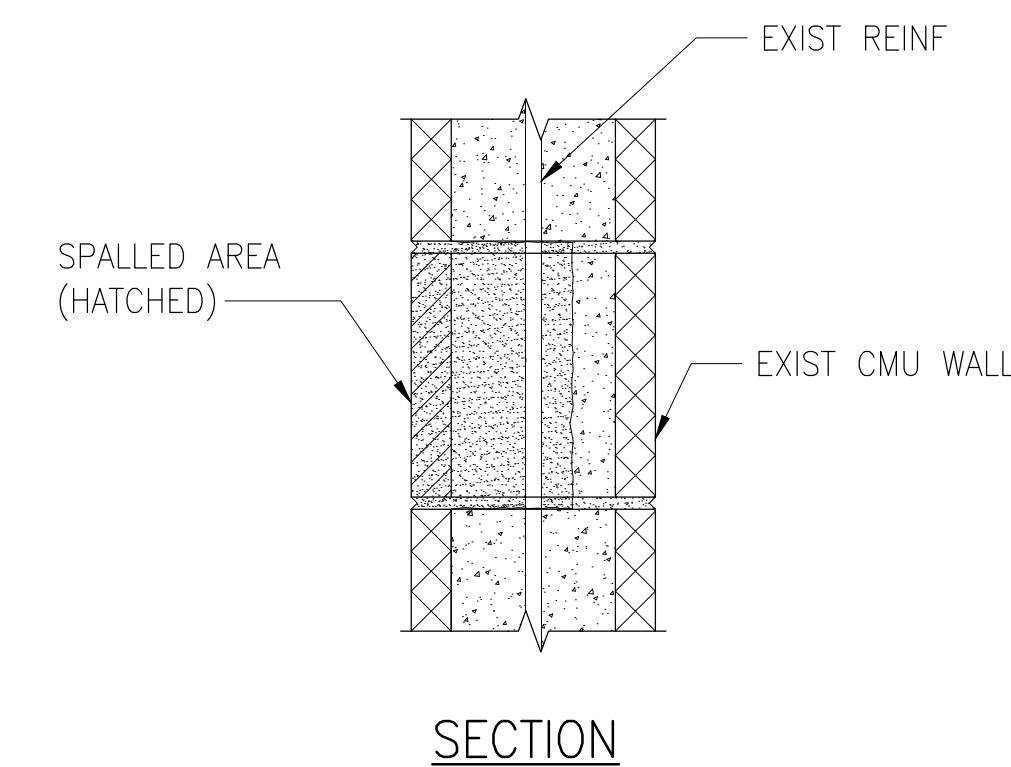


A HORIZONTAL
B HORIZONTAL AND VERTICAL
C VERTICAL
D LAP AND SPLICE WELD

REINFORCING WELDING NOTES:

- 1. CHIP, GRIND, OR GOUGE TO SOUND METAL BEFORE WELDING.
- 2. USE E70 ELECTRODES FOR STIRRUPS, E90 ELECTRODES FOR ALL OTHERS.
- 3. SEE AWS D1.4 FOR WELDING PROCESS PREHEATING, COOLING CONTROLS, AND OTHER DETAILS, FOR WELDING EXISTING REINFORCING STEEL BARS NOT IN CONFORMANCE WITH ASTM A706/A706M.

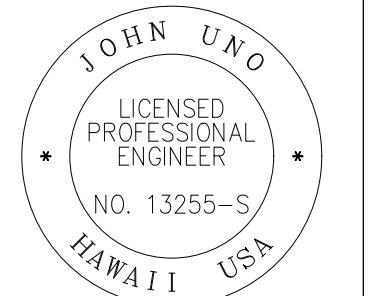
A2
S-501
TYPICAL WELDED BAR SPLICE DETAIL
NOT TO SCALE



SPALL REPAIR DETAIL NOTES:

- 1. LOCATE AND MARK DAMAGED AREA.
- 2. SAWCUT JOINTS AROUND PERIMETER OF SPALLED MASONRY CELLS. ENSURE NO REINFORCING STEEL BARS ARE DAMAGED. REMOVE SPALLED CELL.
- 3. UNDERCUT EXPOSED, CORRODED BARS A MINIMUM OF 1 INCH. MINIMUM BAR CAVITY DEPTH MUST BE 1 INCH.
- 4. CHIP SUBSTRATE TO OBTAIN A SURFACE PROFILE OF +/- 1/8 INCH MINIMUM AMPLITUDE WITH A FRACTURED AGGREGATE SURFACE. TRACES OF RUST AND SCALE MUST BE REMOVED FROM REINFORCING STEEL BARS BY MECHANICAL CLEANING.
- 5. WHEN CROSS-SECTIONAL AREA OF REINFORCING STEEL BAR LOST DUE TO CORROSION IS LESS THAN MINIMUM BAR DIAMETER, SPLICE CORRODED BAR WITH ONE BAR TO MATCH EXISTING BAR SIZE. EXTEND BAR GREATER OF 2'-0" OR 48 BAR DIAMETERS BEYOND AREA OF BAR WITH MORE THAN 25 PERCENT CROSS SECTIONAL AREA LOSS DUE TO CORROSION.
- 6. SUBSTRATE MUST BE SATURATED SURFACE DRY (SSD) WITH NO STANDING WATER. REMOVE ALL DETERIORATED CMU, DUST, OIL, GREASE, DIRT, CONTAMINANTS, AND OTHER BOND-INHIBITING MATERIALS FROM AREA REPAIRED.
- 7. APPLY BONDING AGENT TO REINFORCING STEEL AND CMU COMPATIBLE WITH REPAIR MORTAR.
- 8. FILL CHIPPED AREAS WITH REPAIR MORTAR TO EXISTING SURFACE. IF CHIPPED AREAS ARE GREATER THAN 1-INCH DEPTH, ADD 3/8-INCH COARSE AGGREGATE TO REPAIR MORTAR.
- 9. SPALL AREA REPAIR FINISH MUST MATCH EXISTING SURFACE AREA FINISH INCLUDING BLOCK JOINTS.

A4
S-501
TYPICAL CMU SPALL REPAIR DETAIL
NOT TO SCALE



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4/30/2024

SIGNATURE EXPIRATION DATE

DATE	APPR.	SYN.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 3/01/2024

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
STATE OF HAWAII
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHYMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
STRUCTURAL NOTES AND REPAIR DETAILS

SCALE:
AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 25 OF 123
S-501

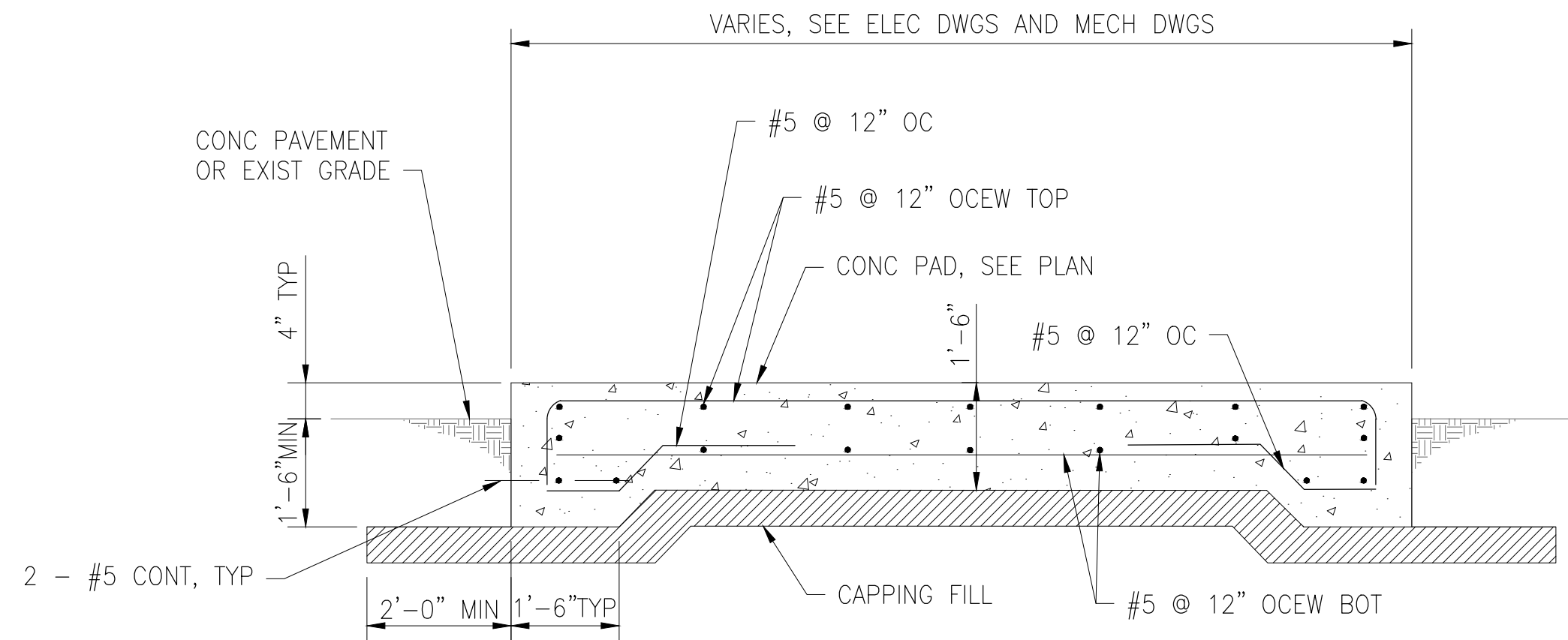
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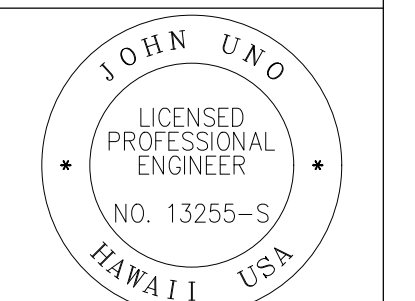
5



NOTES:

1. CAPPING FILL MUST INCLUDE 6 INCHES OF SELECT GRANULAR FILL MATERIAL OR AGGREGATE SUBBASE COURSE. CAPPING FILL MUST BE MOISTURE-CONDITIONED TO ABOVE THE OPTIMUM MOISTURE CONTENT AND COMPACTED TO AT LEAST 95 PERCENT RELATIVE COMPACTION IN ACCORDANCE WITH ASTM D1557.
2. PRIOR TO PLACING THE CAPPING FILL, EXISTING GRADE MUST BE SCARIFIED TO A DEPTH OF AT LEAST 8 INCHES, MOISTURE-CONDITIONED TO ABOVE OPTIMUM MOISTURE CONTENT, AND COMPACTED TO A MINIMUM OF 95 PERCENT RELATIVE COMPACTION IN ACCORDANCE WITH ASTM D1557.

C4 CONCRETE PAD DETAIL
S-502 NOT TO SCALE



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4/30/2024

SIGNATURE	EXPIRATION DATE

DATE	APPR

SYN	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 3/01/2024

STATE OF HAWAII
DEPARTMENT OF DEFENSE
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
**BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS**

DIAMOND HEAD STATE MONUMENT
STRUCTURAL DETAILS

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 26 OF 123
S-502

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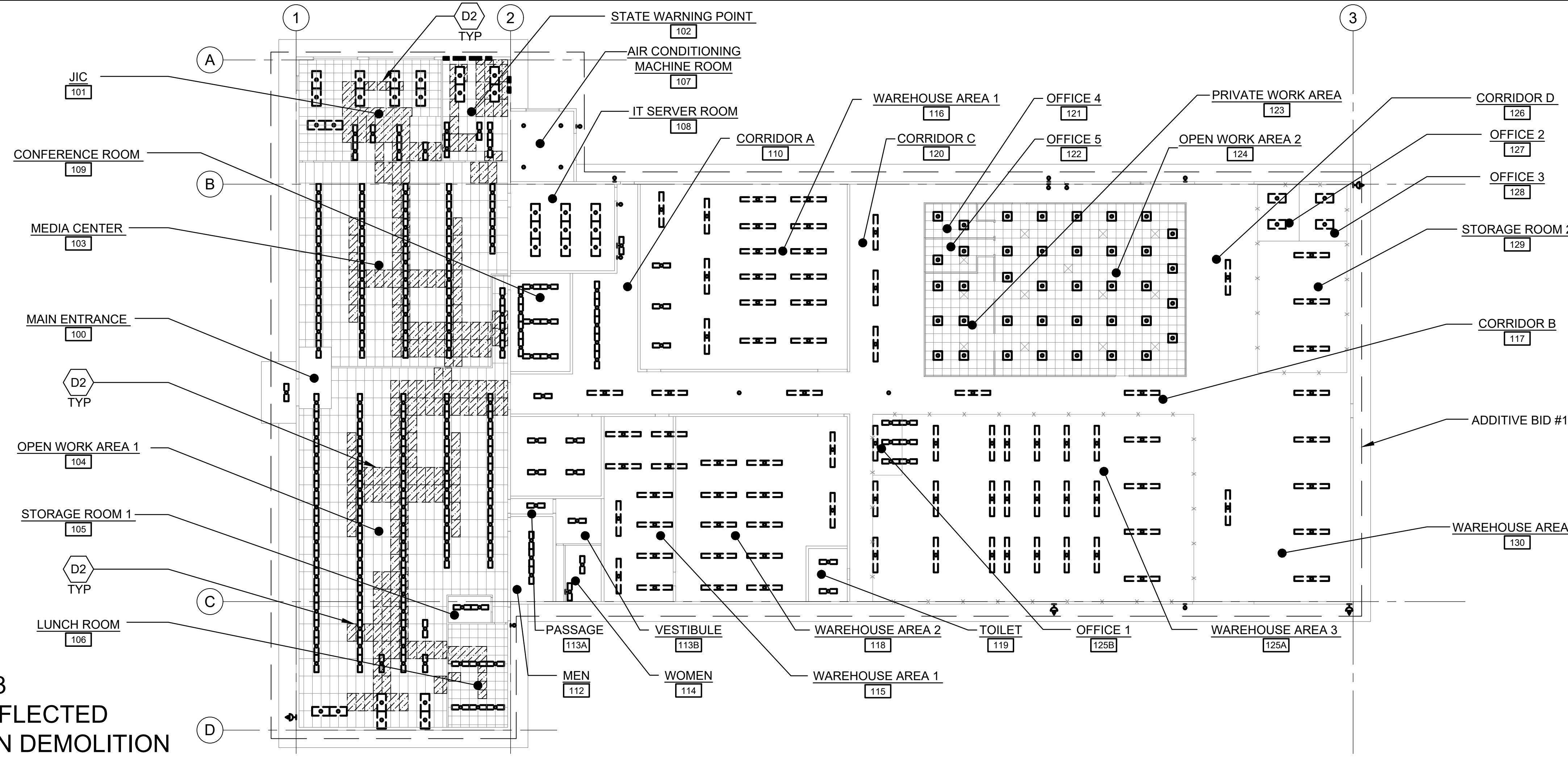
A

D

C

B

A



**BUILDING 303
OVERALL REFLECTED
CEILING PLAN DEMOLITION**

AA101 SCALE: 1/16" = 1'-0"

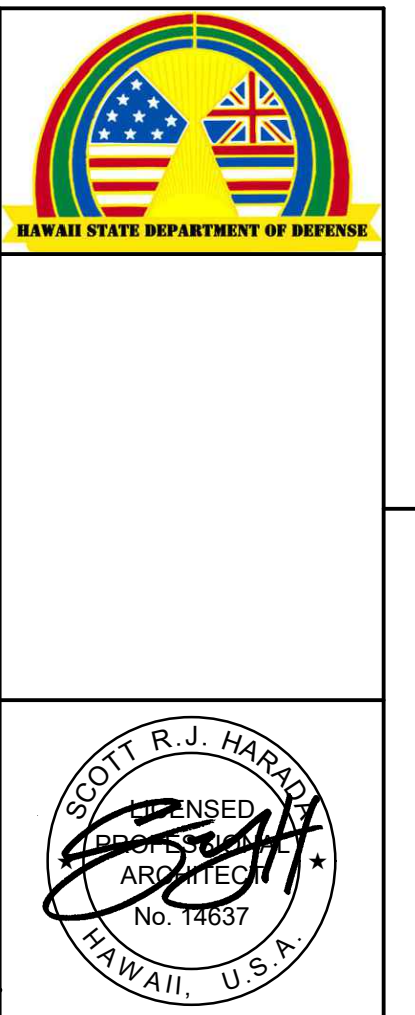
GENERAL SHEET NOTES

- CONTRACTOR MUST REPAIR AND PATCH EXISTING WALL AND FLOOR FOR A SMOOTH SURFACE WHERE DOOR ASSEMBLY, PARTIAL WALL AND GUARD RAIL DEMOLITION / REMOVALS OCCUR. FINISH TO MATCH EXISTING ADJACENT SURFACES.
- CONTRACTOR TO FIELD VERIFY EXISTING CEILING CONDITIONS AND MATERIALS. PATCH TO MATCH EXISTING ADJACENT SURFACES AND COLOR AFTER WORK IS COMPLETED. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
- CONTRACTOR SHALL COORDINATE RELOCATION OF EXISTING WORK STATIONS AFFECTED BY THE IMPROVEMENTS WITH OWNER

DEMOLITION KEYNOTES (FOR THIS SHET ONLY)

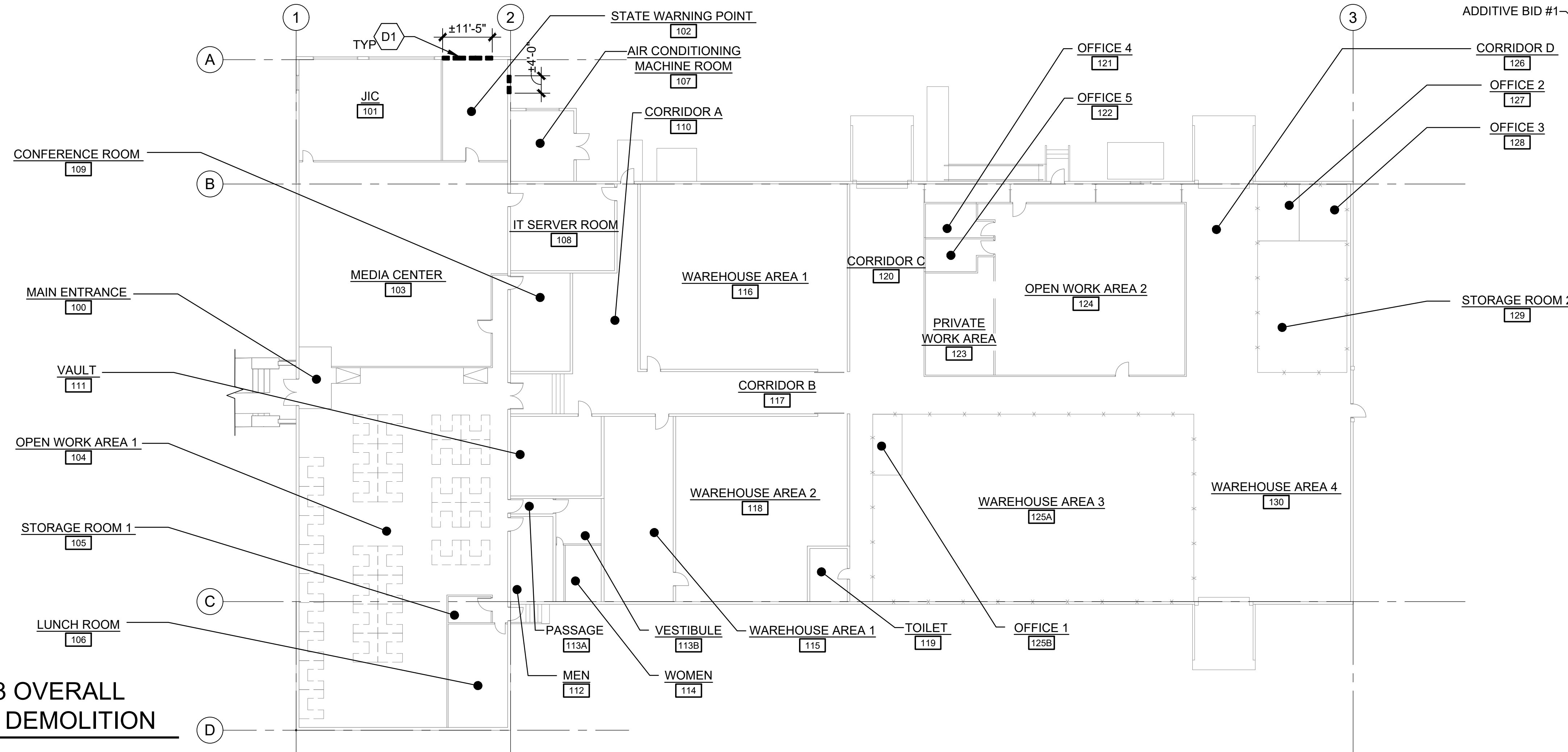
D1. DEMOLISH AND REMOVE EXISTING WINDOW, COMPLETE. RE-INSTALL EXISTING WINDOW SCREEN AFTER NEW WINDOWS ARE INSTALLED

D2. REMOVE AND SALVAGE EXISTING ACOUSTICAL CEILING TILE AND GRID FOR REINSTALLATION, AS NEEDED, TO FACILITATE THE DEMOLITION OF EXISTING MECHANICAL EQUIPMENT. COORDINATE WITH USERS FOR STORAGE LOCATION



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION 4/30/2024

SIGNATURE	EXPIRATION DATE



**BUILDING 303 OVERALL
FLOOR PLAN DEMOLITION**

AA101 SCALE: 1/16" = 1'-0"

LEGEND

- DEMO AND REMOVE LIGHT FIXTURES, SEE ELEC DWGS
- EXISTING CHAIN LINK FENCE
- EXISTING DOOR
- EXISTING WINDOW TO REMAIN
- DEMO AND REMOVE WINDOW
- EXISTING WORK STATION, SEE GENERAL NOTE C
- EXISTING ACOUSTICAL CEILING TILE TO REMAIN
- REMOVE AND SALVAGE ACOUSTICAL CEILING TILE AND GRID SYSTEM FOR REINSTALLATION

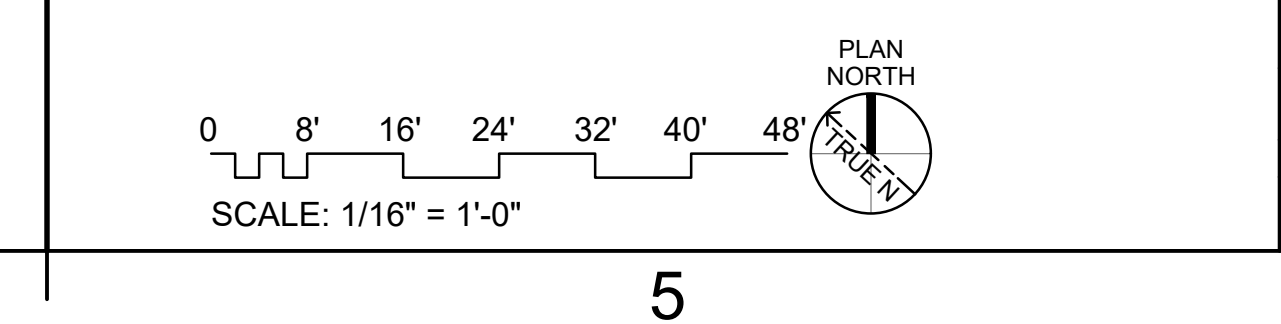
IECC STAMP

CITY AND COUNTY OF HONOLULU
REVISED ORDINANCES OF HONOLULU 1990
CHAPTER 32,

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

- BUILDING COMPONENT SYSTEMS
- ELECTRICAL COMPONENT SYSTEMS
- MECHANICAL COMPONENT SYSTEMS

SIGNATURE: *Scott R.J. Harada* DATE: MAR 2024
NAME: SCOTT RJ HARADA, AIA
TITLE: PRINCIPAL
LICENSE NO.: AR-14637



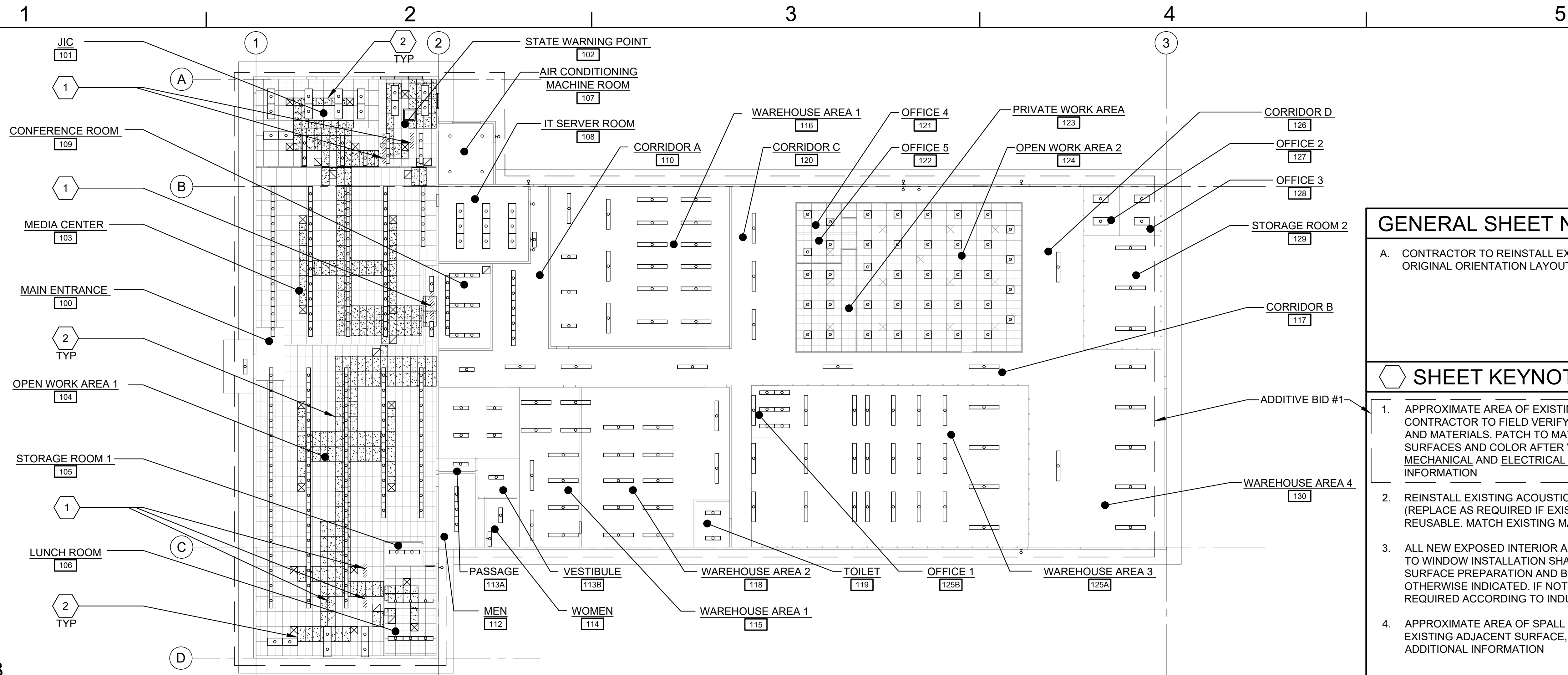
DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
STATE OF HAWAII
TMK: 3-1-042:600
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
OVERALL FLOOR AND CEILING DEMOLITION

SUBMITTAL PHASE		CONSTRUCTION DOCUMENTS	
INK	INK	INK	SH

SUBMITTAL DATE: 3/1/2024

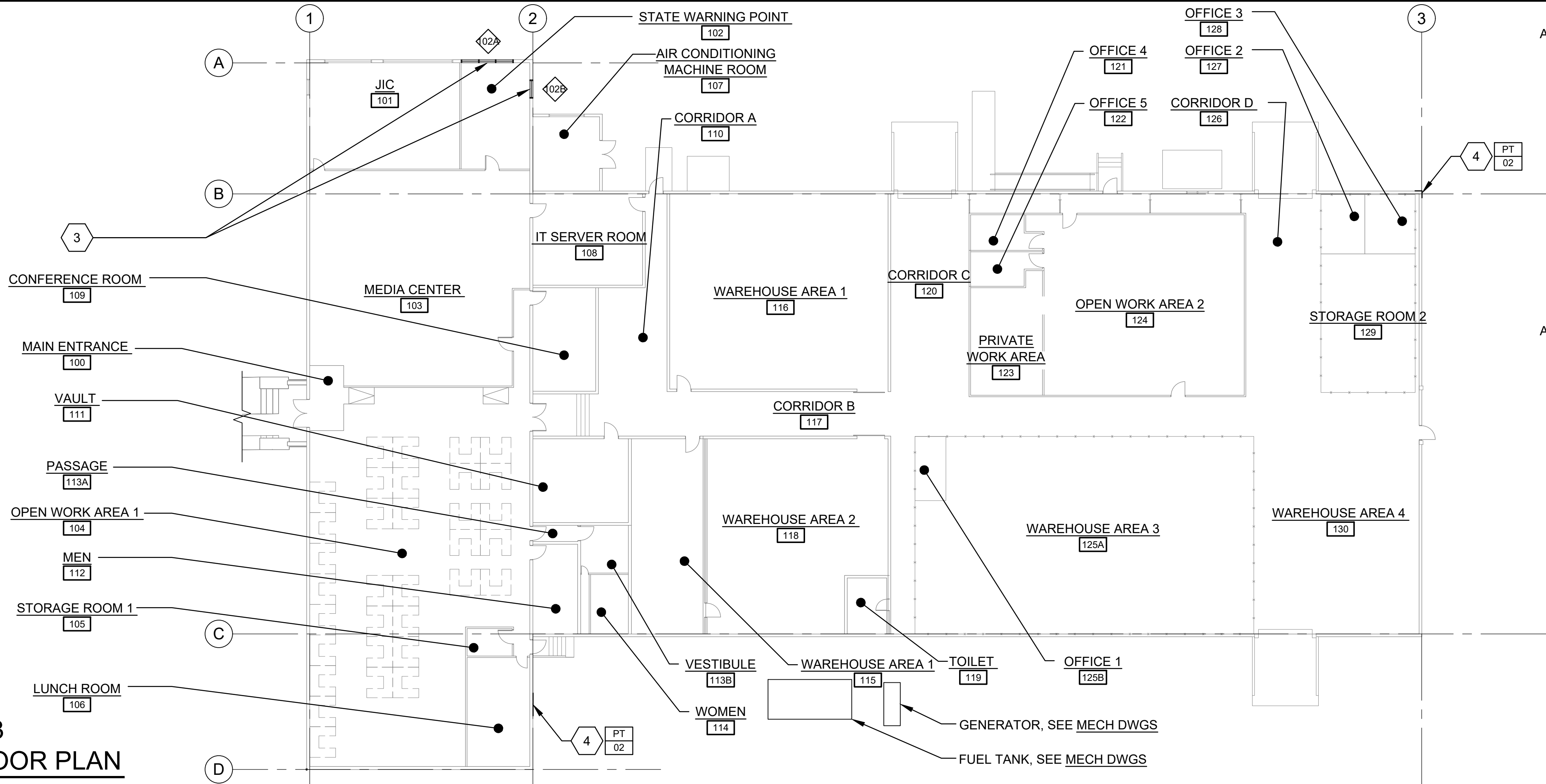
SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 27 OF 123

AA101



**BUILDING 303
OVERALL REFLECTED CEILING PLAN**

AA102 SCALE: 1/16" = 1'-0"



**BUILDING 303
OVERALL FLOOR PLAN**

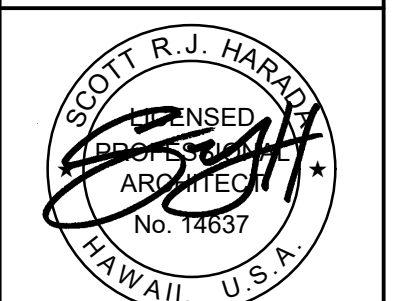
AA102 SCALE: 1/16" = 1'-0"

GENERAL SHEET NOTES

A. CONTRACTOR TO REINSTALL EXISTING WORK STATIONS TO ORIGINAL ORIENTATION LAYOUTS AND LOCATIONS

SHEET KEYNOTES (FOR THIS SHIT ONLY)

- 1. APPROXIMATE AREA OF EXISTING CEILING TO BE PATCHED. CONTRACTOR TO FIELD VERIFY EXISTING CEILING CONDITION AND MATERIALS. PATCH TO MATCH EXISTING ADJACENT SURFACES AND COLOR AFTER WORK IS COMPLETED. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION
- 2. REINSTALL EXISTING ACOUSTICAL CEILING TILE AND GRID (REPLACE AS REQUIRED IF EXISTING CONDITION IS NOT REUSABLE. MATCH EXISTING MATERIAL, PROFILE, AND COLOR)
- 3. ALL NEW EXPOSED INTERIOR AND EXTERIOR SURFACES DUE TO WINDOW INSTALLATION SHALL RECEIVE THE SPECIFIED SURFACE PREPARATION AND BE PAINTED UNLESS OTHERWISE INDICATED. IF NOT SPECIFIED, PROVIDE AS REQUIRED ACCORDING TO INDUSTRY STANDARDS
- 4. APPROXIMATE AREA OF SPALL REPAIR, PAINT TO MATCH EXISTING ADJACENT SURFACE, SEE STR DWGS FOR ADDITIONAL INFORMATION



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4/30/2024

SIGNATURE	EXPIRATION DATE
DATE	APPR.
DATE	DESCRIPTION

LEGEND

- [Symbol] LIGHT FIXTURES, SEE ELEC DWGS
- EXISTING CHAIN LINK FENCE
- [Symbol] EXISTING DOOR
- EXISTING WINDOW
- WINDOW AS SCHEDULED
- [Symbol] EXISTING WORK STATION, SEE GENERAL NOTE C
- [Symbol] EXISTING ACOUSTIC CEILING TILE
- [Symbol] EXISTING ACOUSTIC CEILING TILE AND GRID TO BE REINSTALLED
- [Symbol] PATCH EXISTING CEILING TO MATCH EXISTING ADJACENT SURFACE MATERIAL AND COLOR

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 3/1/2024

INK	INX	SH

DEPARTMENT OF DEFENSE

TMMK: 3-1-042:600

4204 DIAMOND HEAD RD HONOLULU, HI 96815

**BIRKHMIR EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS**

FLOOR PLAN - CEILING

STATE OF HAWAII

DIAMOND HEAD STATE MONUMENT

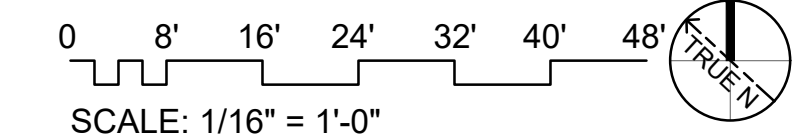
SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 28 OF 123

AA102



BUILDING NAME	ROOM NUMBER	ROOM NAME	FLOOR	BASE	WAINSCOT	WALLS				TRIM & MISC	CEILING	CEILING FINISH	REMARKS
						A	B	C	D				
B303	101	JIC	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	ACT-01/ ACT-02	-	-
B303	102	STATE WARNING POINT	NO CHANGE	NO CHANGE	NO CHANGE	PT-01	PT-01	PT-01	PT-01	NO CHANGE	ACT-01	-	-
B303	103	MEDIA CENTER	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	ACT-01	-	-
B303	104	OPEN WORK AREA 1	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	ACT-01	-	-
B303	106	LUNCH ROOM	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	ACT-02	-	-

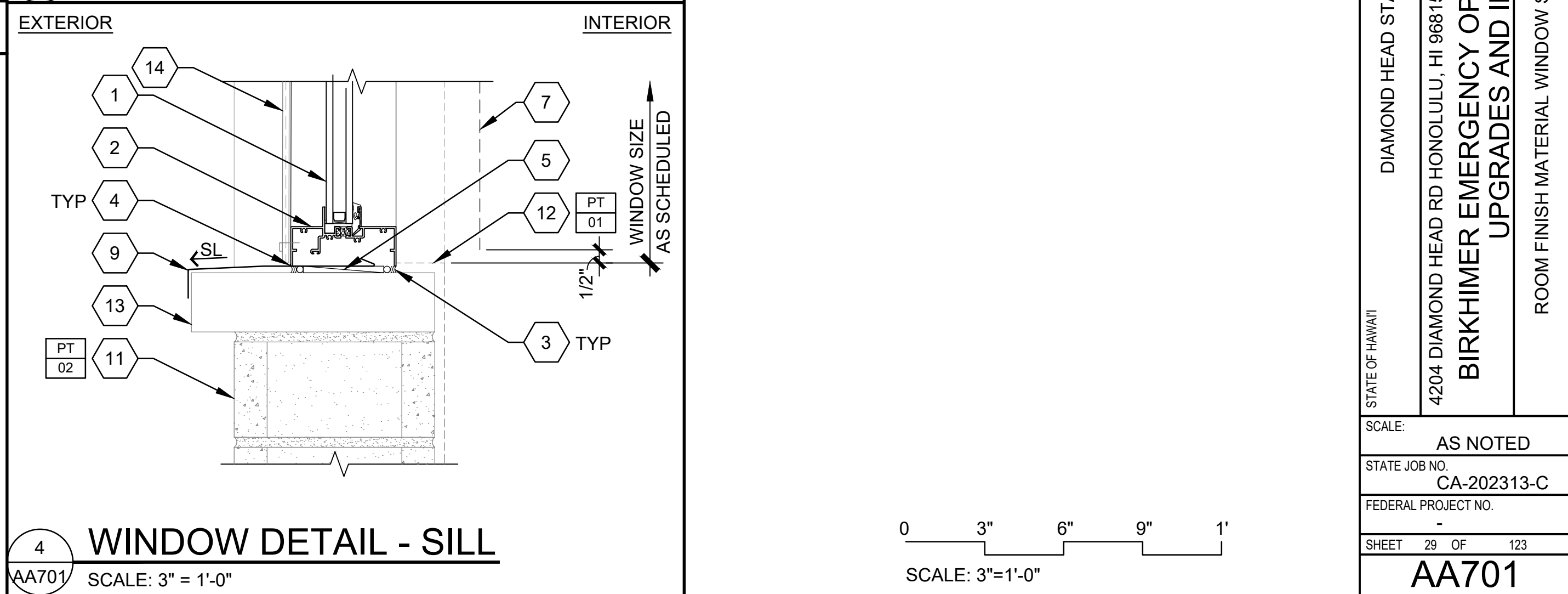
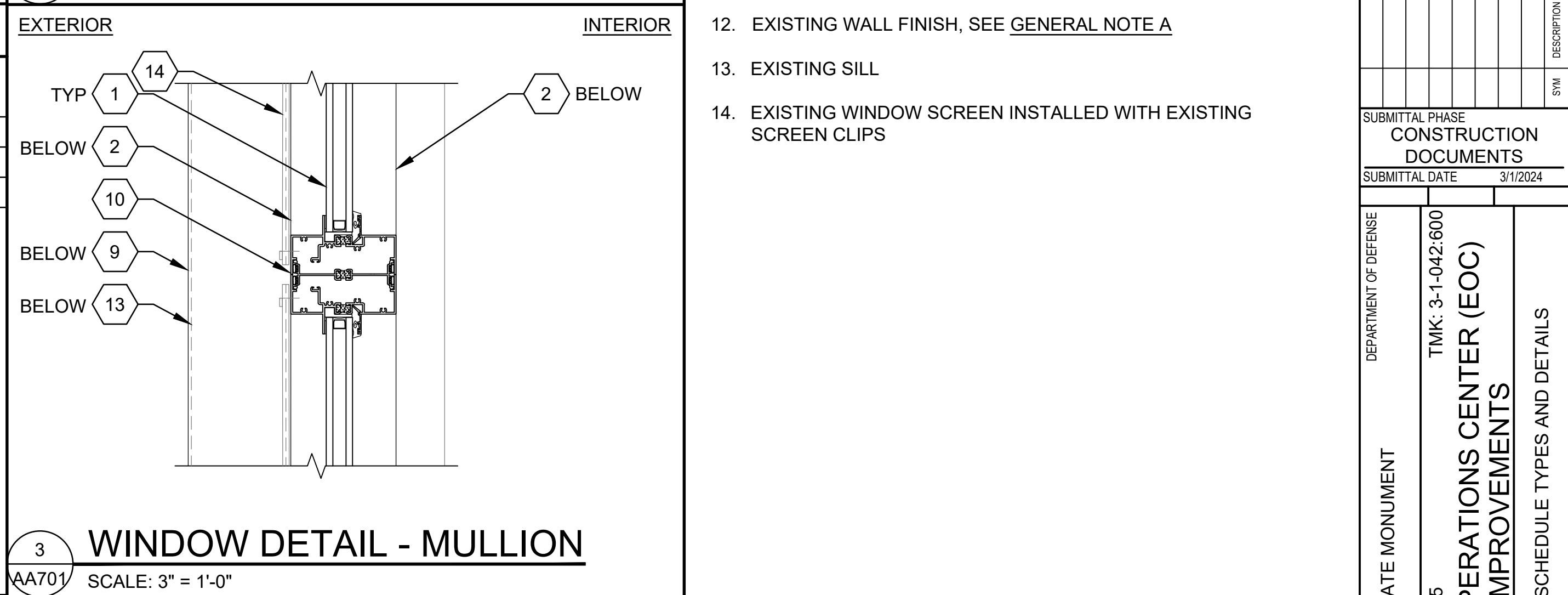
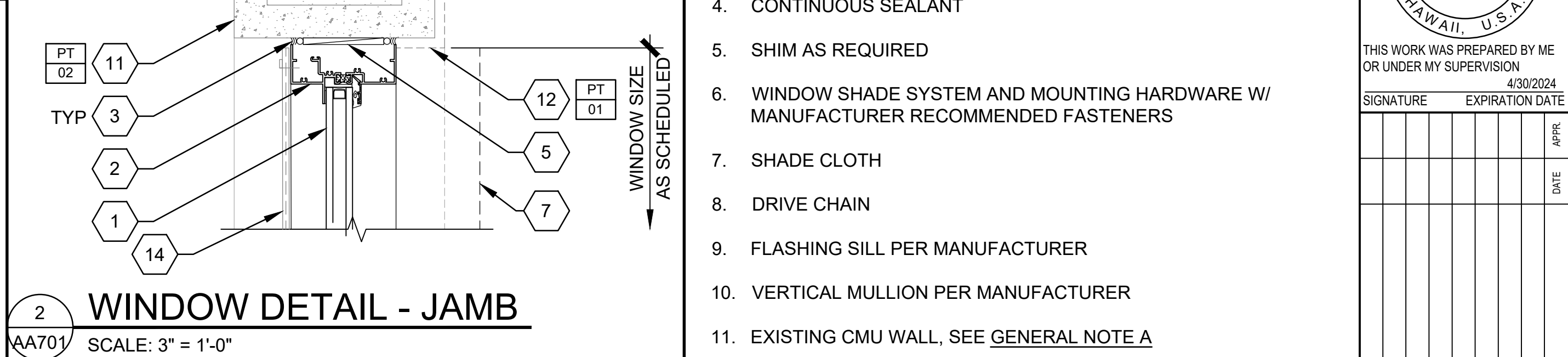
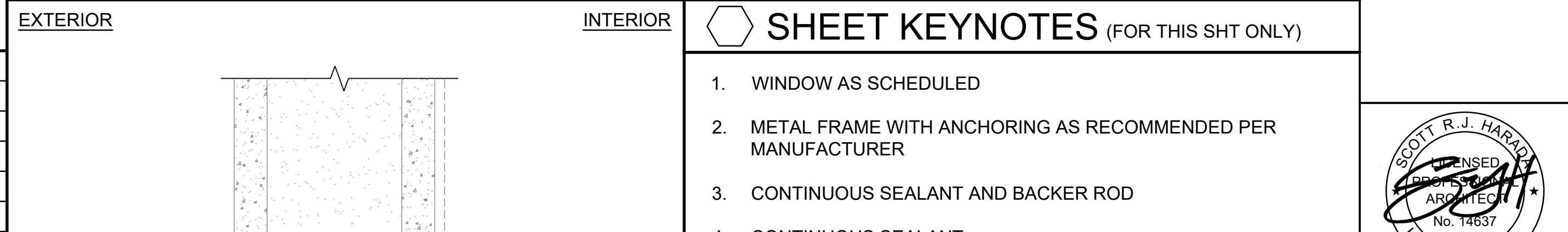
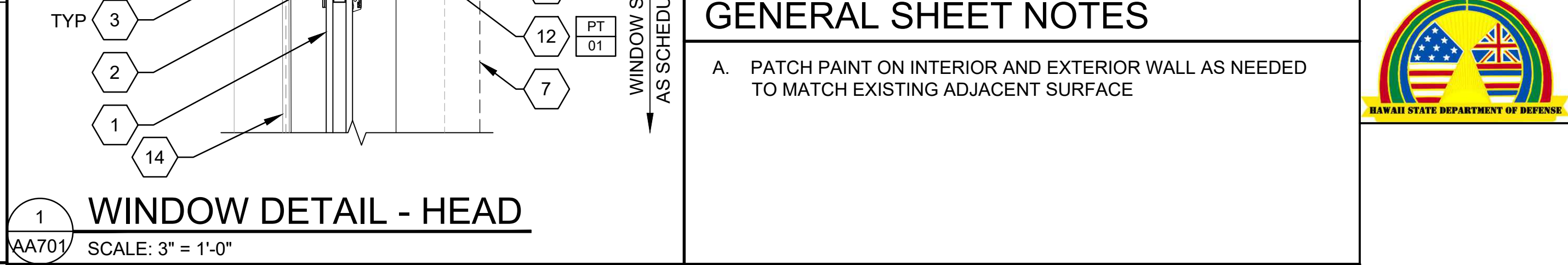
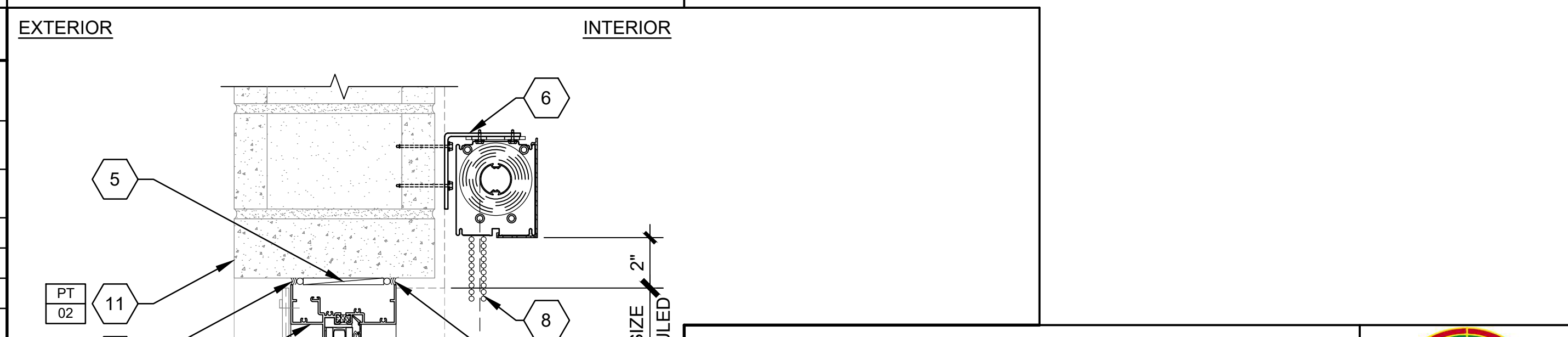
CODE	MATERIAL	MANUFACTURER	MODEL/SIZE	COLOR	OPTIONS	LOCATIONS	REMARKS
ACT-01	ACOUSTICAL CEILING TILE	ARMSTRONG	2X4	MATCH EXISTING	MATCH EXISTING	JIC, STATE WARNING POINT, MEDIA CENTER, OPEN WORK AREA 1	-
ACT-02	ACOUSTICAL CEILING TILE	ARMSTRONG	2X2	MATCH EXISTING	MATCH EXISTING	JIC, LUNCH ROOM	-
PT-01	INTERIOR PAINT	SHERWIN WILLIAMS	-	MATCH EXISTING	SEMI GLOSS	STATE WARNING POINT WALLS	-
PT-02	EXTERIOR PAINT	SHERWIN WILLIAMS	-	MATCH EXISTING	SEMI GLOSS	EXTERIOR WALL, WINDOW REPLACEMENT	-

ROOM NUMBER	WINDOW NUMBER	TYPE	SIZE (ROUGH OPENING)	MATERIAL	DETAIL NUMBER	WINDOW COVERINGS	REMARKS					
			WIDTH	HEIGHT	FRAME	GLAZING	HEAD	JAMB	MULLION	SILL		
102	102A	A	11'-1"	5'-5"	ALUM	SEE SPECS	1/AA701	2/AA701	3/AA701	4/AA701	SHADE	-
102	102B	B	3'-6"	3'-10"	ALUM	SEE SPECS	1/AA701	2/AA701	-	4/AA701	SHADE	-

WINDOW TYPES	
<p style="text-align: center;">A</p> <p style="text-align: center;">FIXED ANOD ALUM FRAME WINDOW W/ 1/4" LOW E GLASS COLOR: MATCH EXISTING</p>	<p style="text-align: center;">B</p> <p style="text-align: center;">FIXED ANOD ALUM FRAME WINDOW W/ 1/4" LOW E GLASS COLOR: MATCH EXISTING</p>

ROOM NUMBER	WINDOW NUMBER	TYPE	SIZE (ROUGH OPENING)	MATERIAL	DETAIL NUMBER	WINDOW COVERINGS	REMARKS					
			WIDTH	HEIGHT	FRAME	GLAZING	HEAD	JAMB	MULLION	SILL		
102	102A	A	11'-1"	5'-5"	ALUM	SEE SPECS	1/AA701	2/AA701	3/AA701	4/AA701	SHADE	-
102	102B	B	3'-6"	3'-10"	ALUM	SEE SPECS	1/AA701	2/AA701	-	4/AA701	SHADE	-

ROOM NUMBER	WINDOW NUMBER	TYPE	SIZE (ROUGH OPENING)	MATERIAL	DETAIL NUMBER	WINDOW COVERINGS	REMARKS					
			WIDTH	HEIGHT	FRAME	GLAZING	HEAD	JAMB	MULLION	SILL		
102	102A	A	11'-1"	5'-5"	ALUM	SEE SPECS	1/AA701	2/AA701	3/AA701	4/AA701	SHADE	-
102	102B	B	3'-6"	3'-10"	ALUM	SEE SPECS	1/AA701	2/AA701	-	4/AA701	SHADE	-

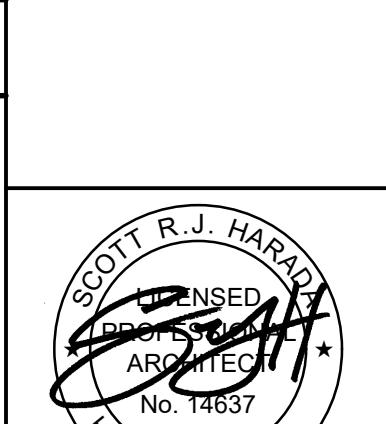


GENERAL SHEET NOTES

A. PATCH PAINT ON INTERIOR AND EXTERIOR WALL AS NEEDED TO MATCH EXISTING ADJACENT SURFACE

SHEET KEYNOTES (FOR THIS SHT ONLY)

- WINDOW AS SCHEDULED
- METAL FRAME WITH ANCHORING AS RECOMMENDED PER MANUFACTURER
- CONTINUOUS SEALANT AND BACKER ROD
- CONTINUOUS SEALANT
- SHIM AS REQUIRED
- WINDOW SHADE SYSTEM AND MOUNTING HARDWARE W/ MANUFACTURER RECOMMENDED FASTENERS
- SHADE CLOTH
- DRIVE CHAIN
- FLASHING SILL PER MANUFACTURER
- VERTICAL MULLION PER MANUFACTURER
- EXISTING CMU WALL, SEE GENERAL NOTE A
- EXISTING WALL FINISH, SEE GENERAL NOTE A
- EXISTING SILL
- EXISTING WINDOW SCREEN INSTALLED WITH EXISTING SCREEN CLIPS



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4/30/2024

SIGNATURE: _____ EXPIRATION DATE: _____

DATE	DESCRIPTION

DEPARTMENT OF DEFENSE

STATE OF HAWAII

4204 DIAMOND HEAD RD HONOLULU, HI 96815

TMWK: 3-1-042:600

BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

ROOM FINISH MATERIAL WINDOW SCHEDULE TYPES AND DETAILS

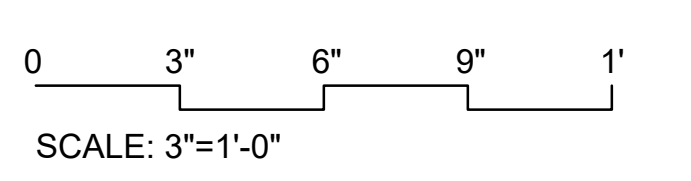
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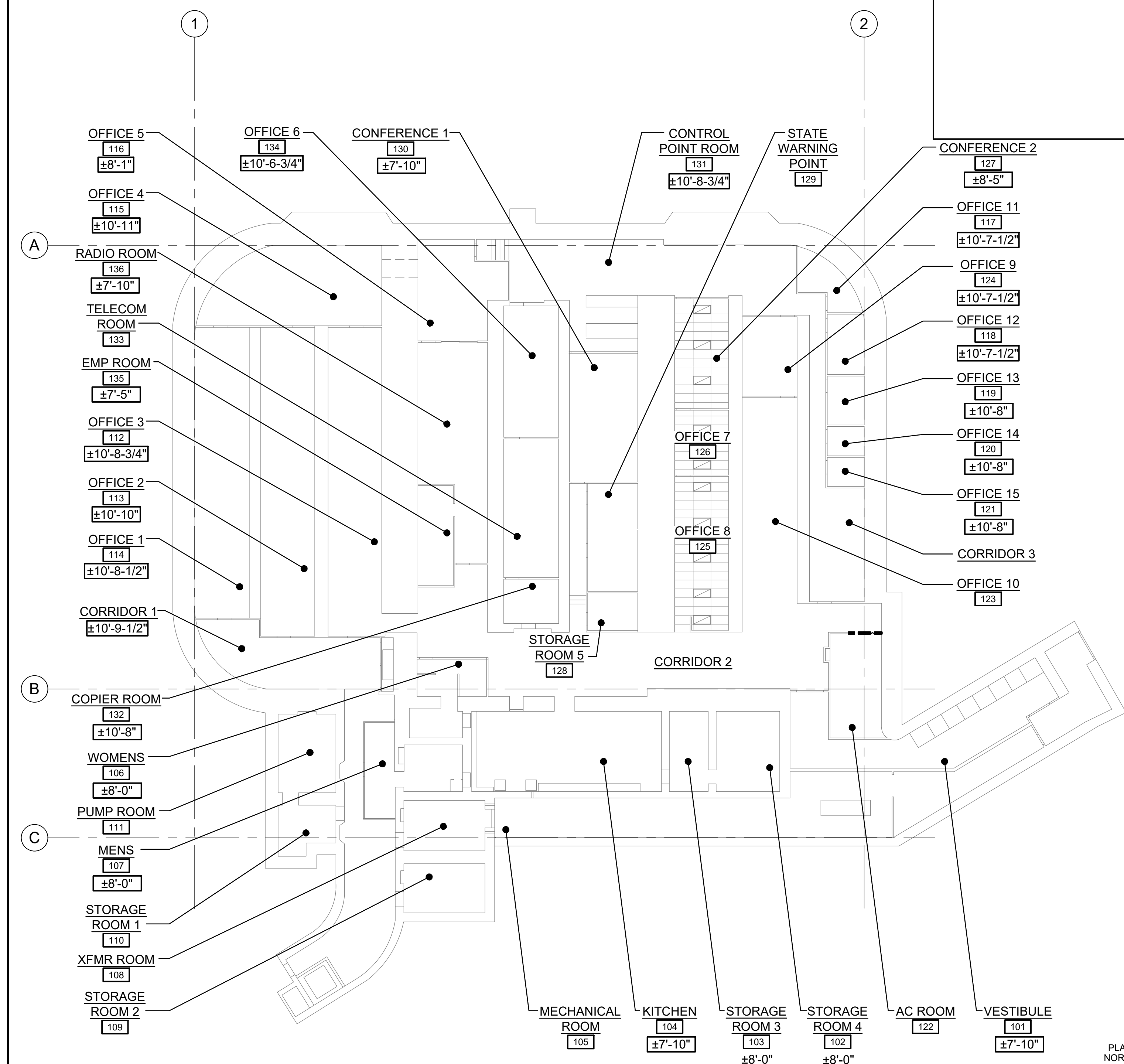
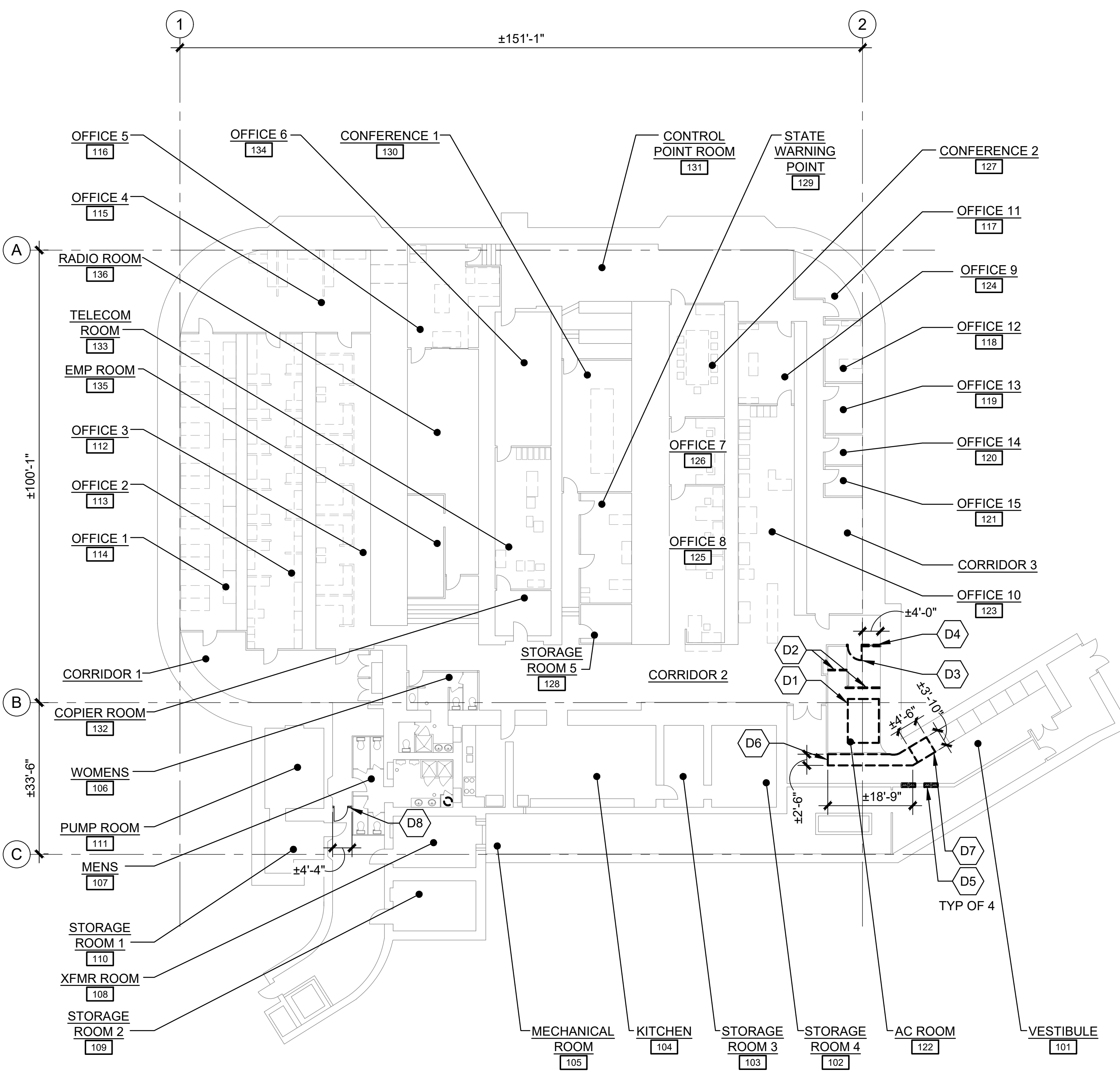
STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 29 OF 123

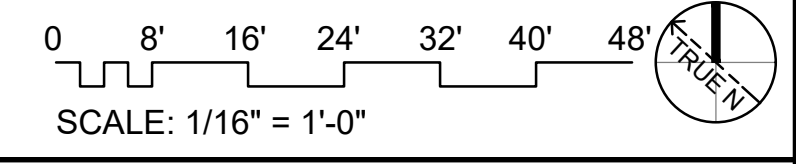
AA701





1 BIRKHIMER OVERALL FLOOR PLAN DEMOLITION
 SCALE: 1/16" = 1'-0"

2 BIRKHIMER OVERALL REFLECTED CEILING PLAN DEMOLITION
 SCALE: 1/16" = 1'-0"



GENERAL SHEET NOTES

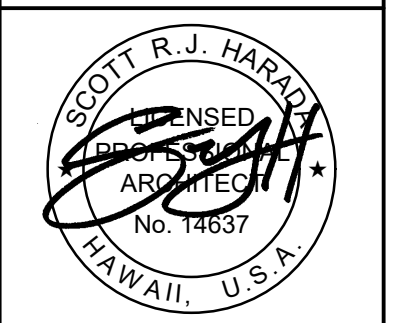
- A. CONTRACTOR MUST REPAIR AND PATCH EXISTING WALL AND FLOOR FOR A SMOOTH SURFACE WHERE DOOR ASSEMBLY, PARTIAL WALL AND GUARD RAIL DEMOLITION/ REMOVALS OCCUR. FINISH TO MATCH EXISTING ADJACENT SURFACES
- B. CONTRACTOR TO FIELD VERIFY EXISTING CEILING CONDITIONS AND MATERIALS. REMOVE AND SALVAGE EXISTING CEILING AS NEEDED TO FACILITATE MECHANICAL AND ELECTRICAL WORK. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
- C. ALL EXISTING PLUMBING FIXTURES AND ACCESSORIES IN WOMENS 106 AND MENS 107 ARE TO REMAIN
- D. SEE SITE PLAN ON SHEET 001 FOR PORTA POTTY LOCATIONS

DEMOLITION KEYNOTES (FOR THIS SHT ONLY)

- D1. DEMOLISH AND REMOVE EXISTING AIR HANDLING UNIT, SEE MECH DWGS
- D2. REMOVE AND SALVAGE EXISTING SURFACE MOUNTED GUARDRAILS FOR REINSTALLATION, AS NEEDED TO FACILITATE THE DEMOLITION AND REMOVAL OF AIR HANDLING UNIT. COORDINATE WITH USERS FOR STORAGE LOCATION
- D3. REMOVE AND SALVAGE EXISTING DOOR AND FRAME FOR REINSTALLATION, AS NEEDED TO FACILITATE THE DEMOLITION AND REMOVAL OF AIR HANDLING UNIT. COORDINATE WITH USERS FOR STORAGE LOCATION
- D4. DEMOLISH AND REMOVE PORTION OF EXISTING METAL STUD WALL, AS NEEDED TO FACILITATE THE DEMOLITION AND REMOVAL OF AIR HANDLING UNIT, EXISTING LOUVER ABOVE TO REMAIN. SEE GENERAL NOTE NO. 27 ON SHEET G-001 FOR SHORING INFORMATION
- D5. DEMOLISH AND REMOVE (36" H X 16" W) PORTION OF EXISTING WALL, AS NEEDED TO FACILITATE INSTALLATION OF TEMPORARY MECHANICAL DUCTS, SEE MECH DWGS
- D6. DEMOLISH AND REMOVE EXISTING PLYWOOD ENCLOSURE COMPLETE TO FACILITATE INSTALLATION OF TEMPORARY MECHANICAL DUCTS, SEE MECH DWGS
- D7. REMOVE AND SALVAGE PORTION OF EXISTING WOOD CABINET TO FACILITATE INSTALLATION OF TEMPORARY MECHANICAL DUCTS. SEE MECH DWGS. SAVE FOR REINSTALLATION. COORDINATE WITH USERS FOR STORAGE LOCATION
- D8. PROVIDE FULL HEIGHT TEMPORARY CONSTRUCTION BARRICADE WALL WITH DOOR DURING PHASE-2 OF CONSTRUCTION. SEE MECH DWGS. DEMOLISH THE TEMPORARY WALL ENTIRELY WHEN PHASE-2 OF THE PROJECT IS COMPLETED.

LEGEND

- EXISTING DOOR
- EXISTING WALL
- EXISTING LIGHT FIXTURE
- EXISTING ACT W/ GRID
- EXISTING DOOR TO BE REMOVED
- EXISTING WALL TO BE REMOVED
- ITEMS TO BE DEMOLISHED
- TEMPORARY CONSTRUCTION BARRICADE WALL AND DOOR



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 4/30/2024
 SIGNATURE EXPIRATION DATE

DATE	APPR.	SYN.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/1/2024

DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600
 BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS

DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 OVERALL FLOOR AND CEILING DEMOLITION

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 30 OF 123

AB101

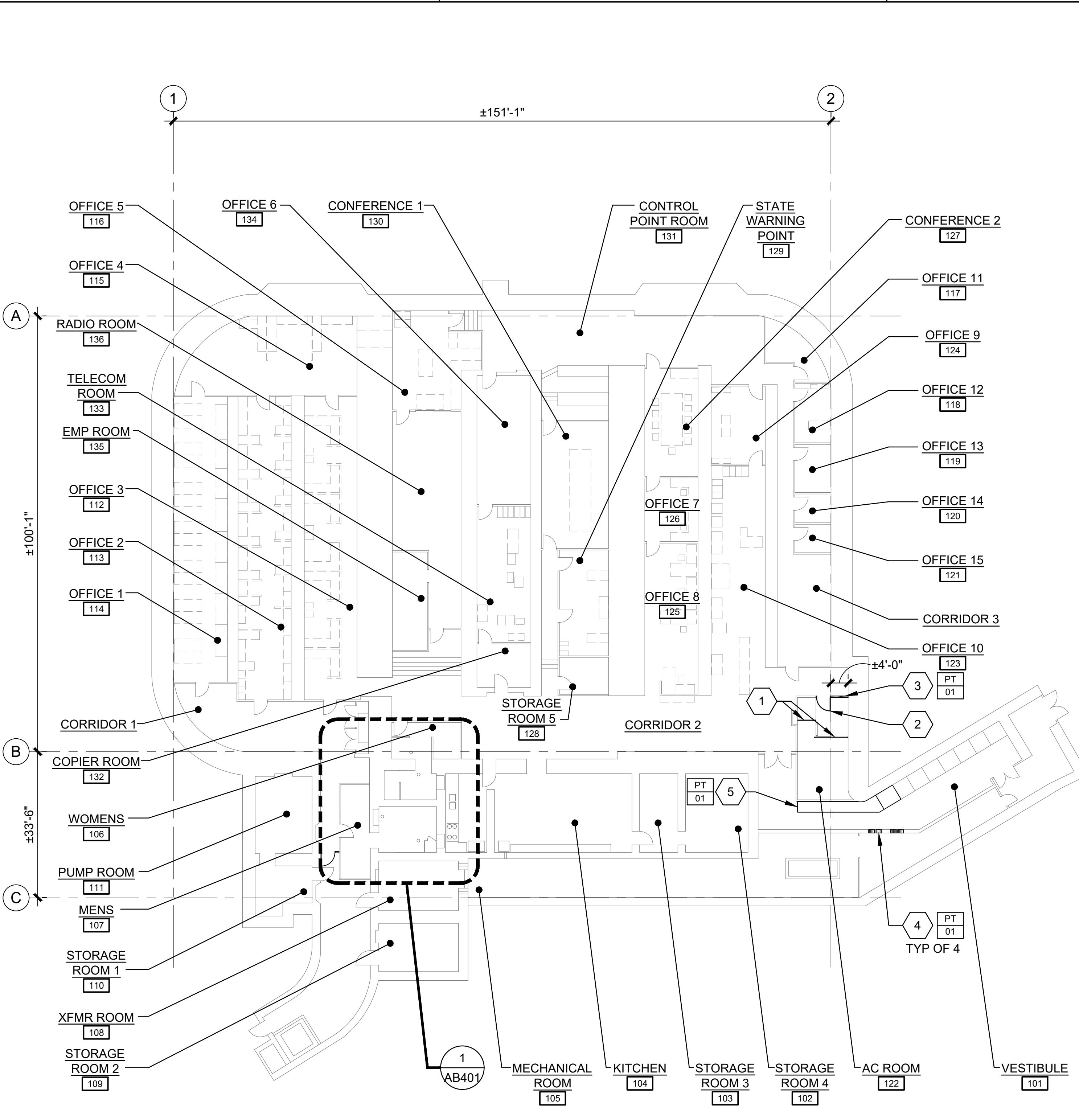
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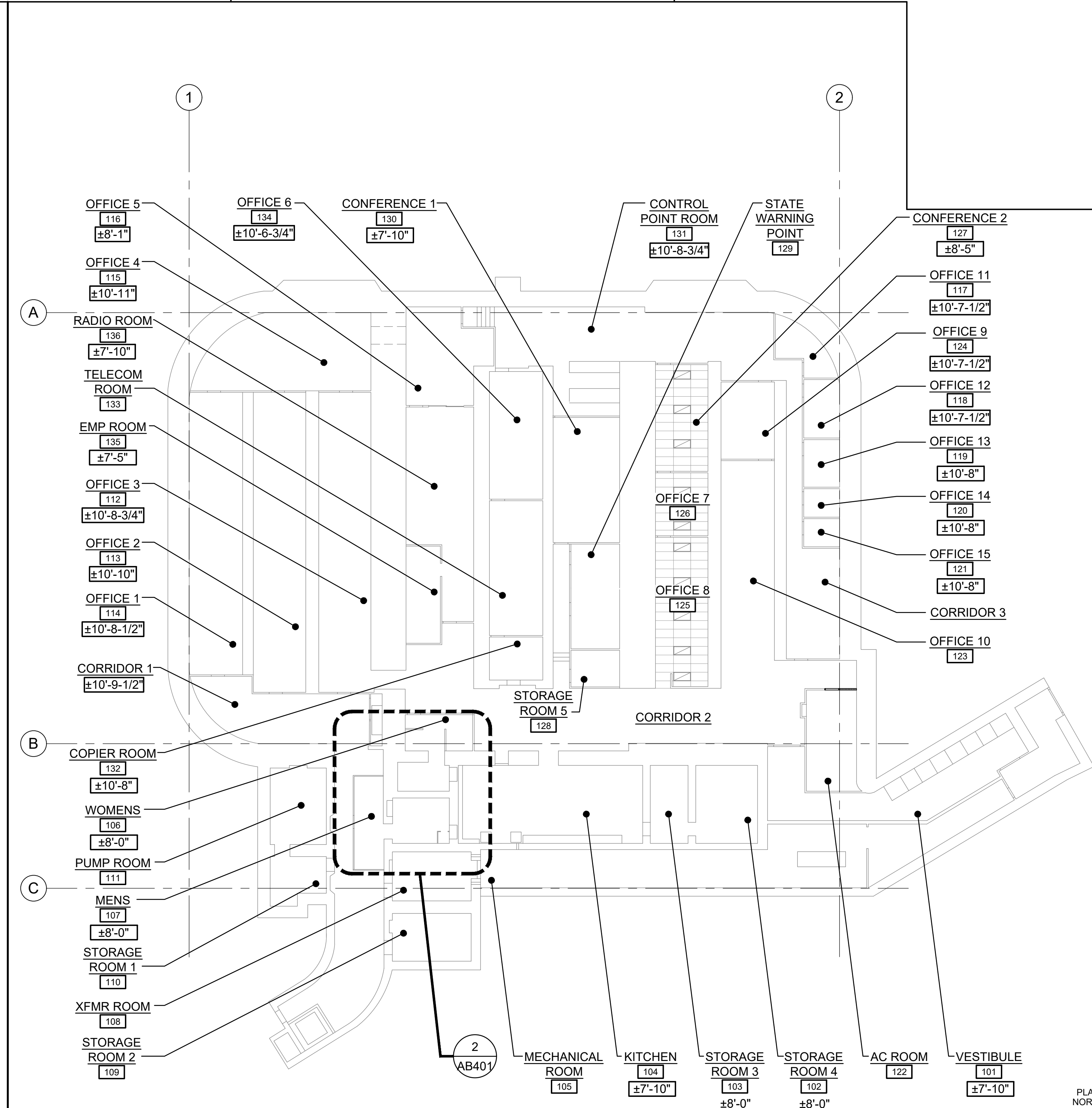
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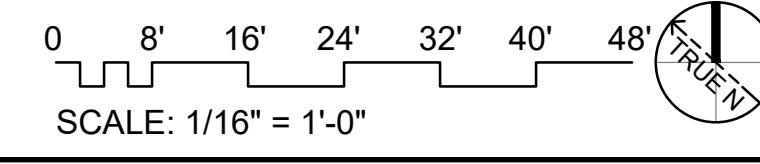
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1 BIRKHIMER OVERALL FLOOR PLAN
 AB102 SCALE: 1/16" = 1'-0"



2 BIRKHIMER OVERALL REFLECTED CEILING PLAN
 AB102 SCALE: 1/16" = 1'-0"



GENERAL SHEET NOTES

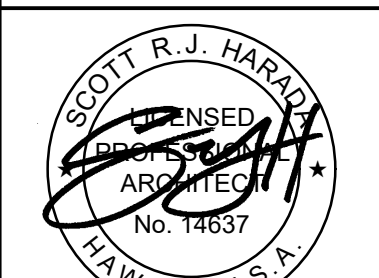
- A. CONTRACTOR MUST REPAIR AND PATCH EXISTING WALL AND FLOOR FOR A SMOOTH SURFACE WHERE DOOR ASSEMBLY, PARTIAL WALL AND GUARD RAIL DEMOLITION/ REMOVALS OCCUR. FINISH TO MATCH EXISTING ADJACENT SURFACES
- B. CONTRACTOR TO FIELD VERIFY EXISTING CEILING CONDITIONS AND MATERIALS. REINSTALL AND PATCH AS NEEDED TO MATCH EXISTING ADJACENT SURFACES AND COLOR AFTER WORK IS COMPLETED. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
- C. ALL EXISTING PLUMBING FIXTURES AND ACCESSORIES IN WOMENS 106 AND MENS 107 ARE TO REMAIN
- D. SEE SITE PLAN ON SHEET 001 FOR PORTA POTTY LOCATIONS

SHEET KEYNOTES (FOR THIS SHT ONLY)

- 1. REINSTALL EXISTING SURFACE MOUNTED GUARDRAILS REMOVED IN THE DEMOLITION OF EXISTING AIR HANDLING UNIT
- 2. REINSTALL DOOR AND FRAME REMOVED IN THE DEMOLITION OF EXISTING AIR HANDLING UNIT
- 3. PATCH PORTION OF EXISTING WALL REMOVED IN THE DEMOLITION OF EXISTING AIR HANDLING UNIT
- 4. INFILL (36" H X 16" W) PORTION OF EXISTING WALL REMOVED IN THE DEMOLITION OF TEMPORARY MECHANICAL DUCTS
- 5. REINSTALL EXISTING PLYWOOD ENCLOSURE AND PORTION OF CABINET. PAINT TO MATCH EXISTING ADJACENT SURFACES

LEGEND

- EXISTING DOOR
- EXISTING WALL
- EXISTING LIGHT FIXTURES
- EXISTING 2X4 ACT W/ GRID
- EXISTING DOOR TO BE REINSTALLED
- WALL PATCH



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 4/30/2024
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DATE	APPR.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 3/1/2024

DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

STATE OF HAWAII
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
OVERALL FLOOR PLAN AND CEILING

SCALE:
 AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 31 OF 123

AB102

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EXISTING GENERATOR ROOM

EXISTING PIPING PENETRATION, TYP

EXISTING LANDSCAPING

PIPE THRU ROOF PENETRATION, SEE C1/MB502, TYP

EXISTING CONCRETE PAD

EXISTING CONCRETE LOW WALL

TOP OF EXISTING ROOF

EXISTING MECHANICAL EQUIPMENT, TYP

MECHANICAL EQUIPMENT, SEE A2/MB102

BUILT OUT CONCRETE PAD, SEE STR DWGS

EXISTING LANDSCAPING

±1'-0"

±9'-5"

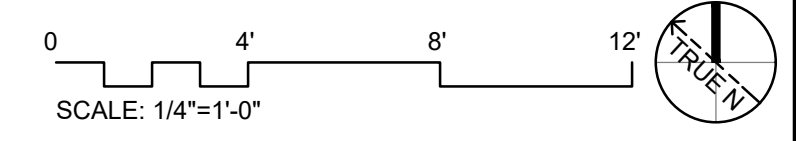
±12'-6"

±2'-11"

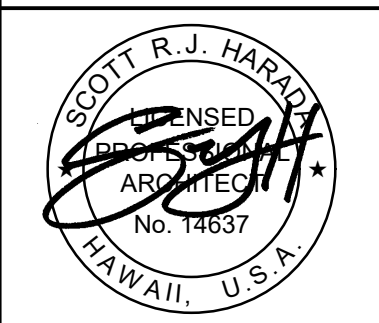
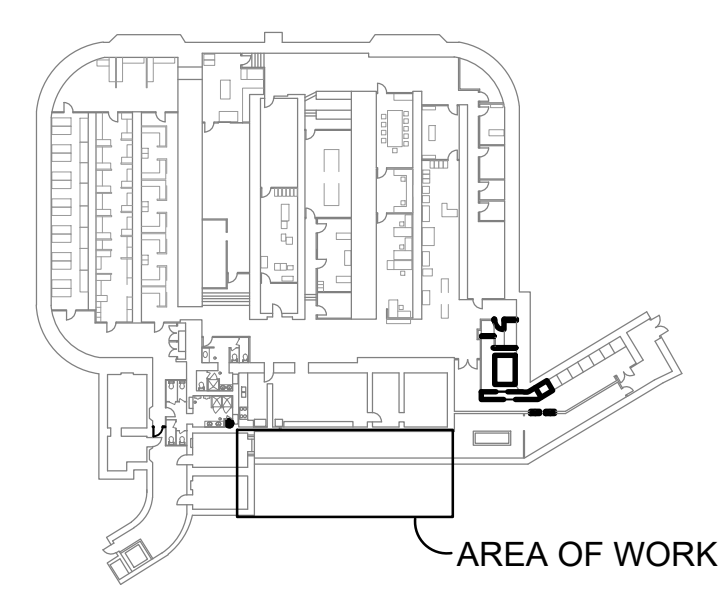
NOTE:
VERIFY SIZE OF BUILT OUT CONCRETE CURB WITH MECH EQUIPMENT REQUIREMENTS

1 BIRKHIMER GENERATOR ROOM ROOF PLAN

AB103 SCALE: 1/4" = 1'-0"



KEY PLAN (NTS)



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SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 3/1/2024

INK	INK	SH

DEPARTMENT OF DEFENSE
TMK: 3-1-042:600

DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS
GENERATOR ROOM ROOF PLAN

STATE OF HAWAII
SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 32 OF 123

AB103

ROOM FINISH SCHEDULE

BUILDING NAME	ROOM NUMBER	ROOM NAME	FLOOR	BASE	WAINSCOT	WALLS				TRIM & MISC	CEILING	CEILING FINISH	REMARKS
						A	B	C	D				
BIRKHIMER	101	VESTIBULE	NO CHANGE	NO CHANGE	NO CHANGE	PT-01	NO CHANGE	PT-01	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	-
BIRKHIMER	106	WOMENS	NO CHANGE	NO CHANGE	CT-01	PT-02	PT-02	PT-02	PT-02	NO CHANGE	GYP BD	PT-03	-
BIRKHIMER	107	MENS	NO CHANGE	NO CHANGE	CT-01	PT-02	PT-02	PT-02	PT-02	NO CHANGE	NO CHANGE	NO CHANGE	-
BIRKHIMER	122	AC ROOM	NO CHANGE	NO CHANGE	NO CHANGE	PT-01	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	-
BIRKHIMER	-	CORRIDOR 2	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	PT-01	NO CHANGE	NO CHANGE	NO CHANGE	NO CHANGE	-

GENERAL SHEET NOTES

- A. SEE PLUMB DWGS FOR MORE INFORMATION
- B. ALL PLUMBING FIXTURES ARE TO REMAIN AND ARE NOT IN CONTRACT.
- C. THE AREA OF PATCH WORK INDICATED IS AN APPROXIMATION. CONTRACTOR TO VERIFY IN FIELD.

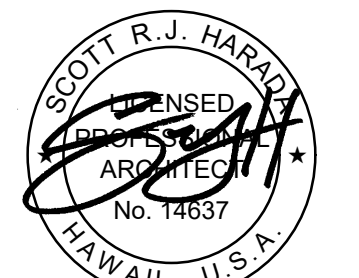


MATERIAL SCHEDULE

CODE	MATERIAL	MANUFACTURER	MODEL/SIZE	COLOR	OPTIONS	LOCATIONS	REMARKS
CT-01	CERAMIC TILE	MATCH EXISTING	MATCH EXISTING	MATCH EXISTING	-	MENS & WOMENS WALL PATCH	-
PT-01	PAINT	SHERWIN WILLIAMS	-	MATCH EXISTING	SEMI GLOSS	VESTIBULE	-
PT-02	PAINT	SHERWIN WILLIAMS	-	MATCH EXISTING	SEMI GLOSS	MENS & WOMENS WALLS	-
PT-03	PAINT	SHERWIN WILLIAMS	-	MATCH EXISTING	SEMI GLOSS	WOMENS CEILING	-

SHEET KEYNOTES (FOR THIS SHT ONLY)

1. PATCH AND REPAIR EXISTING CERAMIC TILE WAINSCOT AS REQUIRED TO PROVIDE SURFACE MATCHING THE EXISTING WHERE PLUMBING PIPING HAVE BEEN REMOVED. SEE SPECS FOR ADDITIONAL INFORMATION
2. PATCH PORTION OF EXISTING GYP BD WALL AS REQUIRED, SEE SPECS FOR ADDITIONAL INFORMATION
3. PATCH AND REPAIR PORTION OF EXISTING GYP BD CEILING WITH GYP BD PATCHING MATERIAL AS REQUIRED TO PROVIDE SURFACE MATCHING THE EXISTING WHERE PLUMBING PIPING HAVE BEEN REMOVED. PAINT TO MATCH EXISTING ADJACENT SURFACE, SEE SPECS FOR ADDITIONAL INFORMATION.
4. DEMOLISH AND REMOVE ELECTRIC WATER HEATER, SEE PLUMB DWGS
5. DEMOLISH AND REMOVE PORTION OF EXISTING GYP BD CEILING TO ALLOW TIE INTO EXISTING EXISTING ABANDONED PIPE, SEE PLUMB DWGS. PATCH PORTION OF EXISTING CEILING AS REQUIRED, SEE SPECS FOR ADDITIONAL INFORMATION.



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DATE	APPR.

ADDITIVE BID #6

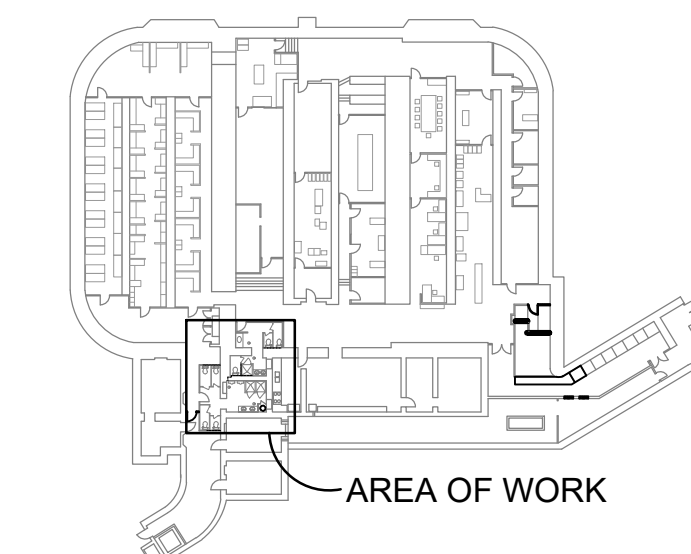
ABBREVIATIONS

- E-FD EXISTING FLOOR DRAIN TO REMAIN
- E-LAV EXISTING LAVATORY TO REMAIN
- E-PRT EXISTING PARTITION TO REMAIN
- E-SHR EXISTING SHOWER TO REMAIN
- E-UR EXISTING URINAL TO REMAIN
- E-WC EXISTING WATER CLOSET TO REMAIN

LEGEND

- EXISTING DOOR
- EXISTING WALL
- PATCH EXISTING WALL
- GYP BD CEILING

KEY PLAN (NTS)



SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 3/1/2024

INR	INR	SH

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
TMK: 3-1-042:600
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS
SCHEDULES RESTROOM FLOOR AND REFLECTED CEILING PLAN

STATE OF HAWAII

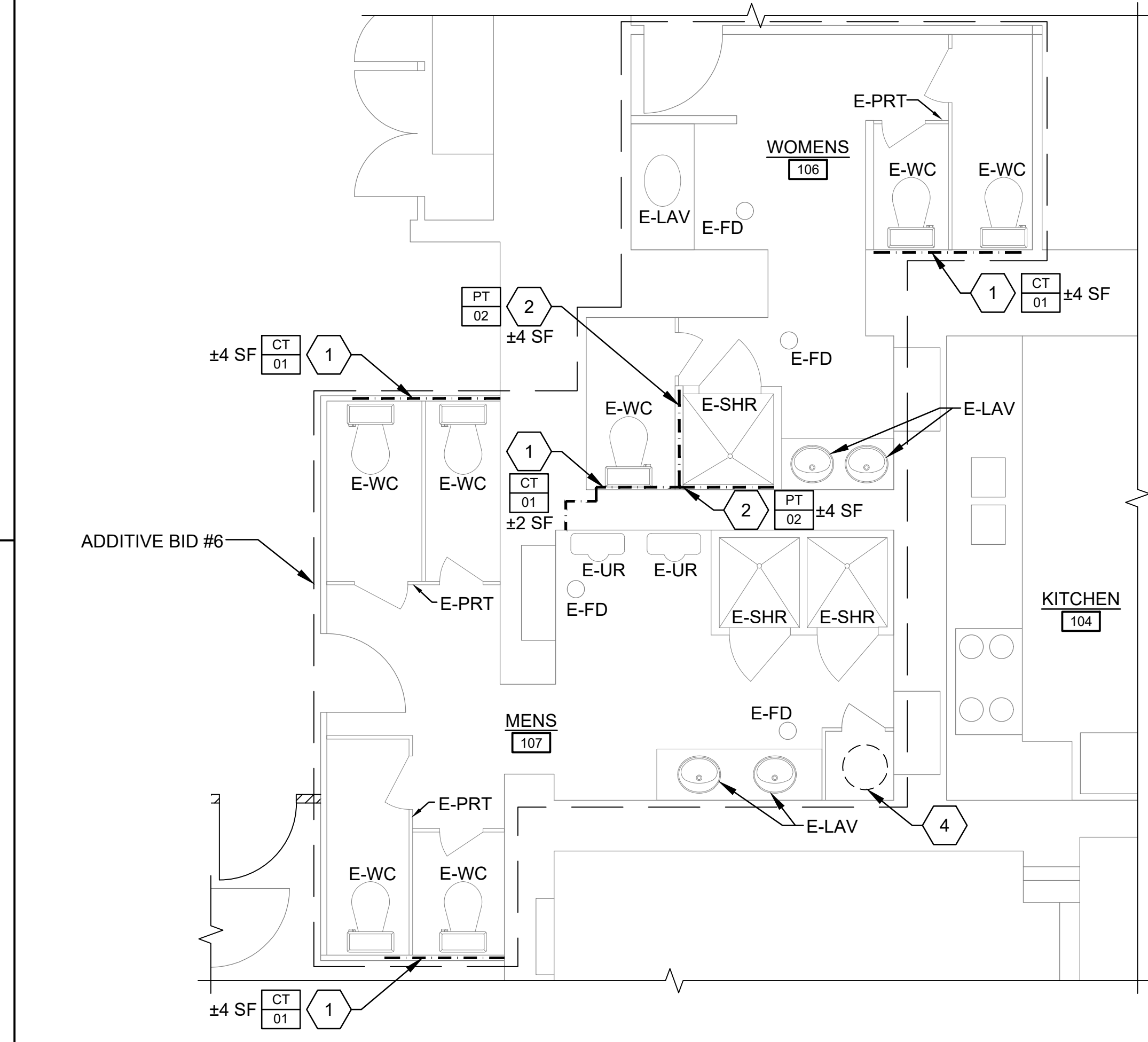
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STATE JOB NO. CA-202313-C

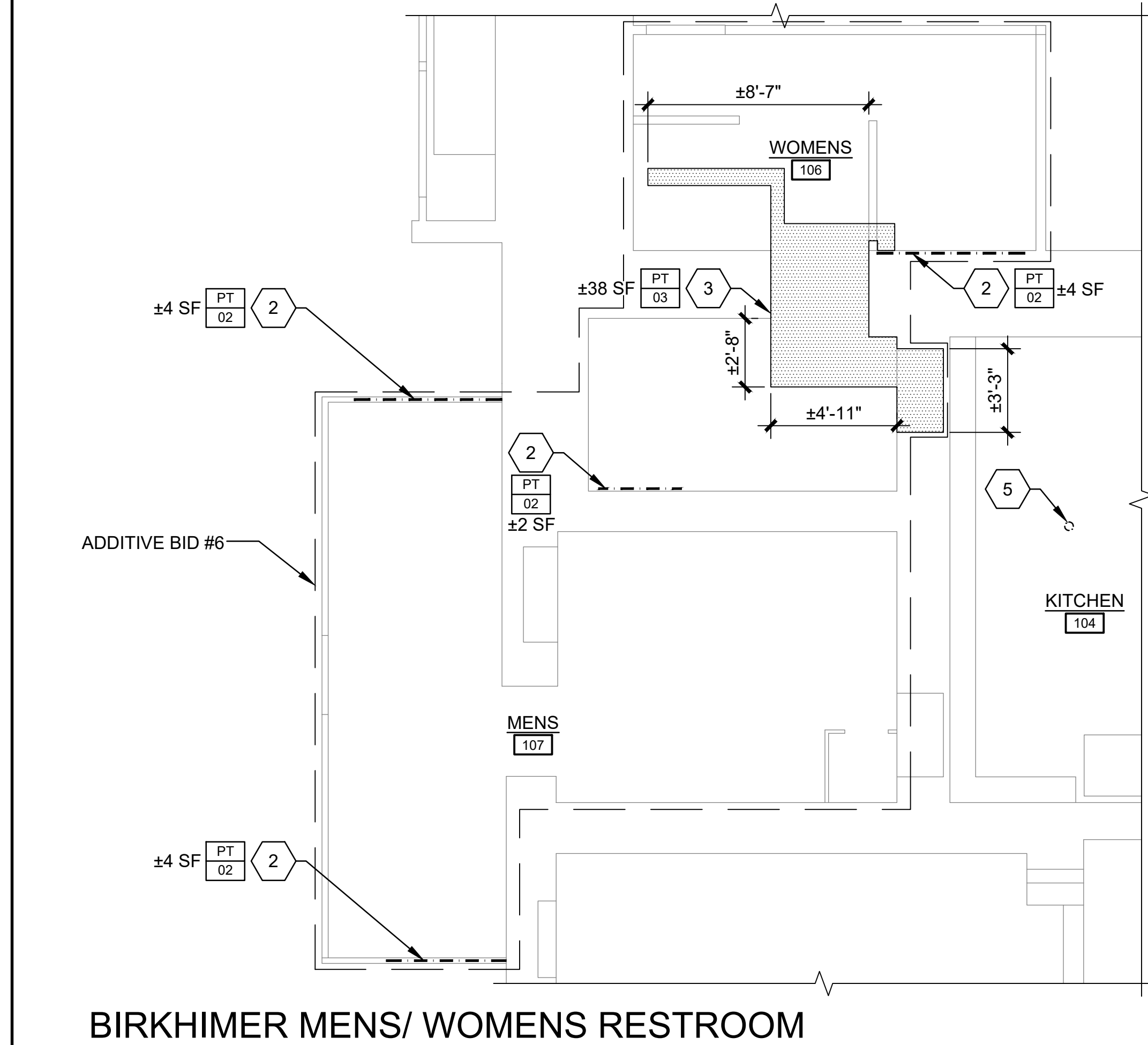
FEDERAL PROJECT NO. -

SHEET 33 OF 123

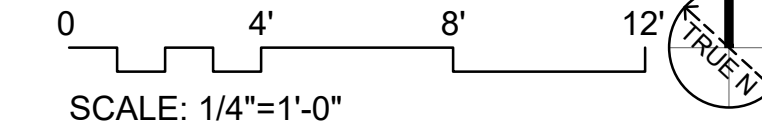
AB401



1 BIRKHIMER MENS/ WOMENS RESTROOM ENLARGED FLOOR PLAN
SCALE: 1/4" = 1'-0"



2 BIRKHIMER MENS/ WOMENS RESTROOM ENLARGED REFLECTED CEILING PLAN
SCALE: 1/4" = 1'-0"



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

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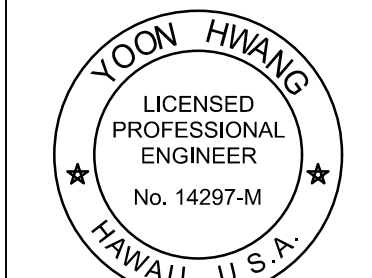
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SYN	DESCRIPTION	DATE	APPR.

CONSTRUCTION DOCUMENTS

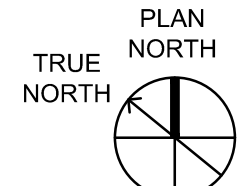
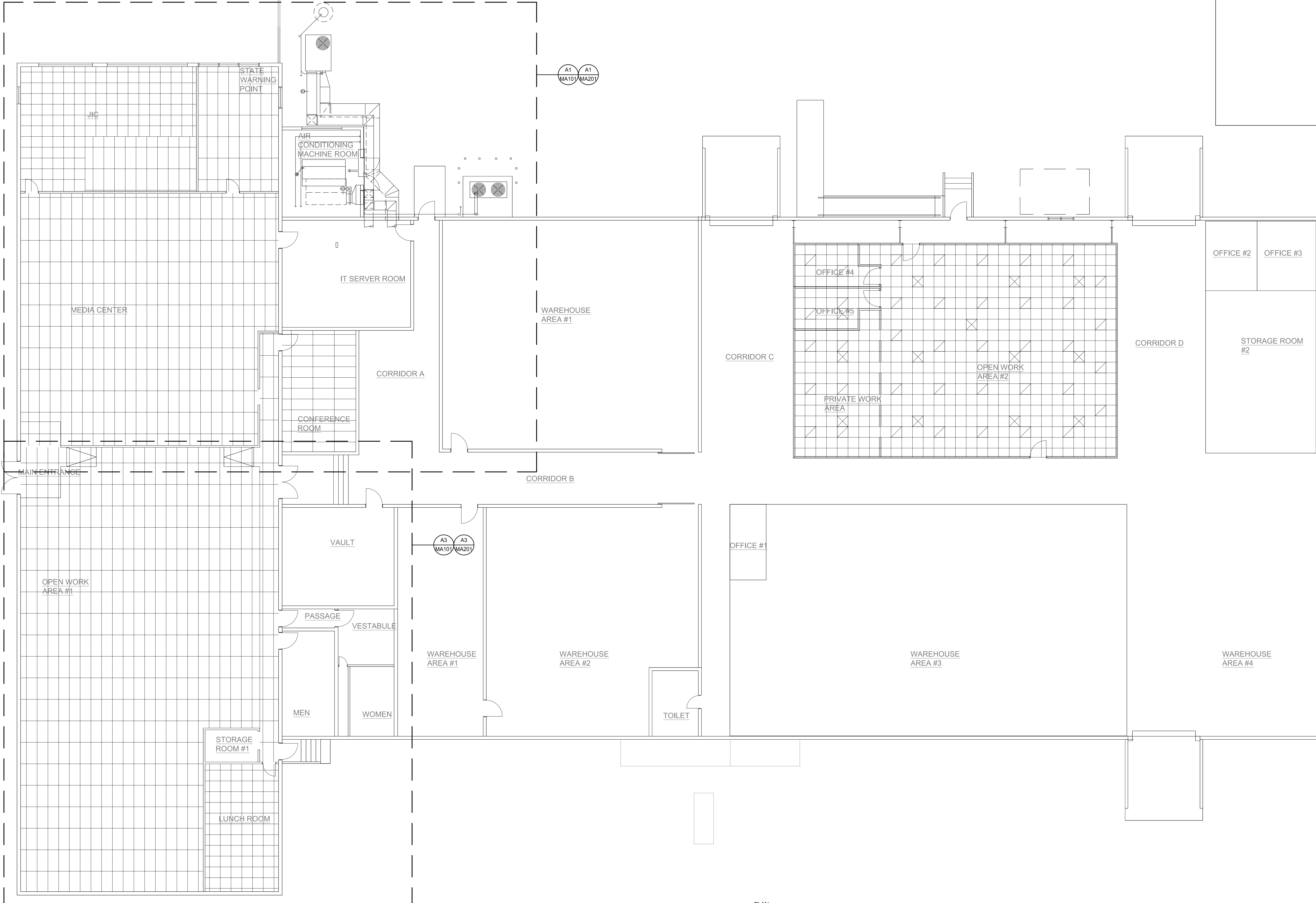
SUBMITTAL DATE 03/01/2024

YH FM YH

DEPARTMENT OF DEFENSE
TMK: 3-1-042:600

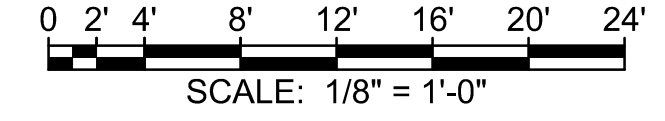
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKIMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS
OVERALL FLOOR PLAN

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 35 OF 123
MA100



OVERALL FLOOR PLAN

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



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

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PHASING NOTES:

CONSTRUCTION OF DUCTWORK REPLACEMENT TO TAKE PLACE OVER MULTIPLE PHASES. REFER TO SPECIFICATIONS FOR AVAILABLE NON-BUSINESS HOUR TIMES. PROVIDE TEMPORARY A/C FOR ALL DISABLED AREAS. CONTRACTOR TO DUCT EXHAUST WITHOUT IMPACTING OPERATIONS AS WELL AS REMOVAL OF CONDENSATE. SEE SPEC FOR SPECIFIC CONSTRUCTION DURATION DAYS PER PHASE.

DEMO/NEW PHASE 1:

REMOVE AND REPLACE ALL SUPPLY AIR AND RETURN AIR DUCTWORK UP TO (E)AHU-1.

DEMO/NEW PHASE 2:

REMOVE AND REPLACE ALL SUPPLY AIR DUCTWORK FOR "MEDIA CENTER". INSTALL NEW TRANSFER AIR DUCTWORK.

DEMO/NEW PHASE 3:

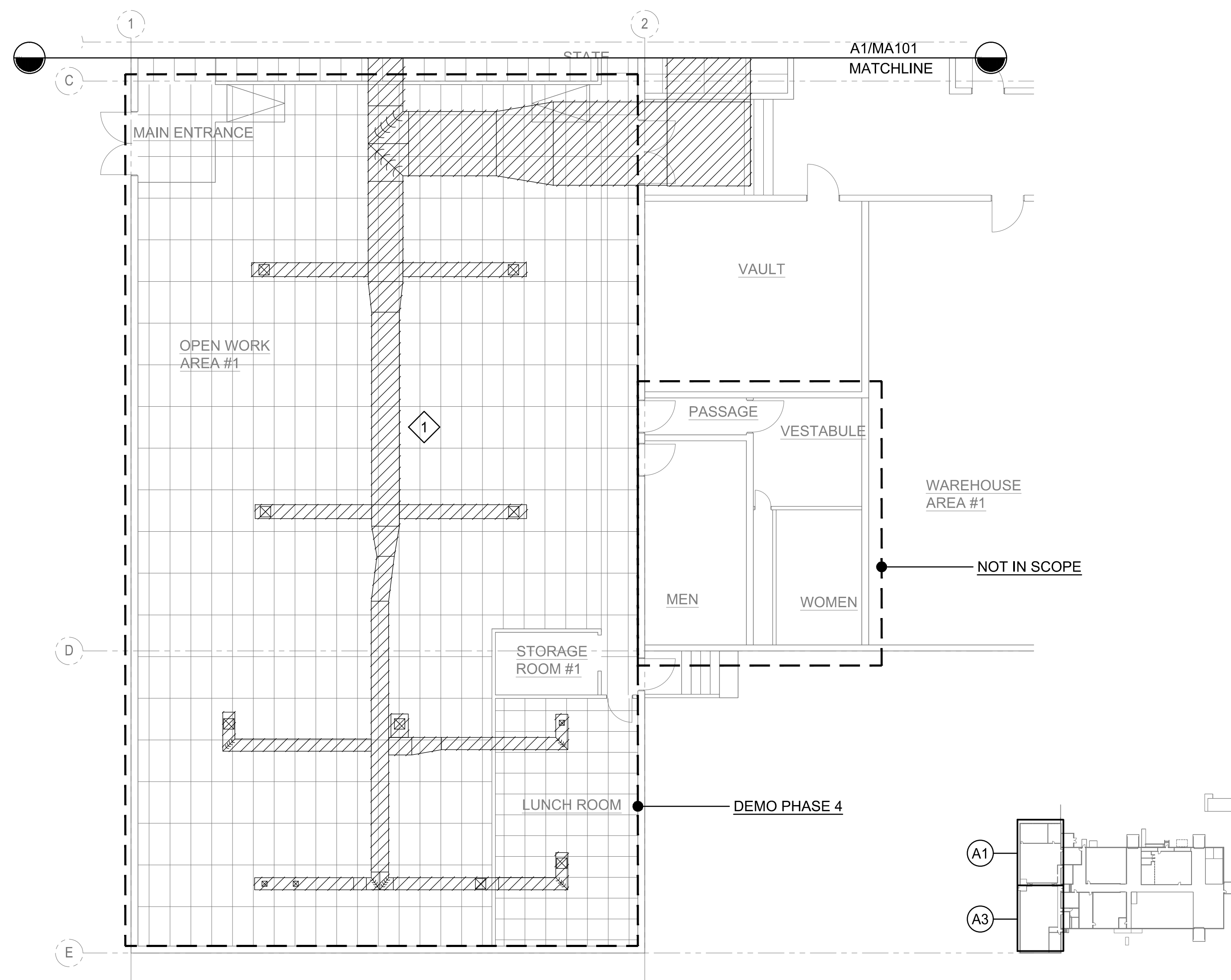
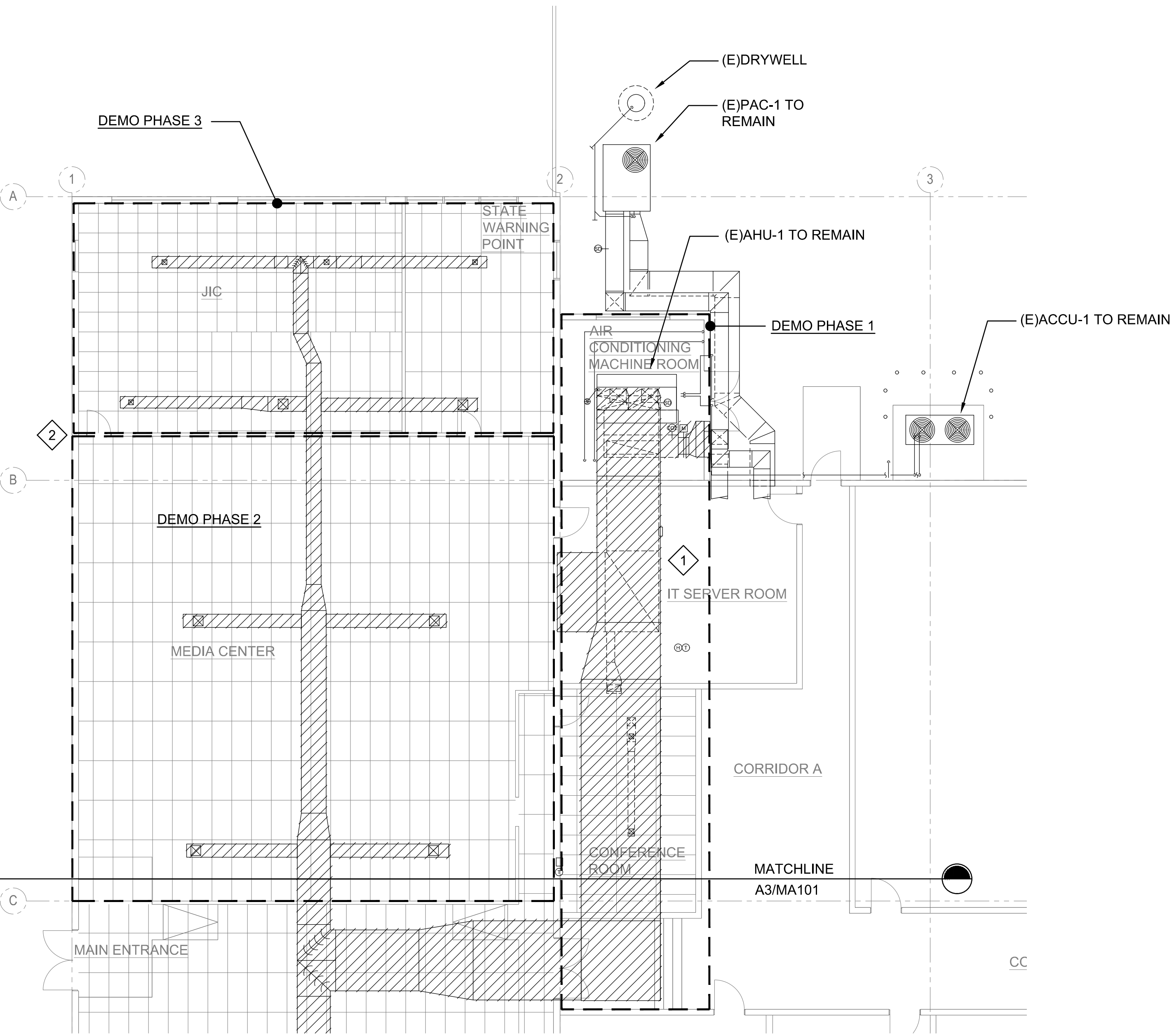
REMOVE AND REPLACE ALL SUPPLY AIR DUCTWORK FOR "JIC" ROOM AND "STATE WARNING POINT ROOM". INSTALL NEW TRANSFER AIR DUCTWORK. *OFFICE STAFF WILL CONTINUE TO WORK DURING THIS CONSTRUCTION.

DEMO/NEW PHASE 4:

REMOVE AND REPLACE ALL SUPPLY AIR DUCTWORK FOR "OPEN OFFICE AREA" AND "LUNCHROOM". INSTALL NEW TRANSFER AIR DUCTWORK.

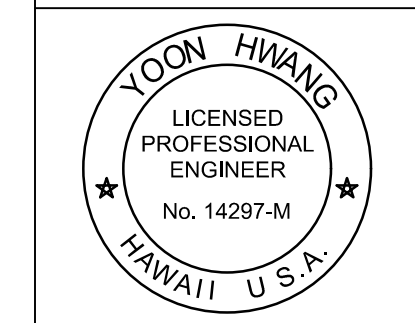
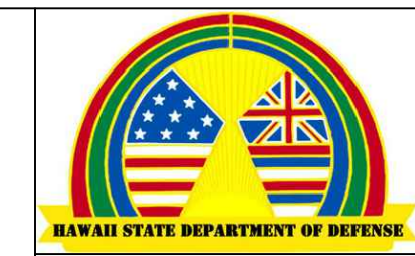
KEYNOTES:

- 1 DEMO ALL EXISTING SA/RA DUCTS.
- 2 DUCTWORK POR FOR FUTURE PHASE AT OVERLAP OF DASHED PHASE BOUNDARY, TYPICAL FOR ALL PHASE BOUNDARIES.



PLAN NORTH TRUE NORTH
A1 ENLARGED FLOOR PLAN - DEMO
 MA101 SCALE: 1/8" = 1'-0"
 0 2' 4' 8' 12' 16' 20' 24'
 SCALE: 1/8" = 1'-0"

PLAN NORTH TRUE NORTH
A3 ENLARGED FLOOR PLAN - DEMO
 MA101 SCALE: 1/8" = 1'-0"
 0 2' 4' 8' 12' 16' 20' 24'
 SCALE: 1/8" = 1'-0"



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SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE: 03/01/2024

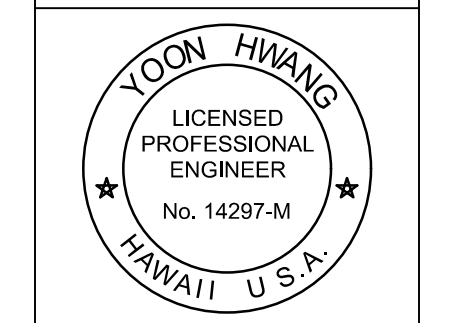
YH	FM	YH

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 STATE OF HAWAII
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ENLARGED FLOOR PLANS - DEMO

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 36 OF 123

MA101

- KEYNOTES:**
- ① CONTRACTOR SHALL REMOVE AND REINSTALL CEILING WHEN DOD STAFF IS NOT PRESENT.
 - ② INSTALL NEW 20X36 BYPASS DUCT AND DAMPER.
 - ③ INSTALL MODULATING DAMPER.
 - ④ DUCTWORK POC FOR FUTURE PHASE AT OVERLAP OF DASHED PHASE BOUNDARY, TYPICAL FOR ALL PHASE BOUNDARIES.
 - ⑤ NEW CONCRETE PAD PROVIDED SHALL BE 4" WIDER THAN NEW ACCU UNIT.
 - ⑥ PAINT NEW REFRIGERANT AND CONDENSATE PIPING WHITE TO MATCH EXISTING OUTSIDE DUCTWORK.



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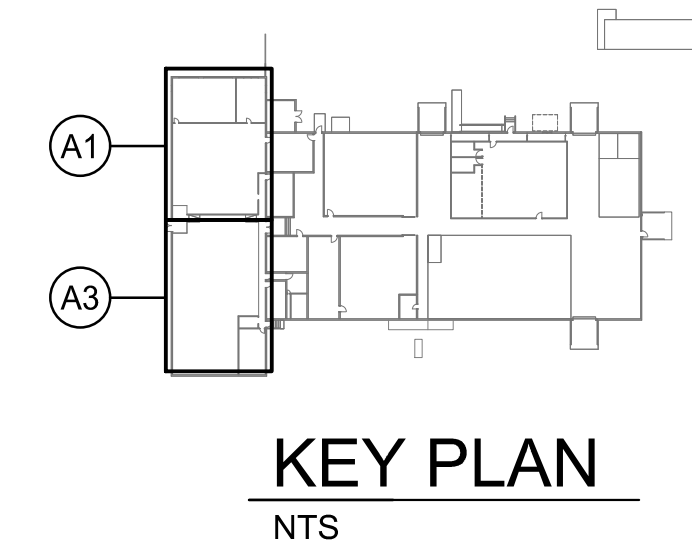
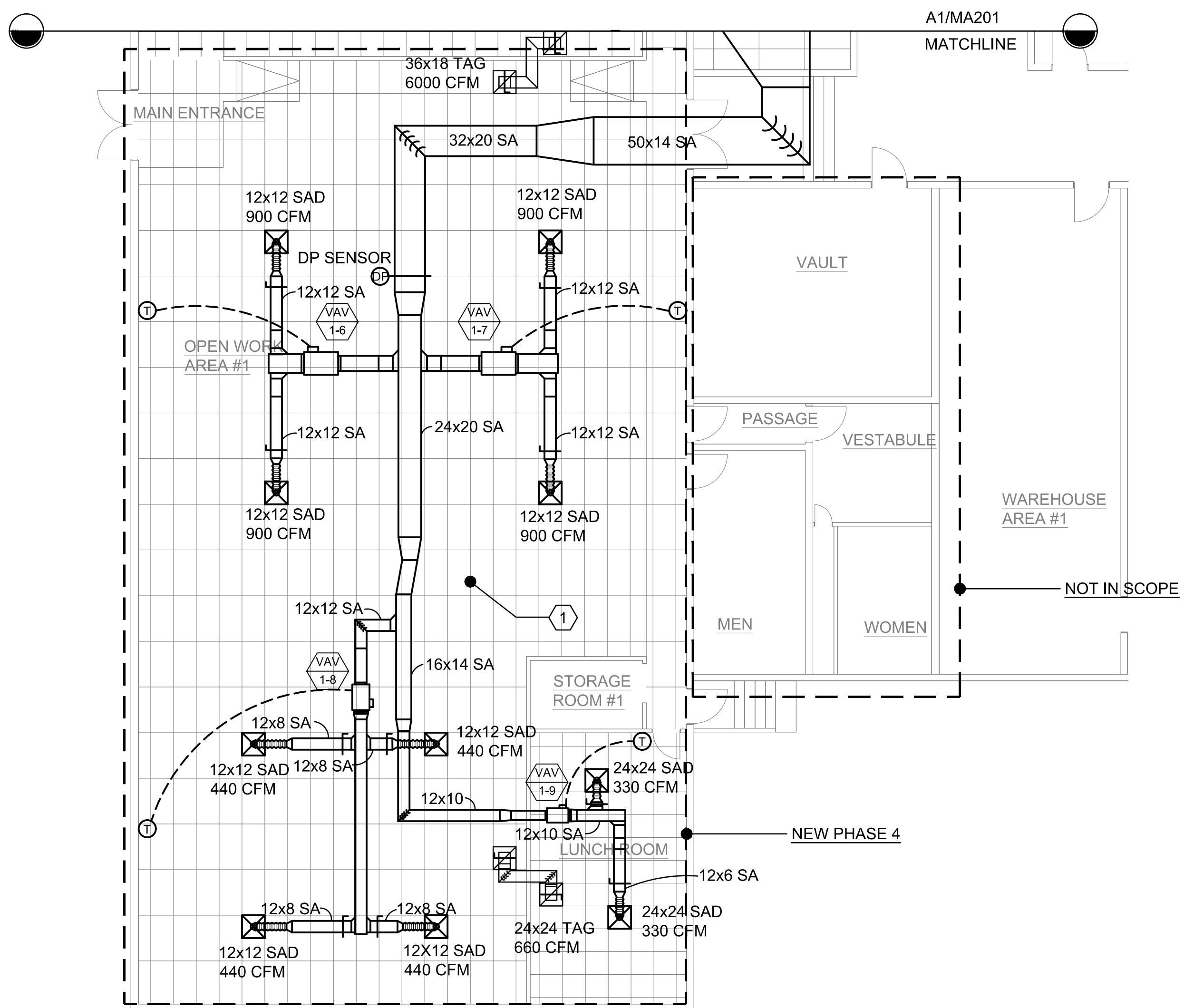
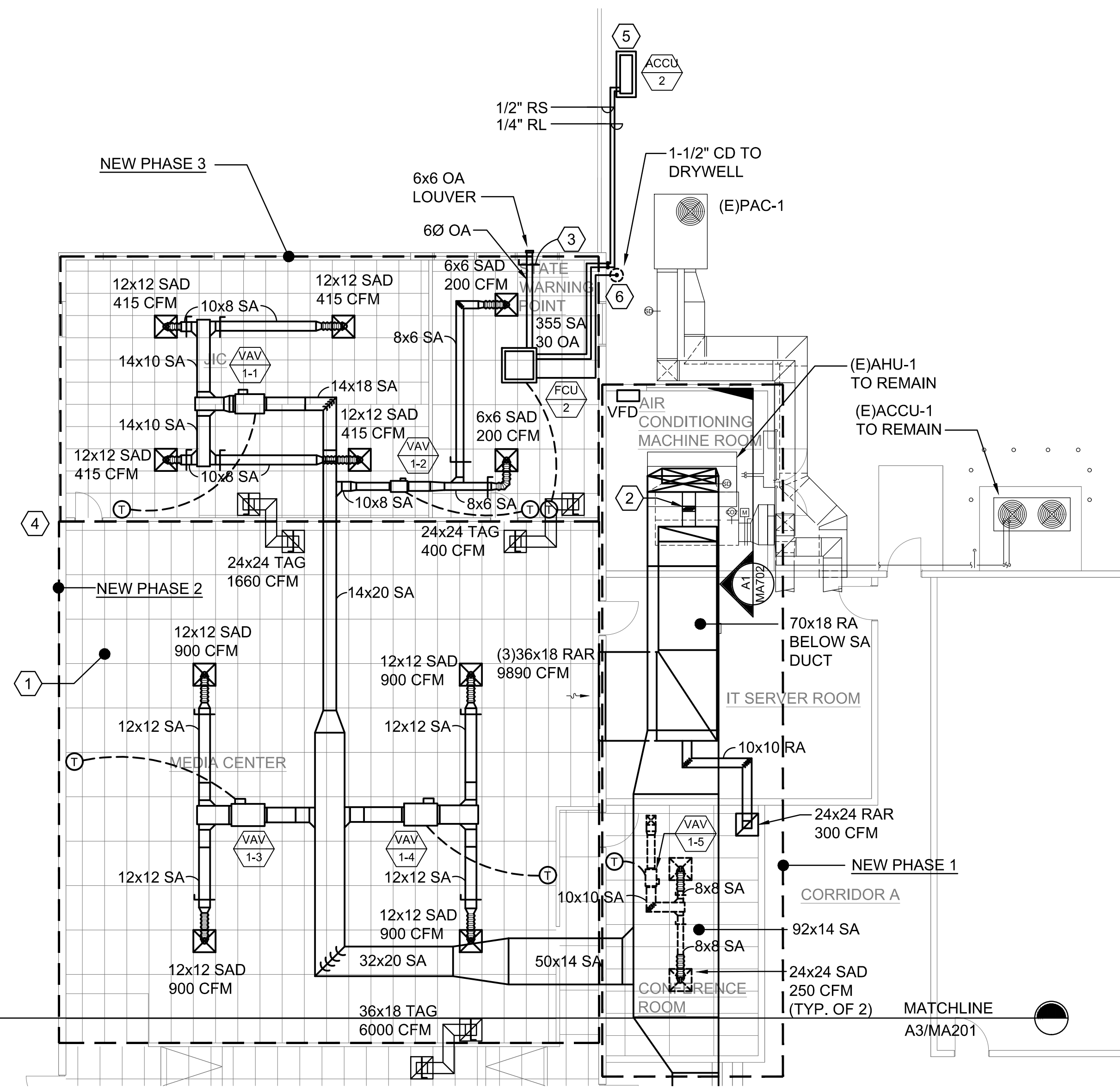
SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE: 03/01/2024

YH	FM	YH

DEPARTMENT OF DEFENSE
 TMJK: 3-1-042:600

STATE OF HAWAII
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
**BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS**
 ENLARGED FLOOR PLANS - NEW

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 37 OF 123
MA201



PLAN NORTH TRUE NORTH
A1 ENLARGED FLOOR PLAN - NEW
 MA201 SCALE: 1/8" = 1'-0"
 0 2' 4' 8' 12' 16' 20' 24'
 SCALE: 1/8" = 1'-0"

PLAN NORTH TRUE NORTH
A3 ENLARGED FLOOR PLAN - NEW
 MA201 SCALE: 1/8" = 1'-0"
 0 2' 4' 8' 12' 16' 20' 24'
 SCALE: 1/8" = 1'-0"

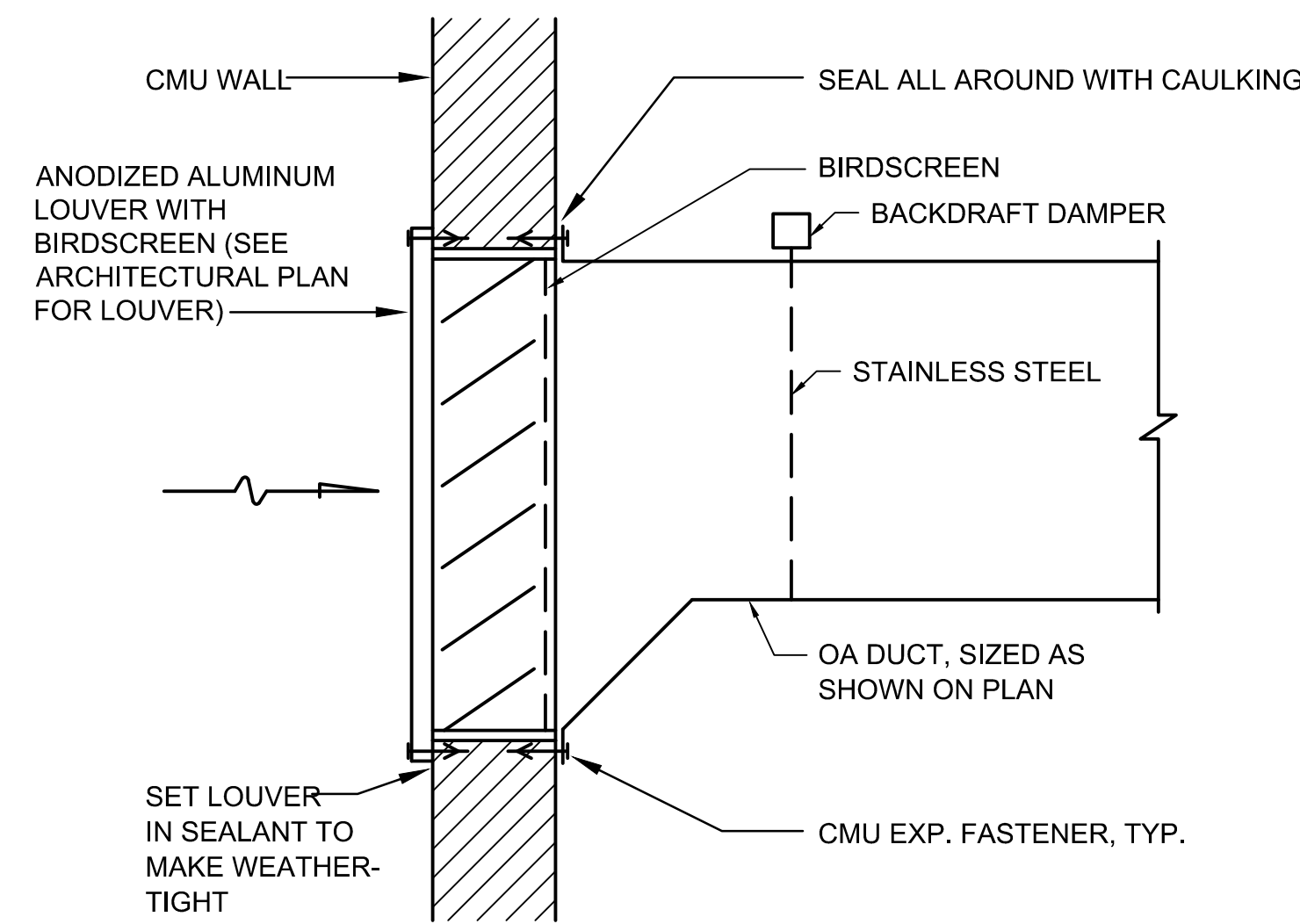
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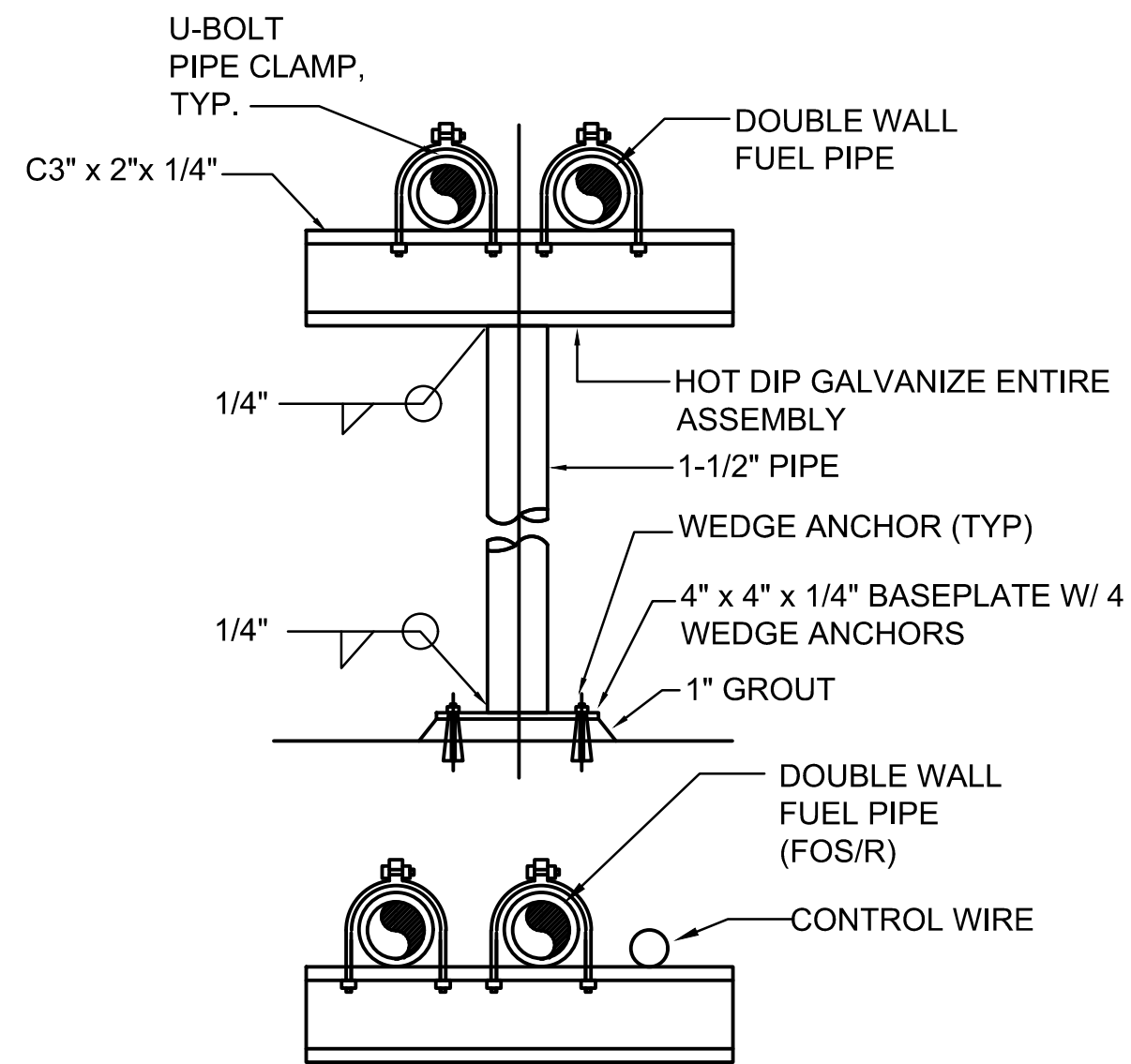
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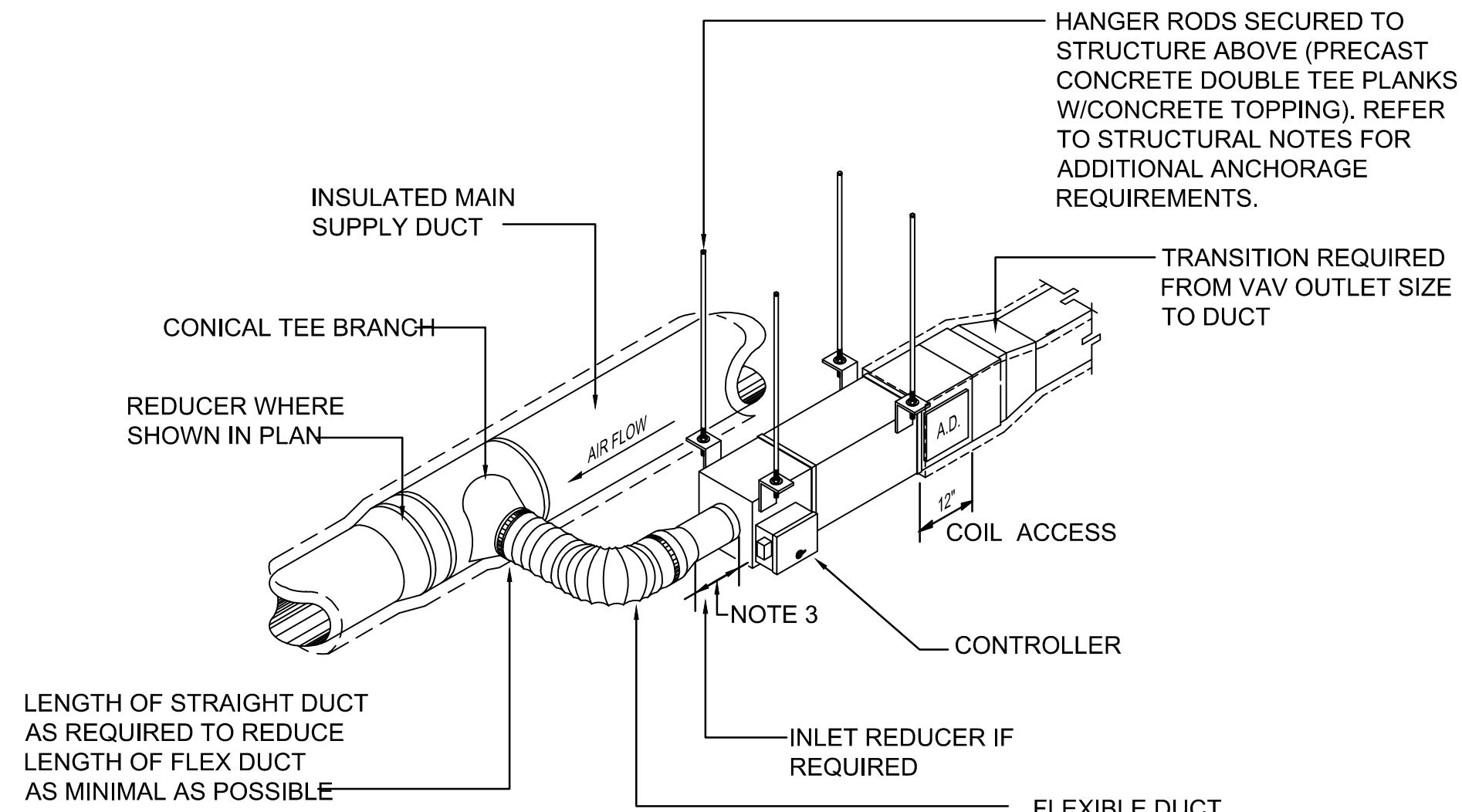


C1 TYPICAL LOUVER DETAIL
 MA501 SCALE: NOT TO SCALE

MINIMUM EMBEDMENT DEPTH BY DIAMETER OF WEDGE ANCHOR	
WEDGE ANCHOR DIAMETER	MINIMUM EMBEDMENT DEPTH
1/4"	1-1/8"
5/16"	1-1/4"
3/8"	1-1/2"
1/2"	2-1/4"
5/8"	2-3/4"
3/4"	3-1/4"
7/8"	3-7/8"
1"	4-1/2"
1-1/4"	5-1/2"



A1 PIPE SUPPORT ON SLAB
 MA501 SCALE: NOT TO SCALE

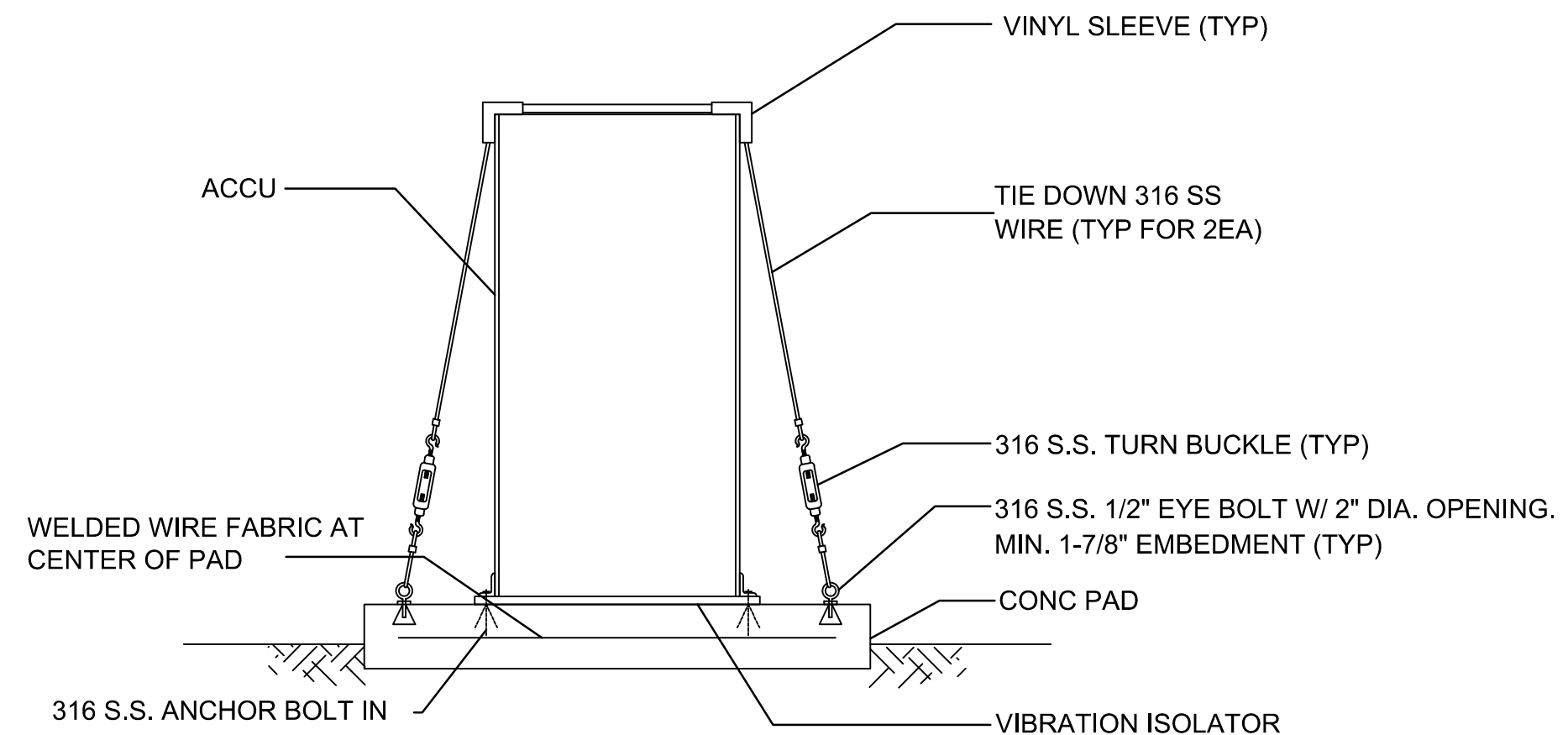


- NOTES:**
- PROVIDE 8"x8" INTERNALLY INSULATED 1" STAND OFF ACCESS DOOR IN 12" INCH COIL ACCESS SECTION.
 - CONTROLLER ENCLOSURE, COIL ACCESS COIL, CONNECTIONS AND CONTROL VALVE ASSEMBLY SHALL BE ON THE SAME SIDE OF THE TERMINAL BOX.
 - 1-1/2" NOZZLE DIAMETERS STRAIGHT DUCT.

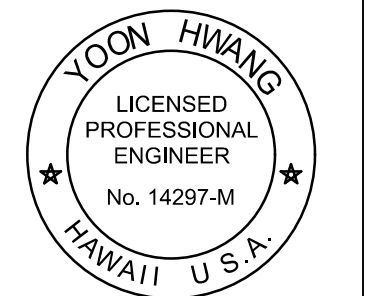
A2 VAV TERMINAL UNIT CONNECTION DETAIL
 MA501 SCALE: NOT TO SCALE

ANCHOR BOLT ULTIMATE LOAD VALUES IN 2000 PSI CONCRETE				
SIZE	MIN. EMBEDMENT	DRILL BIT	PULL-OUT (LBS.)	SHEAR (LBS.)
1/4"	1-1/8"	1/4"	877	1082
5/16"	1-1/8"	5/16"	892	1156
3/8"	1-1/2"	3/8"	1223	3238
1/2"	2-1/4"	1/2"	2999	5564
5/8"	2-3/4"	5/8"	3749	6198
3/4"	3-1/4"	3/4"	4978	9378
7/8"	3-7/8"	7/8"	6294	13687
1"	4-1/2"	1"	7329	17712
1-1/4"	5-1/2"	1-1/4"	13162	24206

VALUES SHOWN ARE AVERAGE ULTIMATE VALUES AND ARE OFFERED ONLY AS A GUIDE AND ARE NOT GUARANTEED. A SAFETY FACTOR OF 4:1 OR 25% IS GENERALLY ACCEPTED AS A SAFE WORKING LOAD. REFERENCE SHOULD BE MADE TO APPLICABLE CODES FOR THE SPECIFIC WORK RATIO.



A4 ACCU TYP INSTALLATION DETAIL
 MA501 SCALE: NOT TO SCALE



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 EXPIRATION DATE

DATE	APPR.	SYN.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

DEPARTMENT OF DEFENSE
 TMNK: 3-1-042:600
 BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 MECHANICAL DETAILS

STATE OF HAWAII
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 DIAMOND HEAD STATE MONUMENT
 SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 38 OF 123

MA501

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(E)AIR HANDLING UNIT SCHEDULE

UNIT ID	LOCATION	AREA SERVED	TOTAL CFM	OUTSIDE AIR CFM (MIN.)	ESP (IN.W.G)	ENTERING AIR		TOTAL HEAT BTUH	SENSIBLE HEAT BTUH	ELECTRICAL			DRIVE	UNIT WEIGHT (LBS)
						DB	WB			V/Hz/PH	MCA	MOCp		
(E)AHU-1	MECH RM	GENERAL OFFICE AREA	12,500	800 (200)	1.0	75.0	62.6	298,600	288,900	208/60/3	40.0	70	BELT	1,050

NOTES:

- UNIT IS EXISTING AND SHOWN FOR REFERENCE ONLY.
- PROVIDE NEW INVERTER DUTY RATED MOTOR.
- PROVIDE VFD.

(E)AIR COOLED CONDENSING UNIT SCHEDULE

UNIT ID	UNIT SERVE	NOMINAL CAPACITY TONS	AMBIENT	REFRIGERANT	MIN. UNIT CAPACITY W/ DIGITAL COMPRESSOR	CAPACITY STEPS W/ DIGITAL OPTION	ELECTRICAL				UNIT WEIGHT (LBS)
							V/Hz/PH	EER	MCA	MOCp	
(E)ACCU-1	(E)AHU-1	25	95F	R410A	17%	22	208/60/3	11.0	120.2	150	1,115

NOTES:

- UNIT IS EXISTING AND SHOWN FOR REFERENCE ONLY

FAN COIL UNIT (FCU) SCHEDULE

FCU NO.	AREA SERVED	TYPE	COOLING CAPACITY					AIRFLOW		ELECTRICAL	MAKE AND MODEL	REMARKS	
			TOTAL (BTUH)	SENSIBLE (BTUH)	EAT DB°F	EAT WB°F	LAT DB°F	LAT WB°F	SA (CFM)	OA (CFM)			V/PH/Hz
FCU-2	STATE WARNING POINT ROOM	CASSETTE	9,500	8,300	76.0	61.9	55.0	52.7	355	30	208/1/60	TRANE TPLA0A0121EA80A	1,2

NOTES:

- MANUFACTURER STANDARD FILTER.
- INDOOR FCU POWERED BY OUTDOOR ACCU.

AIR COOLED CONDENSING UNIT (ACCU) SCHEDULE

ACCU NO.	LOCATION	UNIT(S) SERVED	REFRIG. TYPE	CONDENSER FAN			ELECTRICAL DATA			EER	SIZE HxWxD (IN)	SOUND LEVEL (DBA)	WEIGHT (LBS)	MAKE & MODEL NO.	REMARKS
				AMBIENT AIR TEMP - EXTREME HIGH (F)	TYPE	FAN MOTOR OUTPUT (W)	MCA	MOCp	V/PH/Hz						
ACCU-2	EXTERIOR	FCU-2	R-410A	95	PROP	46	11	28	208/60/1	16.2	25x32x12	44	92	TRANE TRUYA0121KA70NA	1,2

NOTES:

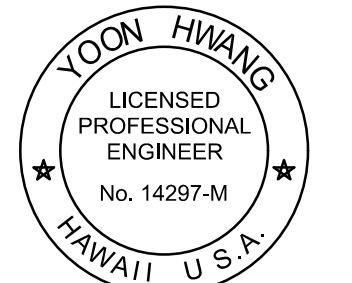
- REFRIGERANT PIPE QUANTITIES AND SIZE TO BE PER MANUFACTURER'S PIPING SCHEMATIC.
- COAT UNIT CASING AND COILS WITH COATING RATED FOR COASTAL ENVIRONMENT

VAV SCHEDULE - AHU-1

VAV ID	ROOM NAME	ROOM AIRFLOW (CFM)	VAV MAX FLOW (CFM)	VAV MIN FLOW (CFM)	TYPE	UNIT SIZE	INLET SIZE (IN)	MAX. INLET PD (IN W.G)	ELECTRICAL	REMARKS
1-1	JIC	1650	1650	545	DDC, SINGLE INLET	14	14	0.25	120/1/60	---
1-2	STATE WARNING POINT	400	400	132	DDC, SINGLE INLET	8	8	0.25	120/1/60	---
1-3	MEDIA CENTER	1800	1800	594	DDC, SINGLE INLET	16	16	0.25	120/1/60	---
1-4	MEDIA CENTER	1800	1800	594	DDC, SINGLE INLET	16	16	0.25	120/1/60	---
1-5	CONFERENCE ROOM	500	500	165	DDC, SINGLE INLET	8	8	0.25	120/1/60	---
1-6	GENERAL OFFICE AREA	1800	1800	594	DDC, SINGLE INLET	16	16	0.25	120/1/60	---
1-7	GENERAL OFFICE AREA	1800	1800	594	DDC, SINGLE INLET	16	16	0.25	120/1/60	---
1-8	GENERAL OFFICE AREA	1760	1760	581	DDC, SINGLE INLET	16	16	0.25	120/1/60	---
1-9	LUNCH ROOM	660	660	218	DDC, SINGLE INLET	10	10	0.25	120/1/60	---



HAWAII STATE DEPARTMENT OF DEFENSE



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DATE: 4/30/2024

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DATE	APPROVAL	SYMBOL

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS

SUBMITTAL DATE: 03/01/2024

STATE OF HAWAII DEPARTMENT OF DEFENSE
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMWK: 3-1-042:600

DIAMOND HEAD STATE MONUMENT

BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS MECHANICAL SCHEDULES

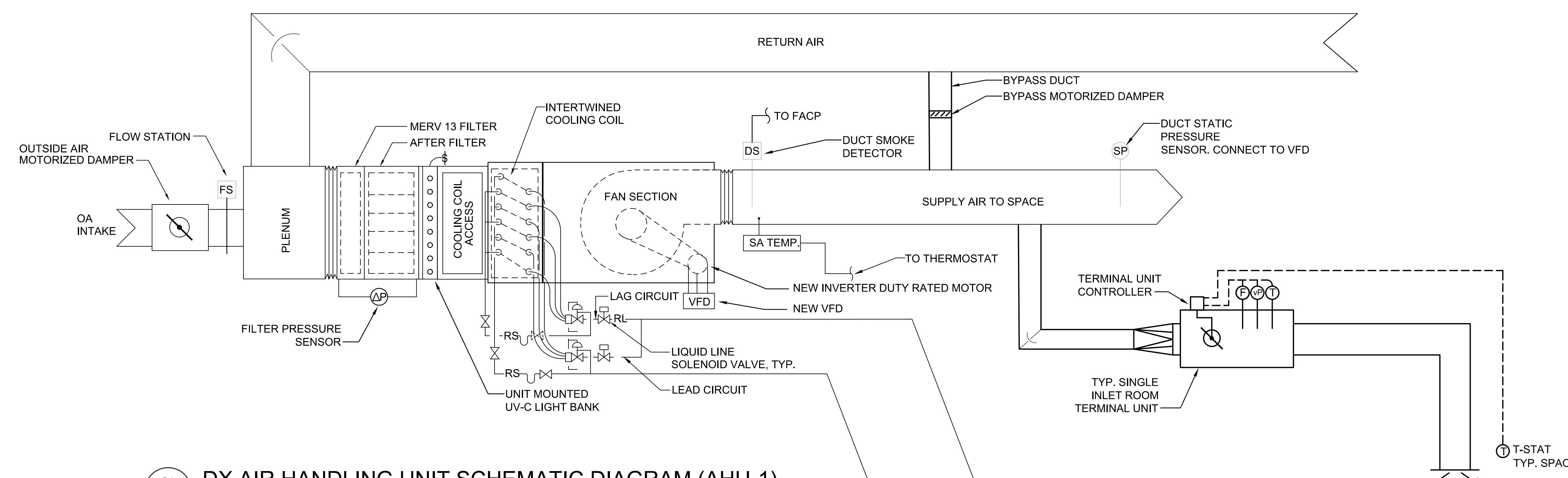
SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 39 OF 123

MA601



C1 DX AIR HANDLING UNIT SCHEMATIC DIAGRAM (AHU-1)
 MA701 SCALE: NOT TO SCALE

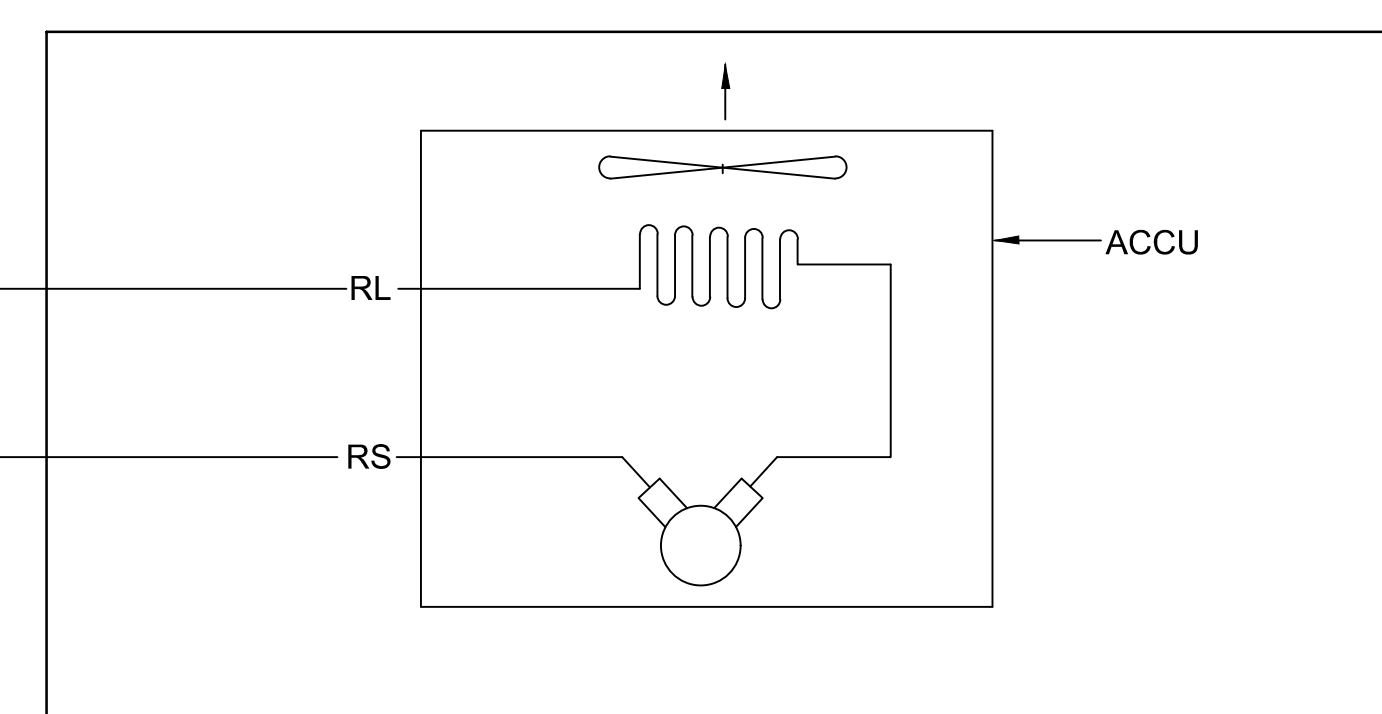
DX AHU SEQUENCE OF OPERATIONS:
 GENERAL AHU SEQUENCE OF OPERATION

1. THE AHU SHALL BE OPERATING ON THE EXISTING STAND ALONE CONTROLLER.
2. THE PRESSURE IN THE SUPPLY DUCT SHALL BE MEASURED BY THE STATIC PRESSURE SENSOR AT THE END OF THE MAIN DUCT RUN (SEE FLOOR PLANS FOR LOCATION) AND THE SIGNAL SHALL BE RELAYED TO THE VARIABLE FREQUENCY DRIVE PANEL. THE PANEL SHALL ADJUST THE FREQUENCY OF THE POWER SUPPLIED TO THE MOTOR TO INCREASE OR DECREASE ITS SPEED TO MAINTAIN THE DUCT STATIC PRESSURE AT 1" WG. OR (ADJUSTBLE). THE REQUIRED SETPOINT SHALL BE ADJUSTED AFTER RECEIVING INPUT FROM THE BALANCING CONTRACTOR.
3. A HIGH LIMIT STATIC PRESSURE SENSOR SHALL BE INSTALLED ON THE DISCHARGE DUCTWORK. THE HIGH LIMIT STATIC PRESSURE SENSOR SHALL SHUT DOWN THE UNIT & SOUND AN ALARM IF THE SENSOR MEASURES A STATIC PRESSURE OF 500 PA OF WATER OR MORE.
4. UPON ACTIVATION OF THE DUCT SMOKE DETECTOR, A SIGNAL SHALL BE RELAYED TO THE FIRE ALARM SYSTEM AND THE FIRE ALARM SYSTEM SHALL SHUTDOWN THE AHU. COORDINATE WITH FIRE ALARM CONTRACTOR.
5. UPON ACTIVATION, THE EXTERIOR LOCATED AIR COOLED CONDENSING UNIT SHALL PROVIDE LIQUID REFRIGERANT TO THE CONNECTED AHU INSIDE THE MECHANICAL ROOM. AHU SHALL PROVIDE A CONSTANT 55F SUPPLY AIR TEMP VIA ITS INTERNAL CONTROL PORGRAM.
6. MODULATE AIR FLOW, VIA FAN VFD, TO SATISFY THE MINIMUM REQUIRED DUCT PRESSURE OF 1" WG (ADJUSTABLE, AND TO BE CONFIRMED DURING TAB), MEASURED BY DUCT PRESSURE SENSOR.
7. THE NEW OUTSIDE AIR DAMPER SHALL BE SYNCHED WITH VFD SPEED TO PROVIDE OUTSIDE AIR PROPORTIONAL TO THE VFD FAN SPEED.
8. SEE VARIABLE VOLUME TERMINAL UNIT SEQUENCE OF OPERATION.
9. NEW BYPASS DUCT SHALL BE PROVIDED TO BYPASS PORTION OF SUPPLY AIR TO RETURN SIDE TO PREVENT COOLING COIL FROM FREEZING.

SUPPLY AIR VAV BOX (VAV):

EACH SUPPLY AIR TERMINAL UNIT SHALL BE INDIVIDUALLY CONTROLLED BY IT'S OWN DDC VAV CONTROLLER.

1. ON A RISE IN ZONE TEMPERATURE MEASURED BY A ROOM TEMPERATURE SENSOR, THE UNIT WILL MODULATE TO OPEN THE DAMPER TO MAINTAIN THE ROOM TEMPERATURE SET POINT. AS SPACE TEMPERATURE DECREASES, THE DAMPER SHALL MODULATE DOWN TO IT'S MINIMUM POSITION. THE FLOW SENSOR SHALL MODULATE THE DAMPER TO MAINTAIN THE PROPER AIR FLOW TO THE BOX WHICH CORRESPONDS TO THE ROOM TEMPERATURE REQUIREMENT REGARDLESS OF FLUCTUATIONS IN UPSTREAM SUPPLY DUCT PRESSURE.



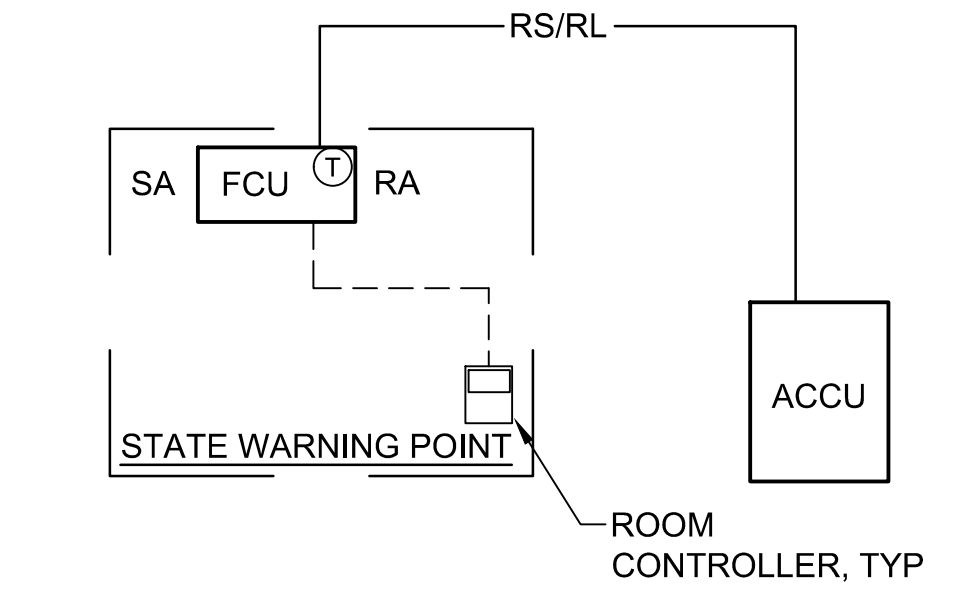
EXTERIOR OF BUILDING

DX FAN COIL/CRAC SEQUENCE OF OPERATIONS:

STATE WARNING POINT ROOM DX UNIT SEQUENCE OF OPERATION:

THE STATE WARNING POINT ROOM WILL BE SERVED BY DEDICATED 24/7 DX DUCTLESS SPLIT AIR CONDITIONING SYSTEM. THE SEQUENCE OF OPERATIONS WILL BE AS FOLLOWS:

1. THE DX SPLIT SYSTEM SHALL BE PROVIDED WITH ITS OWN H-O-A SWITCH FOR CONTROL. IN THE "AUTO" MODE OF OPERATION, THE SYSTEM SHALL OPERATE VIA THE DDC SYSTEM. THE "HAND" MODE WILL BY-PASS THE DDC CONTROLS AND ALLOW FOR MANUAL OPERATION.
2. THE DX FAN COIL UNIT (FCU) SHALL OPERATE 24/7. THE FCU SHALL BE CONTROLLED VIA A ROOM CONTROLLER MOUNTED ON THE WALL WHERE INDICATED ON THE DRAWINGS.
3. THE RETURN AIR T-STAT UNIT SHALL MAINTAIN A SPACE TEMPERATURE OF 24°C (75°F) DEGREES.
4. IF SPACE TEMPERATURES EXCEEDS 27°C (81°F) DEGREES, THEN A HIGH ROOM TEMPERATURE ALARM WILL INITIATE.
5. UPON ACTIVATION OF THE AT/FP EMERGENCY SHUT DOWN SWITCH, THE DX SPLIT SYSTEM SHALL REMAIN OPERATIONAL.
6. THE UNIT SHALL RESUME OPERATION AUTOMATICALLY ONCE POWER IS RESTORED FOLLOWING A POWER OUTAGE.



HAWAII STATE DEPARTMENT OF DEFENSE

YOUNG HWANG
 LICENSED PROFESSIONAL ENGINEER
 No. 14297-M
 HAWAII U.S.A.

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DEPARTMENT OF DEFENSE

DIAMOND HEAD STATE MONUMENT

STATE OF HAWAII

4204 DIAMOND HEAD RD HONOLULU, HI 96815

TMNK: 3-1-042:600

BIRKHYMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

SCHEMATIC AND SEQUENCE OF OPERATION

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 40 OF 123

MA701

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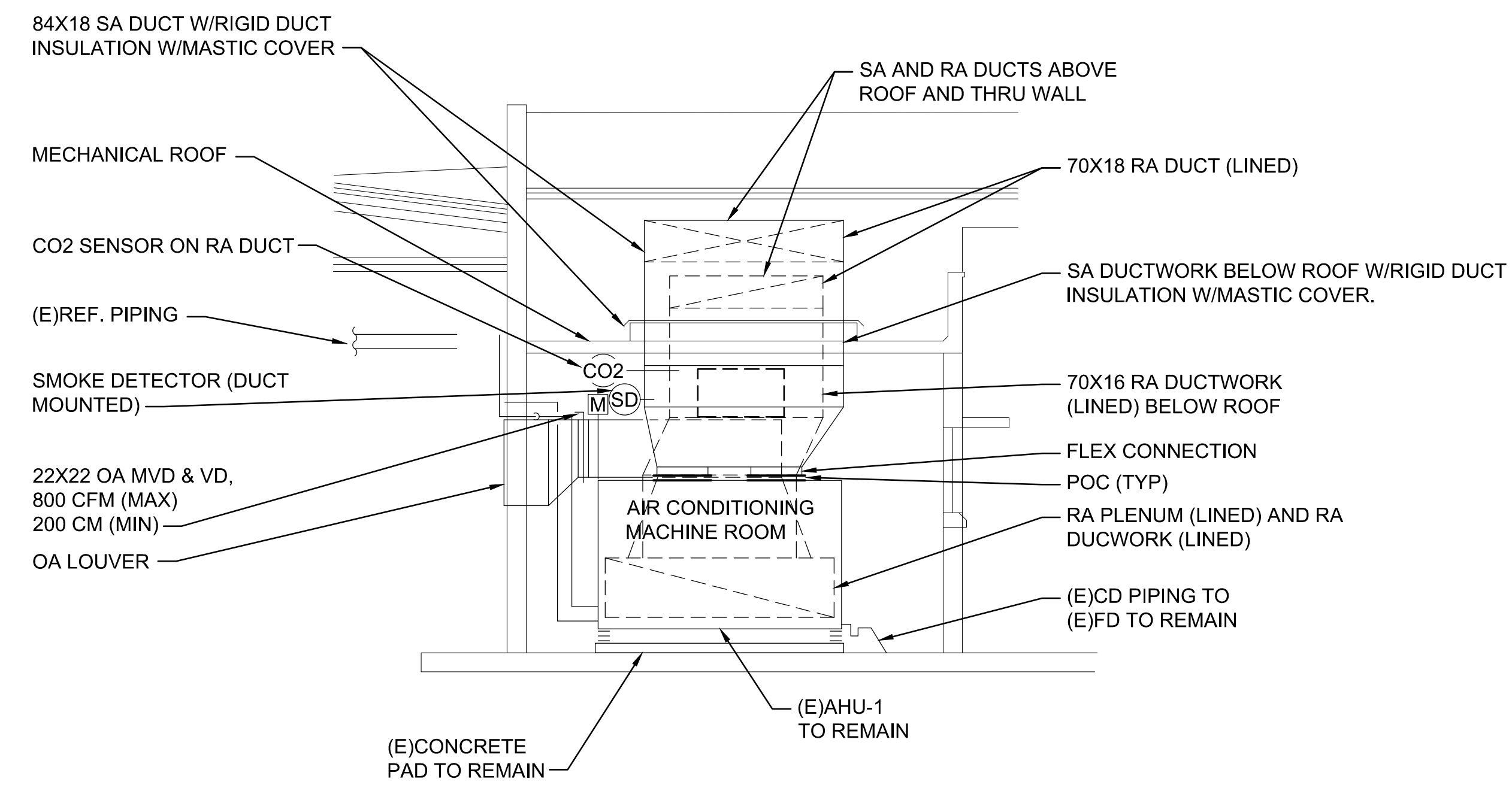
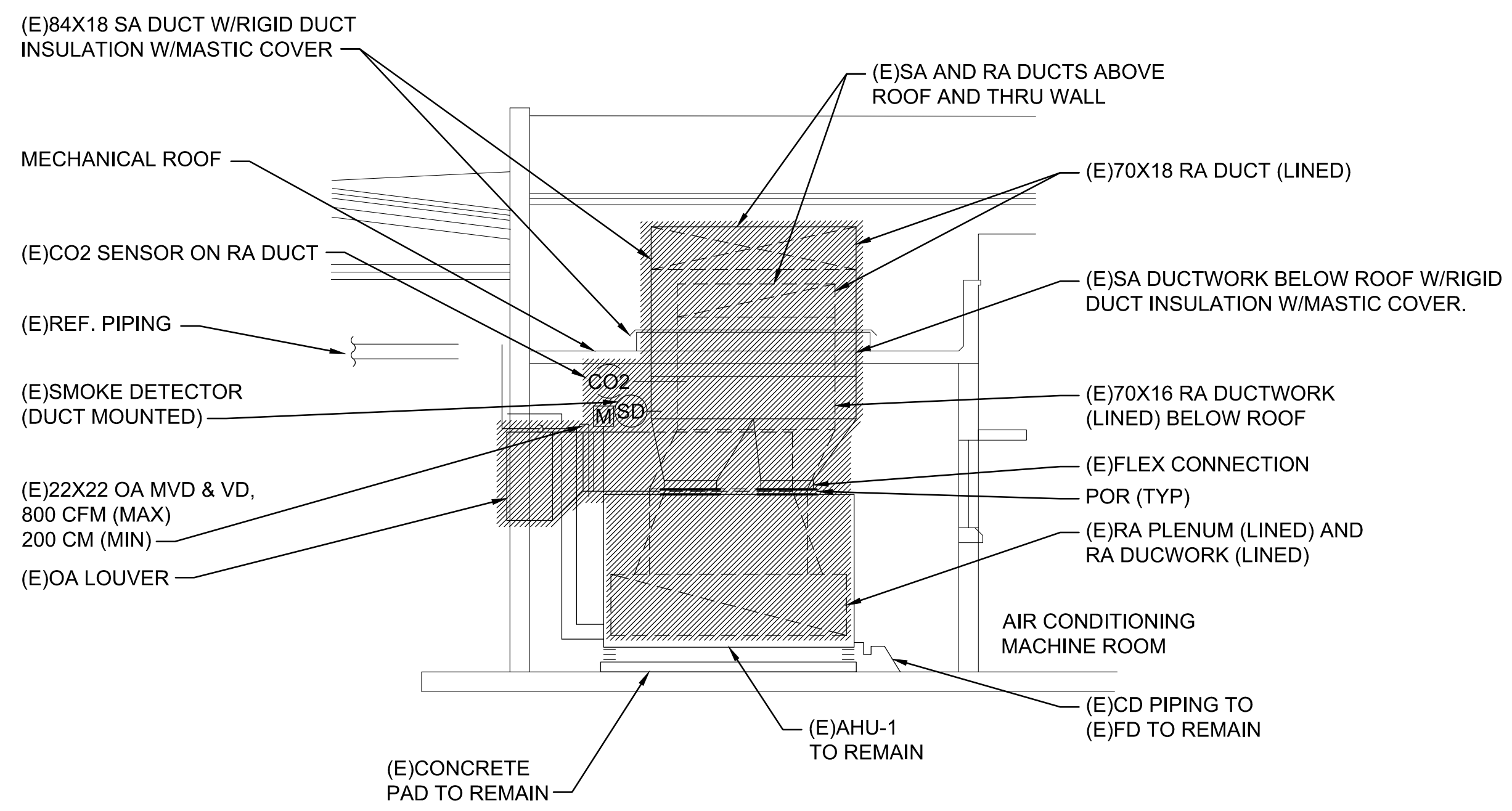
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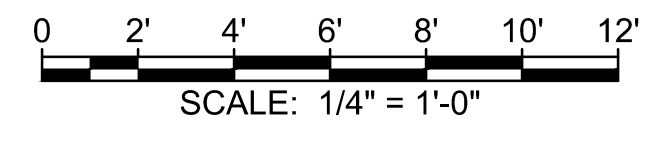
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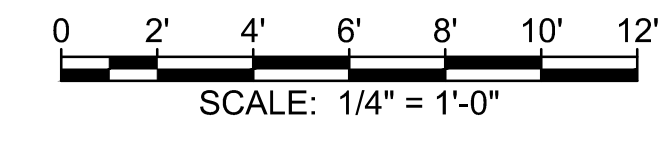
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C1 MECHANICAL SECTION - DEMO
 MA702 SCALE: 1/4" = 1'-0"

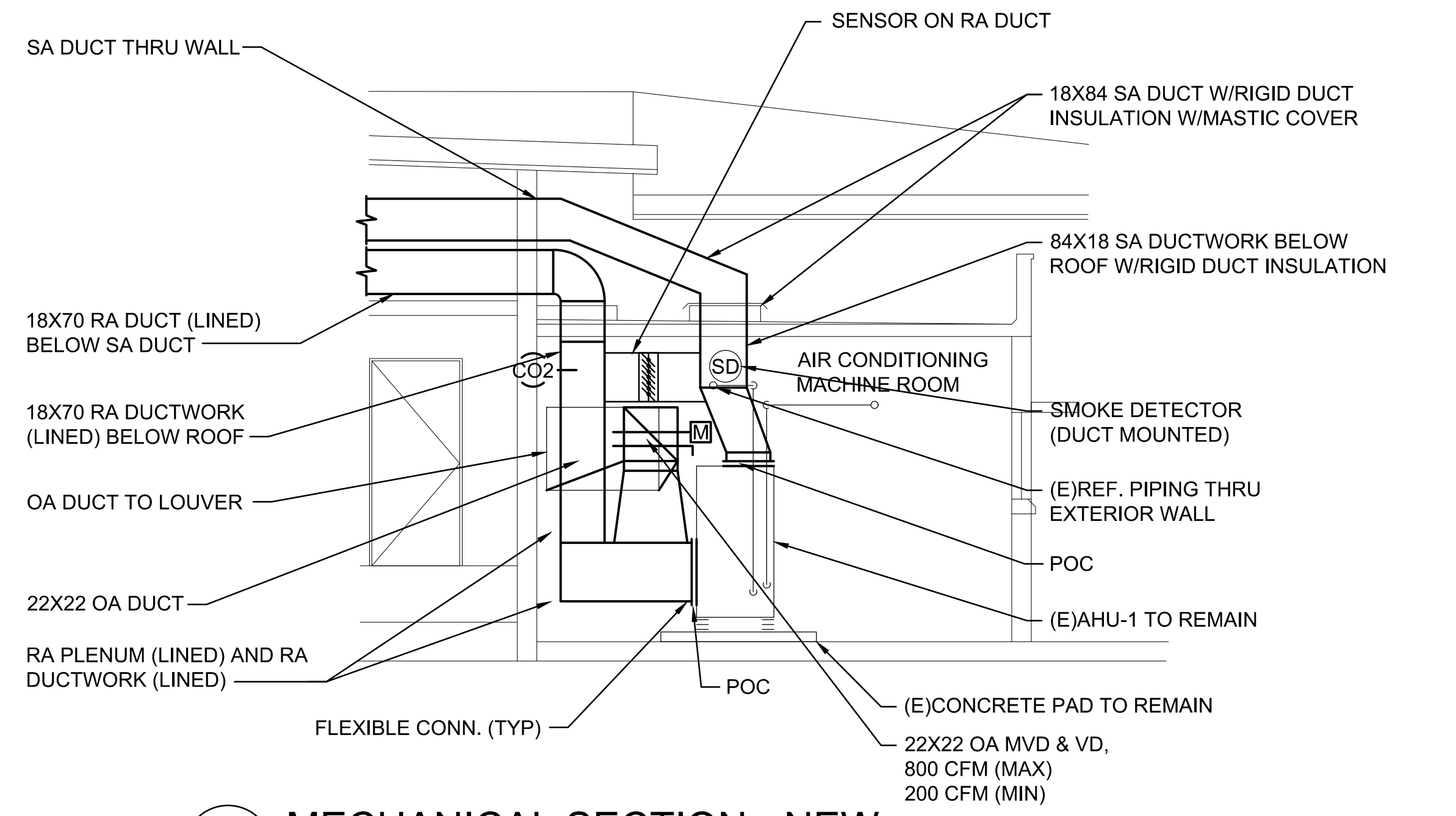
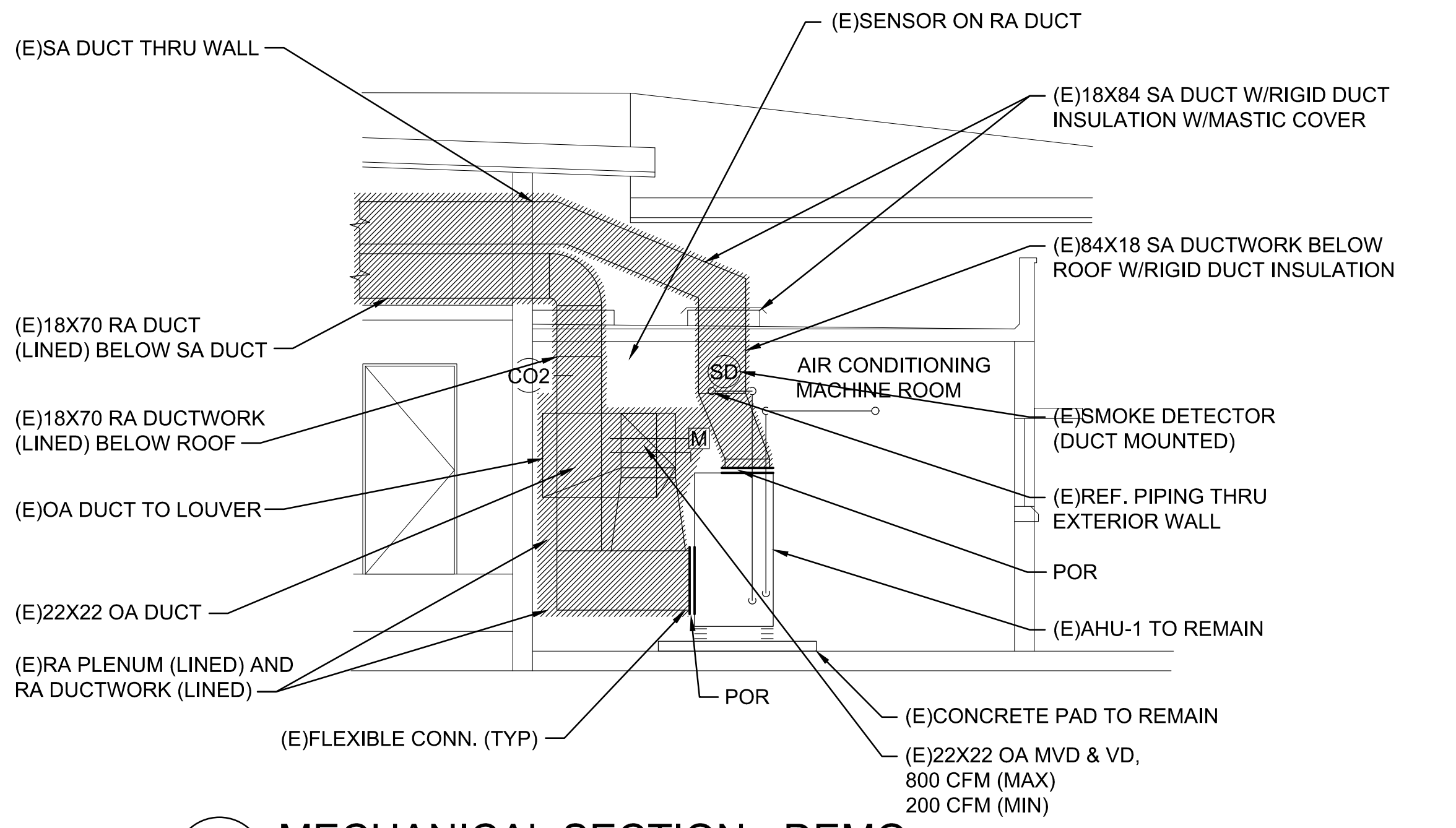


C3 MECHANICAL SECTION - NEW
 MA702 SCALE: 1/4" = 1'-0"



B

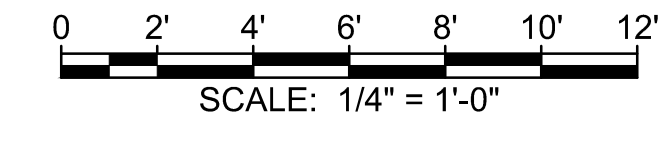
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A1 MECHANICAL SECTION - DEMO
 MA702 SCALE: 1/4" = 1'-0"



A3 MECHANICAL SECTION - NEW
 MA702 SCALE: 1/4" = 1'-0"



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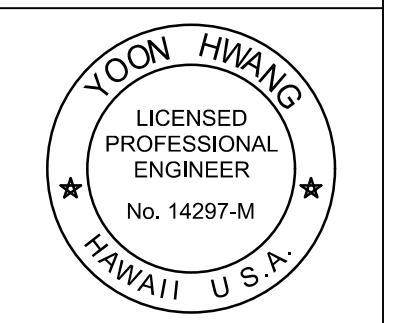
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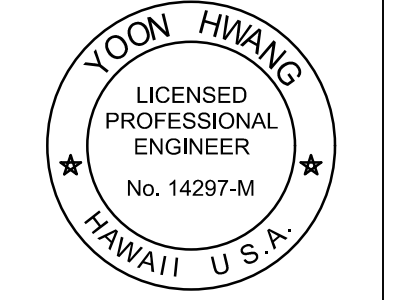
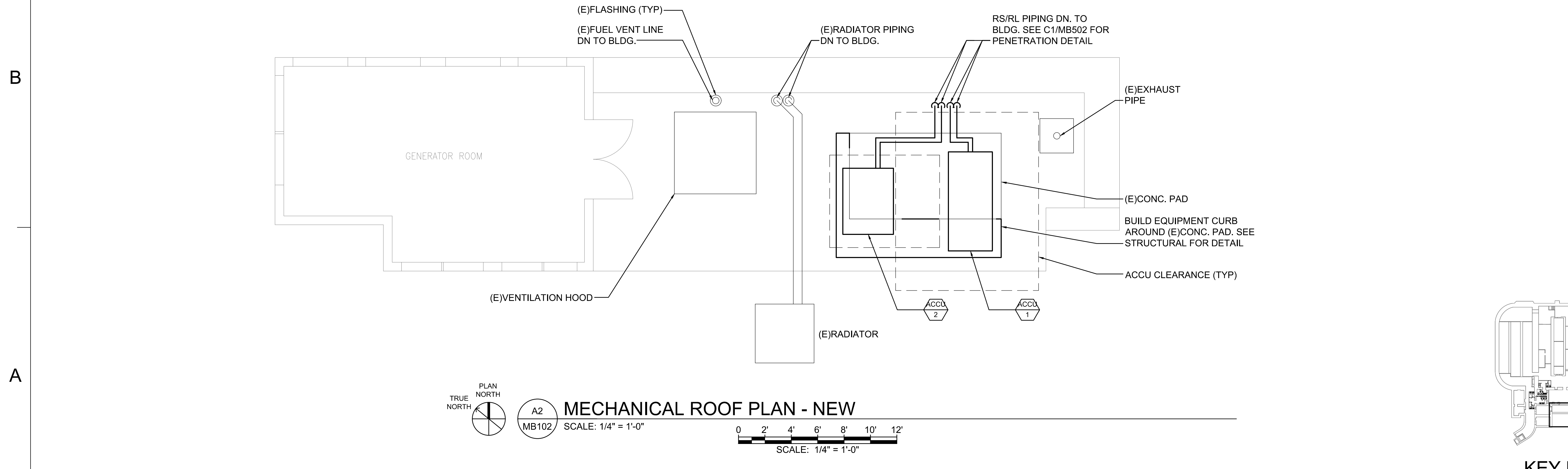
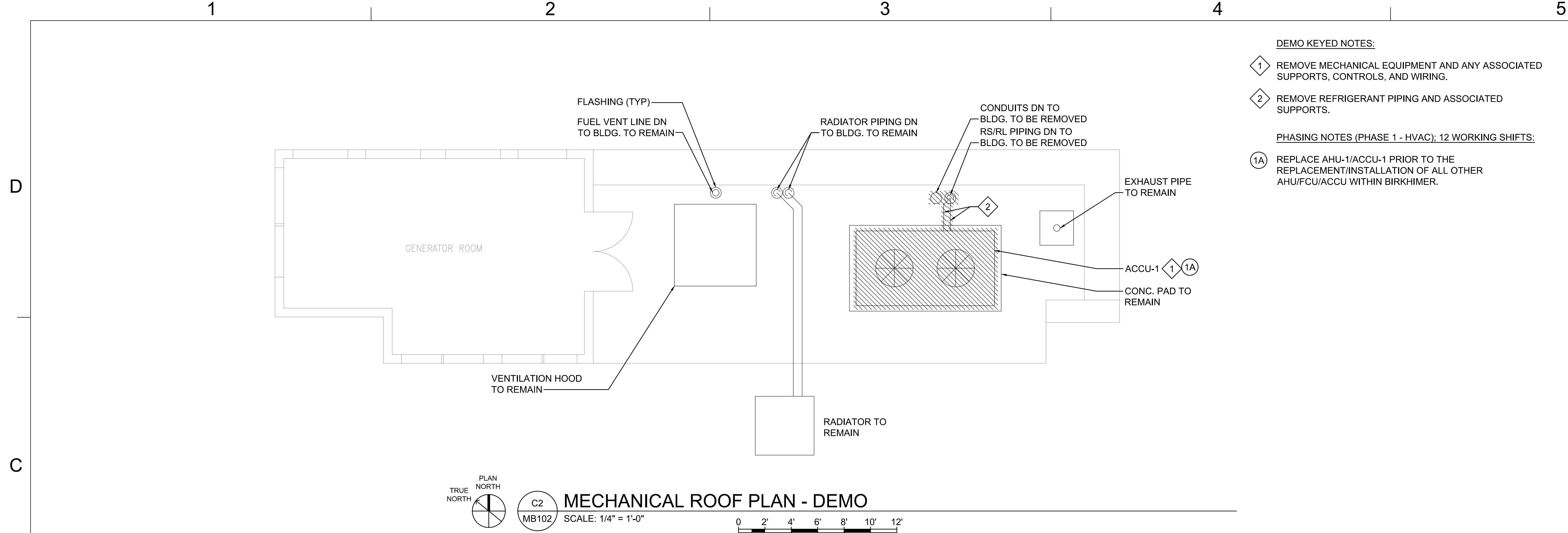


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SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 MECHANICAL SECTIONS

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 41 OF 123
MA702



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SYN	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS

SUBMITTAL DATE: 03/01/2024

YH FM YH

STATE OF HAWAII

DEPARTMENT OF DEFENSE

DIAMOND HEAD STATE MONUMENT

4204 DIAMOND HEAD RD HONOLULU, HI 96815

TMNK: 3-1-042:600

BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

MECHANICAL ROOF PLANS

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 43 OF 123

MB102

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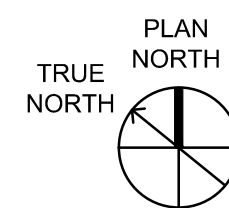
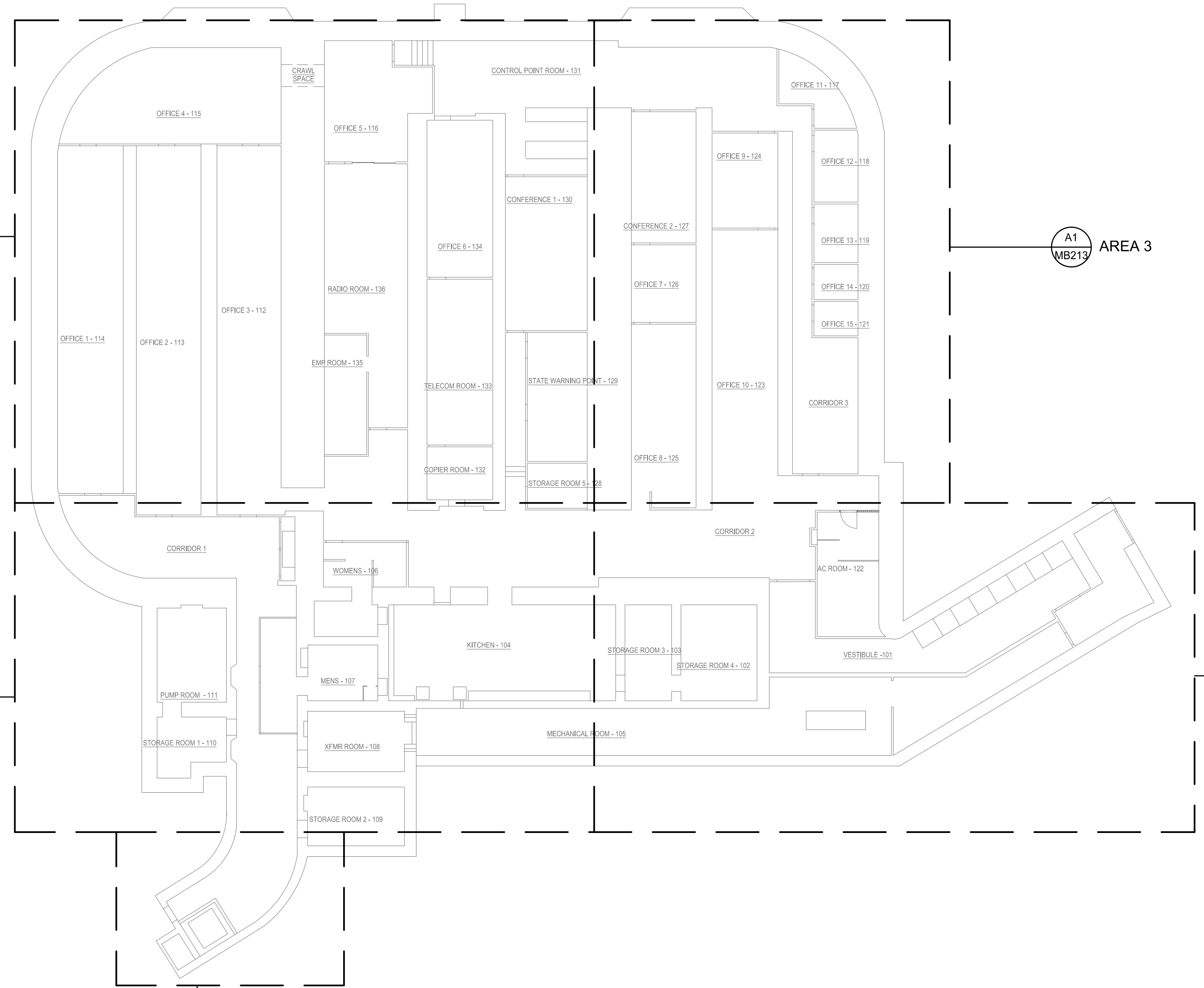
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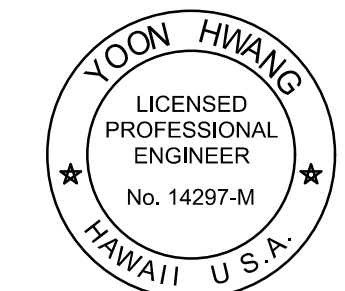
A2
MB111

NEW OVERALL FLOOR PLAN

SCALE: 1/16" = 1'-0"



SCALE: 1/16" = 1'-0"



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DATE	APPR.	SYN.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 03/01/2024

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STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMK: 3-1-042:600
**BIRKHMIR EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS**
 NEW OVERALL FLOOR PLAN

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 44 OF 123

MB111

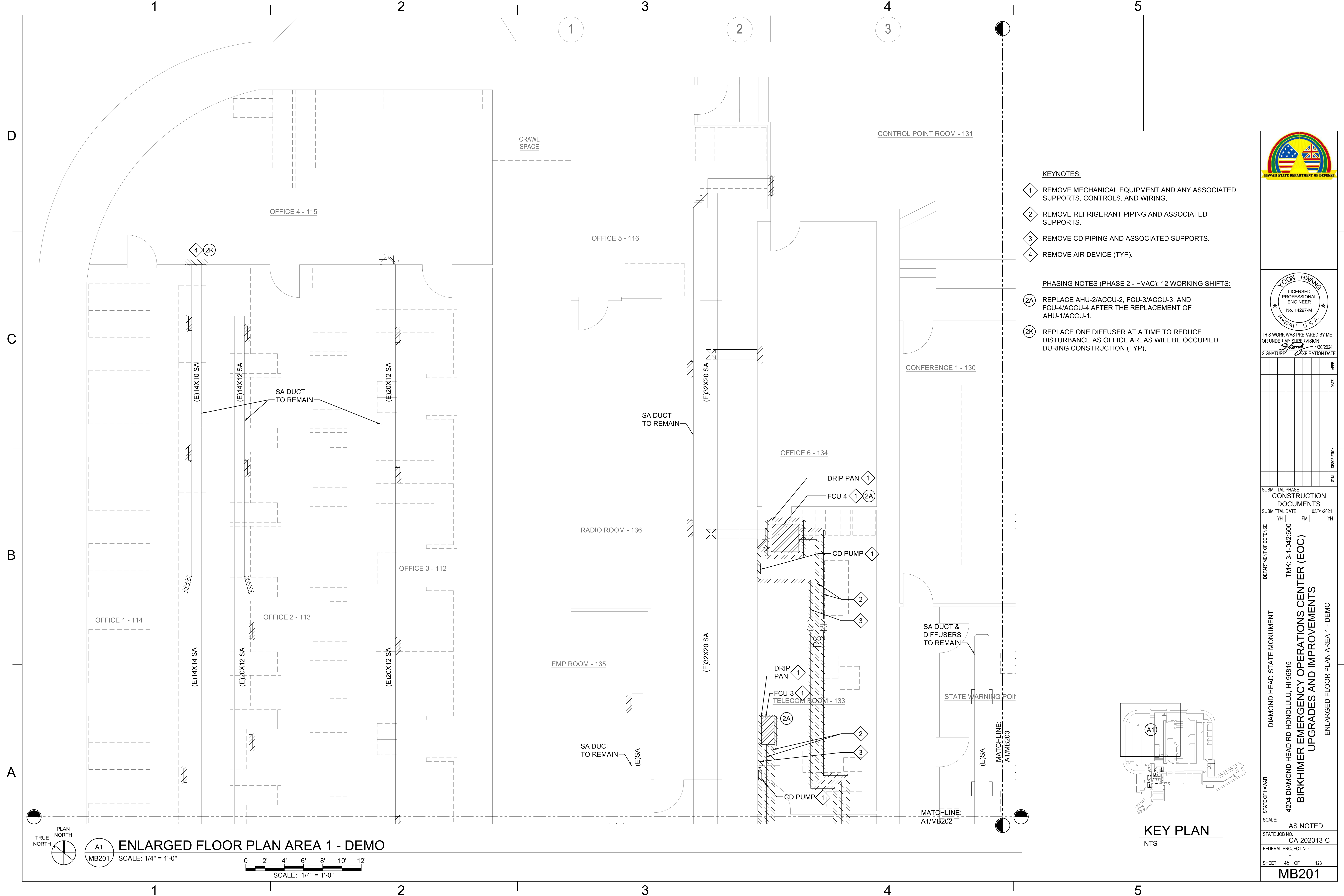
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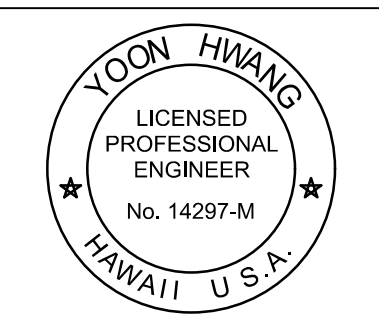
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- KEYNOTES:**
- ① REMOVE MECHANICAL EQUIPMENT AND ANY ASSOCIATED SUPPORTS, CONTROLS, AND WIRING.
 - ② REMOVE REFRIGERANT PIPING AND ASSOCIATED SUPPORTS.
 - ③ REMOVE CD PIPING AND ASSOCIATED SUPPORTS.
 - ④ REMOVE AIR DEVICE (TYP).
- PHASING NOTES (PHASE 2 - HVAC); 12 WORKING SHIFTS:**
- ②A REPLACE AHU-2/ACCU-2, FCU-3/ACCU-3, AND FCU-4/ACCU-4 AFTER THE REPLACEMENT OF AHU-1/ACCU-1.
 - ②K REPLACE ONE DIFFUSER AT A TIME TO REDUCE DISTURBANCE AS OFFICE AREAS WILL BE OCCUPIED DURING CONSTRUCTION (TYP).



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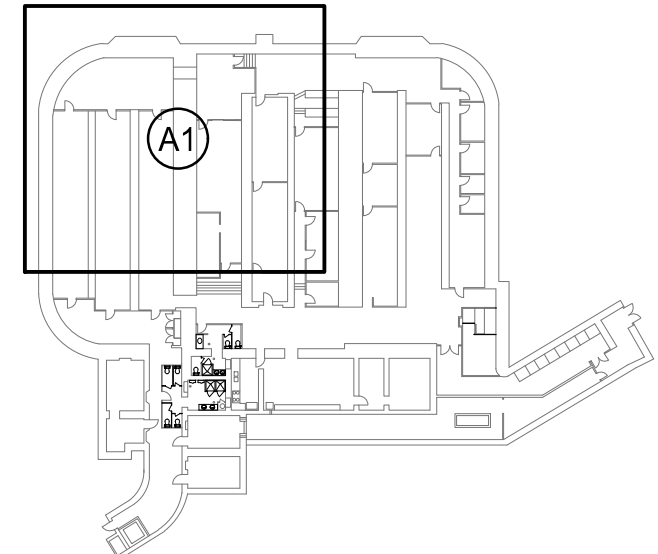
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SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

YH	FM	YH

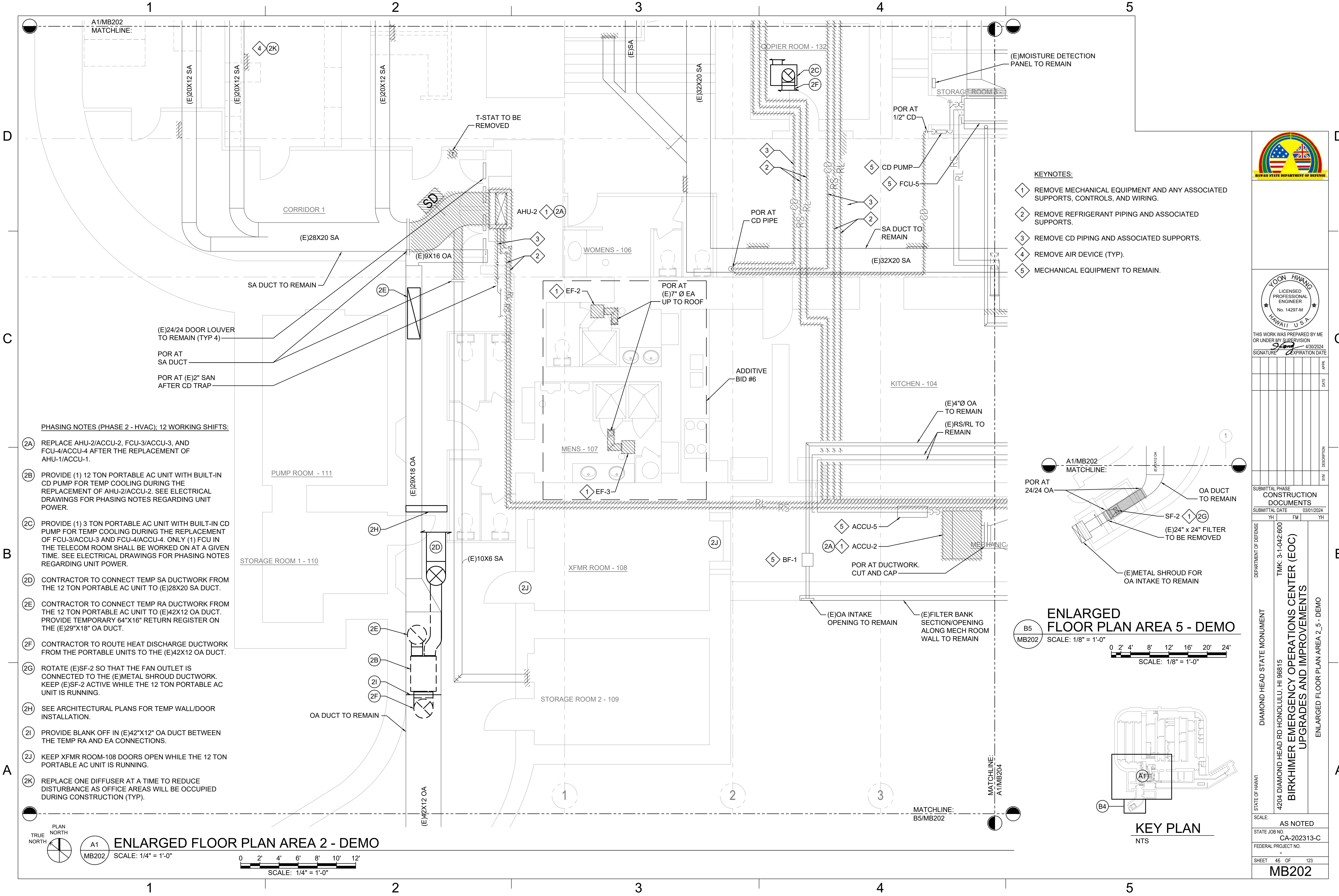
DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ENLARGED FLOOR PLAN AREA 1 - DEMO

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 45 OF 123
MB201



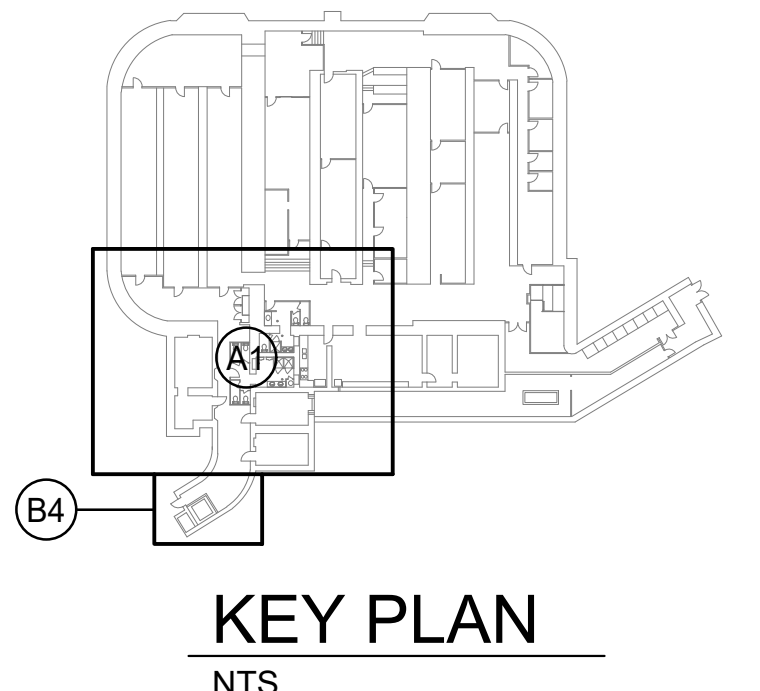
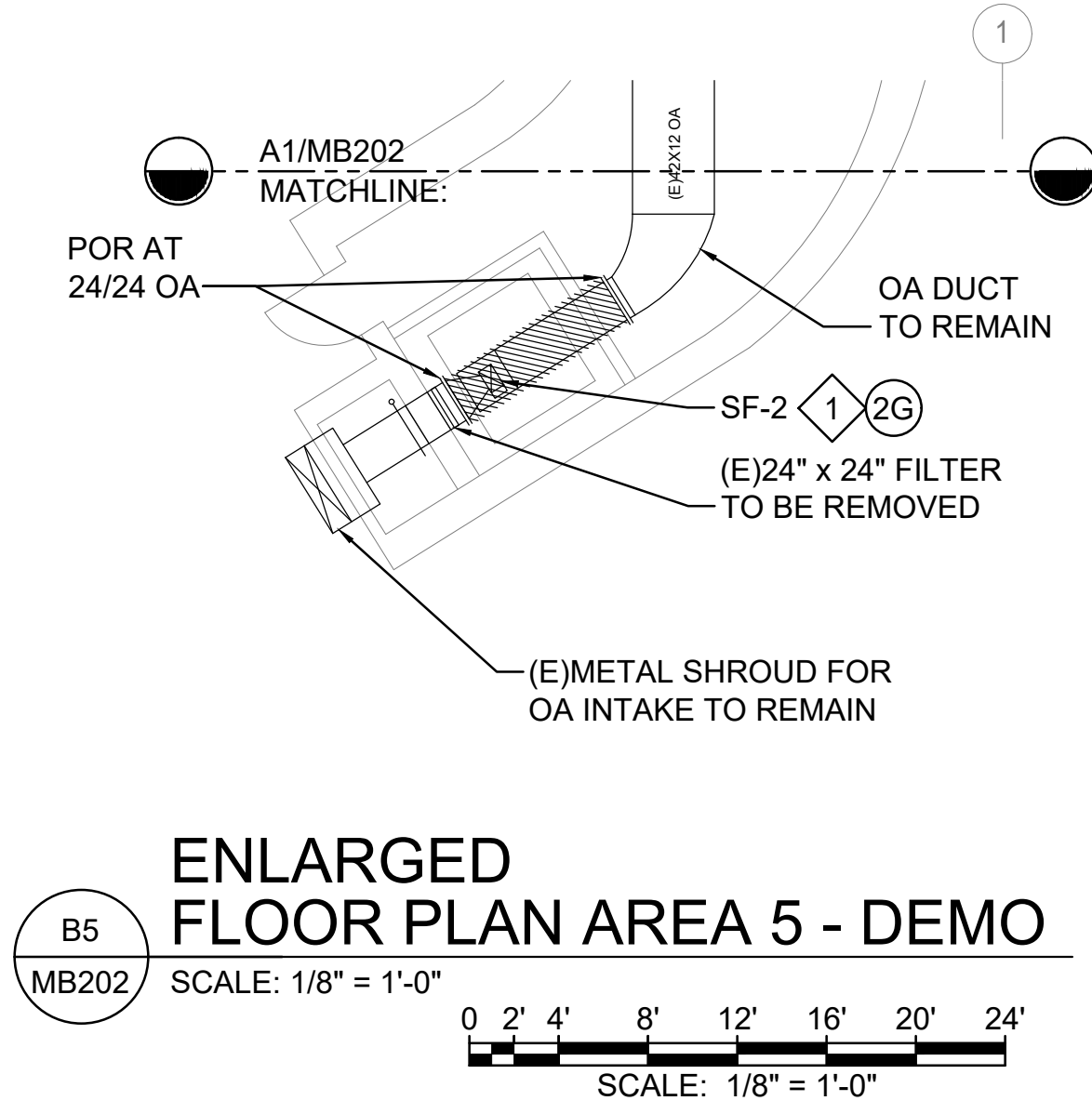
KEY PLAN
 NTS


PLAN NORTH
 TRUE NORTH
 A1 MB201
ENLARGED FLOOR PLAN AREA 1 - DEMO
 SCALE: 1/4" = 1'-0"
 0 2' 4' 6' 8' 10' 12'
 SCALE: 1/4" = 1'-0"



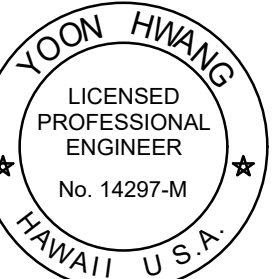
- KEYNOTES:**
- 1 REMOVE MECHANICAL EQUIPMENT AND ANY ASSOCIATED SUPPORTS, CONTROLS, AND WIRING.
 - 2 REMOVE REFRIGERANT PIPING AND ASSOCIATED SUPPORTS.
 - 3 REMOVE CD PIPING AND ASSOCIATED SUPPORTS.
 - 4 REMOVE AIR DEVICE (TYP).
 - 5 MECHANICAL EQUIPMENT TO REMAIN.

- PHASING NOTES (PHASE 2 - HVAC); 12 WORKING SHIFTS:**
- 2A REPLACE AHU-2/ACCU-2, FCU-3/ACCU-3, AND FCU-4/ACCU-4 AFTER THE REPLACEMENT OF AHU-1/ACCU-1.
 - 2B PROVIDE (1) 12 TON PORTABLE AC UNIT WITH BUILT-IN CD PUMP FOR TEMP COOLING DURING THE REPLACEMENT OF AHU-2/ACCU-2. SEE ELECTRICAL DRAWINGS FOR PHASING NOTES REGARDING UNIT POWER.
 - 2C PROVIDE (1) 3 TON PORTABLE AC UNIT WITH BUILT-IN CD PUMP FOR TEMP COOLING DURING THE REPLACEMENT OF FCU-3/ACCU-3 AND FCU-4/ACCU-4. ONLY (1) FCU IN THE TELECOM ROOM SHALL BE WORKED ON AT A GIVEN TIME. SEE ELECTRICAL DRAWINGS FOR PHASING NOTES REGARDING UNIT POWER.
 - 2D CONTRACTOR TO CONNECT TEMP SA DUCTWORK FROM THE 12 TON PORTABLE AC UNIT TO (E)28X20 SA DUCT.
 - 2E CONTRACTOR TO CONNECT TEMP RA DUCTWORK FROM THE 12 TON PORTABLE AC UNIT TO (E)42X12 OA DUCT. PROVIDE TEMPORARY 64"x16" RETURN REGISTER ON THE (E)29"x18" OA DUCT.
 - 2F CONTRACTOR TO ROUTE HEAT DISCHARGE DUCTWORK FROM THE PORTABLE UNITS TO THE (E)42X12 OA DUCT.
 - 2G ROTATE (E)SF-2 SO THAT THE FAN OUTLET IS CONNECTED TO THE (E)METAL SHROUD DUCTWORK. KEEP (E)SF-2 ACTIVE WHILE THE 12 TON PORTABLE AC UNIT IS RUNNING.
 - 2H SEE ARCHITECTURAL PLANS FOR TEMP WALL/DOOR INSTALLATION.
 - 2I PROVIDE BLANK OFF IN (E)42"x12" OA DUCT BETWEEN THE TEMP RA AND EA CONNECTIONS.
 - 2J KEEP XFMR ROOM-108 DOORS OPEN WHILE THE 12 TON PORTABLE AC UNIT IS RUNNING.
 - 2K REPLACE ONE DIFFUSER AT A TIME TO REDUCE DISTURBANCE AS OFFICE AREAS WILL BE OCCUPIED DURING CONSTRUCTION (TYP).





HAWAIIAN STATE DEPARTMENT OF DEFENSE



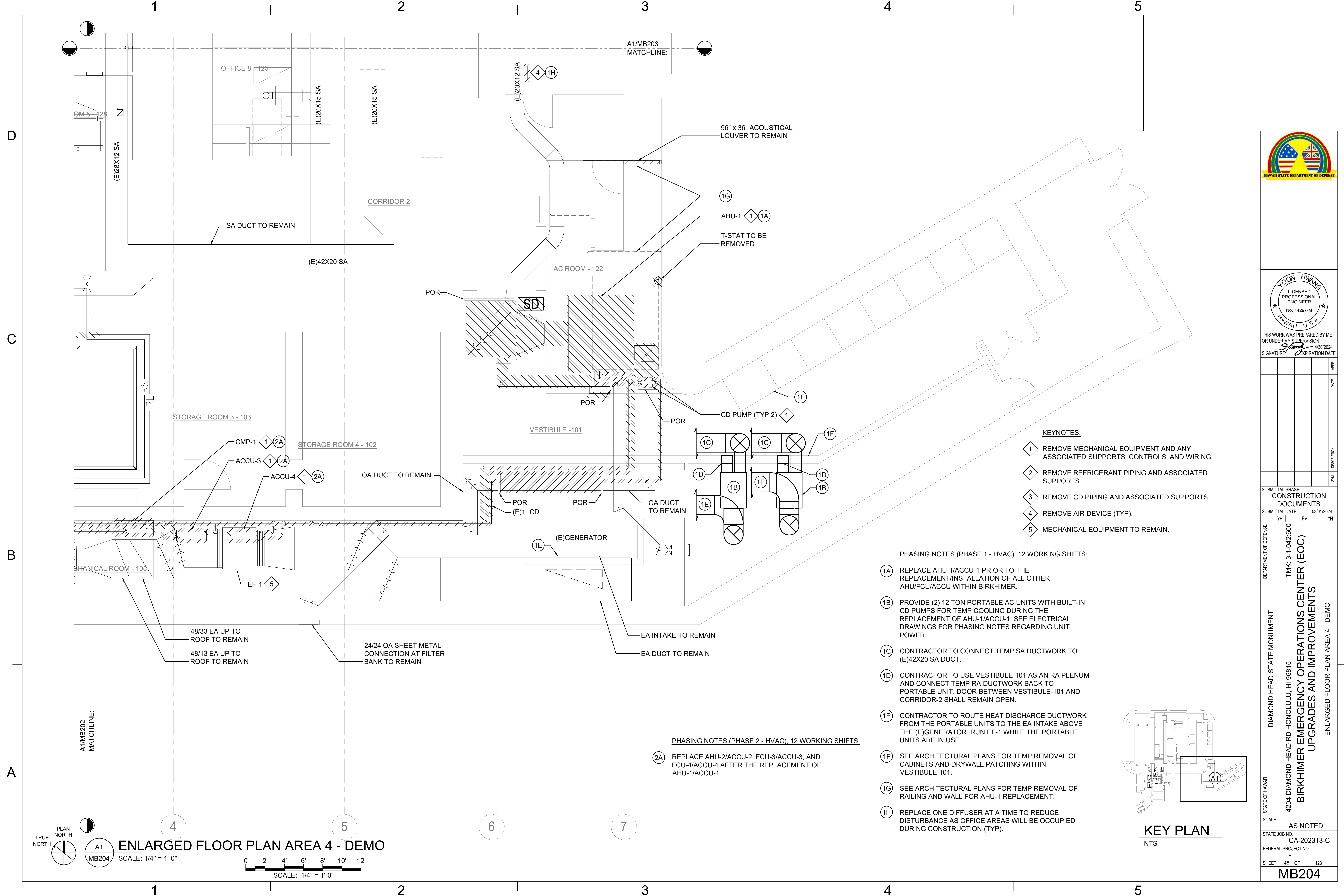
YOAN HWANG
LICENSED PROFESSIONAL ENGINEER
No. 14297-M
HAWAII, U.S.A.

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DATE	DESCRIPTION	APPR.

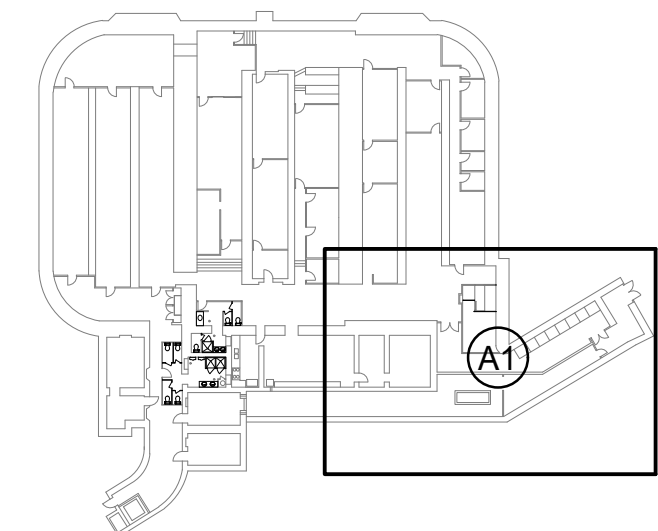
DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ENLARGED FLOOR PLAN AREA 2.5 - DEMO

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 46 OF 123
MB202



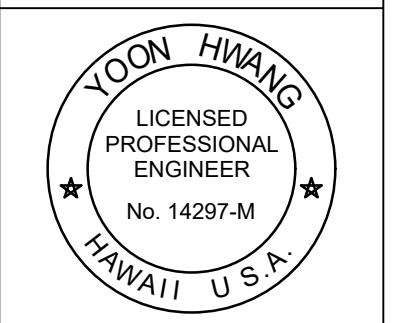
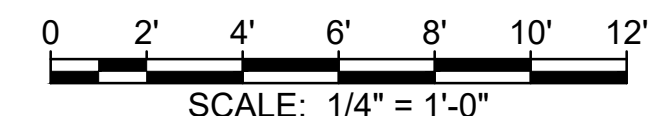
- KEYNOTES:**
- 1 REMOVE MECHANICAL EQUIPMENT AND ANY ASSOCIATED SUPPORTS, CONTROLS, AND WIRING.
 - 2 REMOVE REFRIGERANT PIPING AND ASSOCIATED SUPPORTS.
 - 3 REMOVE CD PIPING AND ASSOCIATED SUPPORTS.
 - 4 REMOVE AIR DEVICE (TYP).
 - 5 MECHANICAL EQUIPMENT TO REMAIN.

- PHASING NOTES (PHASE 1 - HVAC); 12 WORKING SHIFTS:**
- 1A REPLACE AHU-1/ACCU-1 PRIOR TO THE REPLACEMENT/INSTALLATION OF ALL OTHER AHU/FCU/ACCU WITHIN BIRKHIMER.
 - 1B PROVIDE (2) 12 TON PORTABLE AC UNITS WITH BUILT-IN CD PUMPS FOR TEMP COOLING DURING THE REPLACEMENT OF AHU-1/ACCU-1. SEE ELECTRICAL DRAWINGS FOR PHASING NOTES REGARDING UNIT POWER.
 - 1C CONTRACTOR TO CONNECT TEMP SA DUCTWORK TO (E)42X20 SA DUCT.
 - 1D CONTRACTOR TO USE VESTIBULE-101 AS AN RA PLENUM AND CONNECT TEMP RA DUCTWORK BACK TO PORTABLE UNIT. DOOR BETWEEN VESTIBULE-101 AND CORRIDOR-2 SHALL REMAIN OPEN.
 - 1E CONTRACTOR TO ROUTE HEAT DISCHARGE DUCTWORK FROM THE PORTABLE UNITS TO THE EA INTAKE ABOVE THE (E)GENERATOR. RUN EF-1 WHILE THE PORTABLE UNITS ARE IN USE.
 - 1F SEE ARCHITECTURAL PLANS FOR TEMP REMOVAL OF CABINETS AND DRYWALL PATCHING WITHIN VESTIBULE-101.
 - 1G SEE ARCHITECTURAL PLANS FOR TEMP REMOVAL OF RAILING AND WALL FOR AHU-1 REPLACEMENT.
 - 1H REPLACE ONE DIFFUSER AT A TIME TO REDUCE DISTURBANCE AS OFFICE AREAS WILL BE OCCUPIED DURING CONSTRUCTION (TYP).
- PHASING NOTES (PHASE 2 - HVAC); 12 WORKING SHIFTS:**
- 2A REPLACE AHU-2/ACCU-2, FCU-3/ACCU-3, AND FCU-4/ACCU-4 AFTER THE REPLACEMENT OF AHU-1/ACCU-1.



KEY PLAN
NTS

TRUE NORTH
PLAN NORTH
A1
MB204
ENLARGED FLOOR PLAN AREA 4 - DEMO
SCALE: 1/4" = 1'-0"



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EXPIRATION DATE

DATE	APPR.	SYN	DESCRIPTION

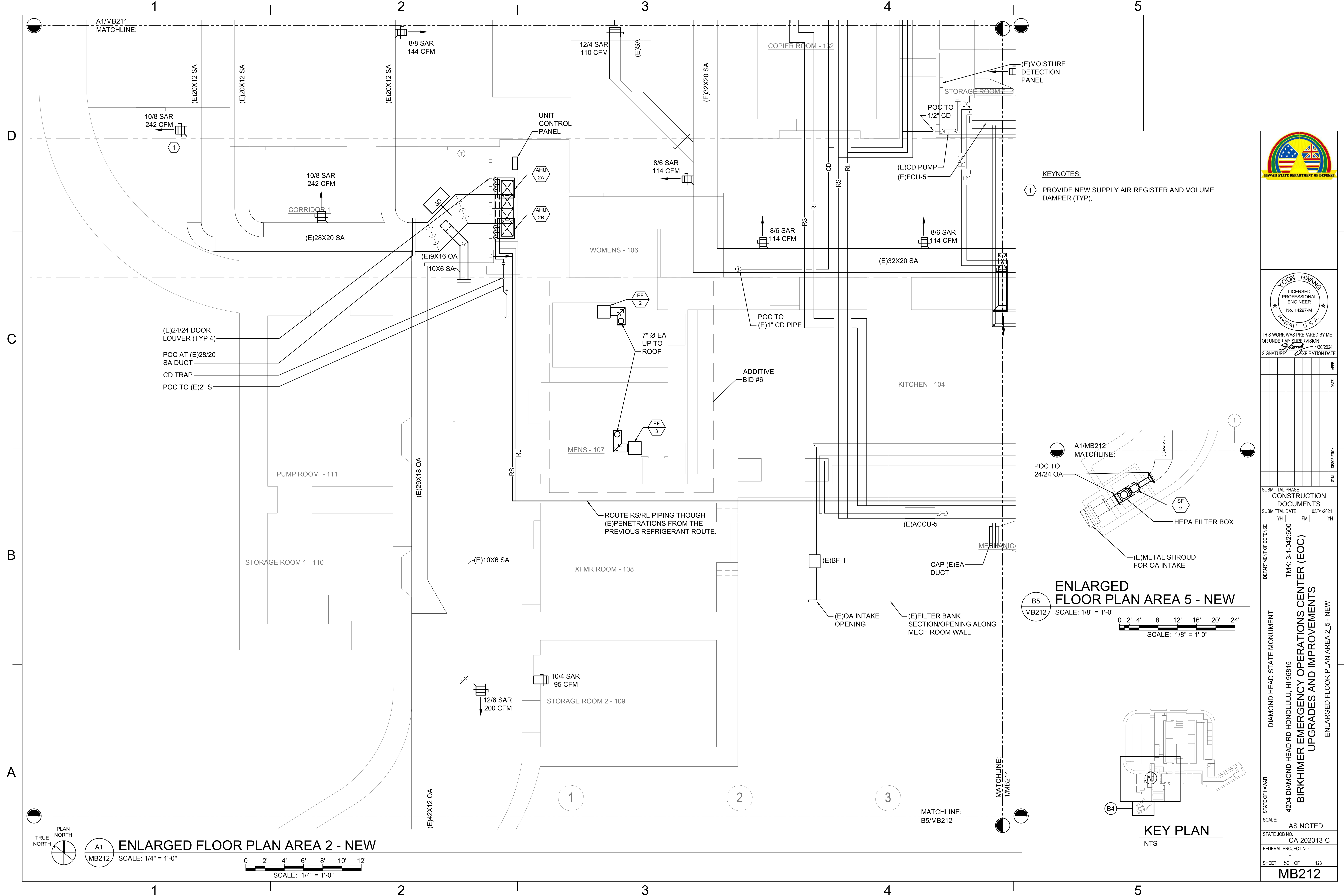
DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
TMK: 3-1-042:600
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
ENLARGED FLOOR PLAN AREA 4 - DEMO

CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 03/01/2024

YH	FM	YH

STATE OF HAWAII
SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 48 OF 123

MB204

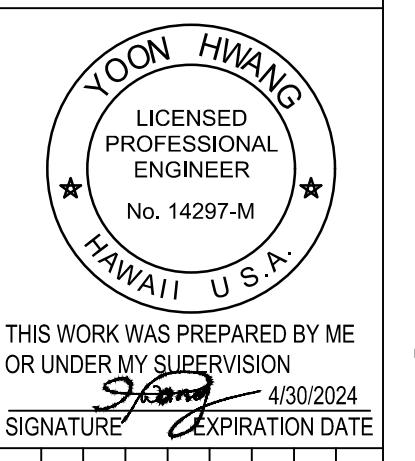


KEYNOTES:
 ① PROVIDE NEW SUPPLY AIR REGISTER AND VOLUME DAMPER (TYP).

ENLARGED FLOOR PLAN AREA 2 - NEW
 SCALE: 1/4" = 1'-0"
 PLAN NORTH
 TRUE NORTH

ENLARGED FLOOR PLAN AREA 5 - NEW
 SCALE: 1/8" = 1'-0"
 B5 MB212

KEY PLAN
 NTS
 A1
 B4



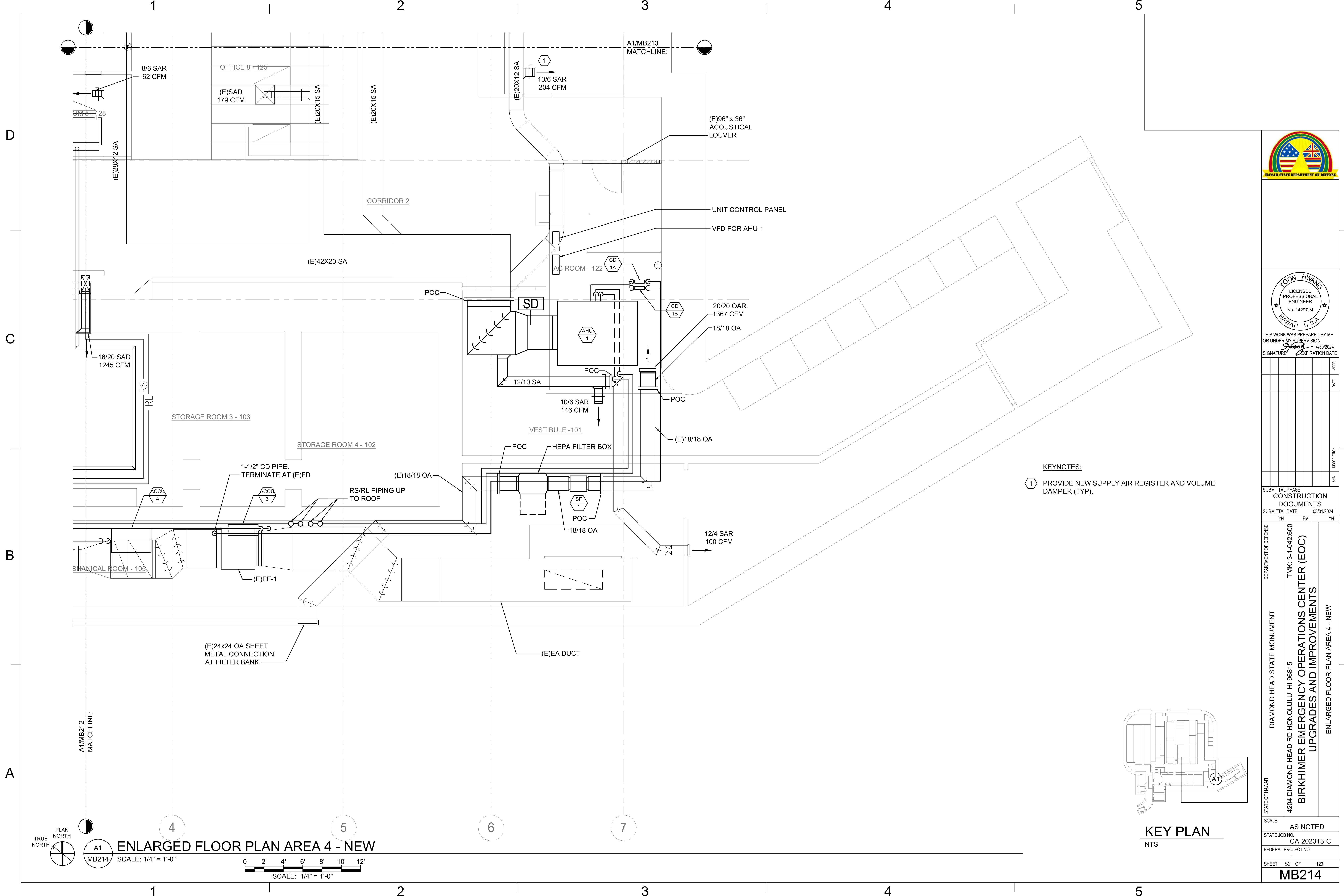
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
 SIGNATURE: Yoon Hwang DATE: 4/30/2024
 EXPIRATION DATE:

SYN	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE: 03/01/2024

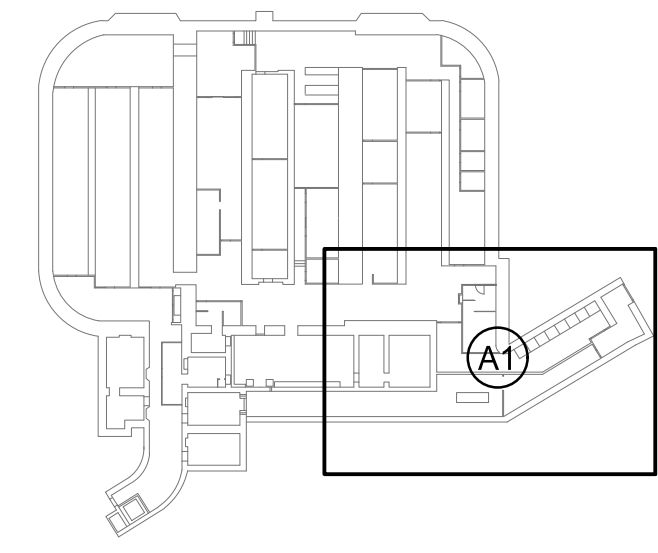
DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ENLARGED FLOOR PLAN AREA 2_5 - NEW

STATE OF HAWAII
 DIAMOND HEAD STATE MONUMENT
 SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 50 OF 123
MB212

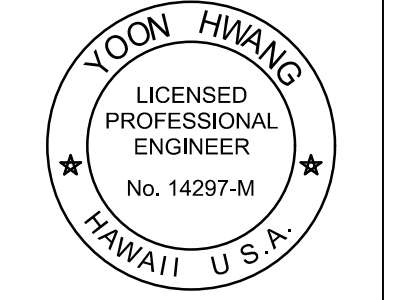


KEYNOTES:
 (1) PROVIDE NEW SUPPLY AIR REGISTER AND VOLUME DAMPER (TYP).

PLAN NORTH
 TRUE NORTH
 A1
MB214
ENLARGED FLOOR PLAN AREA 4 - NEW
 SCALE: 1/4" = 1'-0"
 0 2' 4' 6' 8' 10' 12'
 SCALE: 1/4" = 1'-0"



KEY PLAN
NTS



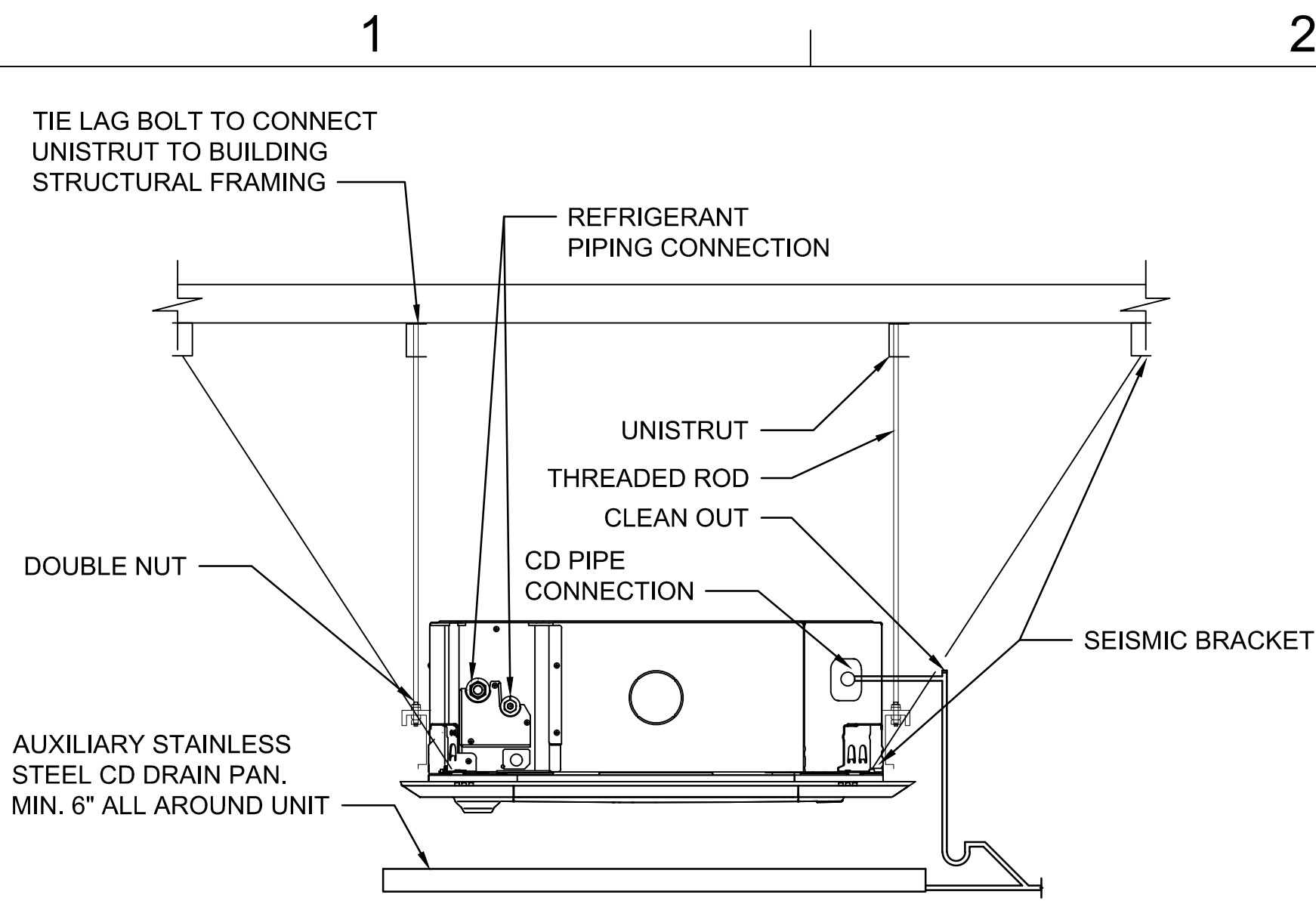
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
 SIGNATURE: [Signature] EXPIRATION DATE: 4/30/2024

SYN	DESCRIPTION	DATE	APPR.

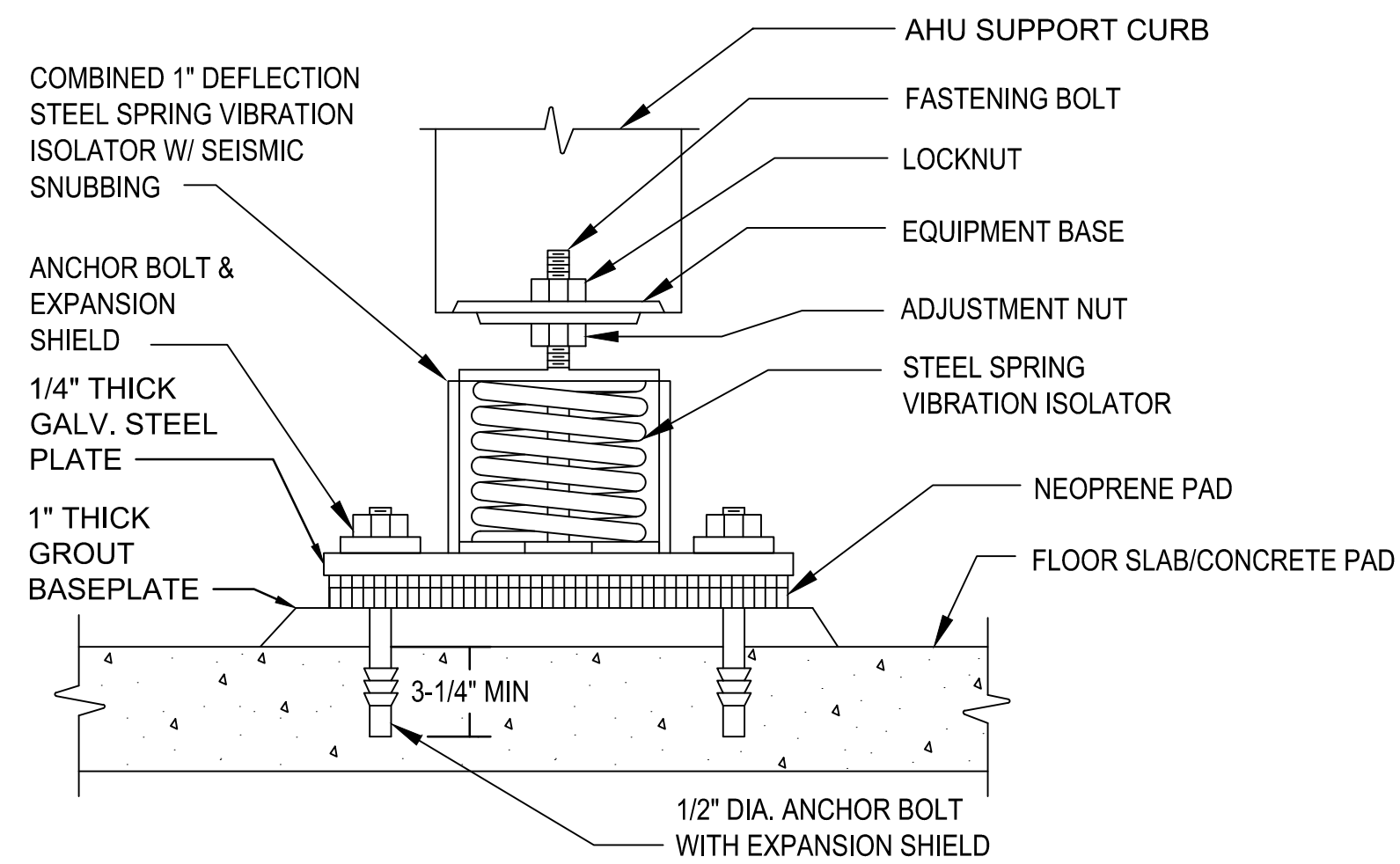
SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

DEPARTMENT OF DEFENSE	TRMK: 3-1-042:600
DIAMOND HEAD STATE MONUMENT	4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIRER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS	
ENLARGED FLOOR PLAN AREA 4 - NEW	

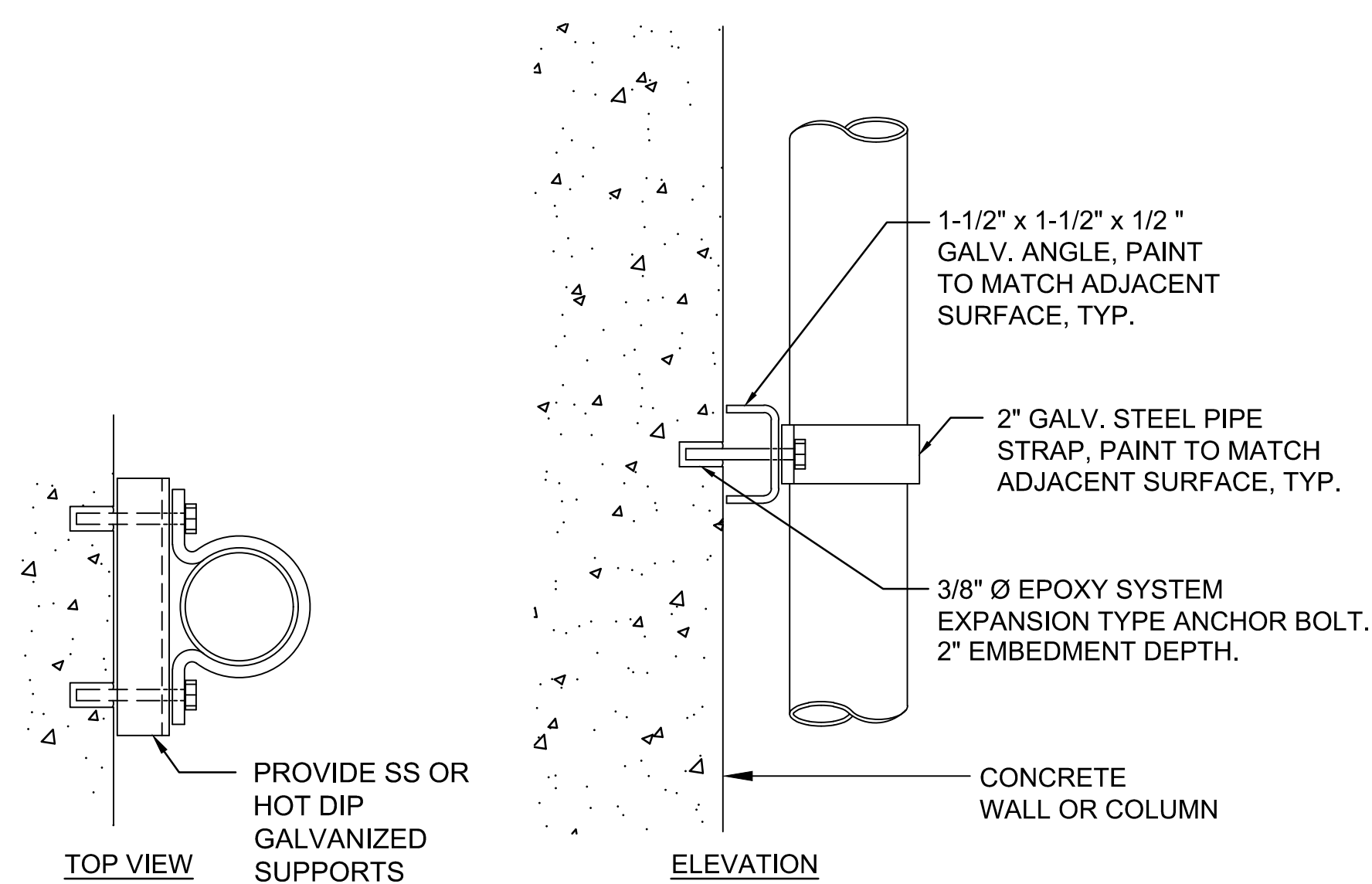
STATE OF HAWAII
 SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 52 OF 123
MB214



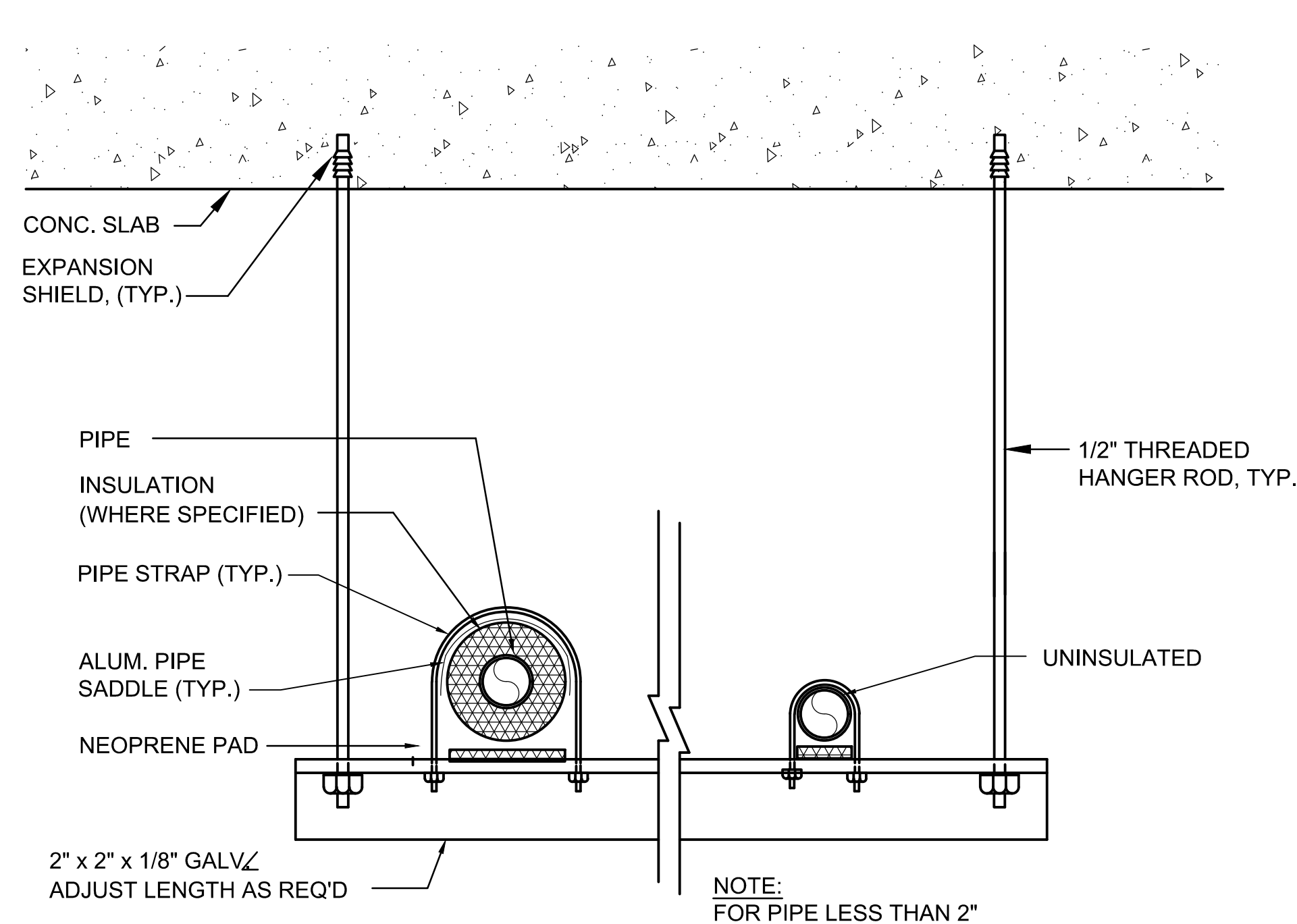
C1 CASSETTE TYPE FCU DETAIL
SCALE: NOT TO SCALE



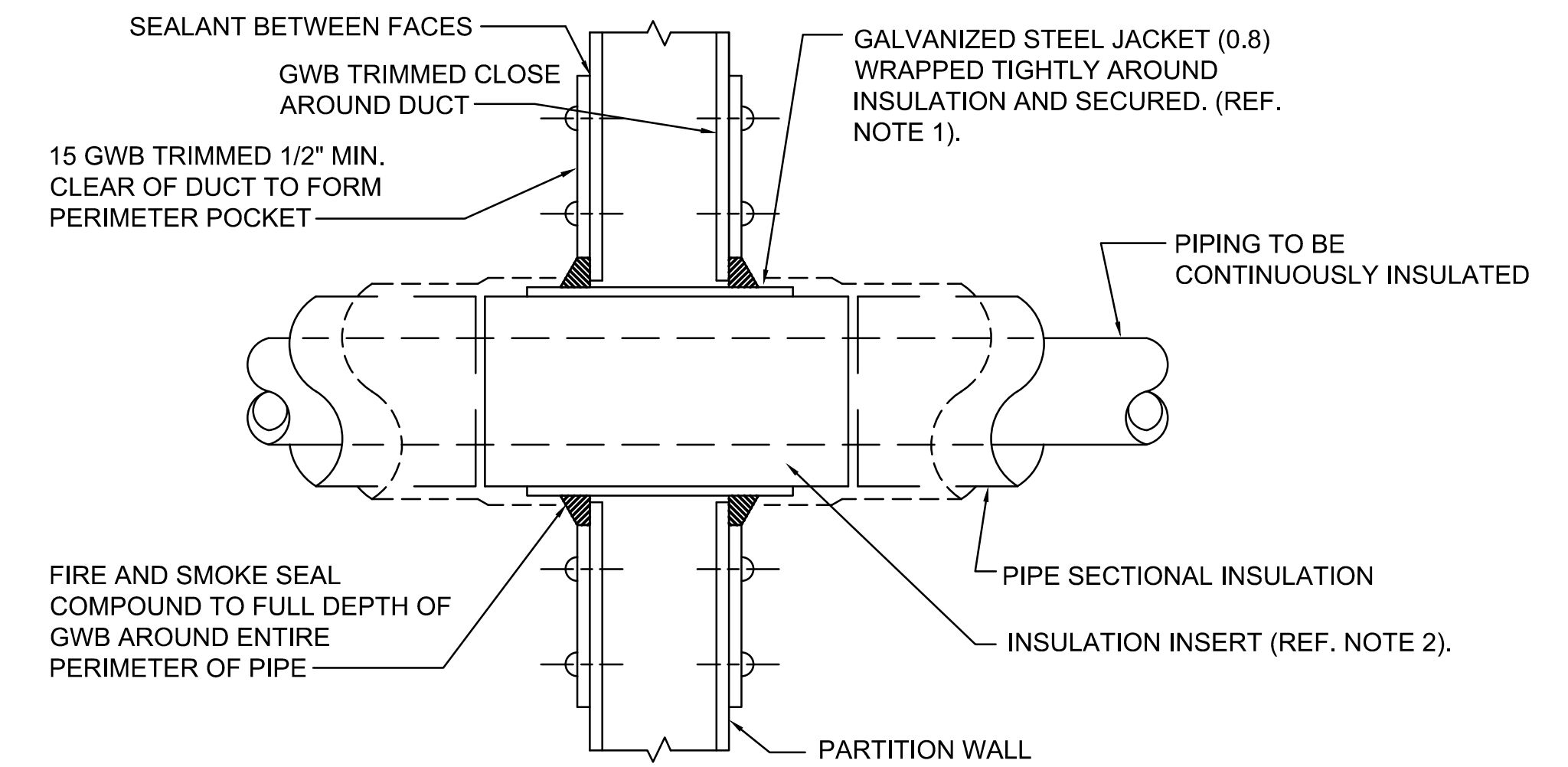
AHU AND ACCU SUPPORT DETAIL (FOR NON-INTERALLY ISOLATED EQUIPMENT)
SCALE: NOT TO SCALE



B1 VERTICAL PIPE SUPPORT
SCALE: NOT TO SCALE



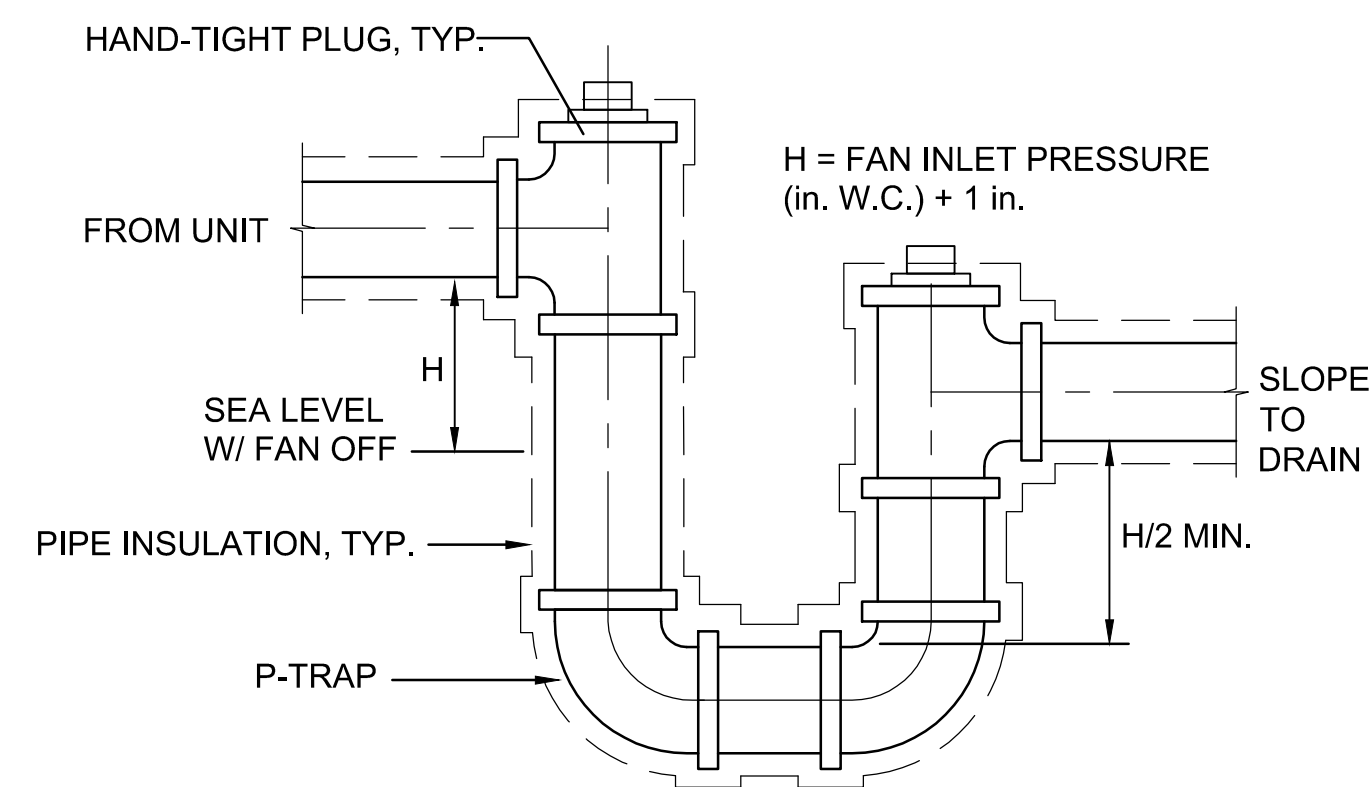
B2 TYPICAL PIPE SUPPORT DETAIL
SCALE: NOT TO SCALE



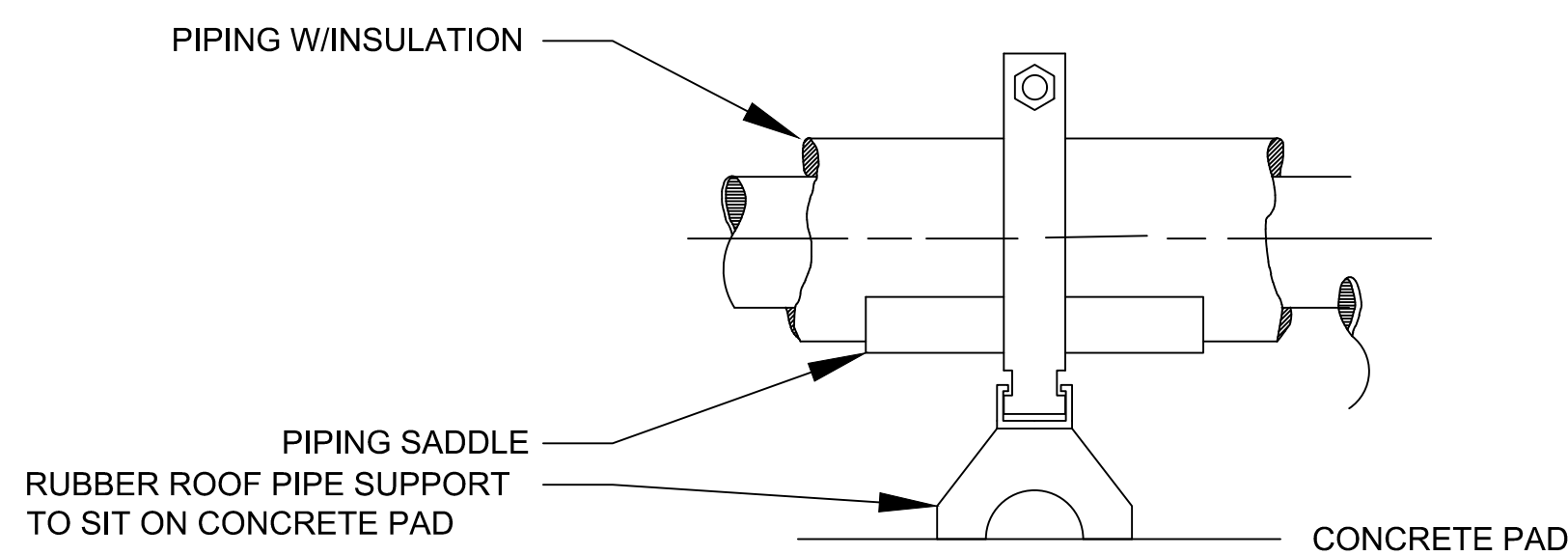
NOTES:

1. GALVANIZED METAL SLEEVE (0.8) WRAPPED TIGHTLY AROUND HEAVY DENSITY INSULATION (SEE NOTE 2) AND SECURE BY WORM DRIVE CLIP (COLD PIPES) OR SCREWS OR RIVETS (HOT PIPES).
2. INSULATION THRU SLEEVE FLUID TEMPERATURE ABOVE DEWPOINT-MINERAL WOOL. FLUID TEMPERATURE BELOW DEWPOINT-FOAM GLASS OR PERLITE W/VAPOR BARRIER JACKET.
3. THIS DETAIL, WITHOUT PIPE INSULATION AND PROTECTIVE JACKET SHALL ALSO APPLY TO NON-INSULATED PIPING.
4. PROVIDE UL 1479 LISTED ASSEMBLY WITH L-RATING OF LESS THAN 1 CFM/SQ FT. AT AMBIENT TEMPERATURE.

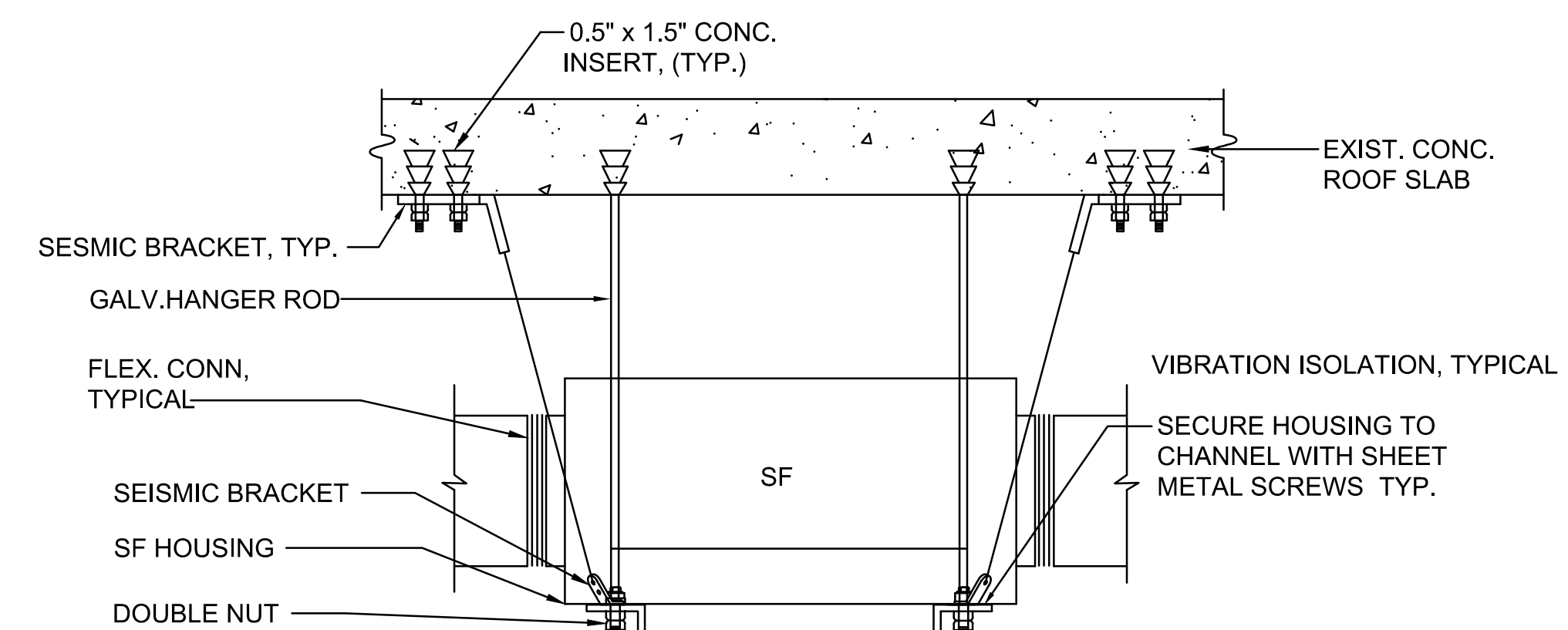
B4 RATED WALL PENETRATION - PIPING
SCALE: NOT TO SCALE



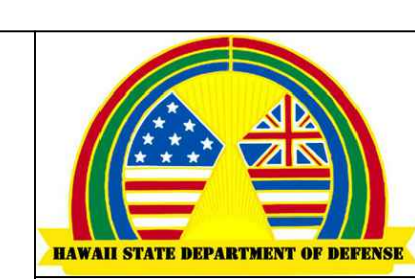
A1 TYPICAL FCU/AHU CONDENSATE TRAP DETAIL
SCALE: NOT TO SCALE



A2 ROOF MOUNTED PIPE SUPPORT DETAIL
SCALE: NOT TO SCALE



A4 SUPPLY FAN MOUNTING DETAIL
SCALE: NOT TO SCALE



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EXPIRATION DATE

YH	FM	YH	DATE	DESCRIPTION	SYN

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 03/01/2024

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHMIR EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
MECHANICAL DETAILS

1

2

3

4

5

D

C

B

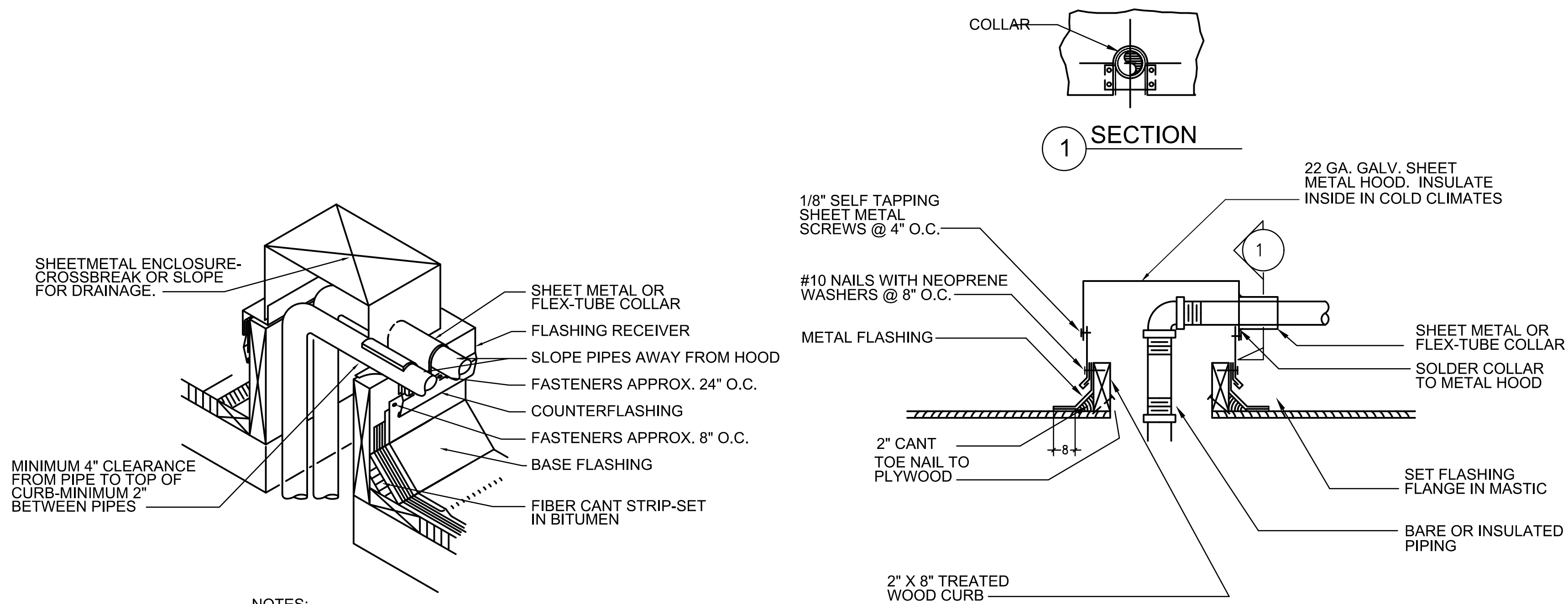
A

D

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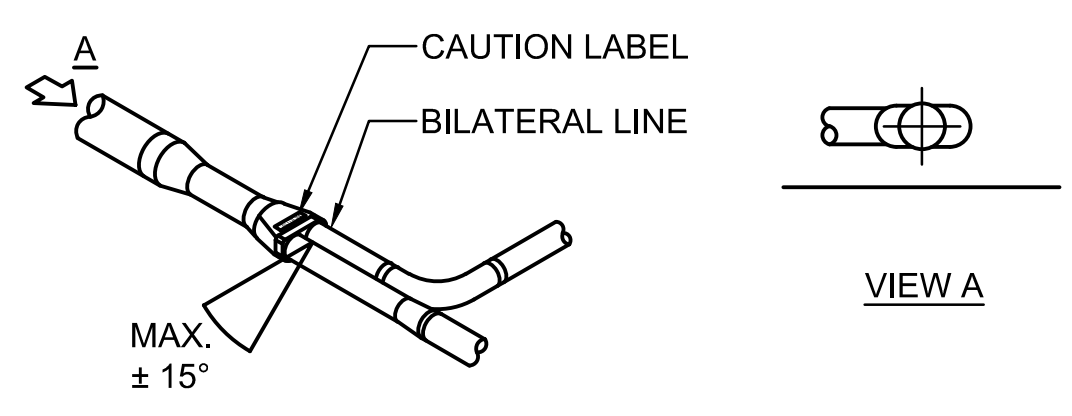
B

A



NOTES:
 1. INSTALLATION SHALL BE IN ACCORDANCE WITH NRCA DETAIL BUR "R" OR SMACNA PLATE 66, FIGURE A.

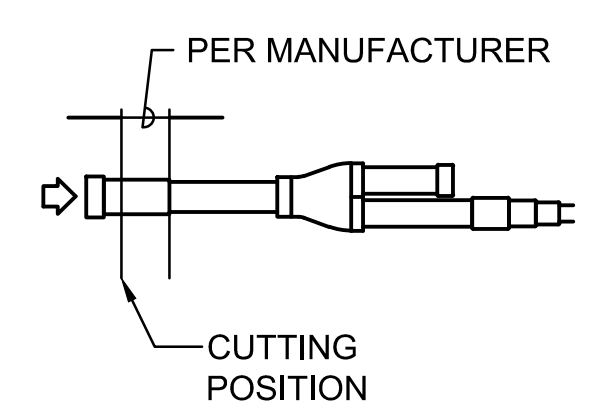
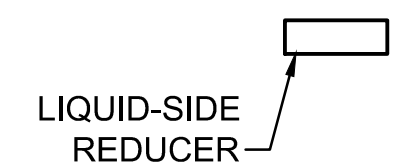
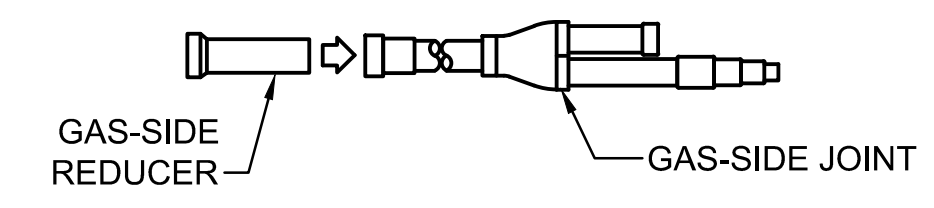
C1 PIPE THRU ROOF PENETRATION DETAIL
 MB502 SCALE: NOT TO SCALE



WHEN REDUCERS ARE USED:

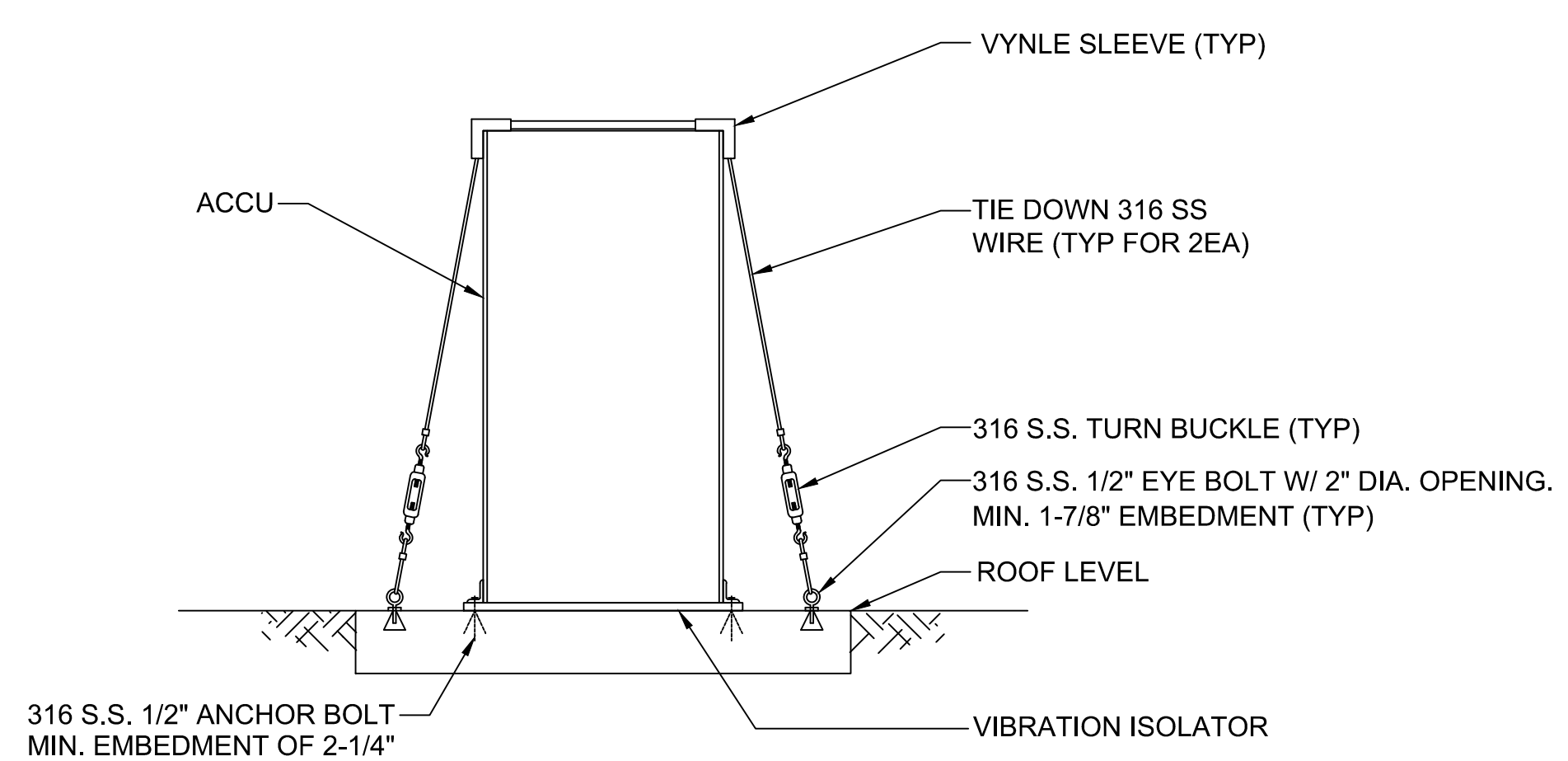
GAS SIDE REDUCER:
 GAS-SIDE REDUCER MAY BE USED ON THE GAS-SIDE JOINT. SEE BELOW FOR CONNECTION.

LIQUID SIDE REDUCER:
 LIQUID-SIDE REDUCER MAY BE USED ON THE LIQUID-SIDE JOINT. SEE BELOW FOR CONNECTION.

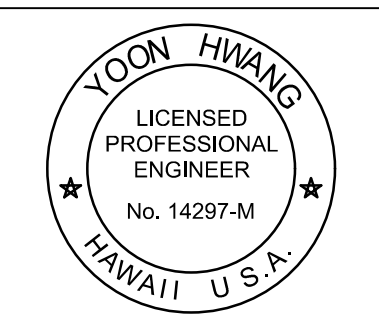


NOTE:
 ALL REDUCERS, ELBOWS, AND FITTINGS FOR REFRIGERANT PIPING SHALL BE PROVIDED PER VRF MANUFACTURER'S RECOMMENDATIONS

A1 REF. PIPE MULTI CONNECTION PIPING KIT DETAIL
 MB502 SCALE: NOT TO SCALE



A3 ACCU TYP INSTALLATION DETAIL - ROOF MOUNT
 MB502 SCALE: NOT TO SCALE



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 SIGNATURE: *Yoon Hwang* 4/30/2024
 EXPIRATION DATE

DATE	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

STATE OF HAWAII	DEPARTMENT OF DEFENSE	TMK: 3-1-042:600
4204 DIAMOND HEAD RD HONOLULU, HI 96815	DIAMOND HEAD STATE MONUMENT	
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS		
MECHANICAL DETAILS		
SCALE: AS NOTED		
STATE JOB NO. CA-202313-C		
FEDERAL PROJECT NO. -		
SHEET 54 OF 123		
MB502		

AIR COOLED CONDENSING UNIT (ACCU) SCHEDULE FOR AHUS

ACCU NO.	LOCATION	UNIT(S) SERVED	CAPACITY TOTAL (BTUH)	REFRIG. TYPE	CONDENSER FAN		ELECTRICAL DATA					EER	E-POWER (Y/N)	REMARKS
					AMBIENT AIR TEMP (F)	TYPE	MCA	MOCP	V/PH/HZ	COMPRESSOR INPUT (KW)				
ACCU-1	ROOF	AHU-1	360,000	R-410A	95	PROP	138	175	208/3/60	31.8	10.8	YES	1,2	
ACCU-2	ROOF	AHU-2	96,100	R-410A	95	PROP	40	60	208/3/60	8.7	13.3	YES	1,2	

NOTES:
 1. REFRIGERANT PIPE QUANTITIES AND SIZE TO BE PER MANUFACTURER'S PIPING SCHEMATIC.
 2. COAT UNIT CASING AND COILS WITH BLYGOLD & PSX-700 COATING RATED FOR COASTAL ENVIRONMENT

AIR COOLED CONDENSING UNIT (ACCU) SCHEDULE FOR FCUS

ACCU NO.	LOCATION	UNIT(S) SERVED	CAPACITY TOTAL (BTUH)	REFRIG. TYPE	CONDENSER FAN		ELECTRICAL DATA					EER	E-POWER (Y/N)	REMARKS
					AMBIENT AIR TEMP (F)	TYPE	MCA	SCCR (kA)	MOCP	V/PH/HZ	COMPRESSOR INPUT (KW)			
ACCU-3	MECHANICAL ROOM	FCU-3	42,000	R-410A	95	PROP	35	5	50	208/1/60	3.4	13.1	YES	1,2
ACCU-4	MECHANICAL ROOM	FCU-4, FCU-6, FCU-7, FCU-8	115,600	R-410A	95	PROP	56	5	90	208/3/60	11.2	11.7	YES	1,2
ACCU-5 (EXISTING)	MECHANICAL ROOM	FCU-5 (EXISTING)	36,000	R-410A	95	PROP	27	-	30	208/1/60	-	-	YES	3

NOTES:
 1. REFRIGERANT PIPE QUANTITIES AND SIZE TO BE PER MANUFACTURER'S PIPING SCHEMATIC.
 2. COAT UNIT CASING AND COILS WITH BLYGOLD & PSX-700 COATING RATED FOR COASTAL ENVIRONMENT
 3. UNIT IS EXISTING AND SHOWN FOR REFERENCE ONLY

DX AIR HANDLING UNIT (AHU) SCHEDULE

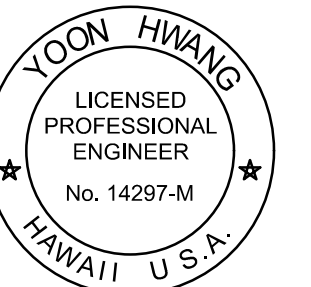
AHU NO.	AREA SERVED	CONFIGURATION	TYPE	COOLING COIL DATA								FAN DATA				ELECTRICAL DATA						DUCT SMOKE DETECTOR	E-POWER (Y/N)	FILTER	WEIGHT (LBS)	SIZE LxWxH (IN.)	REMARKS
				COOLING CAPACITY		ENTERING AIR		LEAVING AIR		MAX FACE VELOCITY (FT/MIN)	MIN. NO. OF ROWS	SA (CFM)	DESIGN OA (CFM)	TOTAL ESP (IN. WG)	MOTOR (HP)	POWER INPUT (KW)	MOTOR RPM	FLA	MCA	MOCP	V/PH/HZ						
				TOTAL (BTUH)	SENSIBLE (BTUH)	EAT DB°F	EAT WB°F	LAT DB°F	LAT WB°F																		
AHU-1	OFFICE AND WARNING POINT ROOM	CEILING MOUNTED	VAV	354,200	269,400	78.3	64.5	55.0	53.0	500	6	10,481	1,367	1.75	15	-	1800	39.8	49.8	80	208/3/60	YES	YES	MERV-8	1541	86" x 84" x 60"	1,2,3,4
AHU-2A	OFFICE	FLOOR MOUNTED	VAV	48,050	37,100	77.0	63.8	55.0	53.0	500	6	1,520	230	0.80	-	0.48	-	-	5.63	15	208/1/60	YES	YES	MERV-8	172	22" x 25" x 60"	1,2,4,5
AHU-2B	OFFICE	FLOOR MOUNTED	VAV	48,050	37,100	77.0	63.8	55.0	53.0	500	6	1,520	230	0.80	-	0.48	-	-	5.63	15	208/1/60		YES	MERV-8	172	22" x 25" x 60"	1,2,4,5

NOTES:
 1. REFER TO MANUFACTURER'S WIRING DIAGRAM FOR POWERING GUIDELINES.
 2. PIPING LENGTH MODIFICATIONS MADE IN FIELD SHALL BE COORDINATED WITH MANUFACTURER FOR PIPING RECOMONDATIONS AND REVISED LINE SIZES.
 3. VFD WITH SOFT START AND DISCONNECT, INSTALLED BY ELECTRICAL.
 4. PROVIDE UVC LIGHT (120V).
 5. PROVIDE WITH CONTRACTOR INSTALLED ALUMINUM FOIL BACKING ON UNIT LINER INSULATION.

DX FAN COIL UNIT (FCU) SCHEDULE

FCU NO.	AREA SERVED	TYPE	COOLING CAPACITY						AIRFLOW			ELECTRICAL				E-POWER (Y/N)	REMARKS
			TOTAL (BTUH)	SENSIBLE (BTUH)	EAT DB°F	EAT WB°F	LAT DB°F	LAT WB°F	SA (CFM)	DESIGN OA (CFM)	KW INPUT	MCA	MOCP	V/PH/HZ			
FCU-3	ROOM 33 - TELECOM	CASSETTE	42,000	42,000	78.0	65.0	55.0	53.0	990	-	0.11	1.3	15	208/1/60	YES	1,2,3,4,5,6	
FCU-4	ROOM 33 - TELECOM	CASSETTE	42,000	42,000	78.0	65.0	55.0	53.0	990	-	0.11	1.3	15	208/1/60	YES	1,2,3,4,5,6	
FCU-5 (EXISTING)	ROOM 27 & 28 - OFFICE	CEILING DUCTED	36,000	29,000	-	-	-	-	950	100	0.38	2.9	15	208/1/60	YES	7	
FCU-6	CORRIDOR 3 - EOC SUPPORT	CASSETTE	25,400	18,300	78.0	65.1	55.0	53.0	723	-	0.63	7.7	15	208/1/60	YES	1,2,3,4,5,6	
FCU-7	CORRIDOR 3 - EOC SUPPORT	CASSETTE	25,400	18,300	78.0	65.1	55.0	53.0	723	-	0.63	7.7	15	208/1/60	YES	1,2,3,4,5,6	
FCU-8	ROOM 29 - CONFERENCE	WALL MOUNTED	22,800	13,500	79.8	68.3	55.0	53.0	500	-	0.07	0.5	15	208/1/60	YES	1,2,5,6	

NOTES:
 1. REFER TO MANUFACTURER'S WIRING DIAGRAM FOR POWERING GUIDELINES.
 2. PIPING LENGTH MODIFICATIONS MADE IN FIELD SHALL BE COORDINATED WITH MANUFACTURER FOR PIPING RECOMONDATIONS AND REVISED LINE SIZES.
 3. HANG FROM STRUCTURE USING MANUFACTURER PROVIDED RUBBER IN SHEAR ISOLATORS AND HANGER RODS.
 4. PROVIDE ONE LEAK SENSOR WITHIN EACH UNIT AND ONE LEAK SENSOR PER DRIP PAN. WIRE ASSOCIATED CONTROLS BACK TO MASTER CONTROLLER FOR LEAK DETECTION.
 5. MANUFACTURER STANDARD FILTER.
 6. PROVIDE BUILT-IN CONDENSATE PUMP.
 7. UNIT IS EXISTING AND SHOWN FOR REFERENCE ONLY.



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SY#	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMK: 3-1-042:600
BIRKHMIR EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 MECHANICAL SCHEDULES

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 55 OF 123
MB601

EXHAUST FAN (EF) SCHEDULE

UNIT	LOCATION/ AREA SERVED	FAN DATA					ELECTRICAL DATA				E-POWER (Y/N)	WEIGHT (LBS)
		TYPE	DRIVE TYPE	CFM	ESP (IN WG)	RPM	INPUT POWER (W)	V	PH	HZ		
EF 2	WOMEN'S RESTROOM	CEILING CABINET	DIRECT	340	0.6	1050	301	120	1	60	YES	56
EF-3	MEN'S RESTROOM	CEILING CABINET	DIRECT	340	0.6	1050	301	120	1	60	YES	56

ADDITIVE
- BID #6

SUPPLY FAN (SF) SCHEDULE

UNITS	UNIT SERVED	TYPE	AIRFLOW (CFM)	EXT SP ("WG)	MOTOR RPM	DRIVE TYPE	ELECTRICAL DATA					WEIGHT (LBS)	E-POWER (Y/N)	REMARKS	
							V	PH	HZ	MOTOR HP	MCA				MOCP
SF-1	AHU-1	INLINE DUCTED	1440	2	1725	BELT	208	3	60	1	5.8	15	122	YES	1,3
SF-2	AHU-2	INLINE DUCTED	500	2	1725	BELT	208	3	60	0.75	4.4	15	107	YES	2,3

NOTES:

- INTERLOCK WITH AHU-1
- INTERLOCK WITH AHU-2
- PROVIDE WITH EXTERNAL HEPA FILTER BOX

CONDENSATE PUMP (CP) SCHEDULE

UNIT	LOCATION	TYPE	SERVES	FLOW (GPH)	TOTAL FT. HEAD	FLUID	ELECTRICAL DATA			E-POWER (Y/N)	REMARKS
							HP	AMPS	V/PH/HZ		
CP-1A	AC ROOM - 122	VERTICAL CENTRIFUGAL	AHU-1	48	10	CONDENSATE	0.033	1.5	120/1/60	YES	1,2
CP-1B	AC ROOM - 122	VERTICAL CENTRIFUGAL	AHU-1	48	10	CONDENSATE	0.033	1.5	120/1/60	YES	1,2,3

NOTES:

- PROVIDE WITH OVERFLOW DETECTION SWITCH
- INTERLOCK WITH AHU-1
- REDUNDANT UNIT

(EXISTING) BOOSTER FAN SCHEDULE

UNITS	FCU SERVED	TYPE	AIRFLOW (CFM)	EXT SP ("WG)	DRIVE TYPE	ELECTRICAL DATA			
						V	PH	HZ	MOTOR HP
BF-1 (EXISTING)	FCU-5	INLINE	100	0.4	DIRECT	120	1	60	0.17

NOTES:

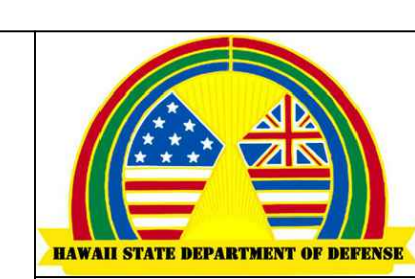
- UNIT IS EXISTING AND SHOWN FOR REFERENCE ONLY

(EXISTING) EXHAUST FAN SCHEDULE

UNIT	LOCATION/ AREA SERVED	FAN DATA				ELECTRICAL DATA			
		TYPE	CFM	ESP (IN WG)	RPM	HP	V	PH	HZ
EF-1 (EXISTING)	MECHANICAL ROOM - GENERATOR	INLINE CENTRIFUGAL	15300	1.4	727	10	208	3	60

NOTES:

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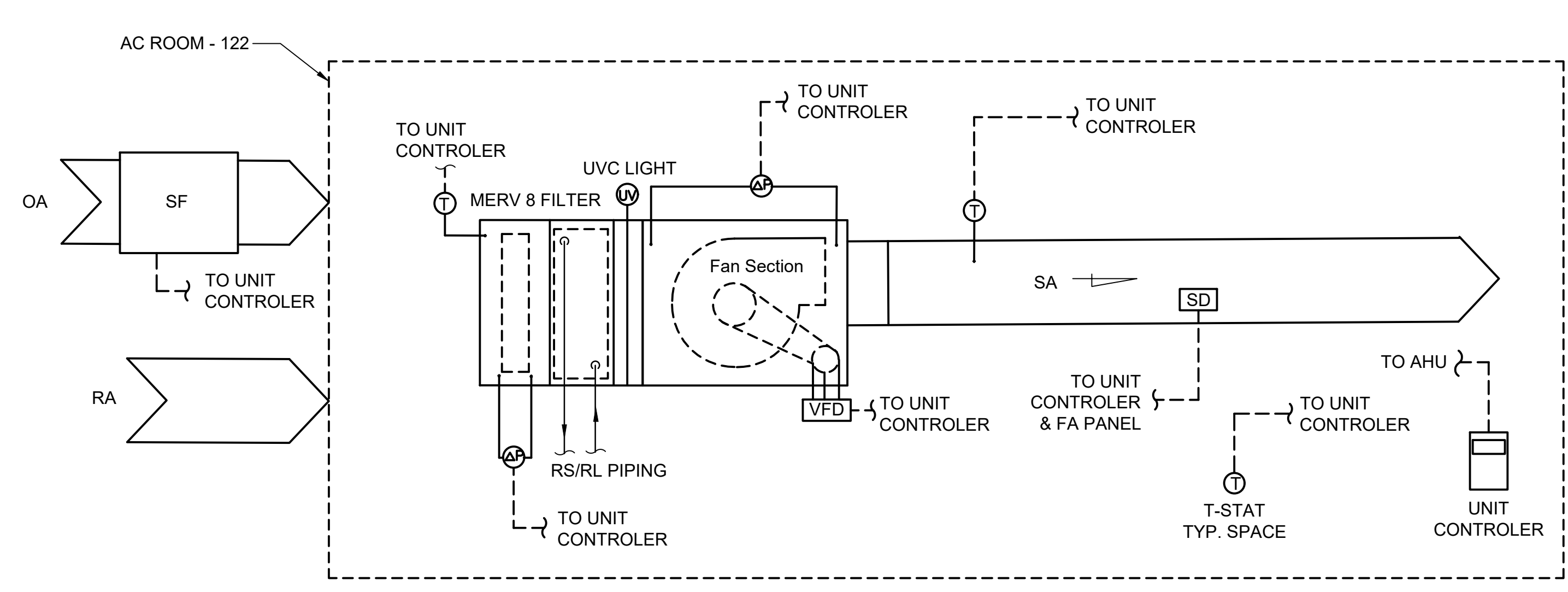
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STATE OF HAWAII
DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
**BIRKHMIR EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS**
MECHANICAL SCHEDULES

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO.
SHEET 56 OF 123
MB602

1 2 3 4 5

D
C
B
A



SEQUENCE OF OPERATIONS (AHU-1):

THE OFFICE AREA WILL BE SERVED BY A DX AHU AIR CONDITIONING SYSTEM. THE AHU SHALL BE CONTROLLED VIA MANUFACTURER'S PROGRAMMABLE CONTROLLER. THE SEQUENCE OF OPERATION WILL BE AS FOLLOWS:

AHU-1 RUN CONDITIONS:

1. OCCUPIED MODE: THE SUPPLY FAN SHALL BE ENABLED AND COMMANDED TO RUN.
2. UNOCCUPIED MODE: THE SUPPLY FAN SHALL BE DISABLED.
3. THE UNIT CONTROLLER SHALL BE PROVIDED WITH AN OPTION TO MANUALLY OVERRIDE THE UNOCCUPIED MODE.
4. THE AHU RUN TIMES SHALL FOLLOW THE BUILDING'S SCHEDULE BELOW:

BUILDING SCHEDULE:

MONDAY-FRIDAY:	6:30AM - 5:30PM
SATURDAY-SUNDAY:	OFF

FAN START/STOP CONTROL:

1. FAN VFD SHALL MODULATE TO MAINTAIN THE ROOM TEMPERATURE SET POINT.
 - 1.1. IF THE RETURN AIR TEMPERATURE, MONITORED BY THE TEMPERATURE SENSOR ON THE RETURN AIR INLET AT THE UNIT, IS HIGHER THAN THE T-STAT SET POINT OF 75F THE VFD SHALL MODULATE TO PROVIDE MORE AIRFLOW.
 - 1.2. IF THE RETURN AIR TEMPERATURE AT THE UNIT IS LOWER THAN THE T-STAT SET POINT OF 73F FOR MORE THAN 20 MINUTES, THE VFD SHALL MODULATE TO PROVIDE LESS AIRFLOW.
2. THE UNIT CONTROLLER SHALL ISSUE A FAN FAILURE ALARM AND DISABLE THE UNIT IF THE FAN HAS BEEN COMMANDED ON FOR 1 MINUTE AND THE FAN STATUS SIGNAL INDICATE THE FAN IS NOT OPERATING.
3. THE UNIT CONTROLLER SHALL ISSUE A FAN OVERRIDDEN ALARM IF THE FAN STATUS SIGNAL INDICATED THE FAN IS ON, BUT THE FAN HAS BEEN COMMANDED OFF FOR 1 MINUTE.
4. THE DX CONDENSING UNIT SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE AT THE SETPOINT OF 55F.
5. SF-1 SHALL BE INTERLOCKED WITH AHU-1 TO PROVIDE OA WHEN THE AHU IS RUNNING.
6. THE UNIT CONTROLLER SHALL SEND AN ALARM WHEN THE PRESSURE DROP ACROSS THE FILTER REACHES THE FILTER CHANGE OUT SETPOINT AS DETERMINED BY THE MANUFACTURER.
7. WHEN SMOKE IS DETECTED IN THE DUCT, THE SMOKE DETECTOR SHALL SEND A SIGNAL TO THE FIRE ALARM MODULE, INITIAL A SMOKE ALARM TO THE UNIT CONTROLLER, AND STOP STOP THE SUPPLY FAN OPERATION. THE SMOKE DETECTOR MUST BE MANUALLY RESET BEFORE THE AHU SHALL START AGAIN.

C1 MB701 **DX VAV AHU WITH VFD MOTOR - SCHEMATIC DIAGRAM AND SEQUENCE OF OPERATION**
SCALE: NOT TO SCALE

SEQUENCE OF OPERATIONS (AHU-2A & AHU-2B):

THE OFFICE AREA WILL BE SERVED BY A VRF AHU AIR CONDITIONING SYSTEM. THE AHUS SHALL OPERATE SIMULTANEOUSLY AND BE CONTROLLED VIA MANUFACTURER'S PROGRAMMABLE CONTROLLER. THE SEQUENCE OF OPERATION WILL BE AS FOLLOWS:

AHU-2A & AHU-2B RUN CONDITIONS:

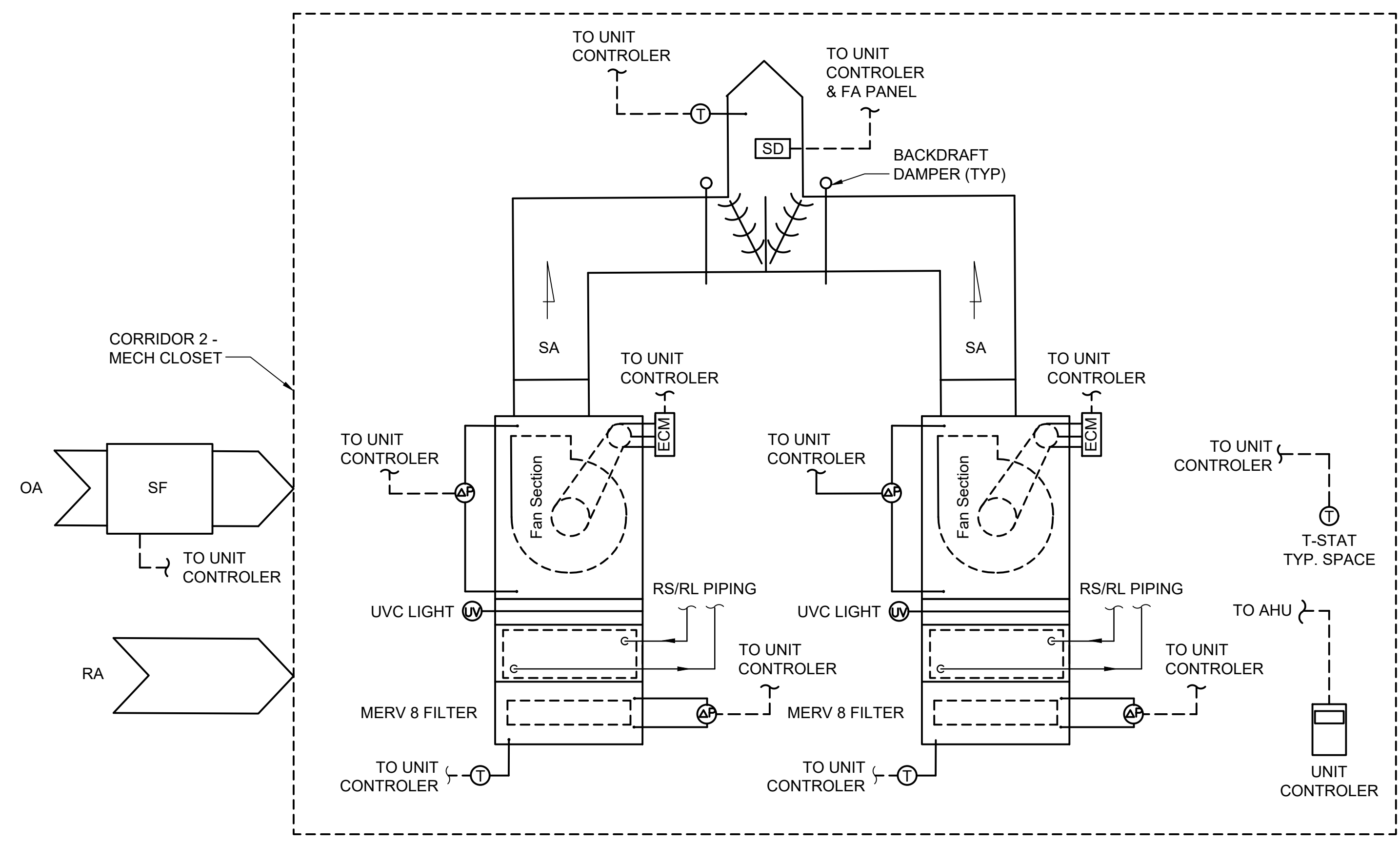
1. OCCUPIED MODE: THE SUPPLY FAN SHALL BE ENABLED AND COMMANDED TO RUN.
2. UNOCCUPIED MODE: THE SUPPLY FAN SHALL BE DISABLED.
3. THE UNIT CONTROLLER SHALL BE PROVIDED WITH AN OPTION TO MANUALLY OVERRIDE THE UNOCCUPIED MODE.
4. THE AHU RUN TIMES SHALL FOLLOW THE BUILDING'S SCHEDULE BELOW:

BUILDING SCHEDULE:

MONDAY-FRIDAY:	6:30AM - 5:30PM
SATURDAY-SUNDAY:	OFF

FAN START/STOP CONTROL:

1. FAN ECM SHALL MODULATE TO MAINTAIN THE ROOM TEMPERATURE SET POINT.
 - 1.1. IF THE RETURN AIR TEMPERATURE, MONITORED BY THE TEMPERATURE SENSOR ON THE RETURN AIR INLET AT EITHER OF THE UNITS, IS HIGHER THAN THE T-STAT SET POINT OF 75F THE ECMS SHALL MODULATE TO PROVIDE MORE AIRFLOW.
 - 1.2. IF THE RETURN AIR TEMPERATURE AT EITHER OF THE UNITS IS LOWER THAN THE T-STAT SET POINT OF 73F FOR MORE THAN 20 MINUTES, THE ECMS SHALL MODULATE TO PROVIDE LESS AIRFLOW.
2. THE UNIT CONTROLLER SHALL ISSUE A FAN FAILURE ALARM AND DISABLE THE INDIVIDUAL UNIT IF THE FAN HAS BEEN COMMANDED ON FOR 1 MINUTE AND THE FAN STATUS SIGNAL INDICATE THE FAN IS NOT OPERATING. THE 2ND AHU SHALL CONTINUE TO OPERATE.
3. THE UNIT CONTROLLER SHALL ISSUE A FAN OVERRIDDEN ALARM IF ONE OF THE FAN STATUS SIGNAL INDICATED THE FAN IS ON, BUT THE FAN HAS BEEN COMMANDED OFF FOR 1 MINUTE.
4. THE VRF CONDENSING UNIT SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE AT THE SETPOINT OF 55F.
5. SF-2 SHALL BE INTERLOCKED WITH AHU-2A & AHU-2B TO PROVIDE OA WHEN EITHER OF THE AHUS ARE RUNNING.
6. THE UNIT CONTROLLER SHALL SEND AN ALARM WHEN THE PRESSURE DROP ACROSS EITHER OF THE FILTERS REACHES THE FILTER CHANGE OUT SETPOINT AS DETERMINED BY THE MANUFACTURER.
7. WHEN SMOKE IS DETECTED IN THE DUCT, THE SMOKE DETECTOR SHALL SEND A SIGNAL TO THE FIRE ALARM MODULE, INITIAL A SMOKE ALARM TO THE UNIT CONTROLLER, AND STOP STOP THE SUPPLY FAN OPERATION. THE SMOKE DETECTOR MUST BE MANUALLY RESET BEFORE THE AHUS SHALL START AGAIN.

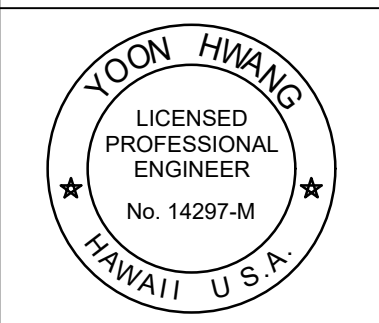


A1 MB701 **VRF VAV AHU WITH ECM MOTOR - SCHEMATIC DIAGRAM AND SEQUENCE OF OPERATION**
SCALE: NOT TO SCALE

EXHAUST FAN SEQUENCE OF OPERATION:

BATHROOM EXHAUST FAN (EF-1 & EF-2):

1. THE EXHAUST FANS SHALL OPERATE CONTINUOUSLY WHILE THE BUILDING IS IN OPERATION.



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SUBMITTAL PHASE	DATE	SYN	DESCRIPTION
CONSTRUCTION DOCUMENTS	03/01/2024		

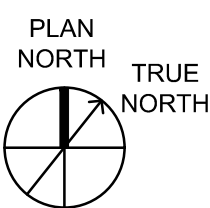
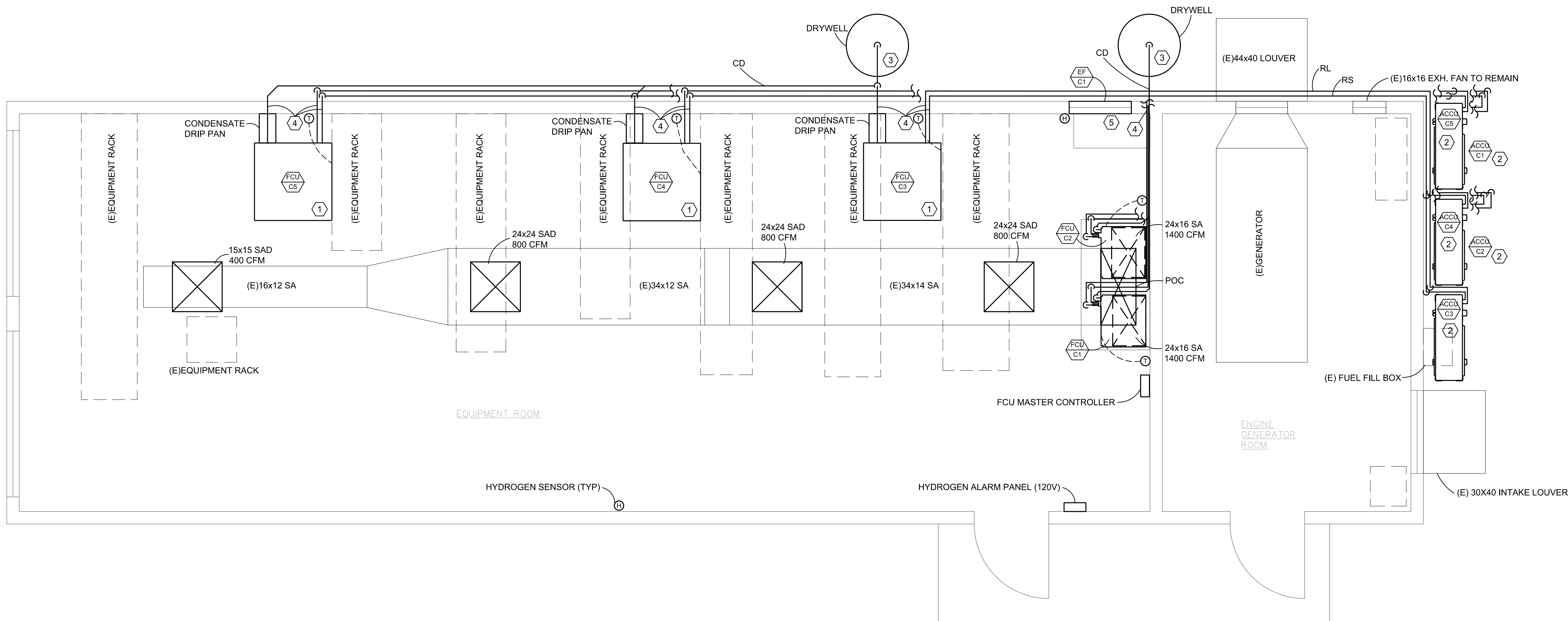
STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMK: 3-1-042:600
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 SCHEMATIC AND SEQUENCE OF OPERATION
 SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 57 OF 123
MB701

PHASING NOTES:

1. PRIOR TO DEMOLISHING EXISTING FCU'S, THE CONTRACTOR SHALL INSTALL NEW FCU C3/C4/C5.
2. ONCE THE NEW FCU'S ARE IN OPERATION, REMOVE THE EXISTING FCU'S.
3. PROGRAM THE NEW UNITS VIA THE NEW MATER CONTROLLER TO MATCH THE NEW SEQUENCE OF OPERATION.

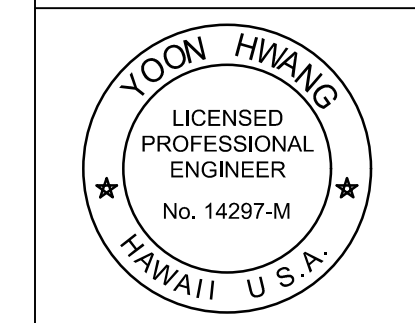
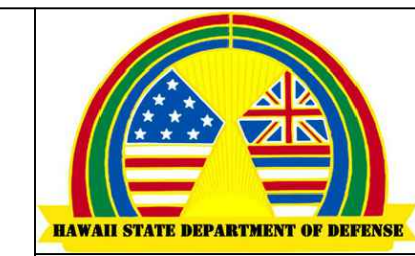
KEYNOTES:

- 1 MOUNT FCU-C3, C4, C5 TO THE ROOF SLAB, SEE A1/MC901.
- 2 MOUNT ACCU-C1-5 TO THE WALL, SEE B1/MC901.
- 3 DRYWELL, SEE C2/MC901.
- 4 PENETRATE THROUGH EXTERIOR WALL. PATCH AROUND PENETRATIONS UPON INSTALLATION OF REF. AND CD PIPING.
- 5 MOUNT EF-C1 IN THE WALL USING EXISTING PENETRATION. PATCH AROUND PENETRATION UPON INSTALLATION. SEE B3/MC901.



A1 FLOOR PLAN - NEW

MC201 SCALE: 1/2" = 1'-0"



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DATE	APPR.	SYN.	DESCRIPTION

SUBMITTAL PHASE
 CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMK: 3-1-042:600
 BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS
 FLOOR PLAN - NEW

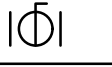
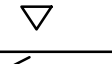
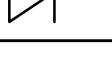
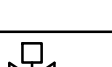
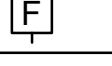

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 60 OF 123
MC201

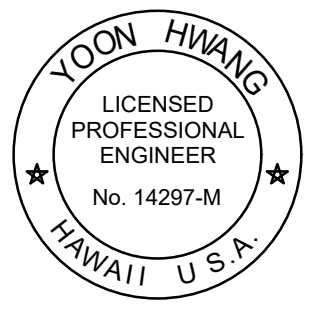
PLUMBING GENERAL NOTES:

1. THE ENTIRE INSTALLATION SHALL COMPLY WITH ALL APPLICABLE REQUIREMENTS LISTED IN CONTRACT RFP DOCUMENTS. THE ENTIRE INSTALLATION SHALL CONFORM TO THE 2018 INTERNATIONAL BUILDING CODE (IBC) AND THE LATEST CITY AND COUNTY OF HONOLULU/STATE OF HAWAII AMENDMENTS AND ORDINANCES, 2018 UNIFORM PLUMBING CODE, UNIFORM FIRE CODE, NATIONAL ELECTRIC CODE, STATE ENERGY CONSERVATION CODE, AND ALL AGENCIES HAVING JURISDICTION.
2. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO COVER THE COMPLETE INSTALLATION OF SYSTEMS TO FUNCTION AS DESCRIBED AND SPECIFIED. THE OMISSION OF REFERENCE TO ANY NECESSARY ITEM OF LABOR OR MATERIAL SHALL NOT RELIEVE THE CONTRACTOR FROM PROVIDING SUCH LABOR AND MATERIAL.
3. ALL EQUIPMENT SHALL BE CAPABLE OF FITTING INTO THE SPACES ALLOCATED WHILE MEETING THE MANUFACTURER'S RECOMMENDED ACCESS REQUIREMENTS. REVIEW ALL SPACES WHERE EQUIPMENT IS TO BE INSTALLED PRIOR TO ORDERING OF EQUIPMENT AND NOTIFY THE ENGINEER OF ANY INADEQUATE CLEARANCES OR CONDITIONS THAT WILL PREVENT THE PROPER INSTALLATION, MAINTENANCE, AND OPERATION OF THE EQUIPMENT.
4. COORDINATE WITH OTHER TRADES PRIOR TO COMMENCING AND DURING CONSTRUCTION. OVERLAY PLANS AND CHECK FOR ANY DISCREPANCIES OR CONFLICTS WITH OTHER TRADES.
5. VERIFY AND COORDINATE ALL WALL AND FLOOR PENETRATIONS WITH THE STRUCTURAL AND ARCHITECTURAL DRAWINGS PRIOR TO THE START OF CONSTRUCTION.
6. OBTAIN APPROVAL FROM THE STRUCTURAL ENGINEER BEFORE MAKING ANY PENETRATIONS THROUGH STRUCTURAL MEMBERS, WALLS, AND SLABS.
7. VERIFY THE EXACT LOCATION, SIZE AND INVERT OF ALL EXISTING SEWER LINES AT THE NEW POINT OF CONNECTION PRIOR TO THE START OF CONSTRUCTION.
8. DRAWINGS DO NOT ATTEMPT TO SHOW EXACT DETAILS OF PIPING. PROVIDE OFFSETS AS NECESSARY TO AVOID LOCAL OBSTRUCTIONS OR INTERFERENCE WITH OTHER TRADES. REVIEW ALL PIPING RUNS PRIOR TO INSTALLATION AND IMMEDIATELY NOTIFY THE GENERAL CONTRACTOR OF ANY INTERFERENCE AND/OR LACK OF ADEQUATE CLEARANCES.
9. 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 GENERAL CONTRACTOR FOR REVIEW. DO NOT PROCEED UNTIL REVIEWED.
10. PATCH AND PAINT ALL EXPOSED PIPING TO MATCH ADJACENT SURFACES OR AS INDICATED.
11. REPAIR ANY DAMAGE TO EXISTING CONSTRUCTION RESULTING FROM THE INSTALLATION OF PLUMBING ITEMS. THE AREAS REPAIRED SHALL MATCH THE ADJACENT SURFACES IN TEXTURE AND COLOR.
12. PROPERLY FIRESTOP ALL PENETRATIONS THROUGH FIRE RATED WALLS, FLOORS, OR PARTITIONS WITH A UL APPROVED SYSTEM APPROPRIATE FOR THE PENETRATION TYPE AND FIRE RATING.
13. PROVIDE ISOLATION VALVES ON PIPING BRANCH LINES WHETHER SHOWN ON THE DRAWINGS OR NOT. SHOW ALL ISOLATION VALVES ON AS-BUILT DRAWINGS.
14. SEISMICALLY BRACE ALL EQUIPMENT, PIPING, AND IN ACCORDANCE WITH CONTRACT SPECIFICATIONS AND RFP REQUIREMENTS.
15. PLUMBING CONTRACTOR SHALL COORDINATE ALL FLOOR CUTTING AND PATCHING WORK REQUIRED TO INSTALL ANY NEW PIPING.
16. PLUMBING CONTRACTOR SHALL PROVIDE ALL ACCESS PANELS TO VALVES, WATER HAMMER ARRESTERS, ETC. WHERE ANY OF THEIR WORK NEEDS ACCESS TO SERVICE OR RESET. SIZES WILL BE DETERMINED BY SUBCONTRACTORS AS WHAT IS NEEDED TO SERVICE OR ACCESS EQUIPMENT. THESE SHOULD BE LOCATED IN THE CLOSETS, STORAGE AREAS, OR INCONSPICUOUS SPACES TO BE REVIEWED BY GENERAL CONTRACTOR ON FINAL LOCATION AND SIZES. THE ACCESS PANELS SHALL MATCH THE FIRE RATING FOR THE WALLS OR CEILINGS THAT THEY ARE PENETRATING. FOR AREAS WITH LAY IN CEILING, MAKE SURE CLEARANCES ARE ADEQUATE.
17. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR AND PROVIDE ALL CAULKING AND SEALANT REQUIRED TO COMPLETE THE INSTALLATION OF ALL PLUMBING FIXTURES AND FITTINGS. SEE CAULKING AND SEALANT SPECIFICATIONS IN CONTRACT SPECS FOR APPROPRIATE CAULKING AND SEALANT SPECIFICATIONS.

ADDITIVE BID ALTERNATES		
ALTERNATE	LOCATION	DESCRIPTION
#1	B303	ALL WORK ASSOCIATED WITH LIGHT FIXTURE REPLACEMENT IN THE ADMIN SECTION OF BUILDING B303.
#2	B303	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART ELECTRIC METER.
#3	B303	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART WATER METER.
#4	BIRKHIMER	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART ELECTRIC METER.
#5	BIRKHIMER	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART WATER METER.
#6	BIRKHIMER	ALL WORK ASSOCIATED WITH BATHROOM PLUMBING UPGRADES.
#7	PSB	ALL WORK ASSOCIATED WITH THE INSTALLATION OF THE NEW SMART ELECTRIC METER.

PLUMBING LEGEND

SYMBOL	ABBRV.	DESCRIPTION
	AST	ABOVE GROUND STORAGE TANK
	BV	BALL VALVE
		BALL VALVE ON RISER
	CKV	CHECK VALVE
	CW	COLD WATER
	CV	CONTROL VALVE
	DWP	DOMESTIC WATER BOOSTER PUMP
	(E)	EXISTING
	EWH	ELECTRIC WATER HEATER
	ET	WATER HEATER EXPANSION TANK
	FCO	FLOOR CLEAN OUT
	FD	FLOOR DRAIN
	FMP	FUEL MONITORING PANEL
		FLOW METER
	FP	FLOOR DRAIN
	GV	GATE VALVE
	HWR	HOT WATER RETURN
	HWRP	HOT WATER RETURN PUMP
	HWS	HOT WATER SUPPLY
	KSK	KITCHEN SINK
	LAV	LAVATORY
	MFP	LAVATORY
	POC	POINT OF CONNECTION
	POR	POINT OF REFERENCE
		PRESSURE TRANSDUCER
	S	SANITARY
	SH	SHOWER
	TMV	THERMOSTATIC MIXING VALVE
	U/G	UNDERGROUND
	UR	URINAL
	UWST	UNDERGROUND WATER STORAGE TANK
	V	VENT
	WC	WATER CLOSET
	WFS	WATER FILTRATION SKID



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DATE	APPROVED	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 03/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 GENERAL NOTES AND LEGENDS

SCALE:
 AS NOTED

STATE JOB NO.
 CA-202313-C

FEDERAL PROJECT NO.
 -

SHEET 63 OF 123

P-001

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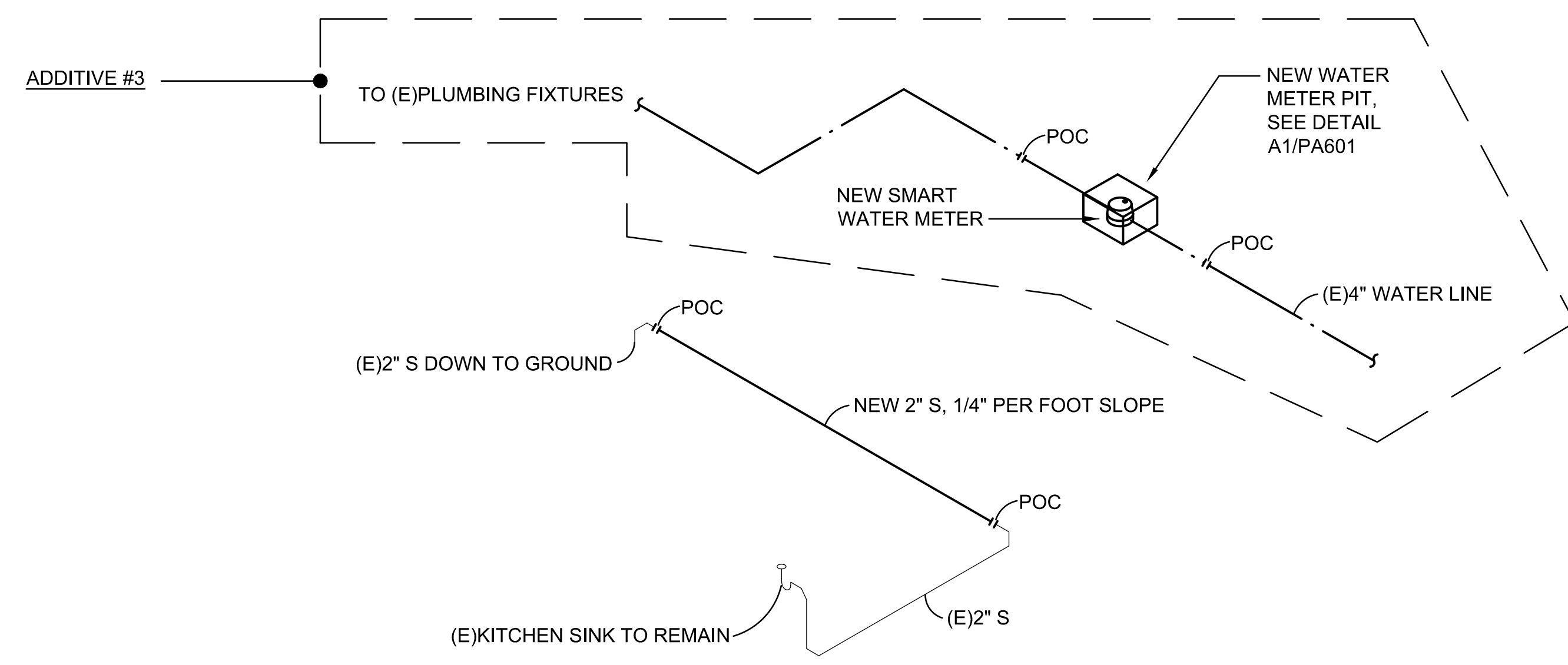
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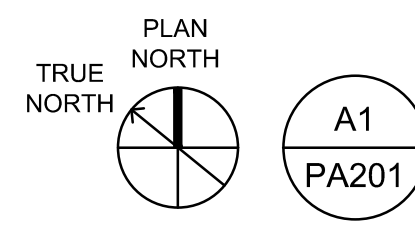
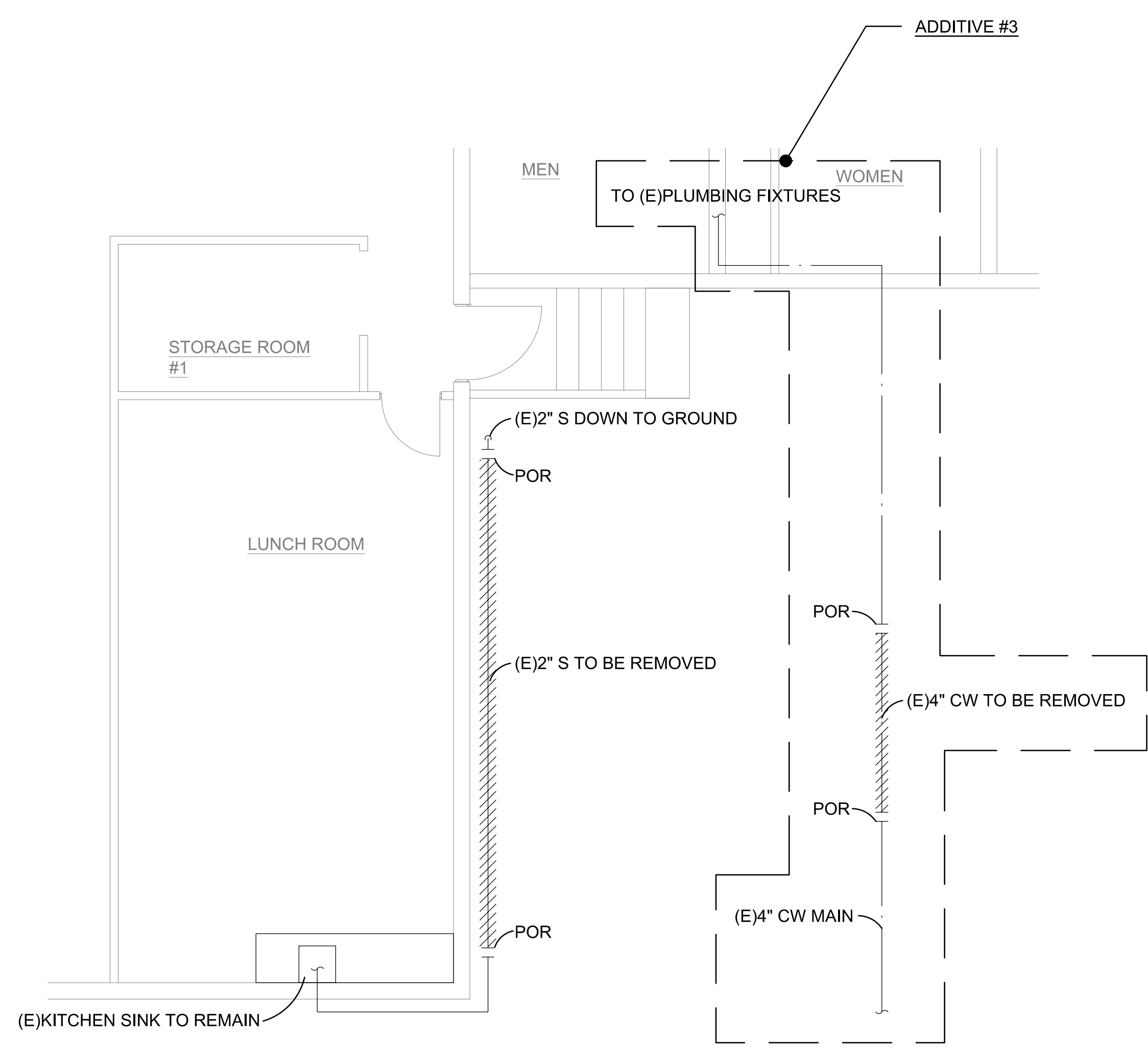
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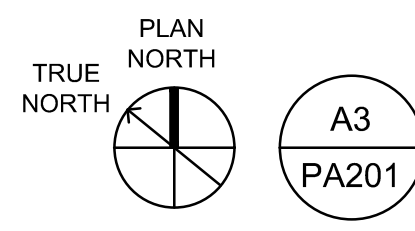
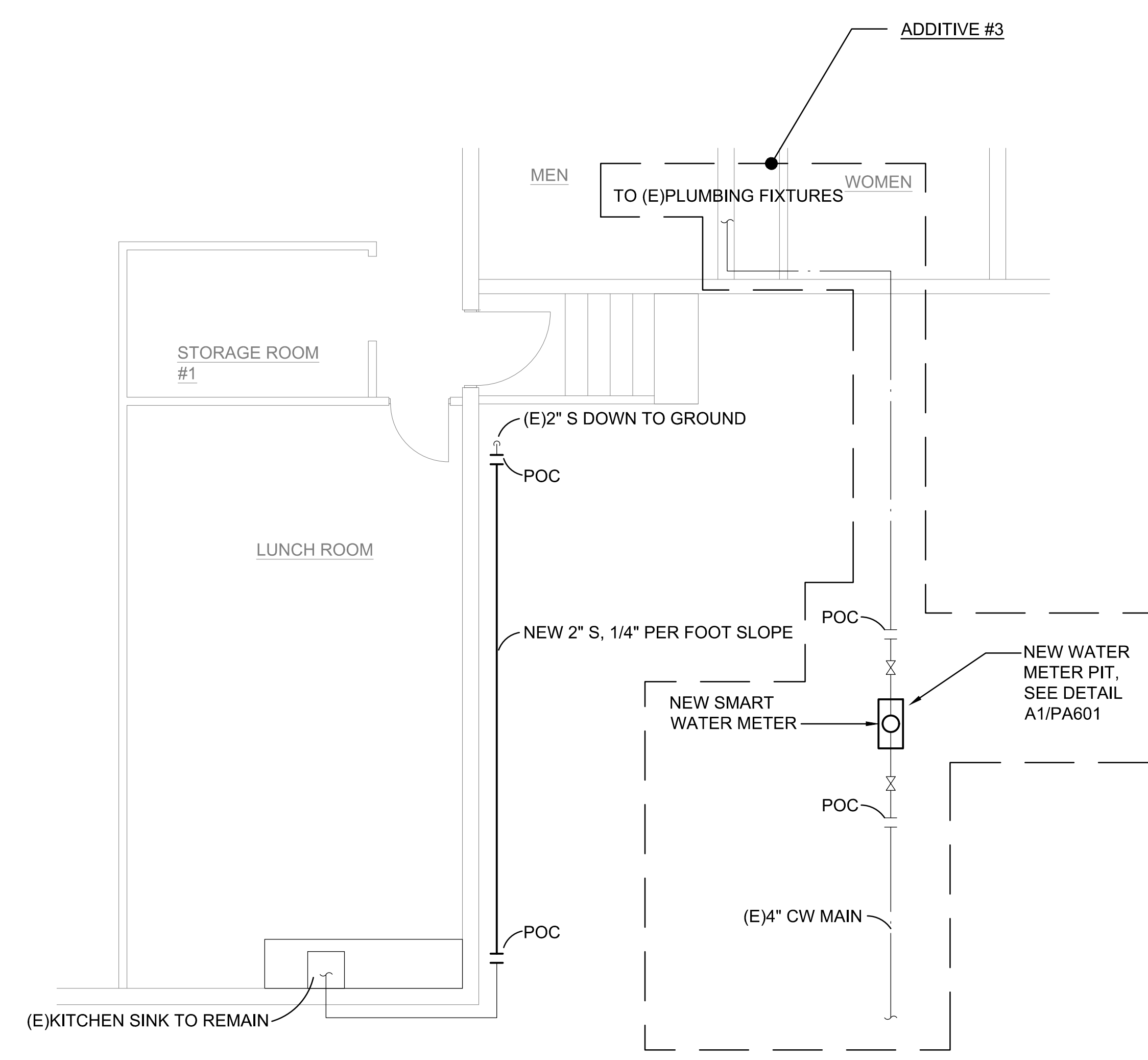
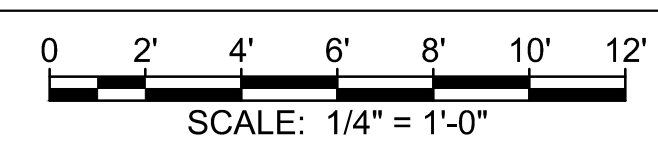
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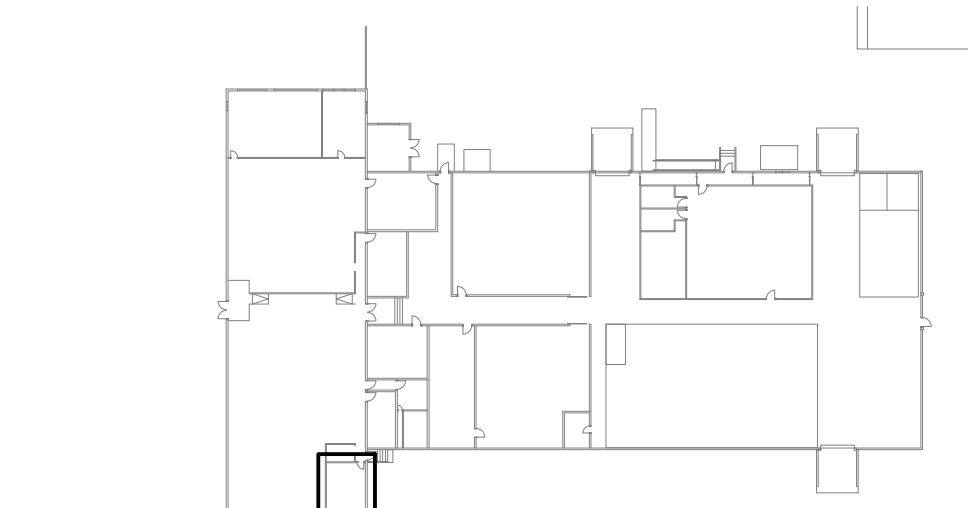
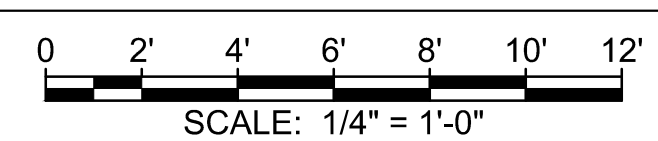
C3 ISOMETRIC PLAN - NEW
PA201 SCALE: NTS



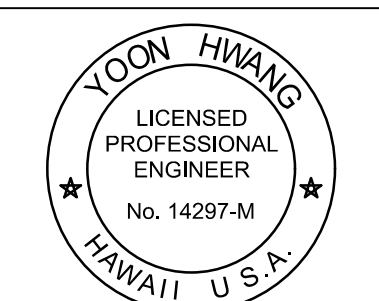
A1 FLOOR PLAN - DEMO
PA201 SCALE: 1/4" = 1'-0"



A3 FLOOR PLAN - NEW
PA201 SCALE: 1/4" = 1'-0"



KEY PLAN
SCALE: NTS



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EXPIRATION DATE

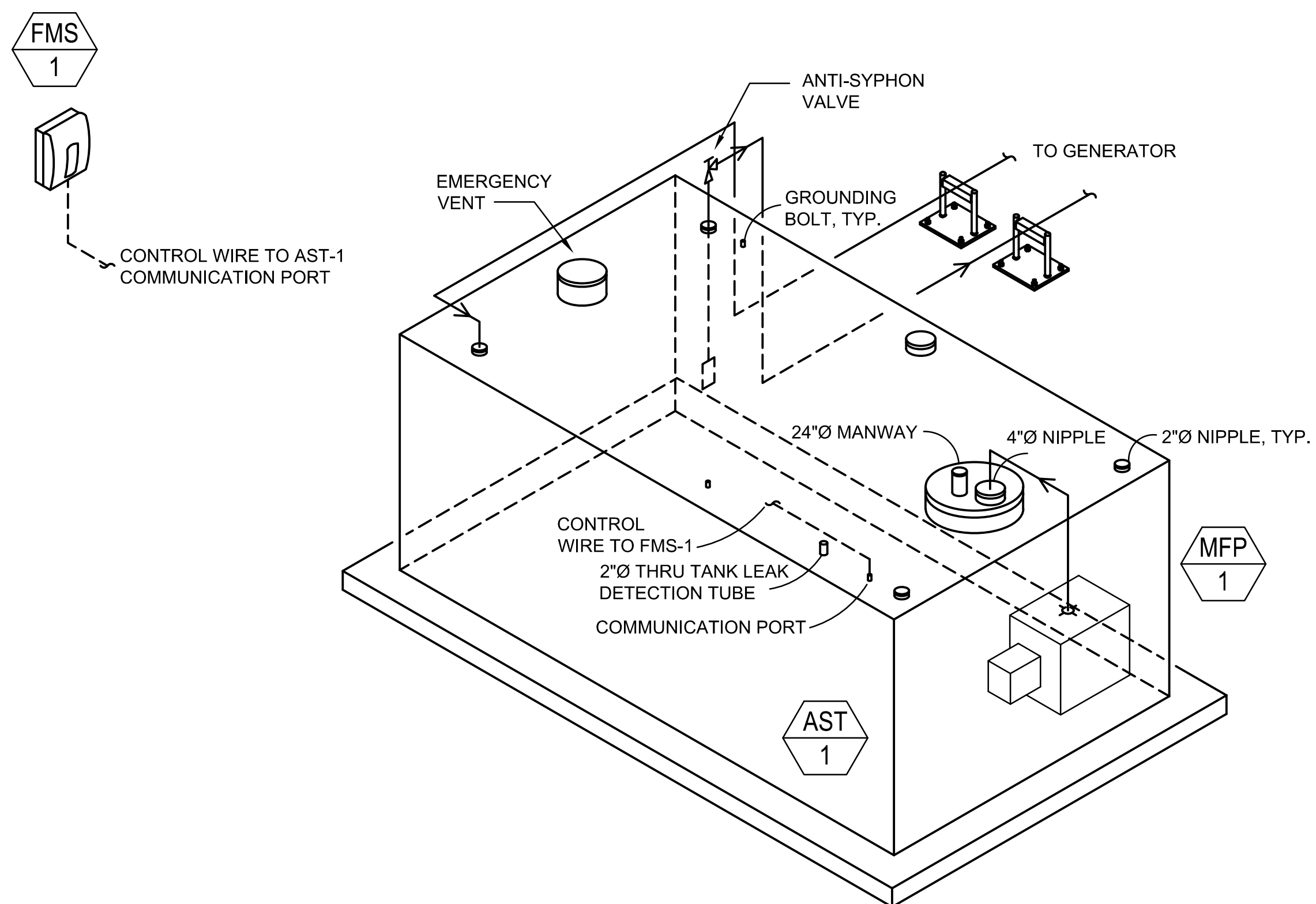
SYN	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 03/01/2024

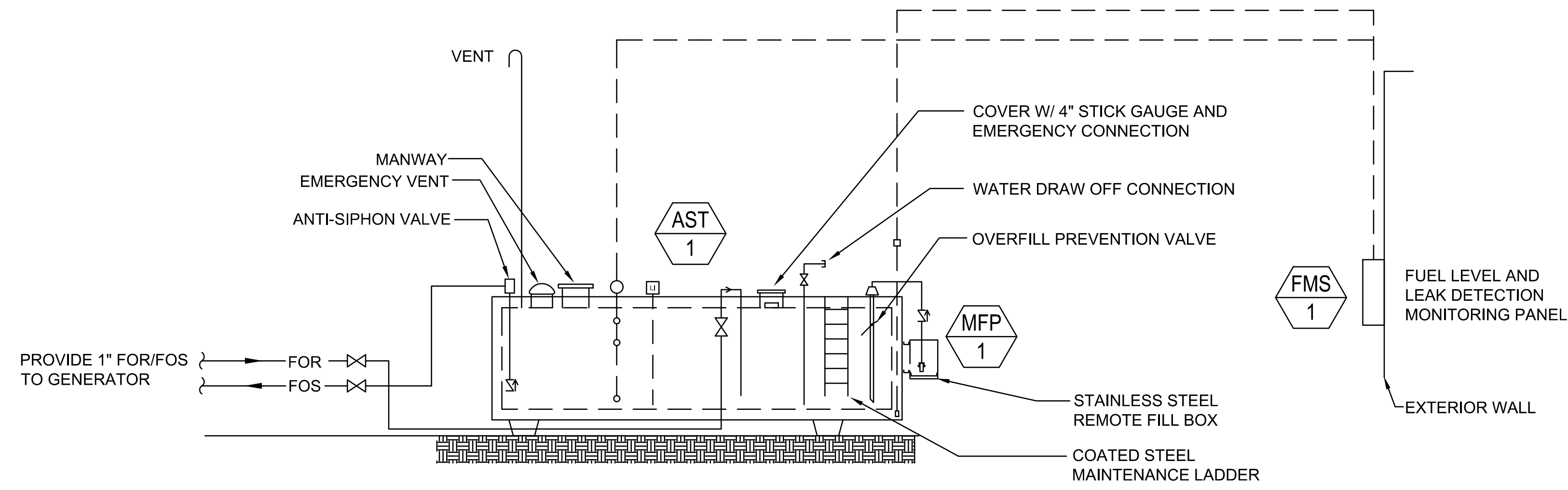
YH	FM	YH

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS
ENLARGED FLOOR PLANS AND ISOMETRIC

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 65 OF 123
PA201



C1 ISOMETRIC
PA401 SCALE: NOT TO SCALE



A1 POL SYSTEM PIPING DIAGRAM
PA401 SCALE: NOT TO SCALE

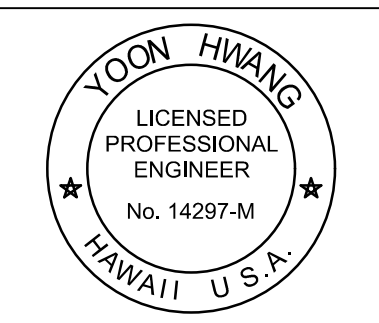
THE FOLLOWING SEQUENCE OF OPERATION SHALL BE PROVIDED AND PRE-PROGRAMMED INTO THE CONTROL PANEL. PANELS SHOULD PROVIDE DRY CONTACT CONNECTIONS TO GENERATOR'S CONTROL PANEL FOR MONITORING AND CONTROL. PROVIDE FOLLOWING FUEL LEVEL ALARM CONTROLS AT THE TANK:

1. HIGH FUEL LEVEL WARNING : 95%
2. LOW FUEL WARNING : 50%
3. CRITICAL LEVEL (ENGINE SHUTDOWN) 10%
 - a. SEND AN ALARM TO GENSET CONTROLLER FOR ENGINE SHUTDOWN
4. FUEL BASIN ALARM
 - a. SEND AN ALARM TO GENSET CONTROLLER FOR ENGINE SHUTDOWN
5. PUMP CONTROL
 - a. PUMP ON - 78% (N.C. SOLENOID VALVE SHALL OPEN. SAME CONTACT FOR PUMP ON SHALL BE PROVIDED TO N.C. SOLENOID VALVE)
 - b. PUMP OFF - 90% (FUEL SUPPLY PUMP SET SHALL STOP)
6. RETURN PUMP CONTROL
 - a. PUMP ON - 97% AND ABOVE

NOTE #1: N.O. SOLENOID VALVE SHALL CLOSE. SAME CONTACT FOR "PUMP ON" SHALL BE PROVIDED TO N.O. SOLENOID VALVE

NOTE #2: SEND AN ALARM TO GENSET CONTROLLER

 - b. PUMP OFF - 90%

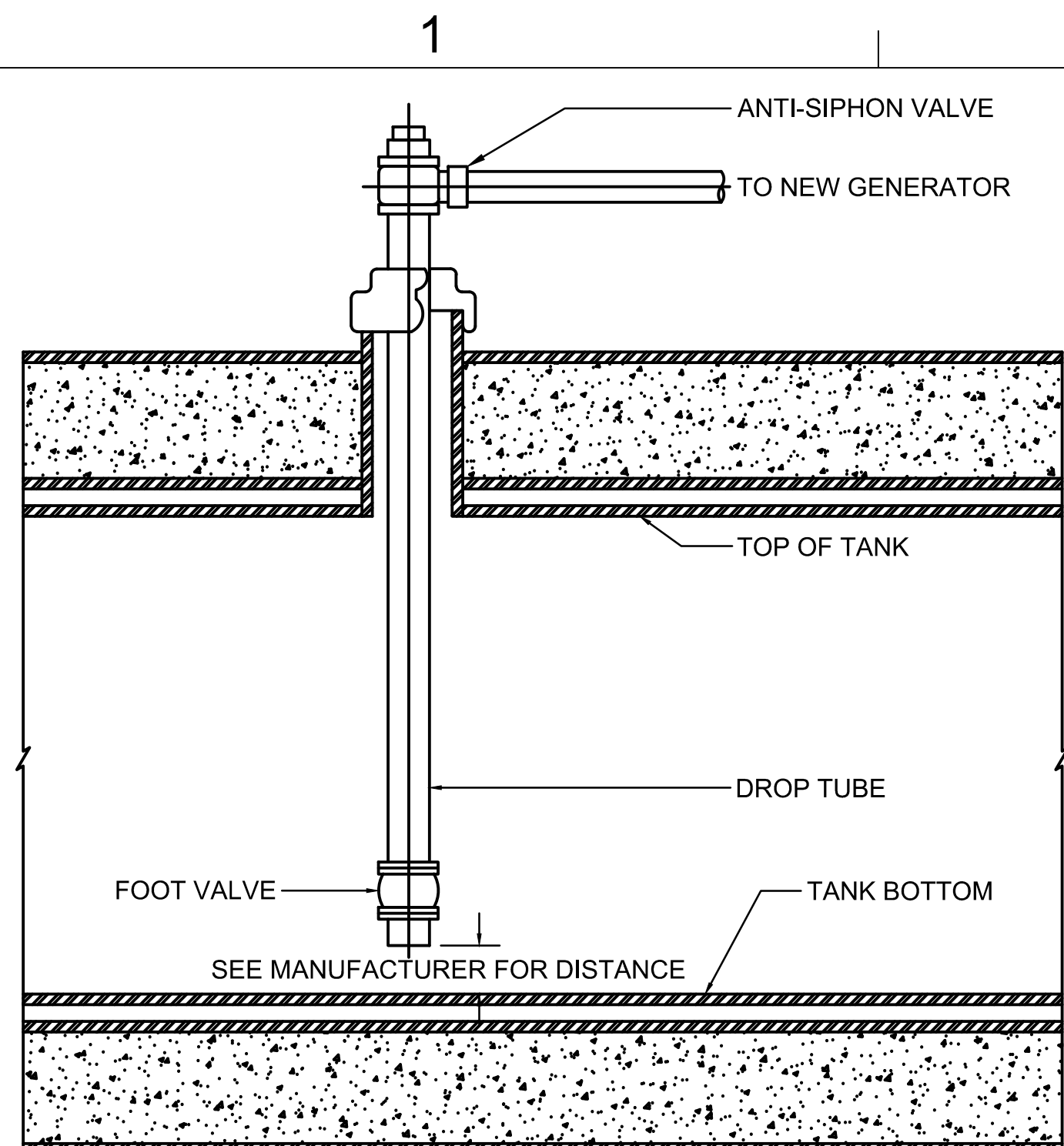


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 SIGNATURE: *[Signature]* DATE: 4/30/2024

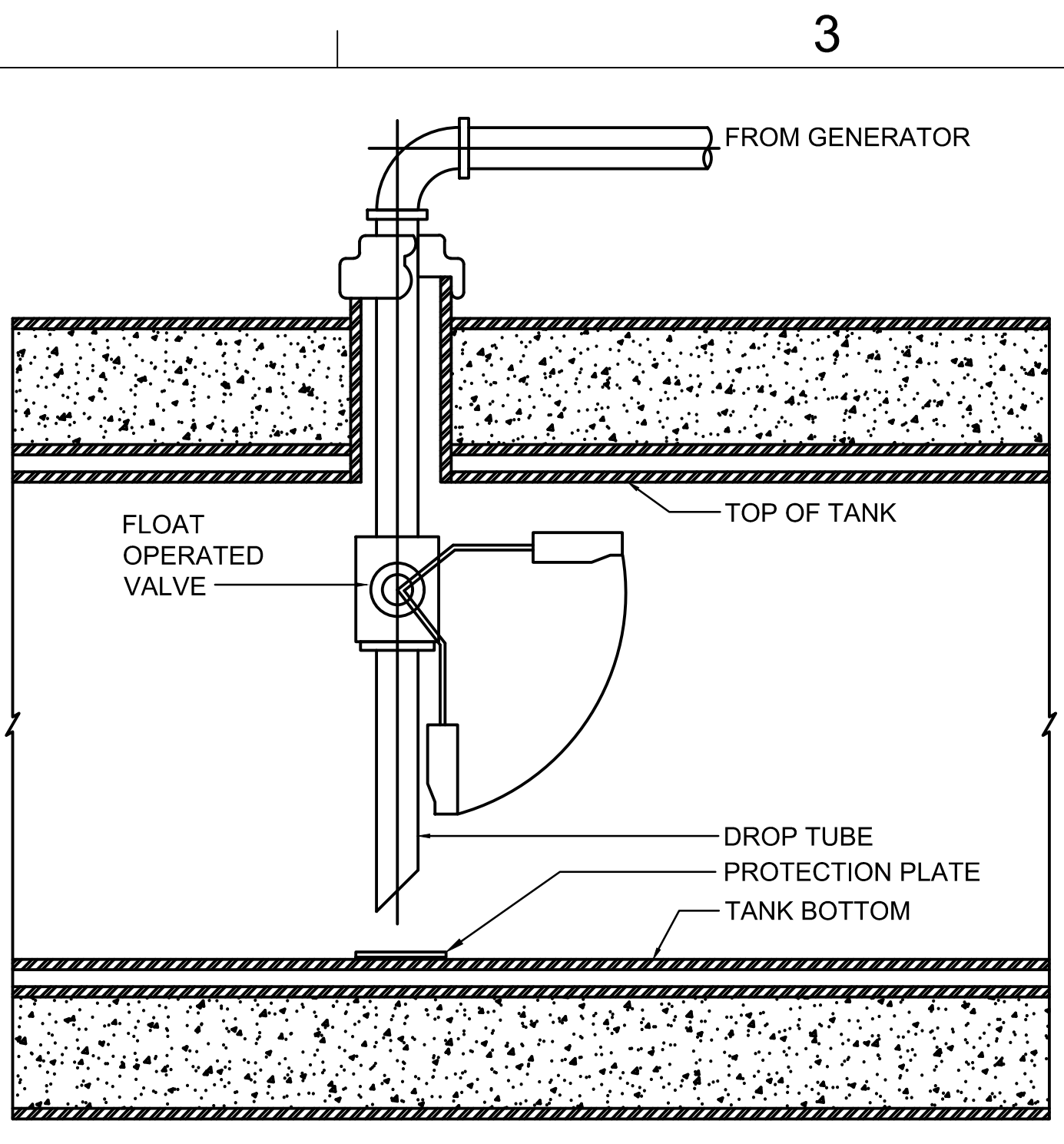
DATE	DESCRIPTION

CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

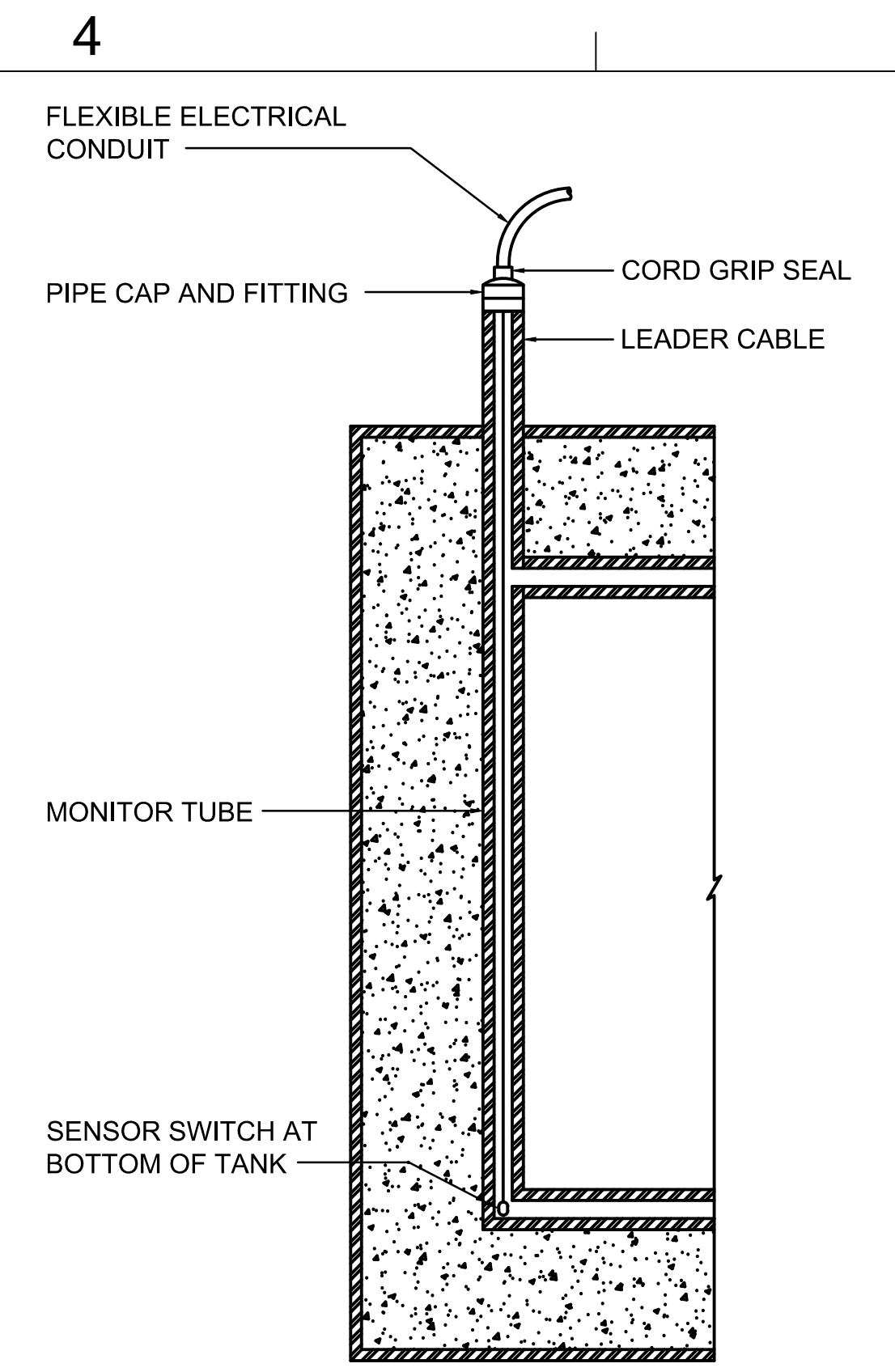
DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600
 BIRKHMIR EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS
 PIPING DIAGRAMS



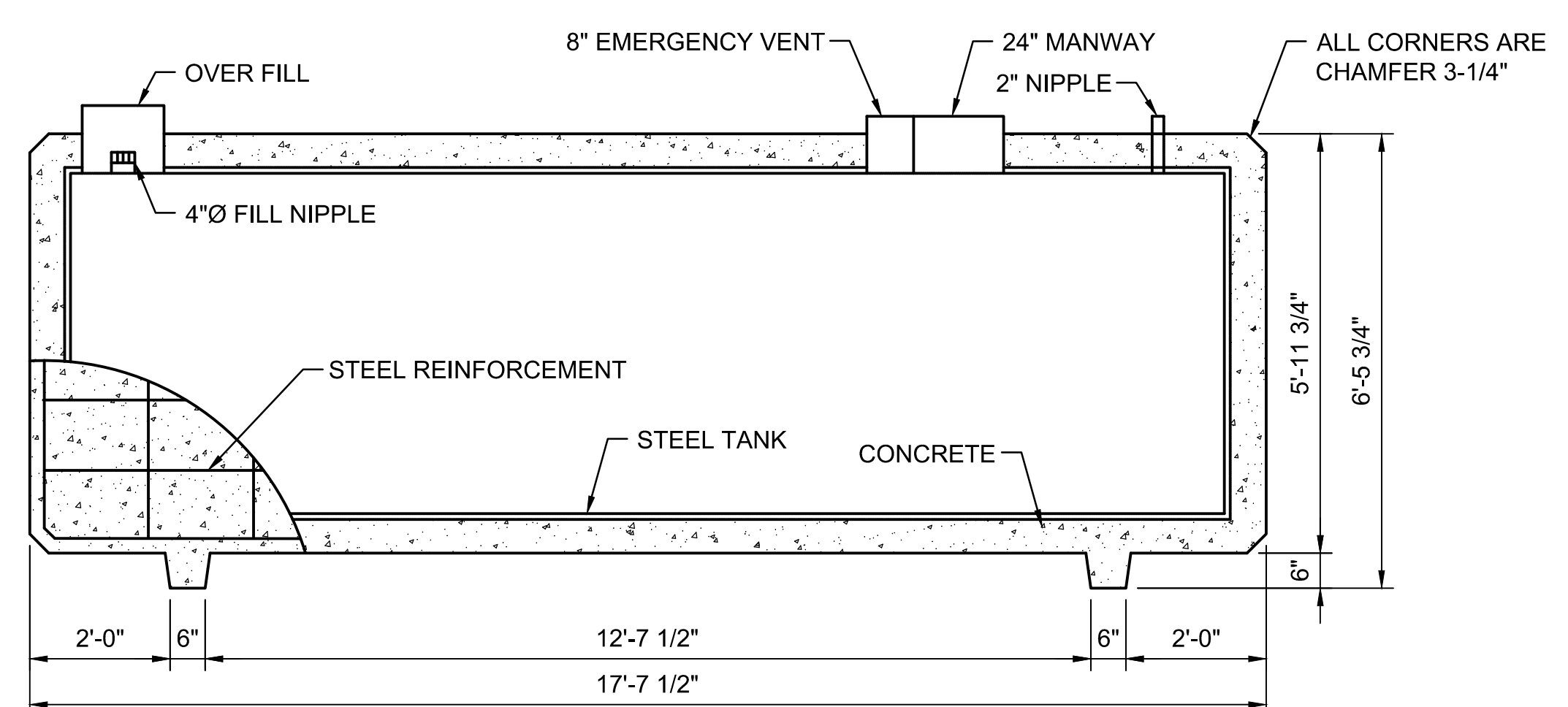
C1
PA501
AST FUEL SUCTION LINE
SCALE: NOT TO SCALE



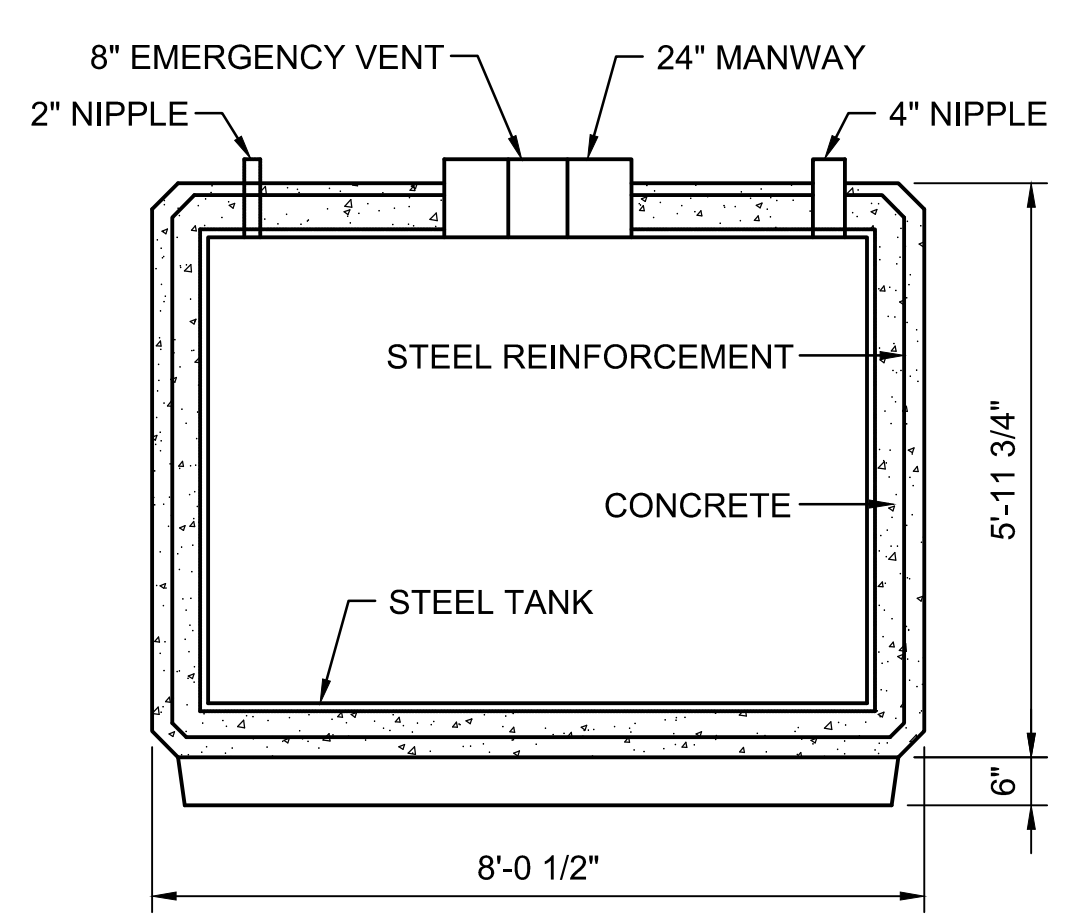
C2
PA501
AST FUEL FILL LINE
SCALE: NOT TO SCALE



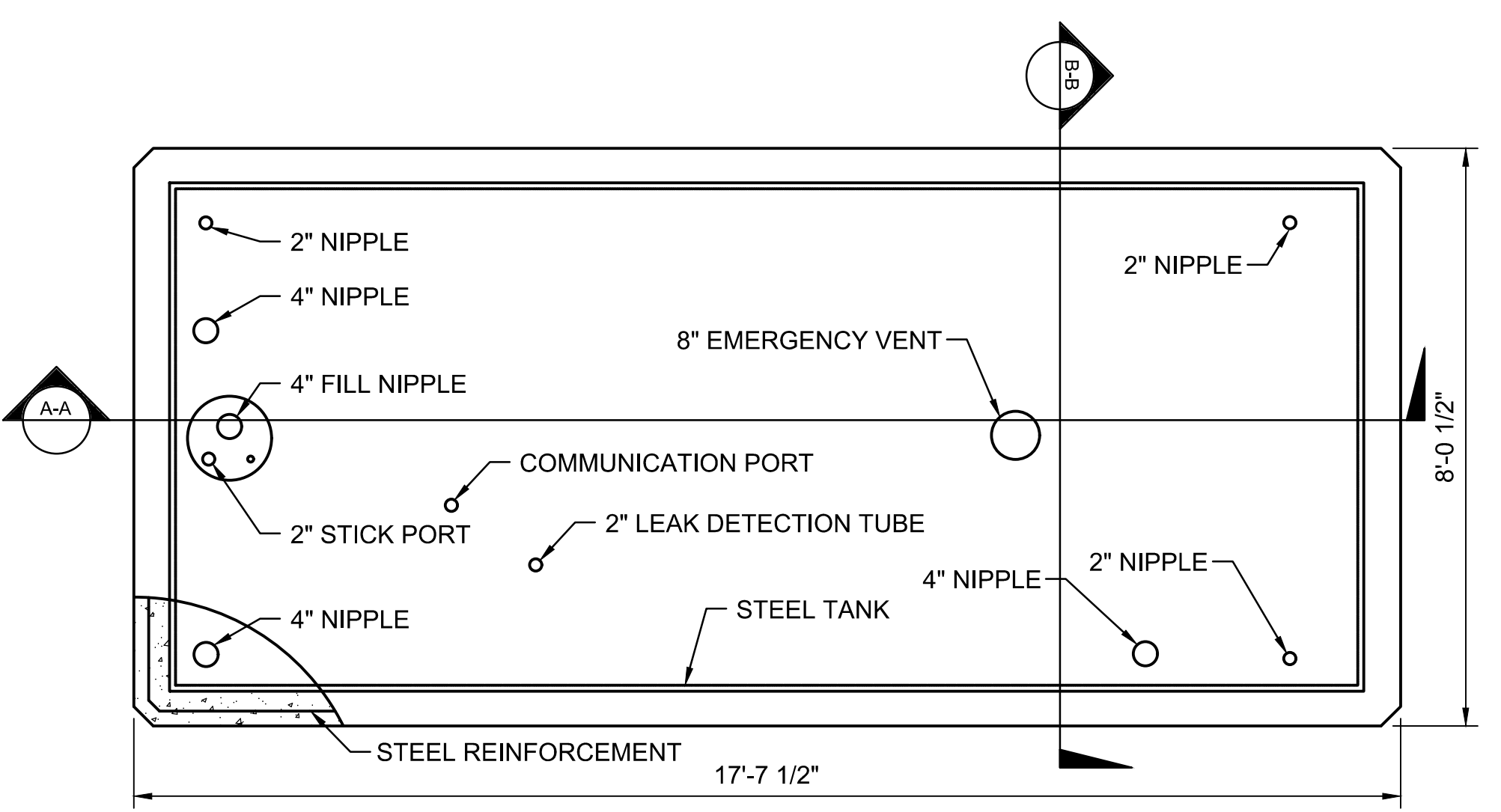
C4
PA501
FUEL STORAGE TANK INTERSTITIAL LEAK DETECTOR TUBE DETAIL
SCALE: NOT TO SCALE



SECTION A-A

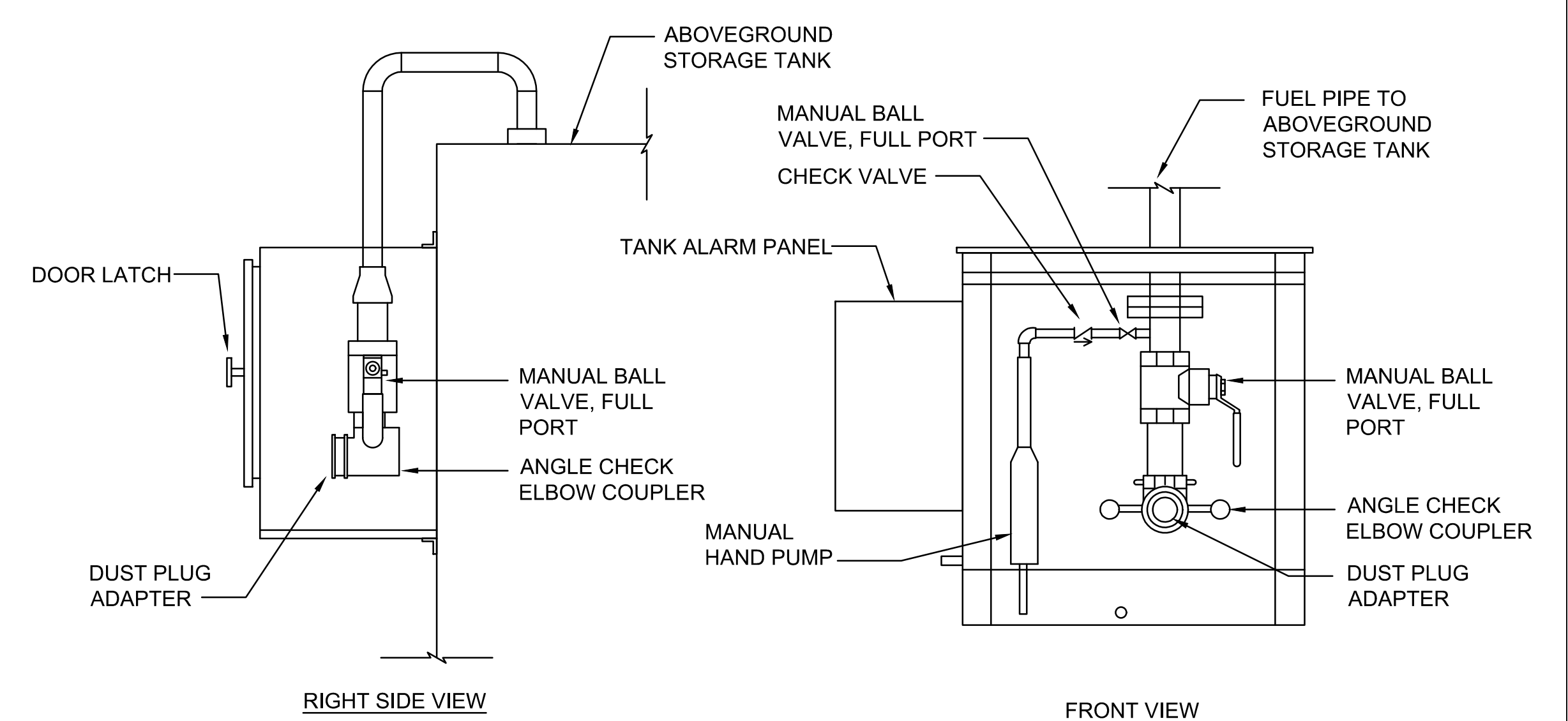


SECTION B-B



PLAN VIEW

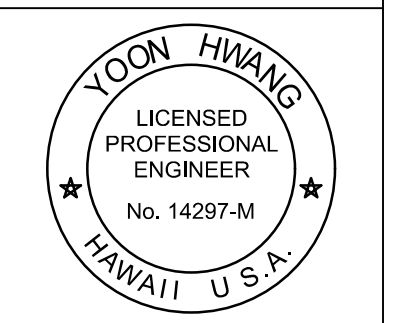
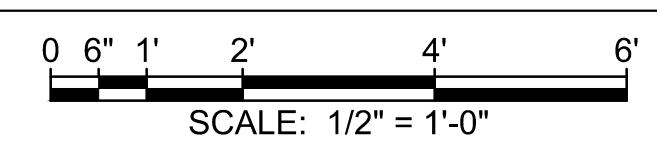
A1
PA501
ABOVEGROUND STORAGE TANK DETAIL
SCALE: 1/2" = 1'-0"



RIGHT SIDE VIEW

FRONT VIEW

A4
PA501
MANUAL FUEL PORT W/ TANK ALARM PANEL
SCALE: NOT TO SCALE



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 EXPIRATION DATE

SYN	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

YH	FM	YH

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMJK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 PLUMBING DETAILS

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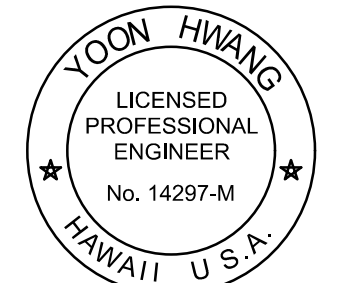
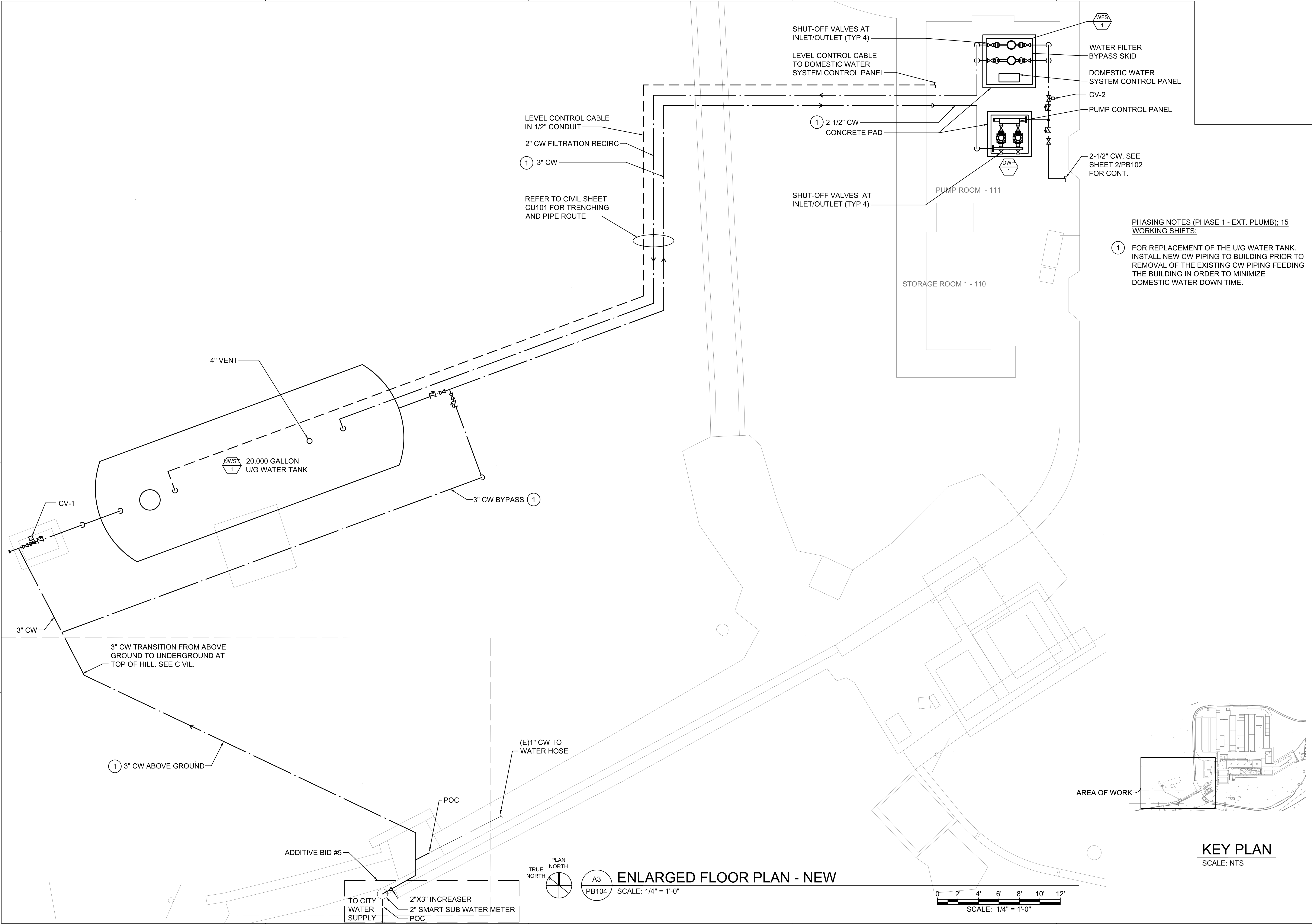
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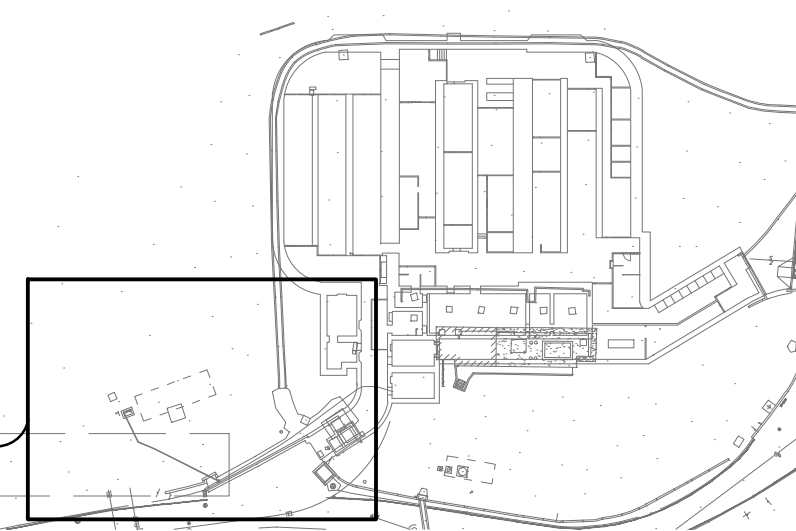
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 SIGNATURE: *Yoon Hwang* 4/30/2024
 EXPIRATION DATE

DATE	DESCRIPTION	SYN

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMJK: 3-1-042:600
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ENLARGED FLOOR PLAN - NEW

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 74 OF 123
PB104



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PHASING NOTES (PHASE 1 - FUEL PLUMB); 15 WORKING SHIFTS:

- 1 INSTALL NEW ABOVEGROUND FUEL TANK PRIOR TO THE REMOVAL OF THE EXISTING U/G FUEL TANK. NEW FUEL PIPING SHALL ALSO BE INSTALLED AS CLOSE AS POSSIBLE TO THE POC PRIOR TO THE REMOVAL OF EXISTING FUEL PIPING.

GENERAL NOTES:

- 1. IF REMOVING, MULTI-INCREMENT SOIL SAMPLELINE SHALL BE PERFORMED. FOR PIPE RUNS OF 90 FEET OR LESS, ONE SOIL SAMPLE IS RECOMMENDED. PIPING EXTERIOR SHALL BE CLEANED AND INSPECTED FOR SIGNS OF CORROSION AND LEAKAGE.
- 2. ENSURE NO SPILLAGE OF THE PIPING CONTENTS OCCUR, NOTIFY FUEL RELEASE TO HDOH IMMEDIATELY AND CLEANUP.

KEYED NOTES:

- 1 REMOVE EQUIPMENT AND ANY ASSOCIATED PIPING, SUPPORTS, CONTROLS, AND WIRING.
- 2 REMOVE PIPING/CONDUIT AND ANY ASSOCIATED SUPPORTS.
- 3 CONTRACTOR TO VERIFY PIPE SIZE.

KEYED NOTES CONT.:

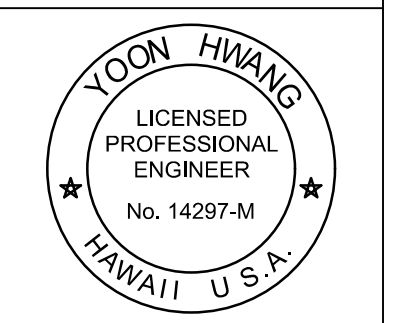
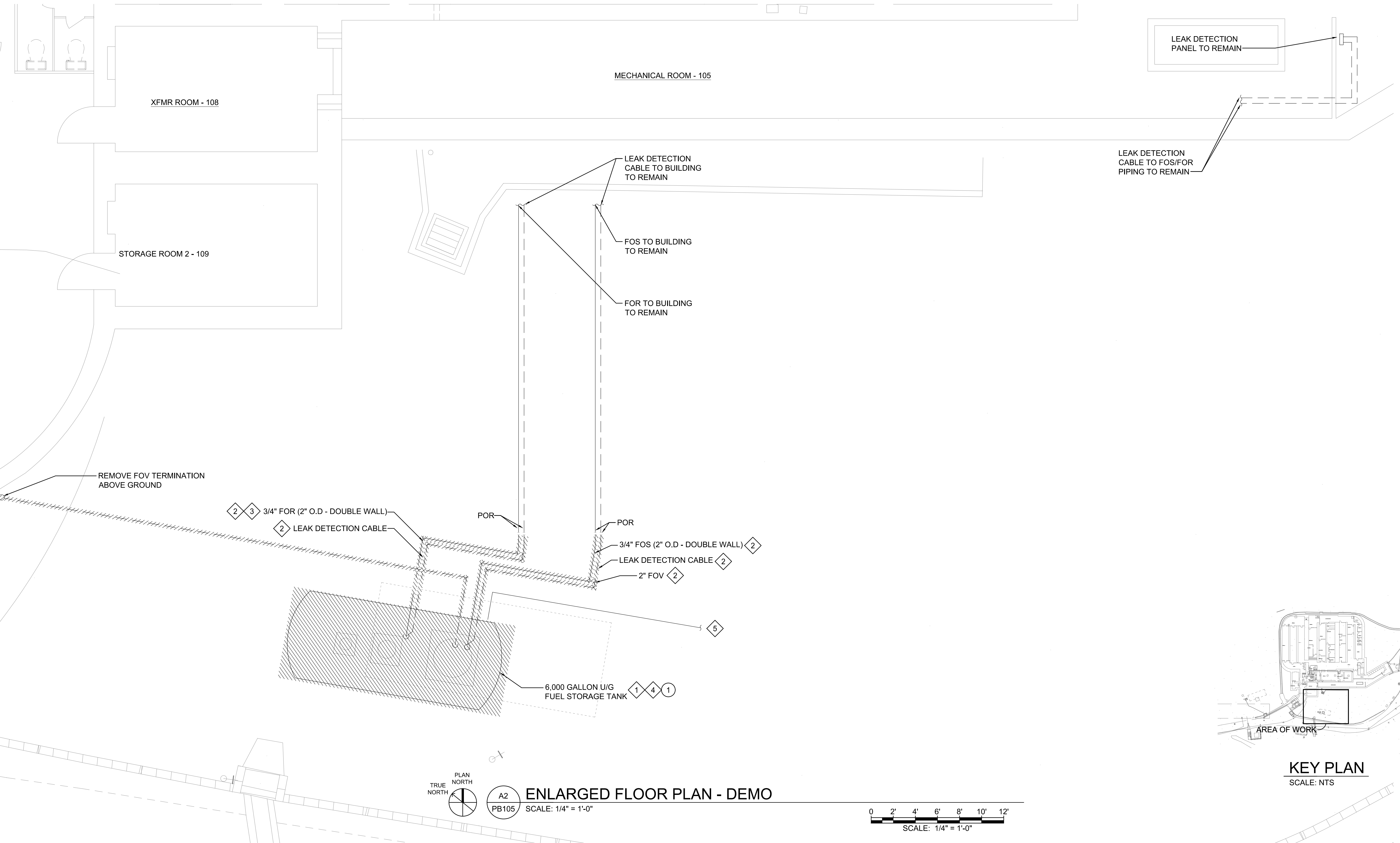
- 4 RECOVER FUEL IN THE (E)U/G STORAGE TANK PRIOR TO REMOVAL. USE THE RECOVERED FUEL TO FILL THE NEW ABOVEGROUND FUEL STORAGE TANK.
- 5 (E)U/G PIPING FROM (E)FUEL TANK. CONTRACTOR TO VERIFY PIPE SIZE AND IF IT IS SERVING ANY ACTIVE EQUIPMENT. DEMO IF THE PIPING IS CONFIRMED TO BE ABANDONED.

D

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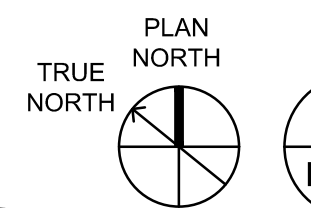
STATE OF HAWAII	DEPARTMENT OF DEFENSE	TMK: 3-1-042:600
DIAMOND HEAD STATE MONUMENT		4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS		
ENLARGED FLOOR PLAN - DEMO		SCALE: 1/4" = 1'-0"
SCALE:	AS NOTED	STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO.	-	
SHEET 75 OF 123	PB105	

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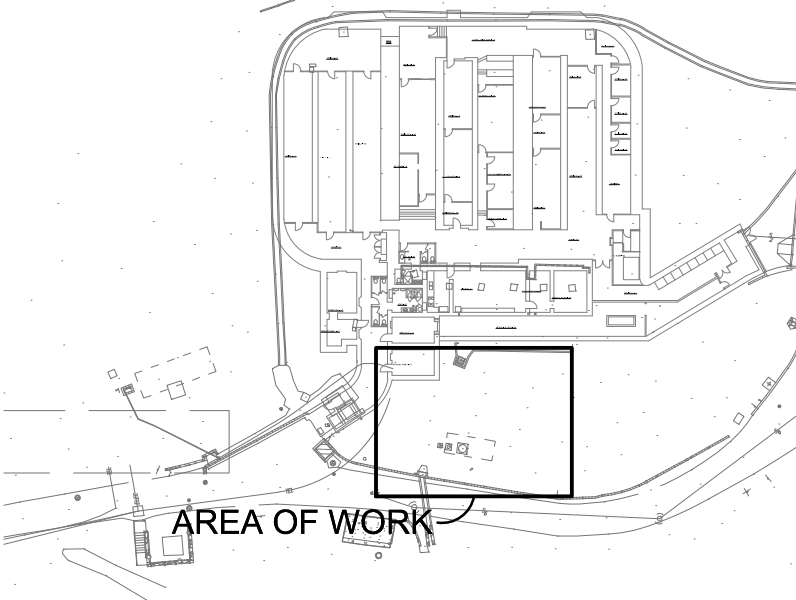
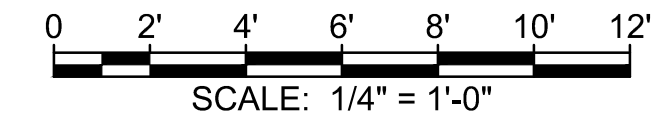
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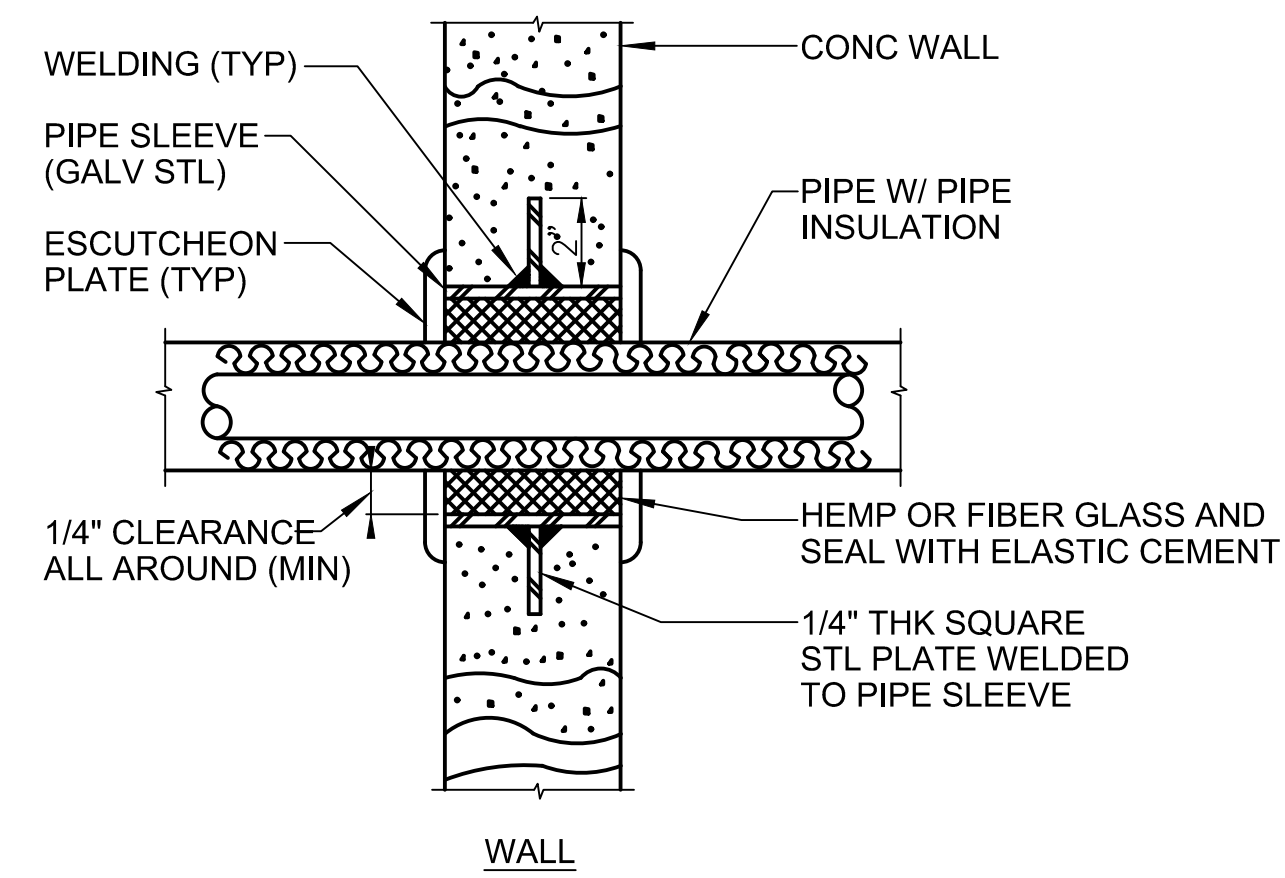
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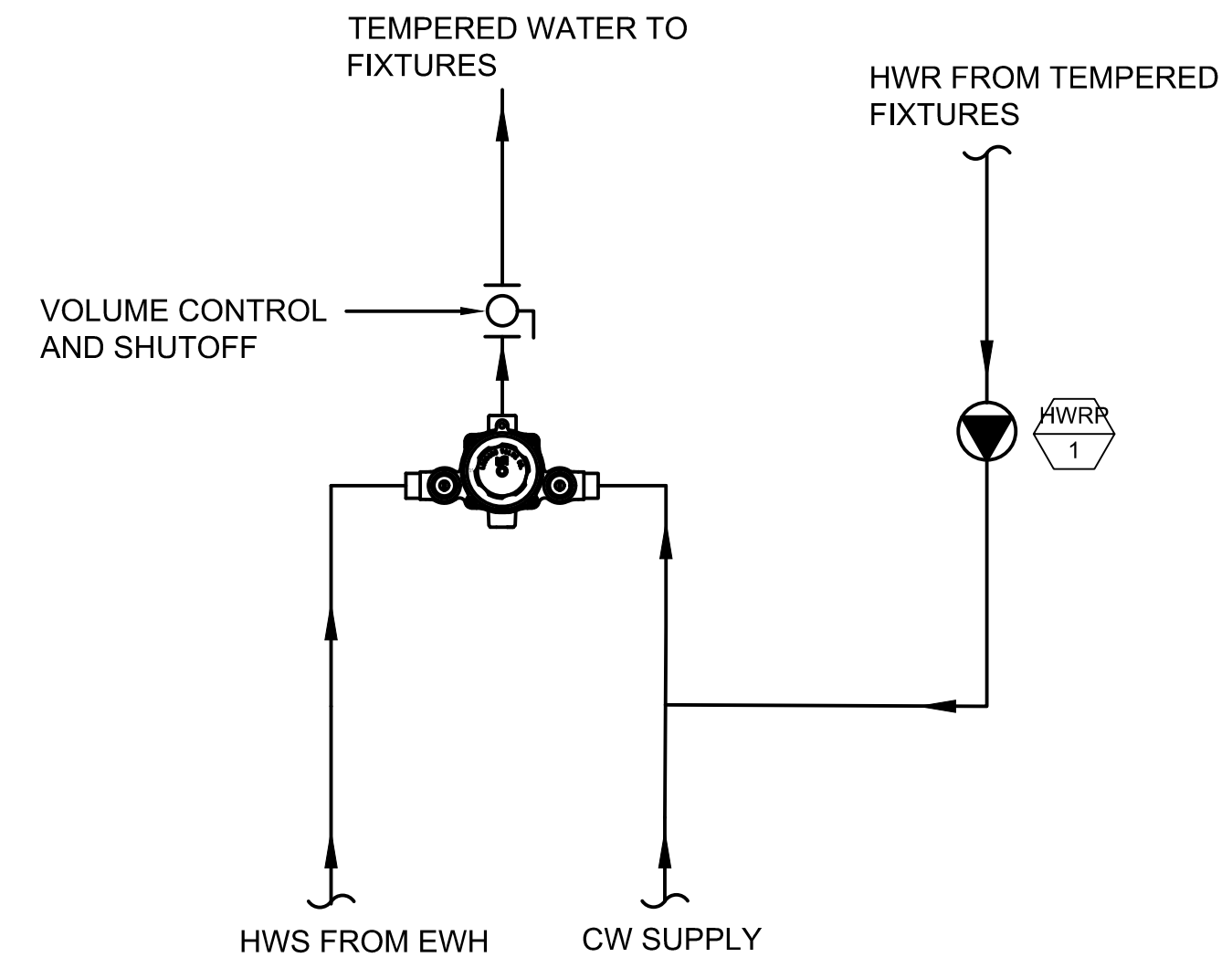


ENLARGED FLOOR PLAN - DEMO
 SCALE: 1/4" = 1'-0"

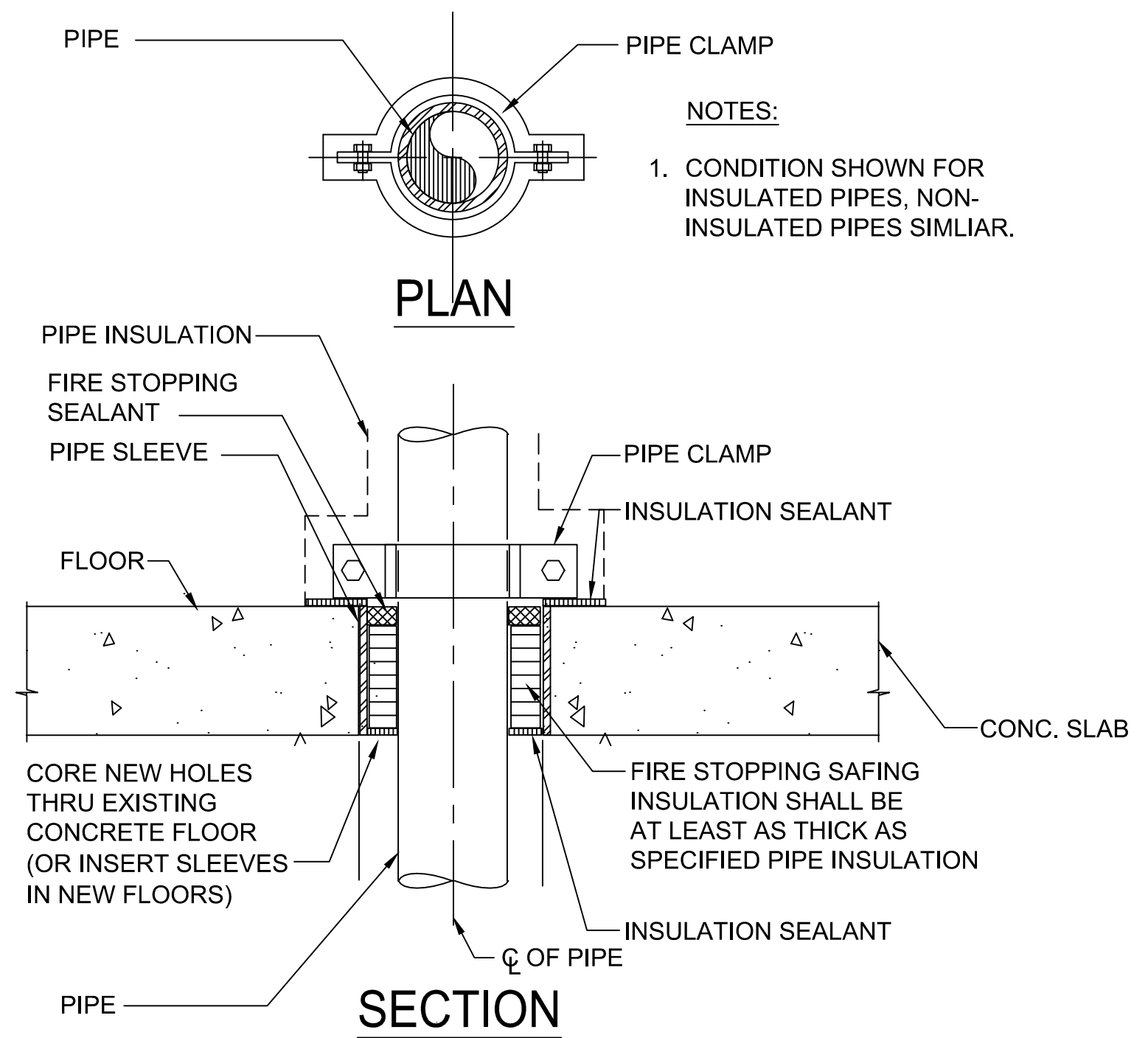




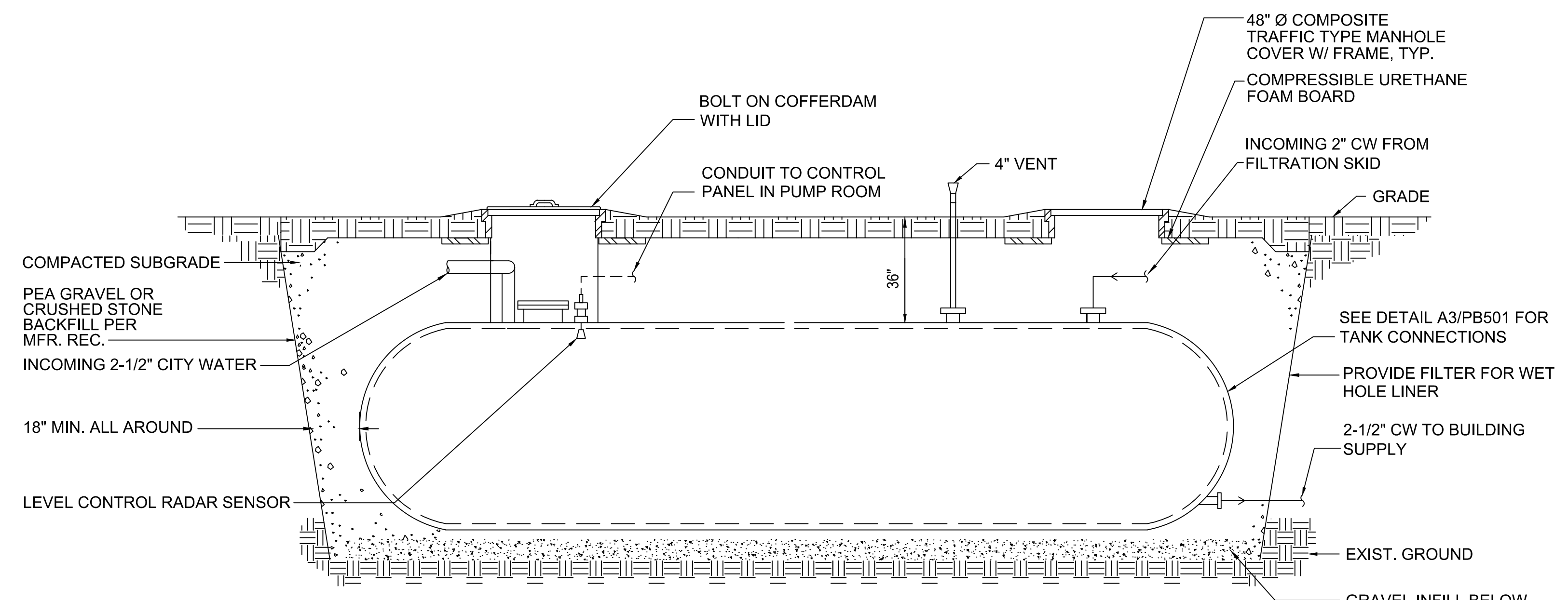
C1 PIPE PENETRATION DETAIL (NON-FIRE RATED)
 PB501 SCALE: NOT TO SCALE



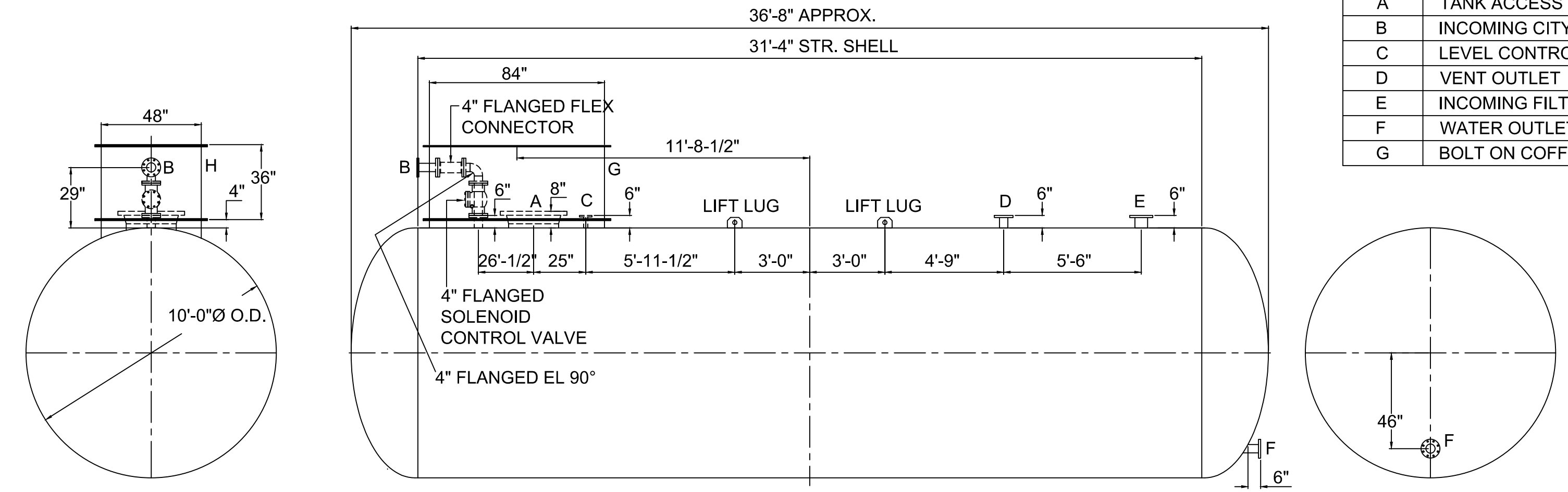
C3 THERMOSTATIC MIXING VALVE
 PB501 SCALE: NOT TO SCALE



B1 PIPE PENETRATION THRU FLOOR
 PB501 SCALE: NOT TO SCALE

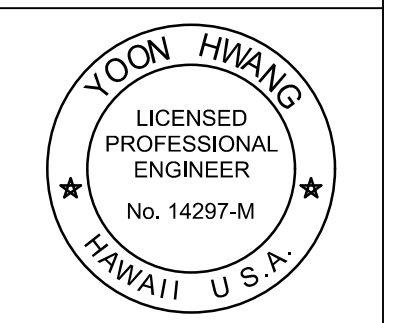


B3 UNDERGROUND WATER TANK INSTALLATION DETAIL
 PB501 SCALE: NOT TO SCALE



A3 UNDERGROUND WATER TANK DETAIL
 PB501 SCALE: NOT TO SCALE

WATER TANK LEGEND	
MARK	DESCRIPTION
A	TANK ACCESS COVER
B	INCOMING CITY WATER INLET
C	LEVEL CONTROL INLET
D	VENT OUTLET
E	INCOMING FILTRATION WATER INLET
F	WATER OUTLET TO BUILDING SUPPLY
G	BOLT ON COFFERDAM WITH LID



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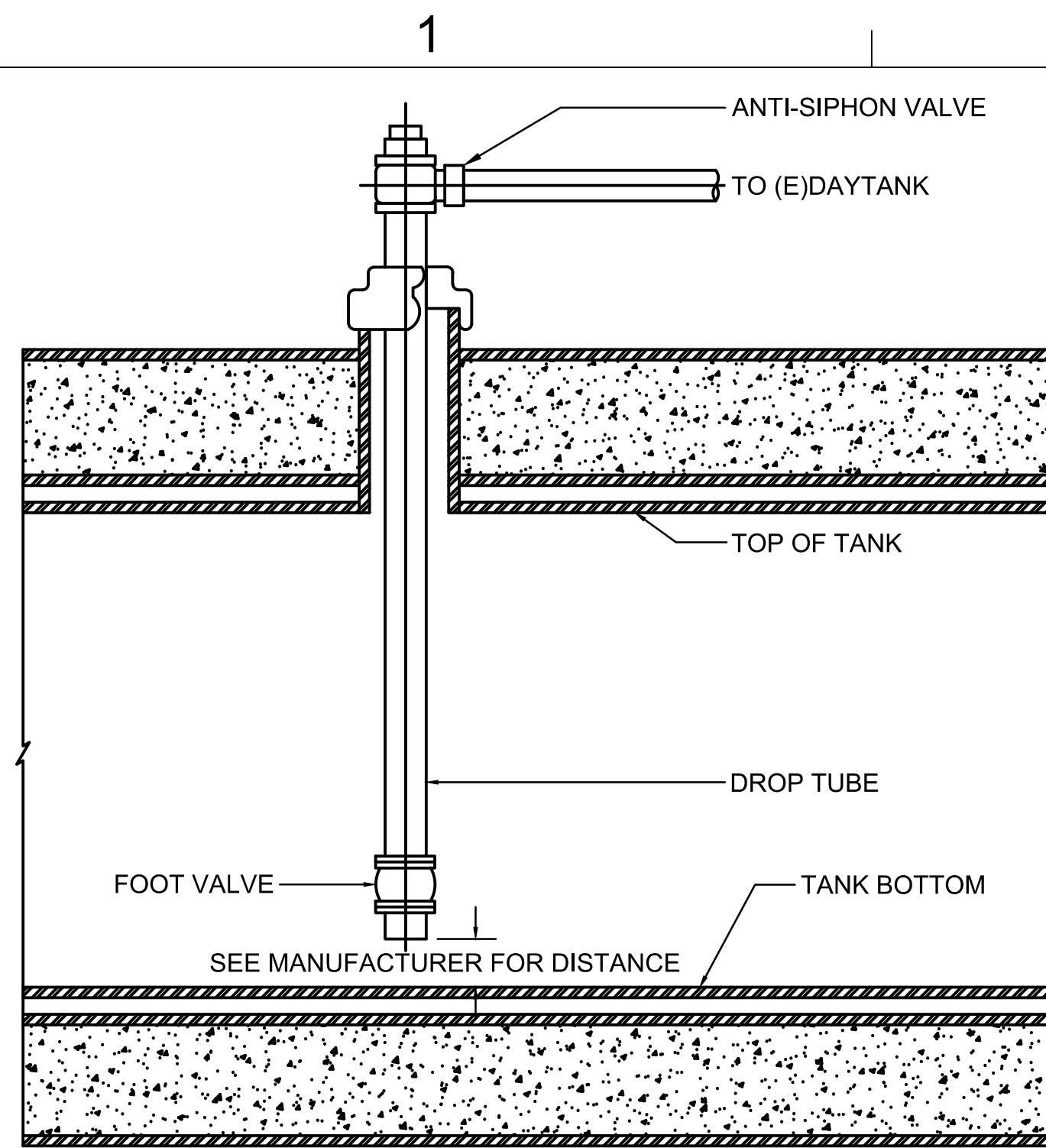
DATE	APPR.	SYN	DESCRIPTION

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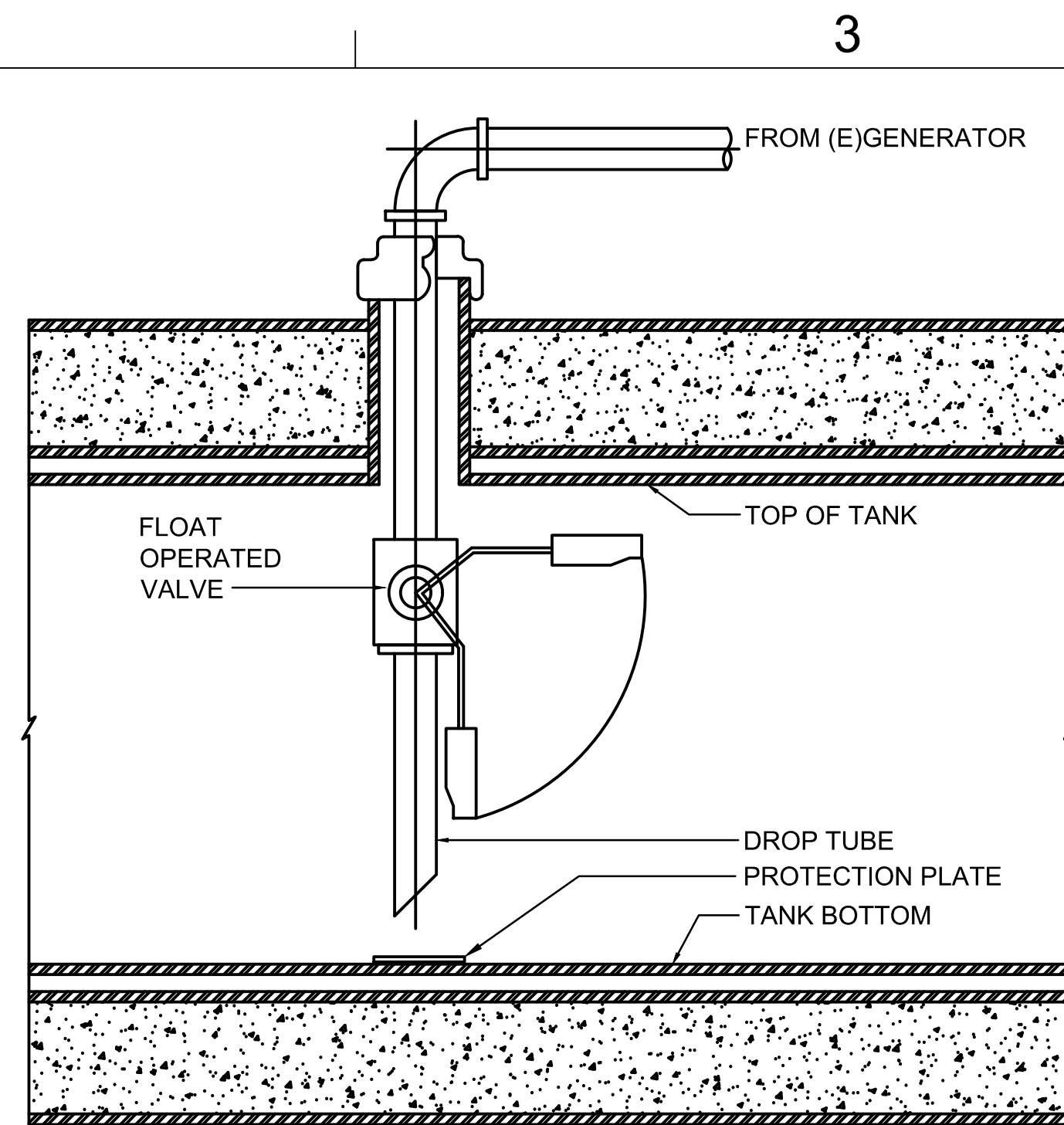
DEPARTMENT OF DEFENSE
 TMJK: 3-1-042:600

DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 PLUMBING DETAILS

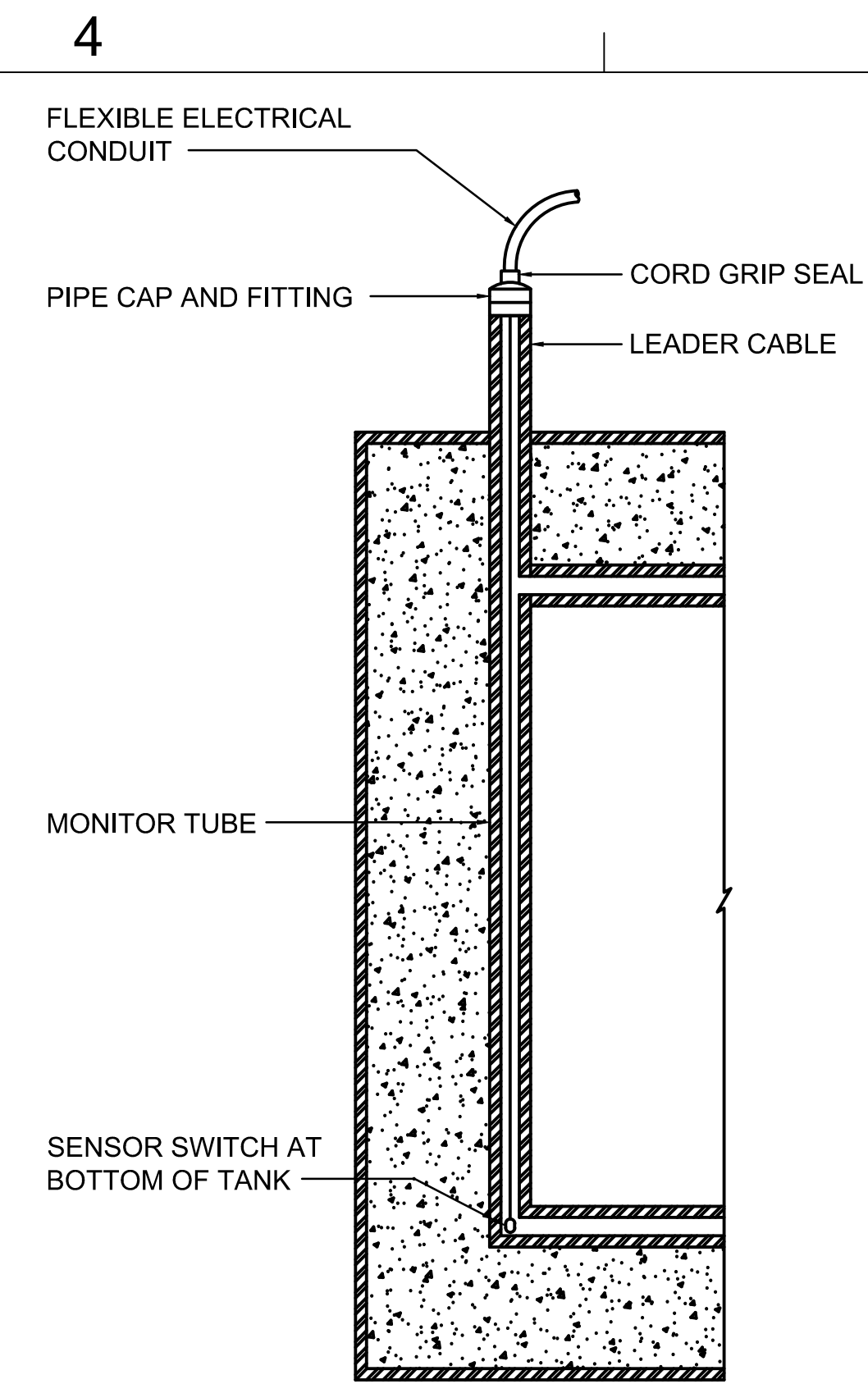
SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 79 OF 123
PB501



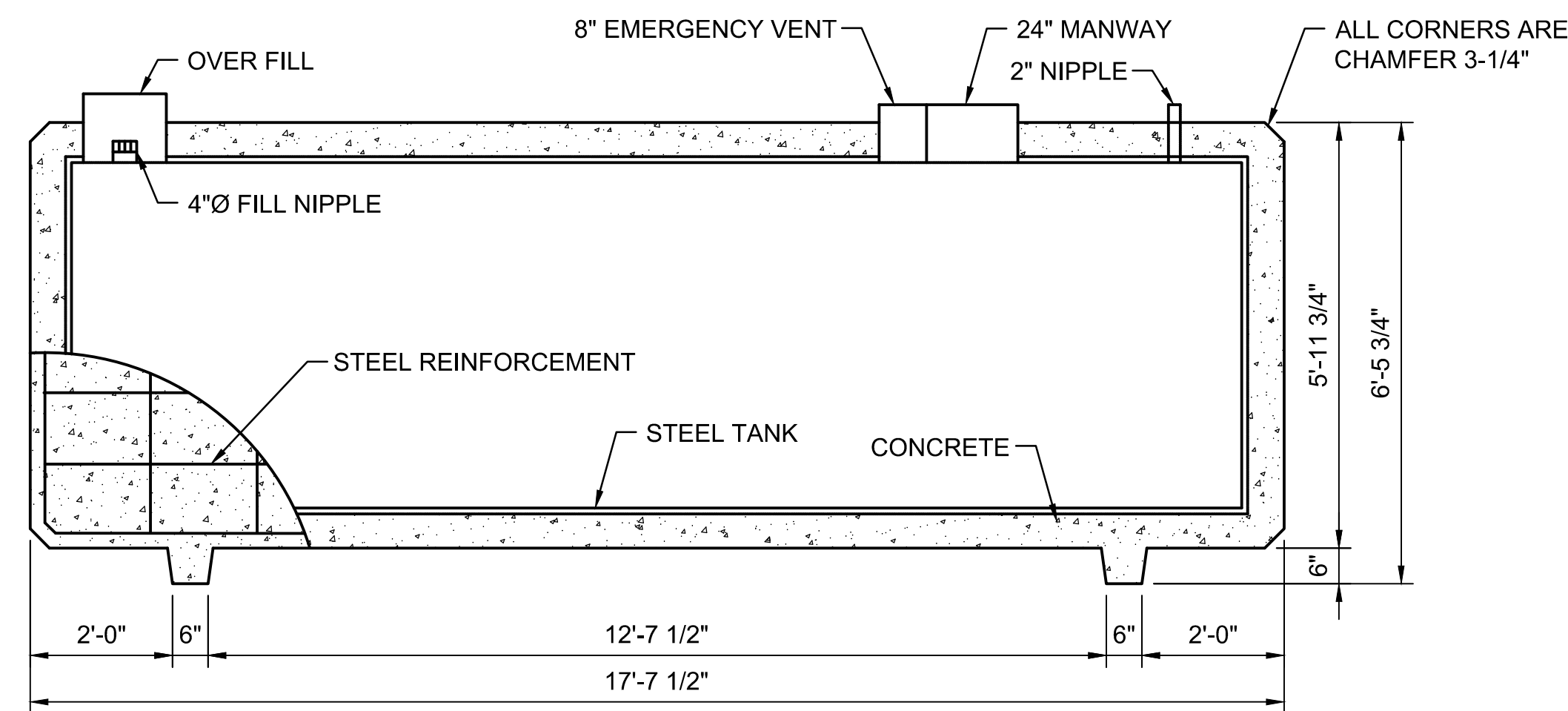
C1
PB502
AST FUEL SUCTION LINE
SCALE: NOT TO SCALE



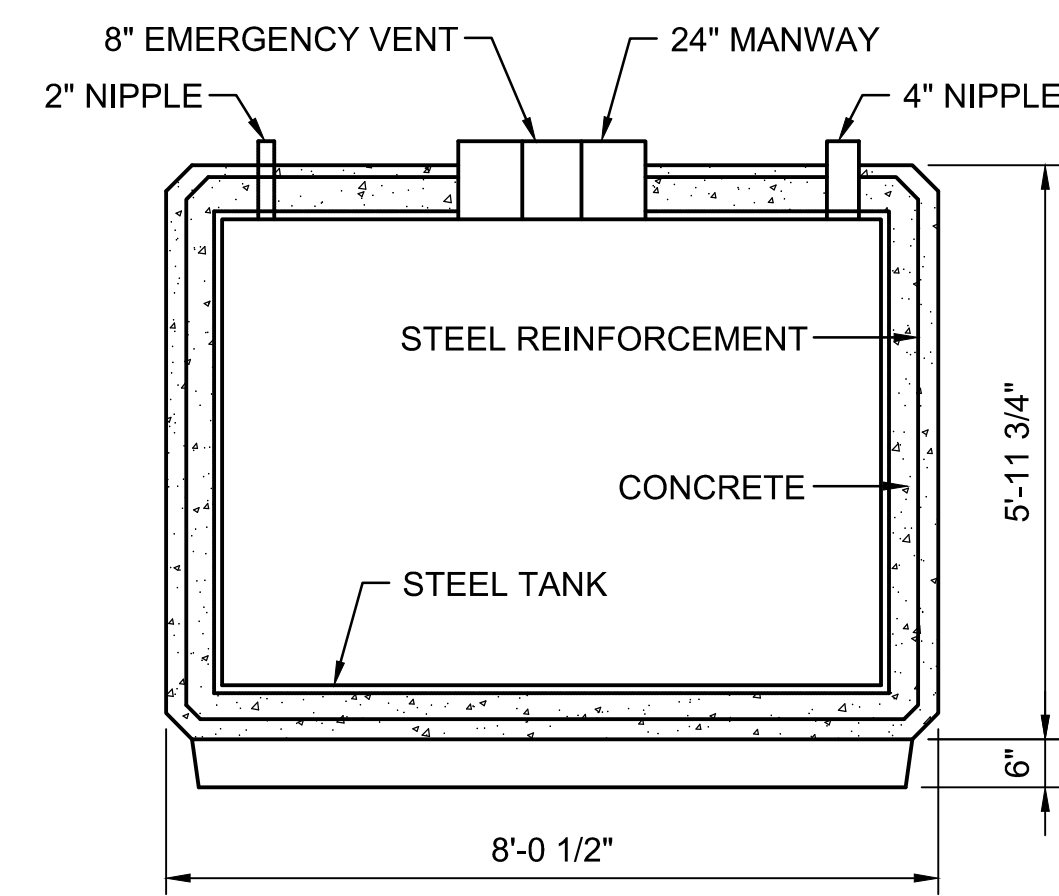
C2
PB502
AST FUEL FILL LINE
SCALE: NOT TO SCALE



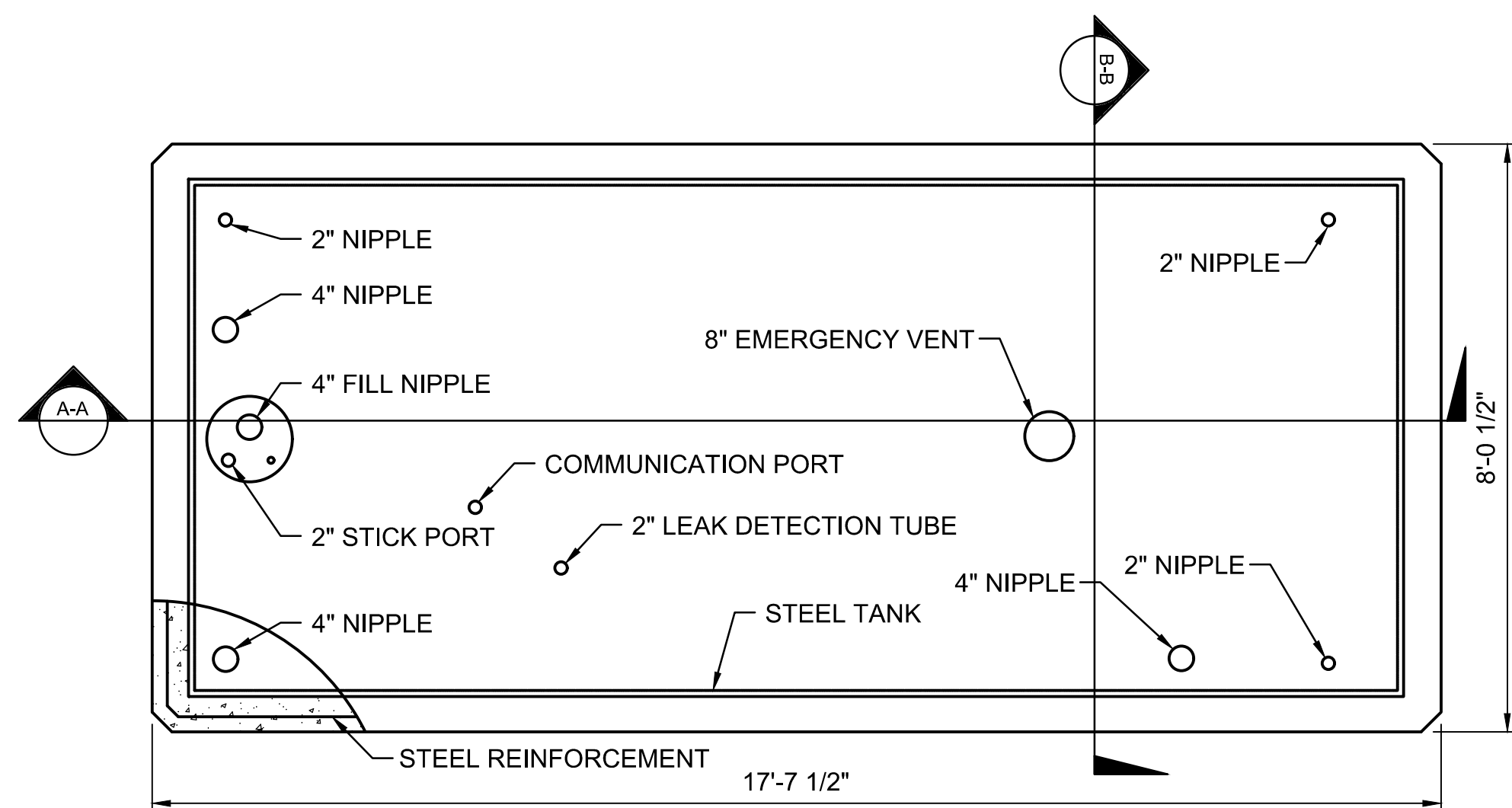
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PB502
FUEL STORAGE TANK INTERSTITIAL LEAK DETECTOR TUBE DETAIL
SCALE: NOT TO SCALE



SECTION A-A

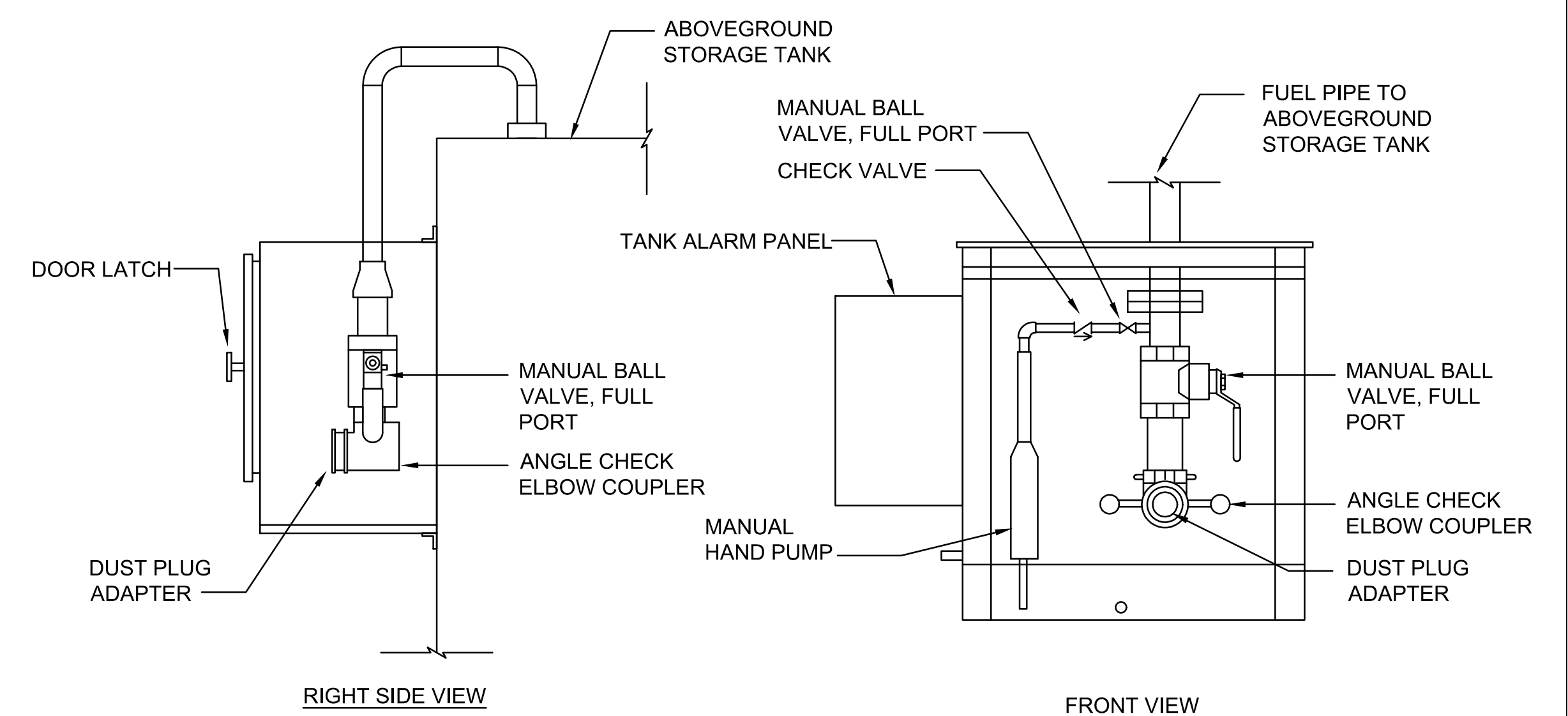


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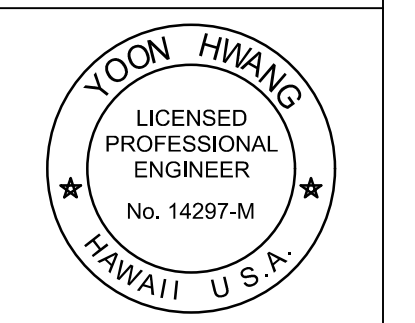
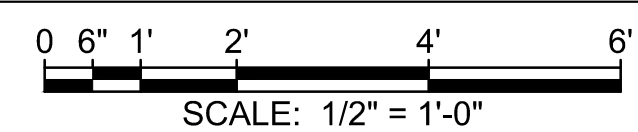


PLAN VIEW

A1
PB502
ABOVEGROUND STORAGE TANK DETAIL
SCALE: 1/2" = 1'-0"



A4
PB502
MANUAL FUEL PORT W/ TANK ALARM PANEL
SCALE: NOT TO SCALE



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DEPARTMENT OF DEFENSE
 TMMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 PLUMBING DETAILS

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 80 OF 123
PB502

ELECTRIC WATER HEATER SCHEDULE

MARK	LOCATION	AREA SERVED	RECOVERY RATE	TANK STORAGE (GAL)	E-POWER (Y/N)	ELECTRICAL				MAXIMUM DIAMETER (IN)	QTY	REMARKS
						INPUT (KW)	VOLTS	PH	HZ			
EW-1	WATER HEATER CLOSET	KITCHEN, MENS AND WOMENS RESTROOMS	21GPH @ 90F RISE	50	NO	4.5	240	1	60	20.25	1	PROVIDE DRAIN PAN WITH DRAINPIPE ROUTED TO NEAREST FLOOR DRAIN

HOT WATER RECIRCULATION PUMP SCHEDULE

MARK	LOCATION	SERVED	FLOW RATE (GPM)	HEAD (FT)	E-POWER (Y/N)	ELECTRICAL					QTY	REMARKS
						V	PH	HZ	WATT S	AMPS		
HWRP-1	MEN'S AND WOMEN'S RESTROOM AND KITCHEN	EW-1	1.25	2.3	NO	115	1	60	25	0.22	1	PROVIDE WITH AQUASTAT AND TIMER.

WATER HEATER EXPANSION TANK SCHEDULE

UNIT	LOCATION	SYSTEM SERVE	TYPE	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	MAX WORKING PRESSURE (PSI)	DIAMETER (IN)	HEIGHT (IN)	OPER. WEIGHT (IN)	NOTES
ET-1	WATER HEATER CLOSET	DOMESTIC HOT WATER SYSTEM	BLADDER TYPE	4.5	2.5	100	11	15.5	10	IN-LINE TANK

THERMOSTATIC MIXING VALVE SCHEDULE

UNIT	BUILDING	LOCATION	MAX OPERATING PRESSURE (PSI)	MAX OUTLET TEMP (°S)	HOT WATER INLET TEMP (°F)	OUTLET TEMP SETPOINT (°F)	INLET, OUTLET SIZE (IN)
TMV	BIRKHIMER	WATER HEATER CLOSET	125	140	140	110	3/4", 1"

WATER FILTRATION SKID SCHEDULE

UNIT	SYSTEM SERVE	FLOW (GPM)	DESCRIPTION	E-POWER (Y/N)	ELECTRICAL		
					V	P	HZ
WFS-1	DOMESTIC WATER; UWST-1	68	FILTRATION UNITS IN PARALLEL OPERATION. PROVIDE WITH DOMESTIC WATER SYSTEM CONTROL PANEL ON THE SKID FOR MONITORING OF UWST-1.	YES	120	1	60

UNDERGROUND WATER STORAGE TANK SCHEDULE

UNIT	SYSTEM SERVE	TYPE	TANK VOLUME (GAL)	DIAMETER	LENGTH
UWST-1	DOMESTIC WATER SYSTEM	UNDERGROUND, HORIZONTAL	20,000	10'-6"	31'-0"

DOMESTIC WATER BOOSTER PUMP SCHEDULE

MARK	LOCATION	AREA SERVED	TYPE	FLOW (GPM)	HEAD (FT)	# OF PUMPS	ELECTRICAL						REMARKS
							V	PH	HZ	HP (PER PUMP)	FLA (PANEL)	MCA (PANEL)	
DWP-1	ROOM 10 - PUMP ROOM	BUILDING DOMESTIC WATER	VERTICAL MULTISTAGE CENTRIFUGAL	68	112	2	208	3	60	3	23.2	25.9	DUPLEX PUMP SET WITH VFD

ABOVEGROUND FUEL STORAGE TANK SCHEDULE

UNIT	SYSTEM SERVE	TYPE	FUEL TYPE	TANK VOLUME (GAL)	DIMENSIONS			OPER. WEIGHT (LBS)
					LENGTH	WIDTH	HEIGHT	
AST-1	GENERATOR FUEL	ABOVEGROUND, HORIZONTAL	DIESEL	6,000	17'-7"	8'-0"	8'-9"	101,600

PLUMBING FIXTURE SCHEDULE

FIXTURE	SYMBOL	QUANTITY	WASTE	VENT	COLD WATER	HOT WATER	ELECTRICAL POWER	REMARKS
WATER CLOSET	WC	7	4"	2"	1"	---	---	WHITE, LOW FLOW TYPE (1.28 GAL/FLUSH), FLOOR MOUNTED FLOOR OUTLET, SIPHON JET, MANUAL FLUSH VALVE, TOP INLET SPUD, ELONGATED BOWL.

CONTROL VALVE SCHEDULE

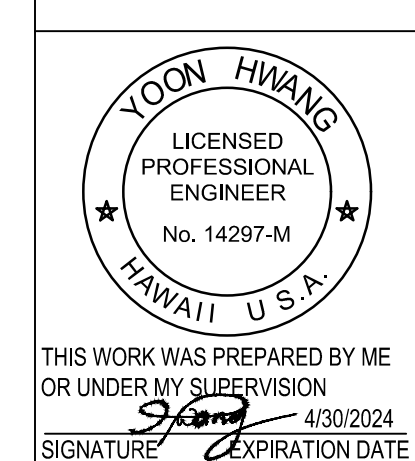
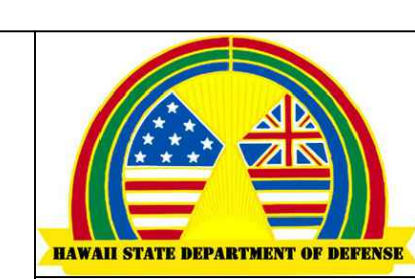
VALVE NO.	EQUIPMENT	MAX FLOW (GPM)	MAX PRESSURE DROP (FT HEAD)	PIPE SIZE (IN)	VALVE SIZE (IN)	VALVE Cv AT FULL FLOW	VALVE TYPE	CONFIG.	ACTION	NORMAL POSITION	E-POWER (Y/N)	ELECTRICAL V/P/HZ
CV-1	UWST-1	140	9.8	2-1/2"	2-1/2"	68	GLOBE	2-WAY	SOLENOID	CLOSE	YES	120/1/60
CV-2	WFS-1	100	4.8	2"	2"	47	GLOBE	2-WAY	SOLENOID	CLOSE	YES	120/1/60

FUEL MONITORING PANEL SCHEDULE

UNIT	SYSTEM SERVE	FUEL TYPE	DESCRIPTION	E-POWER (Y/N)	ELECTRICAL			
					V	P	HZ	AMPS
FMP-1	FP-1; AST-1	DIESEL	PROVIDE WITH CONNECTIONS FOR FUEL PIPING LEAK DETECTION CABLES AND FUEL TANK LEVEL MONITORING CABLE.	YES	120	1	60	10

FUEL PORT SCHEDULE

UNIT	SYSTEM SERVE	FUEL TYPE	DESCRIPTION	E-POWER (Y/N)	ELECTRICAL			
					V	P	HZ	AMPS
FP-1	AST-1	DIESEL	MANUAL FILL SYSTEM FOR ABOVEGROUND STORAGE TANK WITH EXTERIOR CONNECTION FOR FUEL TRUCK. PROVIDE WITH TANK LEVEL MONITOR AND INTERNAL OVERFLOW ALARM. CONTROLS IN NEMA 4X ENCLOSURE.	YES	120	1	60	10



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DEPARTMENT OF DEFENSE

CONSTRUCTION DOCUMENTS

4204 DIAMOND HEAD RD HONOLULU, HI 96815

STATE OF HAWAII

DIAMOND HEAD STATE MONUMENT

PLUMBING SCHEDULES

TMNK: 3-1-042:600

BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

SCALE: AS NOTED

STATE JOB NO. CA-20233-C

FEDERAL PROJECT NO. -

SHEET 81 OF 123

DATE: 03/01/2024

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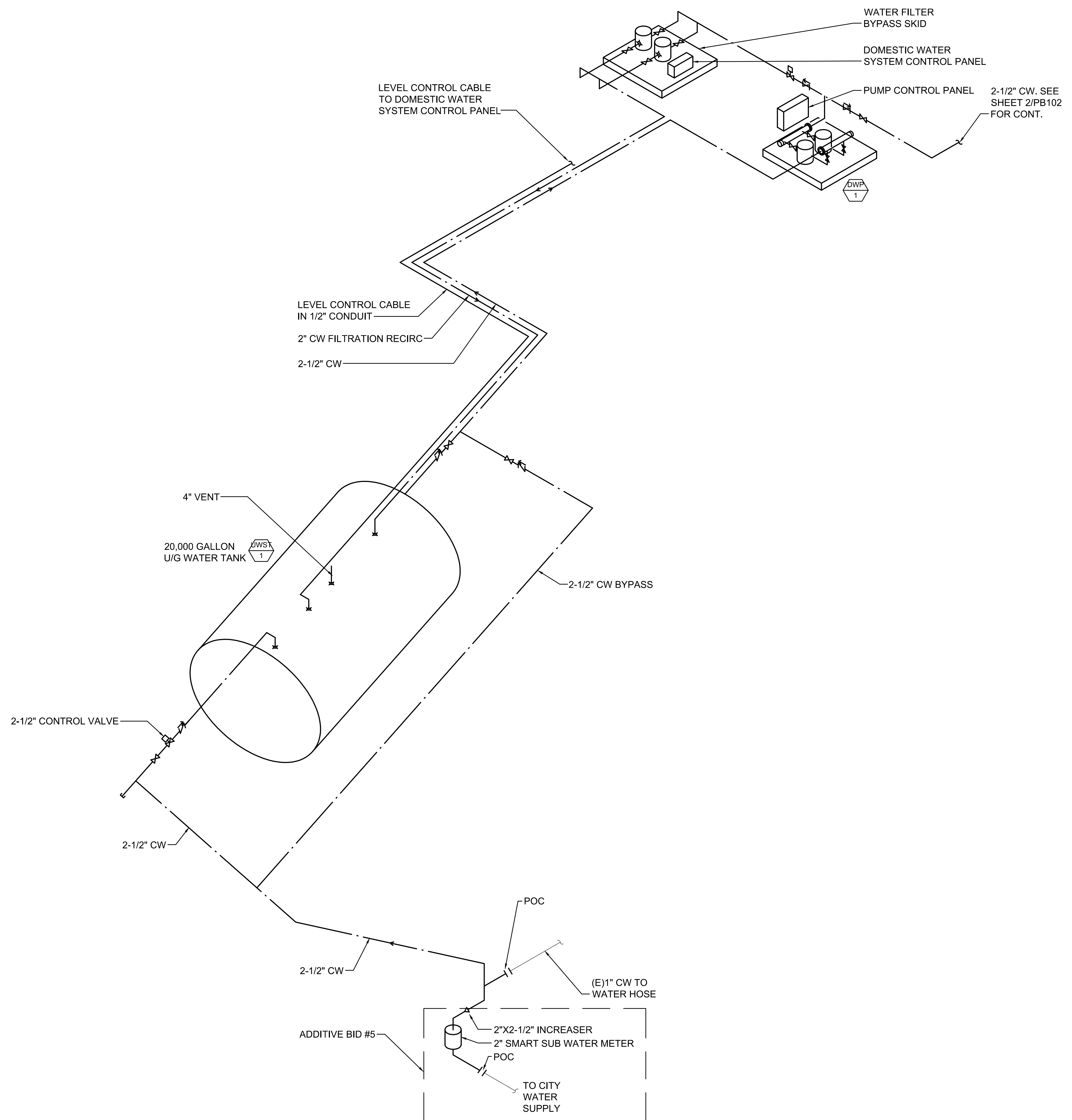
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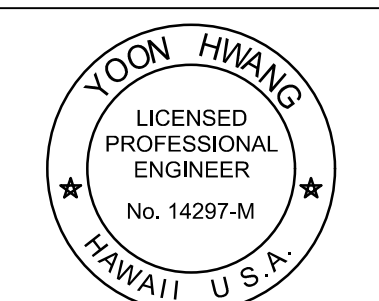
B

A



A2
PB904

DOMESTIC WATER ISOMETRIC DIAGRAM
SCALE: NOT TO SCALE



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SYN	DESCRIPTION	DATE	APPR.

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CONSTRUCTION DOCUMENTS
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YH	FM	YH

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 DOMESTIC WATER TANK ISOMETRIC

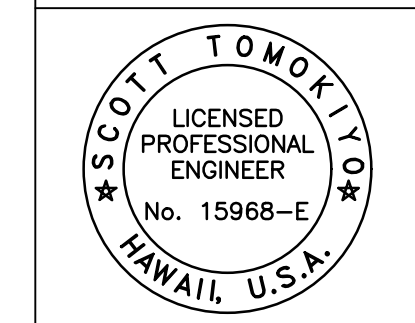
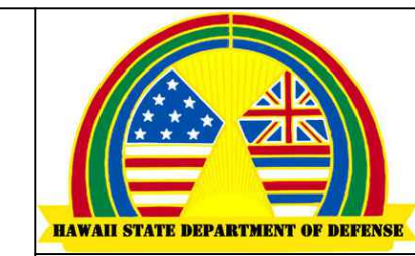
SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 85 OF 123
PB904

ELECTRICAL SYMBOL LIST / MOUNTING HEIGHT SCHEDULE

MOUNTING HEIGHT FROM FLOOR TO TOP	SYMBOL	(SPECIAL MOUNTING HEIGHTS INDICATED ON PLAN)		DESCRIPTION
		SYMBOL		
		EXISTING	NEW	
				LUMINAIRE, 1'X4' NOMINAL, MOUNTING STYLE AS INDICATED IN LIGHT FIXTURE SCHEDULE
				LUMINAIRE, LINEAR, WALL MOUNTED
				LUMINAIRE, 2'X4' NOMINAL, MOUNTING STYLE AS INDICATED IN LIGHT FIXTURE SCHEDULE
				LUMINAIRE, 2'X2' NOMINAL, MOUNTING STYLE AS INDICATED IN LIGHT FIXTURE SCHEDULE
				LUMINAIRE, MOUNTING STYLE AS INDICATED IN LIGHT FIXTURE SCHEDULE
				LUMINAIRE, WALL MOUNTED
				ILLUMINATED EXIT SIGN, WALL MOUNTED, DIRECTIONAL ARROWS AS INDICATED
				ILLUMINATED EXIT SIGN, CEILING MOUNTED, DIRECTIONAL ARROWS AS INDICATED
46"				LIGHT SWITCH, WALL MOUNTED, 1P20A, 120/277V, 1HP MAXIMUM
				OCCUPANCY SENSOR, CEILING MOUNTED
7'-0"				OCCUPANCY SENSOR, WALL MOUNTED
46"				WALL BOX SWITCH/OCCUPANCY SENSOR, SELF-CONTAINED DUAL TECHNOLOGY TYPE, 800W MINIMUM, 120/277V, WALL MOUNTED
46"				LIGHTING CONTROL KEYPAD, WALL MOUNTED ("2" INDICATES NUMBER OF KEYPAD BUTTONS, OTHER NUMBERS SIMILAR)
46"				LOW VOLTAGE CONTROL SWITCH, WALL MOUNTED
				HOMERUN ARROW TO PANELBOARD. LETTER INDICATES PANELBOARD, NUMBERS INDICATES CIRCUITS.
				INTERIOR WORK: CONCEALED CONDUIT IN FINISHED FLOOR OR BELOW GRADE (NO HASHMARKS INDICATE 2 CURRENT CARRYING CONDUCTORS AND 1 GROUND CONDUCTOR WITHIN, ALL OTHERS SIMILAR). EXTERIOR WORK: CONCRETE ENCASED UNDERGROUND DUCT LINE, SEE DUCT SECTION INDICATOR AND SCHEDULE.
				CONCEALED CONDUIT IN CEILING OR WALLS, (HASHMARKS INDICATE 3-WIRES WITHIN, ALL OTHERS SIMILAR).
				EXPOSED RACEWAY, PROVIDE STRAP 8'-0" ON CENTER MAXIMUM
				LIQUID-TIGHT FLEXIBLE CONDUIT
				DENOTES DEMOLITION/REMOVAL
18"				RECEPTACLE, WALL MOUNTED, DUPLEX, GROUNDING TYPE, 125V, NEMA TYPE 5-20R
18"				RECEPTACLE, WALL MOUNTED, DUPLEX, GFCI TYPE, 125V, NEMA TYPE 5-20R
18"				RECEPTACLE, WALL MOUNTED, DUPLEX, GFCI TYPE, WEATHER-RESISTANT DEVICE WITH WEATHERPROOF-WHILE-IN-USE COVER PLATE
				JUNCTION BOX, LARGE, WALL MOUNTED
				JUNCTION BOX, LARGE, HORIZONTALLY MOUNTED
				JUNCTION BOX, HORIZONTALLY MOUNTED
18"				JUNCTION BOX, WALL MOUNTED
				EQUIPMENT TERMINATION WITH FLEXIBLE CONDUIT WHIP
60"				COMBINATION MOTOR STARTER/NON-FUSED DISCONNECT SWITCH, FURNISHED BY MECHANICAL CONTRACTOR & INSTALLED BY ELECTRICAL CONTRACTOR
				MOTOR CONNECTION
60"				MAGNETIC MOTOR STARTER, FURNISHED BY MECHANICAL CONTRACTOR & INSTALLED BY ELECTRICAL CONTRACTOR
60"				NON-FUSED DISCONNECT SWITCH, 3P30A UNLESS OTHERWISE NOTED, VOLTAGE TO MATCH CIRCUITING
60"				ENCLOSED CIRCUIT BREAKER
72"				PANELBOARD
46"				MANUAL MOTOR STARTER WITH THERMAL OVERLOAD, 1HP MAXIMUM
				PARKING LOT/ROADWAY LIGHT ASSEMBLY, SINGLE LUMINAIRE PER POLE

ELECTRICAL SYMBOL LIST / MOUNTING HEIGHT SCHEDULE, CONTINUED

MOUNTING HEIGHT FROM FLOOR TO TOP	SYMBOL	(SPECIAL MOUNTING HEIGHTS INDICATED ON PLAN)		DESCRIPTION
		SYMBOL		
		EXISTING	NEW	
				POWER TRANSFORMER
				GROUND
				CIRCUIT BREAKER
				NON-FUSED DISCONNECT SWITCH
				TRANSFER SWITCH
				POTENTIAL TRANSFORMER
				CURRENT TRANSFORMER
				METER SOCKET AND KILOWATT HOUR METER WITH DEMAND REGISTER
				DIESEL ENGINE GENERATOR SET
				FLOOD LIGHT FIXTURE
				EQUIPMENT TAG; EXHAUST FAN "EF-1" INDICATED; ALL OTHERS SIMILAR
				LIGHT FIXTURE TYPE INDICATOR; FIXTURE TYPE "A" INDICATED; ALL OTHERS SIMILAR
				KEYNOTE INDICATOR - DEMOLITION WORK
				KEYNOTE INDICATOR - NEW WORK
				DETAIL INDICATOR: TOP HALF DENOTES DETAIL NUMBER, BOTTOM HALF DENOTES SHEET NUMBER
				+42" DENOTES 42" ABOVE FINISHED FLOOR OR GRADE
				ATS AUTOMATIC TRANSFER SWITCH
				GFCI GROUND FAULT CIRCUIT INTERRUPTER
				GND GROUND
				HP HORSEPOWER
				KVA KILOVOLT-AMPERE
				KW KILOWATT
				KWH KILOWATT-HOUR
				MIN MINIMUM
				WP WEATHERPROOF



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 Scott Tomokiyo 4/30/2024
 SIGNATURE EXPIRATION DATE

DATE	APPR.	SYN	DESCRIPTION

SUBMITTAL PHASE
 CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024
 SF KR ST

DEPARTMENT OF DEFENSE
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 BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS
 ELECTRICAL LEGEND AND ABBREVIATION

CITY AND COUNTY OF HONOLULU
 REVISED ORDINANCES OF HONOLULU 2021
 CHAPTER 16B

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

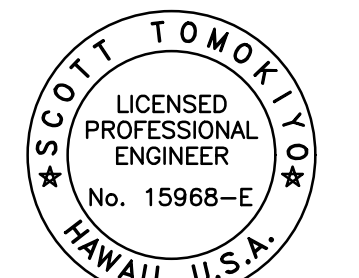
X ELECTRICAL COMPONENT SYSTEMS

SIGNATURE: Scott Tomokiyo DATE: 02/12/2024
 NAME: SCOTT TOMOKIYO
 TITLE: ELECTRICAL ENGINEER
 LICENSE No.: 15968-E

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 86 OF 123
E-001

GENERAL ELECTRICAL NOTES:

- ALL WORK SHOWN ON THE ELECTRICAL DRAWINGS IS NEW UNLESS OTHERWISE NOTED. ALL MATERIALS SHALL BE NEW AND "LISTED" OR "LABELED" AS DEFINED BY THE NATIONAL ELECTRICAL CODE (NEC). WORK INCLUDES INSTALLATION OF ALL ELECTRICAL SYSTEMS COMPLETE AND OPERATIONAL AS LIMITED BY THE INTENT OF THE CONTRACT DOCUMENTS.
- ALL WORK SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE (NEC), NATIONAL ELECTRICAL SAFETY CODE, AND BUILDING ORDINANCES OF THE CITY AND COUNTY OF HONOLULU. CONSTRUCTION PRACTICES SHALL CONFORM TO THE LATEST EDITION OF AMERICAN ELECTRICIANS' HANDBOOK BY CROFT AND APPLICABLE INSTRUCTIONS OF MANUFACTURERS OF EQUIPMENT AND MATERIAL SUPPLIED FOR THIS PROJECT.
- OBTAIN AND PAY FOR BUILDING / ELECTRICAL PERMIT, ARRANGE FOR PERIODIC INSPECTION BY LOCAL AUTHORITIES, AND DELIVER CERTIFICATE OF FINAL INSPECTION TO THE CONTRACTING OFFICER.
- RETENTION OF PLANS: ONE SET OF APPROVED PLANS, SPECIFICATIONS, AND COMPUTATIONS SHALL BE RETAINED BY THE BUILDING OFFICIAL FOR A PERIOD OF NOT LESS THAN 90 DAYS FROM DATE OF COMPLETION OF THE WORK COVERED THEREIN, AND ONE SET OF APPROVED PLANS SHALL BE RETURNED TO THE APPLICANT, AND SAID SET SHALL BE KEPT ON THE SITE OF THE BUILDING OR WORK AT ALL TIMES DURING WHICH THE WORK AUTHORIZED THEREBY IS IN PROGRESS.
- STRUCTURES UNDERGOING CONSTRUCTION, ALTERATION, OR DEMOLITION OPERATIONS, INCLUDING THOSE IN UNDERGROUND LOCATIONS, SHALL COMPLY WITH NFPA 241, STANDARD FOR SAFEGUARDING CONSTRUCTION, ALTERATION, AND DEMOLITION OPERATIONS, AND NFPA 1, AS LOCALLY AMENDED.
- FIRE SAFETY DURING ALTERATION:
 - NFPA 1, 16.4.4.1 WHERE THE BUILDING IS PROTECTED BY FIRE PROTECTION SYSTEMS, SUCH SYSTEMS SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES DURING ALTERATION.
 - NFPA 1, 16.4.4.2 WHERE ALTERATION REQUIRES MODIFICATION OF A PORTION OF THE FIRE PROTECTION SYSTEM, THE REMAINDER OF THE SYSTEM SHALL BE KEPT IN SERVICE AND THE FIRE DEPARTMENT SHALL BE NOTIFIED.
 - NFPA 1, 16.4.4.3 WHEN IT IS NECESSARY TO SHUT DOWN THE SYSTEM, THE AHJ SHALL HAVE THE AUTHORITY TO REQUIRE ALTERNATE MEASURES OF PROTECTION UNTIL THE SYSTEM IS RETURNED TO SERVICE.
 - NFPA 1, 10.7.1.1 AS NECESSARY DURING EMERGENCIES, MAINTENANCE, DRILLS, PRESCRIBED TESTING, ALTERATIONS, OR RENOVATIONS, PORTABLE OR FIXED FIRE-EXTINGUISHING SYSTEMS OR DEVICES OR ANY FIRE-WARNING SYSTEM SHALL BE PERMITTED TO BE MADE INOPERATIVE OR INACCESSIBLE. A FIRE WATCH SHALL BE REQUIRED AS SPECIFIED IN SECTIONS 13.3.3.6.5.2(4)(b), 13.7.1.5.3, 16.5.4, 34.6.3.3, 41.2.2.6, 41.2.2.7, 41.2.4, 41.3.5, 41.4.1, 34.5.4.3, AND 25.1.8 AT NO COST TO THE AHJ. NFPA 1, AS LOCALLY AMENDED.
- THE DRAWINGS DO NOT REFLECT ALL THE EXISTING CONDITIONS THAT MAY BE ENCOUNTERED DURING CONSTRUCTION. VISIT THE PROJECT SITE AND BECOME FAMILIAR WITH THE READILY OBSERVABLE EXISTING CONDITIONS, THE EXTENT OF ANY DEMOLITION, RELOCATION, RECONNECTION, AND THE NEW WORK PRIOR TO BIDDING. REPORT ANY READILY OBSERVABLE DISCREPANCIES AND/OR DIFFERENCES BETWEEN THE EXISTING CONDITIONS AND THE CONSTRUCTION DOCUMENTS TO THE CONTRACTING OFFICER. RESOLVE ALL READILY OBSERVABLE DISCREPANCIES AND QUESTIONS PRIOR TO THE START OF WORK. BID SUBMISSION SHALL BE CONSIDERED AS EVIDENCE THAT THE CONTRACTOR HAS VISITED THE SITE AND RESOLVED ALL READILY OBSERVABLE DISCREPANCIES AND QUESTIONS AND NO EXTRA PAYMENT WILL BE AUTHORIZED FOR WORK REQUIRED BY THE CONTRACTOR'S FAILURE TO DO SO.
- COORDINATE ALL ELECTRICAL WORK WITH THE WORK OF THE OTHER TRADES AND SCHEDULE WORK TO MINIMIZE THE NUMBER AND DURATION OF ELECTRICAL OUTAGES AND IMPACT TO THE OPERATIONS IN OR ADJACENT TO THE PROJECT AREA. COORDINATE ACCESS TO THE PROJECT AREA AND SCHEDULE ALL REQUIRED SYSTEM OUTAGES WITH THE CONTRACTING OFFICER.
- VERIFY AND COORDINATE ALL PENETRATIONS PRIOR TO THE START OF CONSTRUCTION. OBTAIN APPROVAL BEFORE MAKING ANY PENETRATIONS THROUGH STRUCTURAL MEMBERS OR FIRE RATED WALLS AND CEILINGS.
- SCAN (E.G. X-RAY, ELECTROMAGNETIC, ETC.) ALL CONCRETE WALLS OR FLOOR STRUCTURES PRIOR TO COMMENCING WITH CORING/DRILLING WORK FOR PENETRATIONS TO AVOID DAMAGING THE EXISTING REINFORCING STEEL.
- COORDINATE AND PROVIDE ACCESS PANELS FOR ALL CONCEALED ELECTRICAL EQUIPMENT, DEVICES, BOXES, AND CONDUIT BODIES SO THAT THEY ARE ACCESSIBLE.
- EXISTING DEVICE AND EQUIPMENT LOCATIONS, CIRCUIT ASSIGNMENTS, WIRING CONNECTIONS, AND CONDUIT RUNS INDICATED WERE DERIVED FROM AVAILABLE REFERENCE DOCUMENTS AND LIMITED FIELD INVESTIGATION. FIELD VERIFY ALL EXISTING CONDITIONS AND MAKE ANY NECESSARY ADJUSTMENTS TO SATISFY THE INTENT OF THE DRAWINGS AND SPECIFICATIONS.
- RE-ROUTE ALL EXISTING CONDUIT, WIRING, AND CABLING TO REMAIN WITHIN THE PROJECT AREA AS NECESSARY TO FACILITATE THE REMOVAL OF EXISTING EQUIPMENT AS WELL AS THE INSTALLATION OF ALL NEW EQUIPMENT. REMOVE AND RE-INSTALL ELECTRICAL EQUIPMENT, INCLUDING LIGHTS, TO REMAIN AS REQUIRED.
- WORK INCIDENTAL TO THE CONTRACT AND NECESSARY TO COMPLETE THE PROJECT, ALTHOUGH NOT SPECIFICALLY REFERRED TO IN THE CONTRACT DOCUMENTS, SHALL BE FURNISHED AND PERFORMED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE PROJECT. AN EXAMPLE OF SUCH INCIDENTAL WORK ARE OUTLET BOXES, JUNCTION BOXES, AND PULL BOXES REQUIRED FOR THE INSTALLATION OF ELECTRICAL DEVICES, LIGHTING FIXTURES, AND EQUIPMENT. ALL INCIDENTAL WORK SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE NEC.
- ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL CONDUIT AND WIRING FOR THE POWER CONNECTION TO ALL EQUIPMENT AS INDICATED IN THE DRAWINGS AND SPECIFICATIONS. ALL INCIDENTAL CONDUIT AND WIRING REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM MAY NOT BE SHOWN IN THE DRAWINGS OR SPECIFICATIONS. CONTRACTOR SHALL COORDINATE INCIDENTAL CONDUIT AND WIRING REQUIREMENTS BETWEEN ALL TRADES TO ENSURE THE INCIDENTAL CONDUIT AND WIRING IS PROVIDED AND THE AFFECTED SYSTEMS OPERATE AS INTENDED.
- THE LOCATION OF ALL ELECTRICAL APPARATUS AND DEVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE AND BEFORE INSTALLING, STUDY THE ARCHITECTURAL, STRUCTURAL, AND MECHANICAL DETAILS, THEN MAKE INSTALLATION IN THE MOST LOGICAL MANNER. CIRCUIT ROUTING IS TYPICAL AND MAY BE VARIED IN ANY MANNER. ANY PIECE OF EQUIPMENT/DEVICE MAY BE RELOCATED WITHIN 10' BEFORE INSTALLATION AT THE DIRECTION OF THE CONTRACTING OFFICER WITHOUT ADDITIONAL CHARGE TO THE PROJECT.
- SHOULD PROJECT CONDITIONS REQUIRE REARRANGEMENT OF THE PROJECT'S WORK, THE CONTRACTOR SHALL MARK SUCH CHANGES ON THE AS-BUILT DRAWINGS. IF THESE CHANGES REQUIRE AN ALTERNATE METHOD TO THOSE SPECIFIED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL SUBMIT DRAWINGS TO REFLECT THE PROPOSED ALTERNATE METHODS TO THE CONTRACTING OFFICER FOR REVIEW AND APPROVAL. THE CONTRACTOR SHALL NOT PROCEED UNTIL APPROVAL IS OBTAINED. REARRANGEMENT OF WORK FOR THE PURPOSE OF COORDINATION SHALL NOT BE CONSIDERED AN ITEM FOR EXTRA COST.
- DISCONNECT AND REMOVE ALL ELECTRICAL APPARATUS, LIGHT FIXTURES, WIRING DEVICES, JUNCTION BOXES, AND ASSOCIATED FEEDER AND BRANCH CIRCUIT WIRING IN THE PROJECT AREA, UNLESS OTHERWISE NOTED. THE DEMOLITION DRAWINGS ARE INTENDED TO SHOW THE GENERAL LIMITS OF THE SCOPE OF WORK AND MAY NOT SHOW ALL THE EXISTING DEVICES, CONDUIT RUNS, ETC. FEEDER AND BRANCH CIRCUIT WIRING TO BE REMOVED SHALL BE DISCONNECTED FROM ITS SOURCE. REMOVE ALL CONDUCTORS, CONDUIT, AND CONDUIT SUPPORT STRUCTURES WHERE ACCESSIBLE. PATCH/REPAIR WALL, FLOOR, AND CEILING DAMAGES AS A RESULT OF THE REMOVAL WORK.
- THE ACCESSIBLE PORTIONS OF ABANDONED COMMUNICATIONS AND FIRE ALARM CABLES SHALL BE REMOVED IN ACCORDANCE WITH THE NEC.
- THE EXISTING ELECTRICAL, TELECOM, FIRE ALARM, AND OTHER ELECTRICALLY-RELATED SYSTEMS IN AREAS ADJACENT TO, OUTSIDE OF, AND/OR OTHERWISE PASSING THROUGH THE PROJECT LIMITS, MUST REMAIN OPERATIONAL DURING THE CONSTRUCTION PERIOD AND POST-CONSTRUCTION. THE CONTRACTOR SHALL EXERCISE DUE CARE AND CAUTION WHEN WORKING NEAR ANY EXISTING EQUIPMENT, DEVICES, OR CABLING/CIRCUITING. PROVIDE NEW JUNCTION BOXES, CONDUITS, WIRING, AND THE LABOR REQUIRED TO FACILITATE THE REQUIRED OPERATIONAL CONTINUITY. BOXES, CONDUITS, AND WIRING SHALL BE IN ACCORDANCE WITH THE NEC. ANY DAMAGE TO THE EXISTING EQUIPMENT, DEVICES, OR CABLING/CIRCUITING RESULTING FROM THE CONTRACTOR'S OPERATIONS SHALL BE IMMEDIATELY REPAIRED OR OTHERWISE RESTORED TO ITS ORIGINAL WORKING CONDITION AT NO ADDITIONAL COST TO THE PROJECT.
- THE ELECTRICAL DRAWINGS ARE BASED ON PROPOSED EQUIPMENT. VERIFY ALL SYSTEM REQUIREMENTS (ELECTRICAL, MECHANICAL, FIRE ALARM, SPECIALTY SYSTEMS, ETC.) WITH THE SELECTED SYSTEM'S MANUFACTURER OR AUTHORIZED REPRESENTATIVE PRIOR TO COMMENCING WITH ANY WORK. COORDINATE RATINGS OF OVERCURRENT PROTECTION DEVICES, DISCONNECT SWITCHES, CONDUIT, AND WIRING TO MATCH THE ACTUAL EQUIPMENT SUPPLIED FOR THE PROJECT. CORRECT ALL DISCREPANCIES SO AS TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM. RECORD CHANGES ON THE AS-BUILT DRAWINGS.
- ALL EQUIPMENT AND APPARATUS SHALL BE CAPABLE OF FITTING IN THE SPACES SHOWN WHILE MEETING THE MANUFACTURER'S RECOMMENDED ACCESS REQUIREMENTS AND APPLICABLE CODE REQUIREMENTS. REVIEW ALL SPACES WHERE EQUIPMENT IS TO BE INSTALLED PRIOR TO ORDERING OF EQUIPMENT AND NOTIFY THE CONTRACTING OFFICER OF ANY INADEQUATE CLEARANCES OR CONDITIONS THAT WILL PREVENT THE PROPER INSTALLATION, MAINTENANCE, AND OPERATION OF THE EQUIPMENT.
- CONFIRM THE TYPE OF CEILING BEING INSTALLED PRIOR TO ORDERING LUMINAIRES AND TRIMS FOR PROPER COORDINATION. LUMINAIRES INDICATED MAY NOT EXPRESSLY CONFORM TO THE TYPE OF CEILING OR OPENING PROVIDED BY OTHER TRADES.
- CONCEAL ALL CONDUIT WHEREVER REASONABLY POSSIBLE; EXPOSED CONDUITS ARE PERMITTED ONLY WHERE SPECIFICALLY SHOWN ON THE DRAWINGS. ALL EXPOSED CONDUITS IN FINISHED AREAS SHALL BE INSTALLED IN THE LEAST VISIBLE LOCATIONS. CARE SHALL BE TAKEN TO INSTALL CONDUIT IN THE MOST AESTHETICALLY PLEASING MANNER.
- WHERE DEVICES, EQUIPMENT, BOXES, AND OTHER ELECTRICAL MATERIALS ARE INDICATED TO BE OF WEATHERPROOF (WP) CONSTRUCTION, THE INTERCONNECTING RACEWAYS, INCLUDING COUPLINGS AND CONNECTORS, SHALL BE LISTED FOR AND INSTALLED TO PROVIDE A COMPLETE WEATHERPROOF / WET LOCATION INSTALLATION. ALL INCIDENTAL MATERIALS REQUIRED TO COMPLETE THE INSTALLATION SHALL ALSO BE OF WEATHERPROOF / WET LOCATION LISTING.
- WIRING DEVICES AND CONDUITS SHALL BE FLUSH MOUNTED, WHEREVER REASONABLY POSSIBLE. WHERE NEW DEVICES ARE INDICATED TO BE INSTALLED IN EXISTING WALLS, FISH THE CONDUIT DOWN INTO THE EXISTING WALL CAVITY AND KEEP DISTURBANCES TO THE EXISTING WALLS TO A MINIMUM. WHERE OBSTRUCTIONS ARE ENCOUNTERED OR CUTTING OF THE WALL TO ACCOMPLISH THE WIRING DEVICE AND CONDUIT INSTALLATION IS UNAVOIDABLE, CONSULT WITH THE CONTRACTING OFFICER PRIOR TO COMMENCING ANY WORK.
- PROVIDE TYPEWRITTEN CIRCUIT DIRECTORIES FOR ALL PANELS, NEW OR MODIFIED, REFLECTING THE CIRCUIT ARRANGEMENTS AS THEY WERE ACTUALLY INSTALLED.
- AN ADHESIVE VINYL NAMEPLATE SHALL BE PROVIDED FOR ALL SWITCHES, RECEPTACLES, DISCONNECT SWITCHES, MOTOR STARTERS, AND MISCELLANEOUS DEVICES REQUIRING POWER. THE NAMEPLATE SHALL INDICATE THE PANELBOARD SERVING THE DEVICE AND THE CORRESPONDING CIRCUIT ASSIGNMENT. LETTERING SHALL BE A MINIMUM OF 1/4" HIGH. UTILIZE BROTHER "P-TOUCH" LABEL MAKER OR APPROVED SUBSTITUTE.
- A GREEN, EQUIPMENT GROUND CONDUCTOR SIZED IN ACCORDANCE WITH THE NEC ARTICLE 250 SHALL BE INSTALLED IN ALL FEEDER AND BRANCH CIRCUITS WHETHER INDICATED ON CONTRACT DRAWINGS OR NOT. INSTALL THIS CONDUCTOR IN ALL RACEWAYS INCLUDING THOSE INSTALLED FOR SWITCH LEGS AND ATTACH TO THE DEVICE, LUMINAIRE, OR EQUIPMENT USING A SUITABLE GROUNDING LUG.
- DO NOT USE A COMMON NEUTRAL FOR MULTIPLE BRANCH CIRCUITS INSTALLED IN A COMMON CONDUIT. PROVIDE A DEDICATED NEUTRAL FOR EACH INDIVIDUAL CIRCUIT. WHERE MULTIPLE DEDICATED NEUTRALS ARE INSTALLED IN A COMMON CONDUIT, PROVIDE COLOR CODING OF THE DIFFERENT NEUTRAL CONDUCTORS IN ACCORDANCE WITH THE NEC (WHITE, GRAY, THREE CONTINUOUS WHITE OR GRAY STRIPES, ETC.)
- PROVIDE NYLON PULLSTRINGS IN ALL EMPTY CONDUITS UNLESS OTHERWISE INDICATED.
- THE TELECOMMUNICATIONS RACEWAY SYSTEM INSTALLATION SHALL COMPLY WITH TIA/EIA AND BICSI STANDARDS UNLESS OTHERWISE NOTED.
- CONDUIT BODIES (E.G. LB, LR, ETC.) SHALL NOT BE PERMITTED IN THE TELECOMMUNICATIONS RACEWAY SYSTEMS UNLESS SPECIFICALLY INDICATED TO BE UTILIZED AND LISTED FOR TELECOMMUNICATIONS SYSTEM USE.
- PROVIDE INSULATED BUSHINGS AT ALL TELECOMMUNICATIONS CONDUIT TERMINATIONS AT ALL BOXES, BACKBOARDS, AND CONDUIT STUBS.
- ALL SURFACE MOUNTED DEVICES SHALL BE INSTALLED UTILIZING FACTORY PAINTED SURFACE MOUNTING ACCESSORIES AND MATCHING DEVICE BOXES FOR THE MOST AESTHETICALLY PLEASING INSTALLATION.
- PROVIDE KNOCK-OUT PLUGS FOR ALL UNUSED CONDUIT PENETRATIONS IN BOXES AND ENCLOSURES DUE TO CONDUIT REMOVAL.
- PENETRATIONS THROUGH FIRE-RATED WALLS, CEILINGS, AND FLOORS SHALL BE SEALED TO MAINTAIN FIRE RATINGS. UTILIZE 3M CP25, PUTTY 303, OR OTHER SUITABLE UL-LISTED SEALING SYSTEM.
- PATCH, REFINISH, AND PAINT ALL PENETRATIONS THROUGH WALLS AND SLABS TO MATCH FINISH OF ADJACENT SURFACES.
- RESTORE/REPAIR ANY DAMAGE TO EXISTING SURFACES RESULTING FROM THE INSTALLATION OF NEW ELECTRICAL ITEMS. THE AREAS REPAIRED SHALL MATCH THE ADJACENT SURFACES IN TEXTURE, FINISH, AND COLOR.
- PAINTING OF ELECTRICAL EQUIPMENT:
 - INTERIOR LOCATIONS - PRIME AND PAINT ALL EXPOSED CONDUITS, BOXES, FITTINGS, SUPPORT CHANNELS, MOUNTING HARDWARE, AND ACCESSORIES WITH TWO FINISH COATS TO MATCH THE SURFACE ON WHICH THEY ARE MOUNTED OR TO MATCH THE FINISH OF THE ADJACENT SURFACES. EQUIPMENT SURFACES/COMPONENTS WITH A FACTORY-APPLIED PAINT FINISH NEED NOT BE PAINTED.
 - EXTERIOR LOCATIONS - PRIME ALL EXPOSED CONDUITS, BOXES, FITTINGS, SUPPORT CHANNELS, MOUNTING HARDWARE, AND ACCESSORIES WITH A 2-PART EPOXY PRIMER AND FINISH WITH 2 COATS OF AN ALIPHATIC ACRYLIC URETHANE PAINT. PAINT FINISH TO MATCH THE SURFACE ON WHICH THEY ARE MOUNTED OR TO MATCH THE FINISH OF THE ADJACENT SURFACES. STAINLESS STEEL MATERIALS NEED NOT BE PAINTED.
- ELECTRICAL EQUIPMENT SUPPORTING HVAC EQUIPMENT INSTALLED ABOVE SUSPENDED CEILINGS SHALL COMPLY WITH THE NEC FOR WORKSPACE CLEARANCE IN AREAS OF LIMITED ACCESS.
- LIGHTING SYSTEM CONTROLS FUNCTIONAL TESTING: PROVIDE ALL MATERIALS AND LABOR REQUIRED TO TEST THE LIGHTING SYSTEM CONTROLS TO ENSURE THAT THE CONTROL HARDWARE AND SOFTWARE ARE CALIBRATED, ADJUSTED, PROGRAMMED, AND IN PROPER WORKING CONDITION IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL PERFORM AND DOCUMENT THE FUNCTIONAL TESTING WHICH SHALL BE IN ACCORDANCE WITH THE APPLICABLE PARAGRAPHS OF THE COUNTY'S ENERGY CODE. THE DESIGNER OF RECORD SHALL WITNESS THE FUNCTIONAL TESTING. THE TESTING DOCUMENTATION SHALL BE PROVIDED TO THE DESIGNER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO PROJECT CLOSE-OUT.
- ALL ELECTRIFIED UTILIZATION EQUIPMENT, CONTROL DEVICES, CONTROL CIRCUITING, AND SEPARATELY MOUNTED MOTOR STARTERS/CONTROLLERS ARE SPECIFIED AND PROVIDED UNDER THE APPLICABLE SPECIFICATION SECTIONS. ALL LINE VOLTAGE POWER TO THE ELECTRIFIED UTILIZATION EQUIPMENT SHALL BE PROVIDED UNDER THE ELECTRICAL CONTRACT DOCUMENTS.
- FOR ELECTRIFIED UTILIZATION EQUIPMENT, COORDINATE THE MOUNTING HEIGHT OF THE ASSOCIATED JUNCTION BOX, DISCONNECT SWITCH, OR STARTER/CONTROLLER WITH THE ACTUAL EQUIPMENT SUPPLIED.
- PROVIDE EARTHQUAKE BRACING FOR ALL ELECTRICAL EQUIPMENT, APPARATUS, AND RACEWAYS. BRACING SHALL, AS A MINIMUM, COMPLY WITH THE COUNTY BUILDING CODE.
- ALL CONDUITS ENTERING THE BUILDING FROM THE EXTERIOR SHALL BE SEALED TO PREVENT ENTRANCE OF MOISTURE, GASES, AND RODENTS.
- WHERE A FIRE ALARM SYSTEM EVENT IS REQUIRED TO TURN "ON" EGRESS OR OTHER AUTOMATICALLY CONTROLLED LIGHTING FIXTURES, COORDINATE ALL INTERFACE REQUIREMENTS WITH THE FIRE ALARM SYSTEM SUPPLIER AND APPROPRIATE INSTALLING CONTRACTOR.
- THE STATE WARNING POINT ROOM AND IT SERVER ROOM IN B303 SHALL REMAIN OPERATIONAL THROUGHOUT THE ENTIRE CONSTRUCTION PERIOD. PROVIDE A PORTABLE GENERATOR TO POWER PANELS MS-1, CDS-1, AND IT-1 DURING ANY OUTAGES. THE FLOOR OUTLETS IN THE WARNING POINT ROOM ARE POWERED BY PANEL MS-1. OUTAGE IS LIMITED TO AFTER HOURS AND THE WEEKENDS FOR THE REST OF B303. 24/7 POWER IS REQUIRED FOR BIRKHIMER AND PSB. PROVIDE TEMPORARY POWER TO SUPPORT OPERATIONS. COORDINATE ANY OUTAGES WITH THE CONTRACTING OFFICER 2 WEEKS IN ADVANCE.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
 Scott Tomokiyok 4/30/2024
 SIGNATURE: _____ EXPIRATION DATE: _____

SUBMITTAL PHASE	DATE	APPR.
CONSTRUCTION DOCUMENTS <td>03/01/2024 <td></td> </td>	03/01/2024 <td></td>	
DESCRIPTION		

SUBMITTAL DATE	SF	KR	ST
03/01/2024			

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 GENERAL ELECTRICAL NOTES
 SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
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E-002

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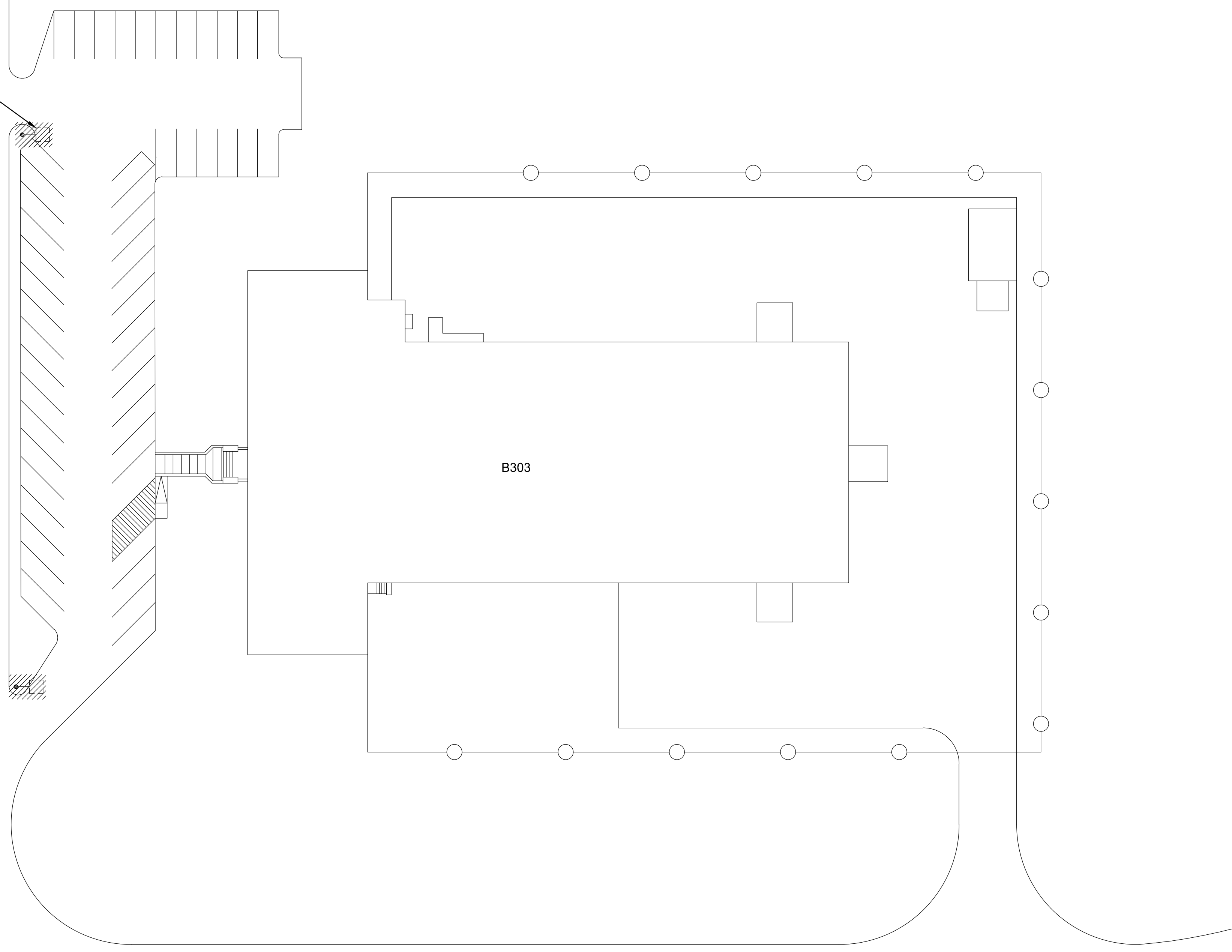
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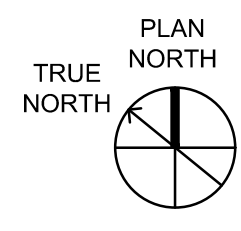
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COMPLETELY REMOVE LIGHT POLE AND FOUNDATION. EXISTING CONDUCTORS WERE REMOVED IN A PREVIOUS PROJECT. ABANDON ALL UNDERGROUND INFRASTRUCTURE IN PLACE. TYPICAL.



DIAMOND HEAD TUNNEL ROAD

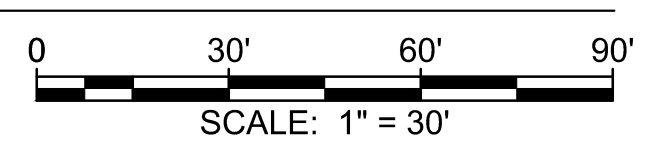
B303



A1
EA101

SITE ELECTRICAL PLAN - DEMO

SCALE: 1" = 30'-0"



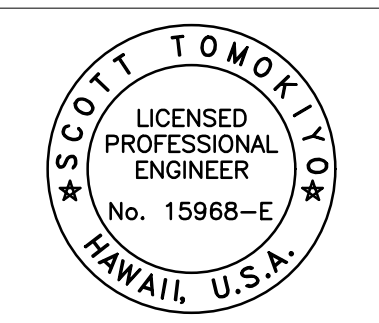
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SYN	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 03/01/2024

SF	KR	ST

DEPARTMENT OF DEFENSE
TMK: 3-1-042:600

DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS

STATE OF HAWAII
SITE ELECTRICAL PLAN - DEMO

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 88 OF 123

EA101

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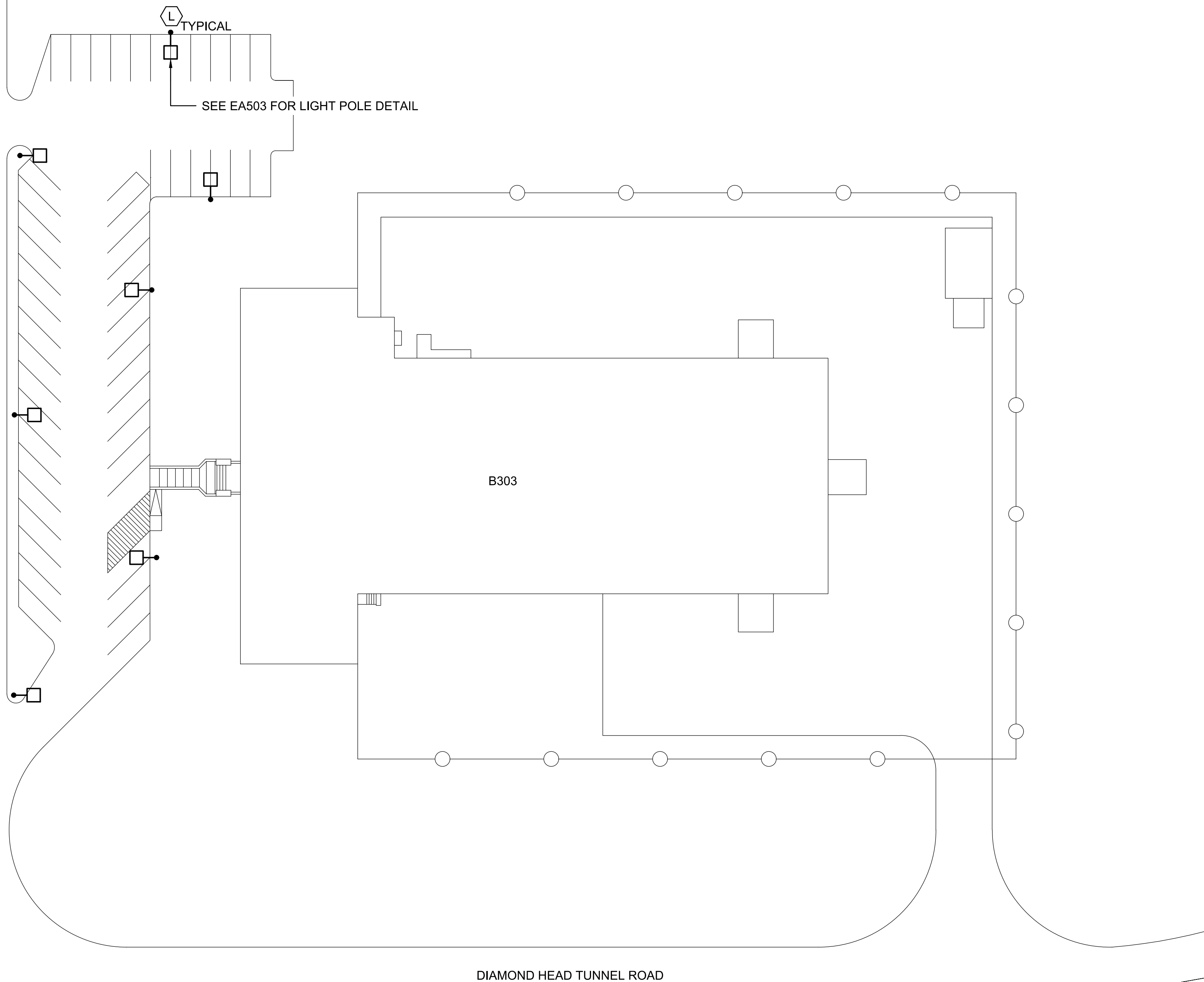
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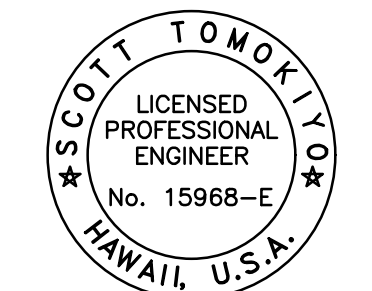
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GENERAL NOTES

- 1. (L) REFER TO EA701 FOR LIGHT FIXTURE



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 Signature: *Scott Tomkiyo* 4/30/2024
 SIGNATURE EXPIRATION DATE

SYN	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 03/01/2024

SF	KR	ST
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STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 TMK: 3-1-042:600
**BIRKHIRER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS**
 SITE ELECTRICAL PLAN

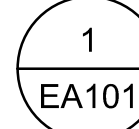
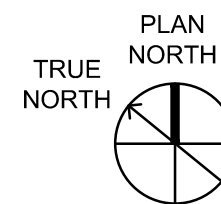
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STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

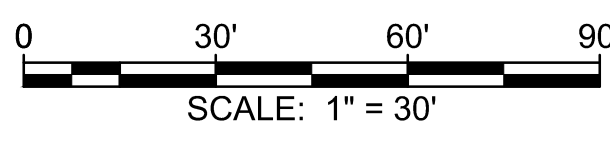
SHEET 89 OF 123

EA102



SITE ELECTRICAL PLAN

SCALE: 1" = 30'-0"



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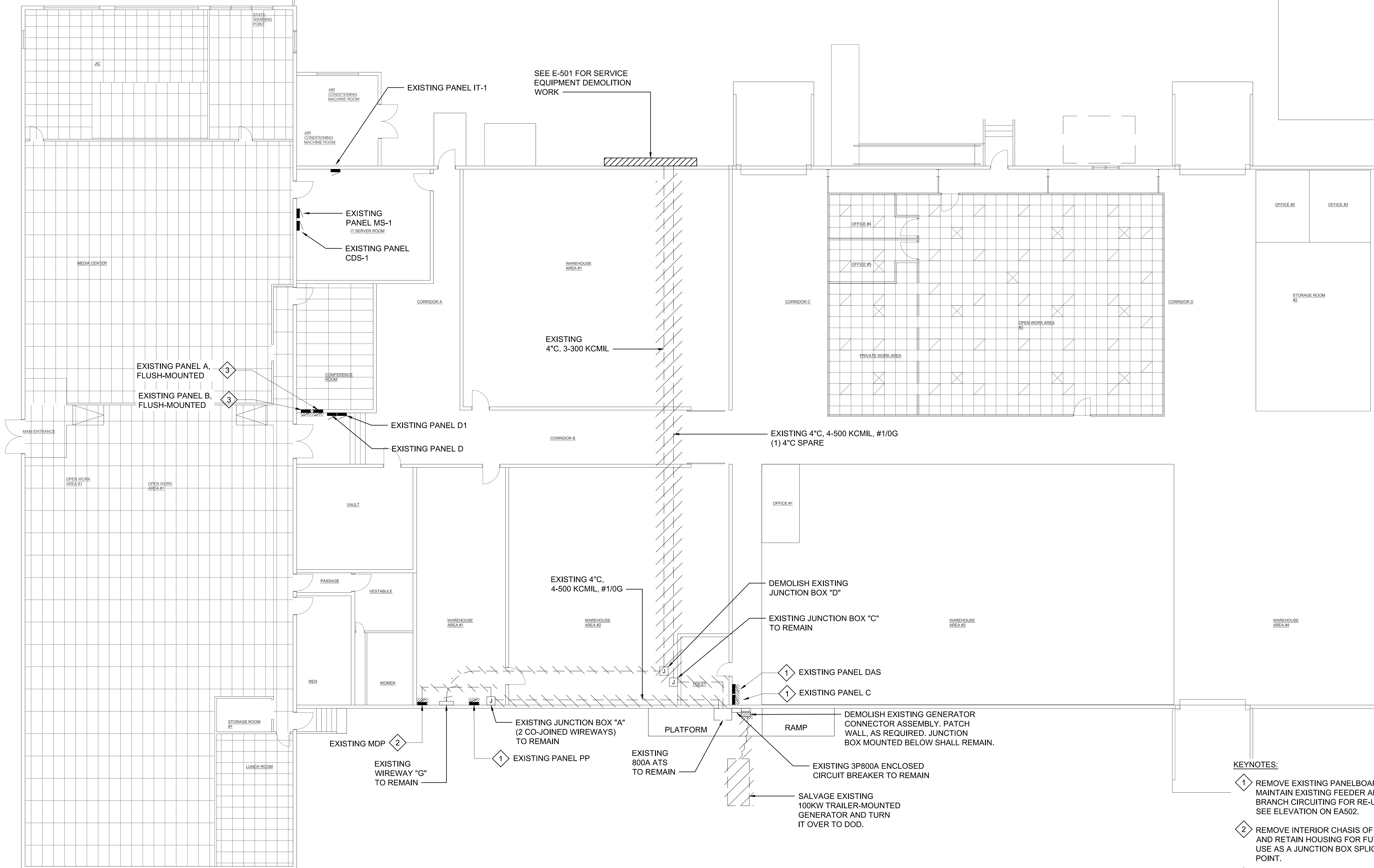
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SEE E-501 FOR SERVICE EQUIPMENT DEMOLITION WORK

EXISTING PANEL A, FLUSH-MOUNTED
EXISTING PANEL B, FLUSH-MOUNTED

EXISTING PANEL D1
EXISTING PANEL D

EXISTING 4C, 3-300 KCML

EXISTING 4C, 4-500 KCML, #1/0G (1) 4C SPARE

EXISTING 4C, 4-500 KCML, #1/0G

DEMOLISH EXISTING JUNCTION BOX "D"
EXISTING JUNCTION BOX "C" TO REMAIN

EXISTING PANEL DAS
EXISTING PANEL C

EXISTING JUNCTION BOX "A" (2 CO-JOINED WIREWAYS) TO REMAIN
EXISTING PANEL PP

EXISTING 800A ATS TO REMAIN

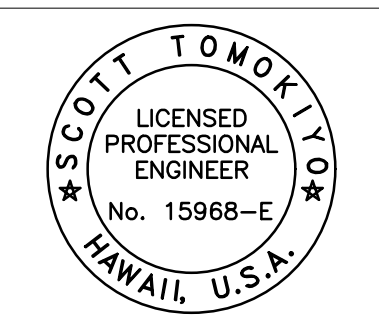
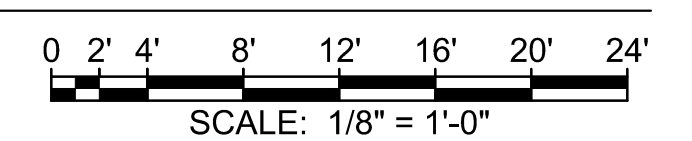
DEMOLISH EXISTING GENERATOR CONNECTOR ASSEMBLY. PATCH WALL, AS REQUIRED. JUNCTION BOX MOUNTED BELOW SHALL REMAIN.

EXISTING 3P800A ENCLOSED CIRCUIT BREAKER TO REMAIN

SALVAGE EXISTING 100KW TRAILER-MOUNTED GENERATOR AND TURN IT OVER TO DOD.

- KEYNOTES:**
- 1 REMOVE EXISTING PANELBOARD. MAINTAIN EXISTING FEEDER AND BRANCH CIRCUITING FOR RE-USE. SEE ELEVATION ON EA502.
 - 2 REMOVE INTERIOR CHASIS OF PANEL AND RETAIN HOUSING FOR FUTURE USE AS A JUNCTION BOX SPLICE POINT.
 - 3 REMOVE INTERIOR CHASIS OF PANEL AND COVER TRIM. MAINTAIN PANEL BOX AND WIRES. EXISTING WIRING IS TO BE RE-ROUTED TO A NEW SURFACE-MOUNTED PANEL. SEE DETAIL 3/E-504 AND THE ONE-LINE DIAGRAMS FOR FURTHER CLARIFICATION.

PLAN NORTH
TRUE NORTH
A1
EA102
POWER PLAN - DEMO
SCALE: 1/8" = 1'-0"



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Scott Tomkiyo 4/30/2024
SIGNATURE EXPIRATION DATE

SYN	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 03/01/2024

SF	KR	ST

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
POWER PLAN - DEMO

STATE OF HAWAII
SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 90 OF 123

EA103

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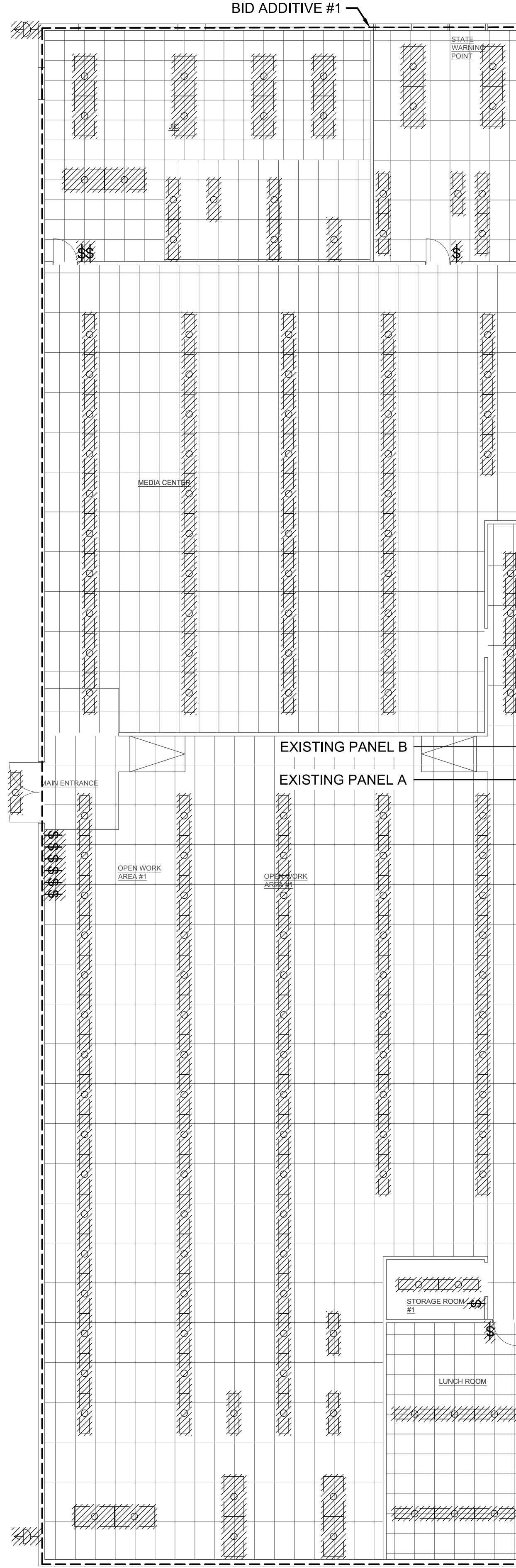
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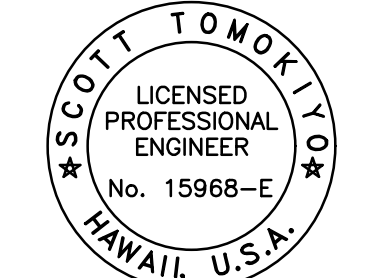
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LIGHT FIXTURES IN OPEN WORK AREA #2, PRIVATE WORK AREA, OFFICE #4 AND #5 TO REMAIN

INTERCEPT AND REMOVE LIGHT FIXTURES LOCATED ABOVE OFFICE SPACE. TYPICAL.



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SUBMITTAL DATE: 03/01/2024

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DEPARTMENT OF DEFENSE

TMJK: 3-1-042:600

DIAMOND HEAD STATE MONUMENT

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BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

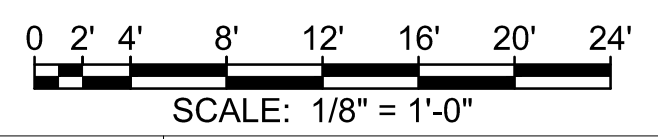
LIGHTING PLAN - DEMO

PLAN NORTH

TRUE NORTH

A1 LIGHTING PLAN - DEMO

EA103 SCALE: 1/8" = 1'-0"



- SHEET NOTES**
- TRACE AND VERIFY EXISTING CIRCUITING.
 - REMOVE EXISTING BRANCH CIRCUITING FOR ALL LIGHT FIXTURES, CONDUITS AND OUTLET BOXES TO REMAIN FOR REUSE.
 - REMOVE EXISTING BRANCH CIRCUITING AND CONDUITS FOR ALL EXISTING LIGHT SWITCHES.

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

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EA104

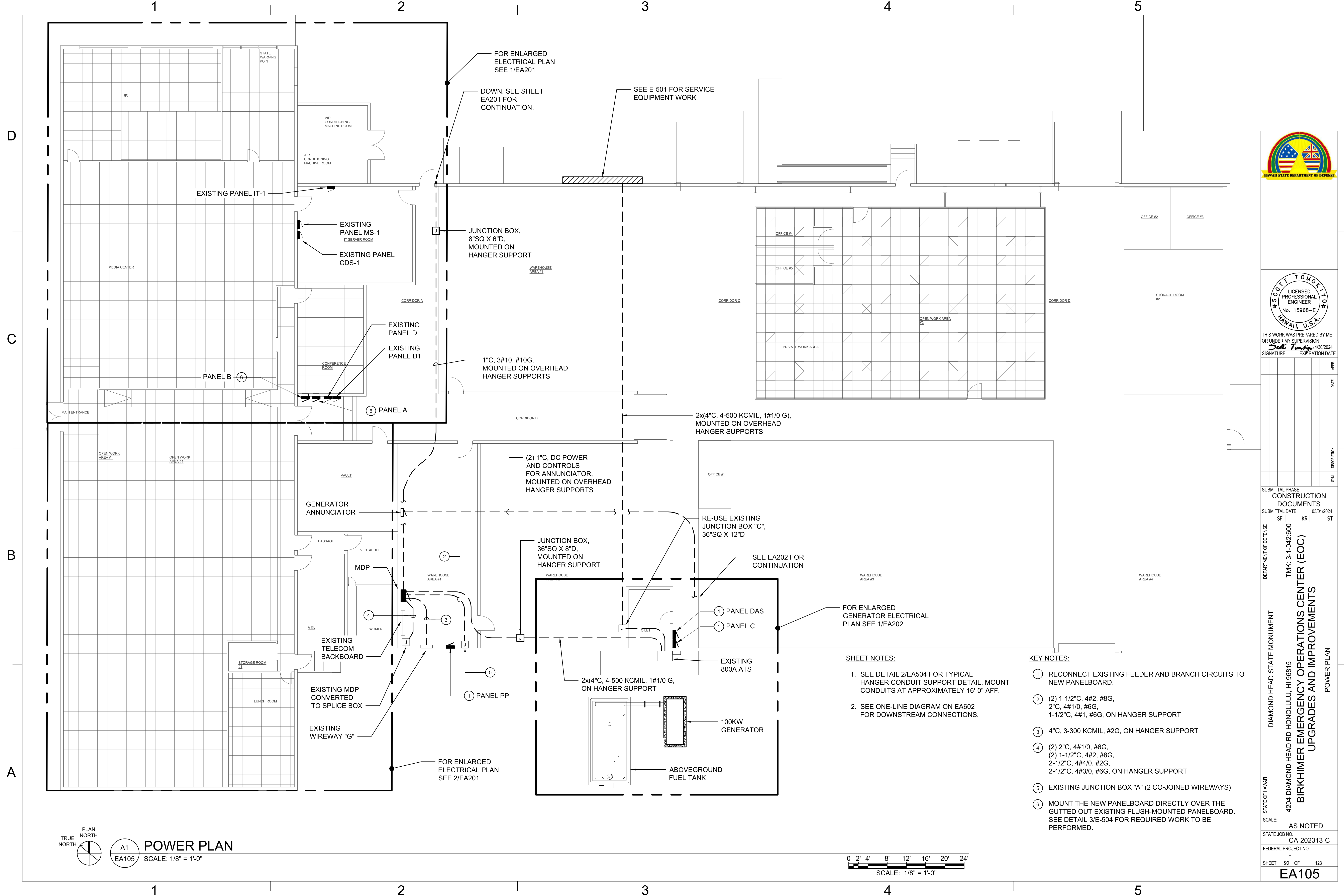
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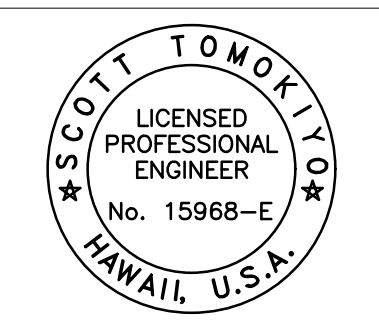
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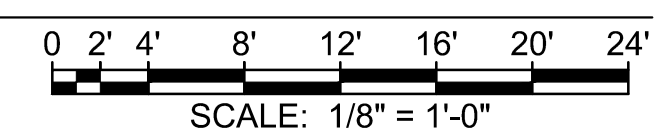
SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

SF	KR	ST

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 POWER PLAN

STATE OF HAWAII
 SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
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EA105

PLAN NORTH
 TRUE NORTH
 A1
POWER PLAN
 SCALE: 1/8" = 1'-0"



SHEET NOTES:

- SEE DETAIL 2/EA504 FOR TYPICAL HANGER CONDUIT SUPPORT DETAIL. MOUNT CONDUITS AT APPROXIMATELY 16'-0" AFF.
- SEE ONE-LINE DIAGRAM ON EA602 FOR DOWNSTREAM CONNECTIONS.

KEY NOTES:

- RECONNECT EXISTING FEEDER AND BRANCH CIRCUITS TO NEW PANELBOARD.
- (2) 1-1/2" C, 4#2, #8G, 2" C, 4#1/0, #6G, 1-1/2" C, 4#1, #6G, ON HANGER SUPPORT
- 4" C, 3-300 KCMIL, #2G, ON HANGER SUPPORT
- (2) 2" C, 4#1/0, #6G, (2) 1-1/2" C, 4#2, #8G, 2-1/2" C, 4#4/0, #2G, 2-1/2" C, 4#3/0, #6G, ON HANGER SUPPORT
- EXISTING JUNCTION BOX "A" (2 CO-JOINED WIREWAYS)
- MOUNT THE NEW PANELBOARD DIRECTLY OVER THE GUTTED OUT EXISTING FLUSH-MOUNTED PANELBOARD. SEE DETAIL 3/E-504 FOR REQUIRED WORK TO BE PERFORMED.

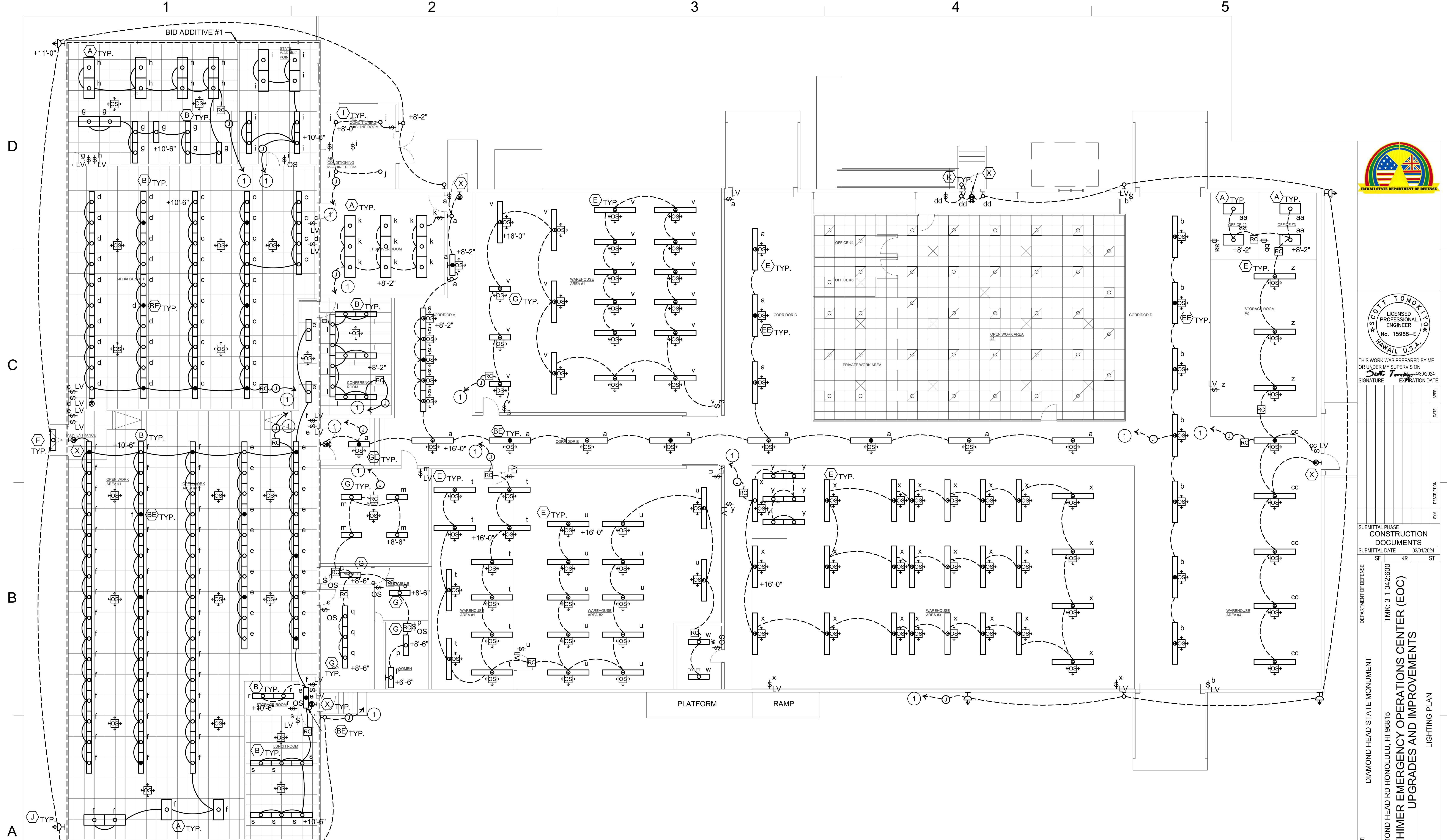
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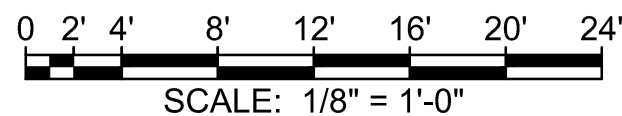
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PLAN NORTH
TRUE NORTH

A1 LIGHTING PLAN
EA105 SCALE: 1/8" = 1'-0"

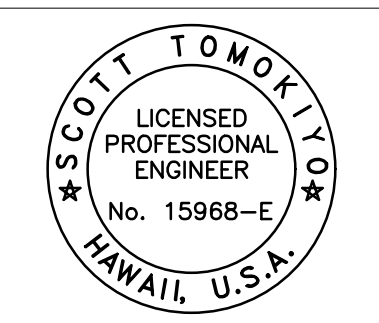


KEYNOTES

- ① INTERCEPT EXISTING CIRCUIT VIA A JUNCTION BOX AND EXTEND TO ROOM CONTROLLER AND NEW LIGHTS

GENERAL NOTES

- 1. INSTALL NEW LIGHT FIXTURES AND DEVICES IN LOCATIONS AS NOTED UTILIZING EXISTING CIRCUITING. INTERCEPT AND EXTEND EXISTING CIRCUITING AS REQUIRED FOR NEW LIGHT FIXTURES.
- 2. (A) REFER TO EA701 FOR LIGHT FIXTURE



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SUBMITTAL DATE: 03/01/2024
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STATE OF HAWAII
DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
LIGHTING PLAN
TMK: 3-1-042:600

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 93 OF 123
EA106

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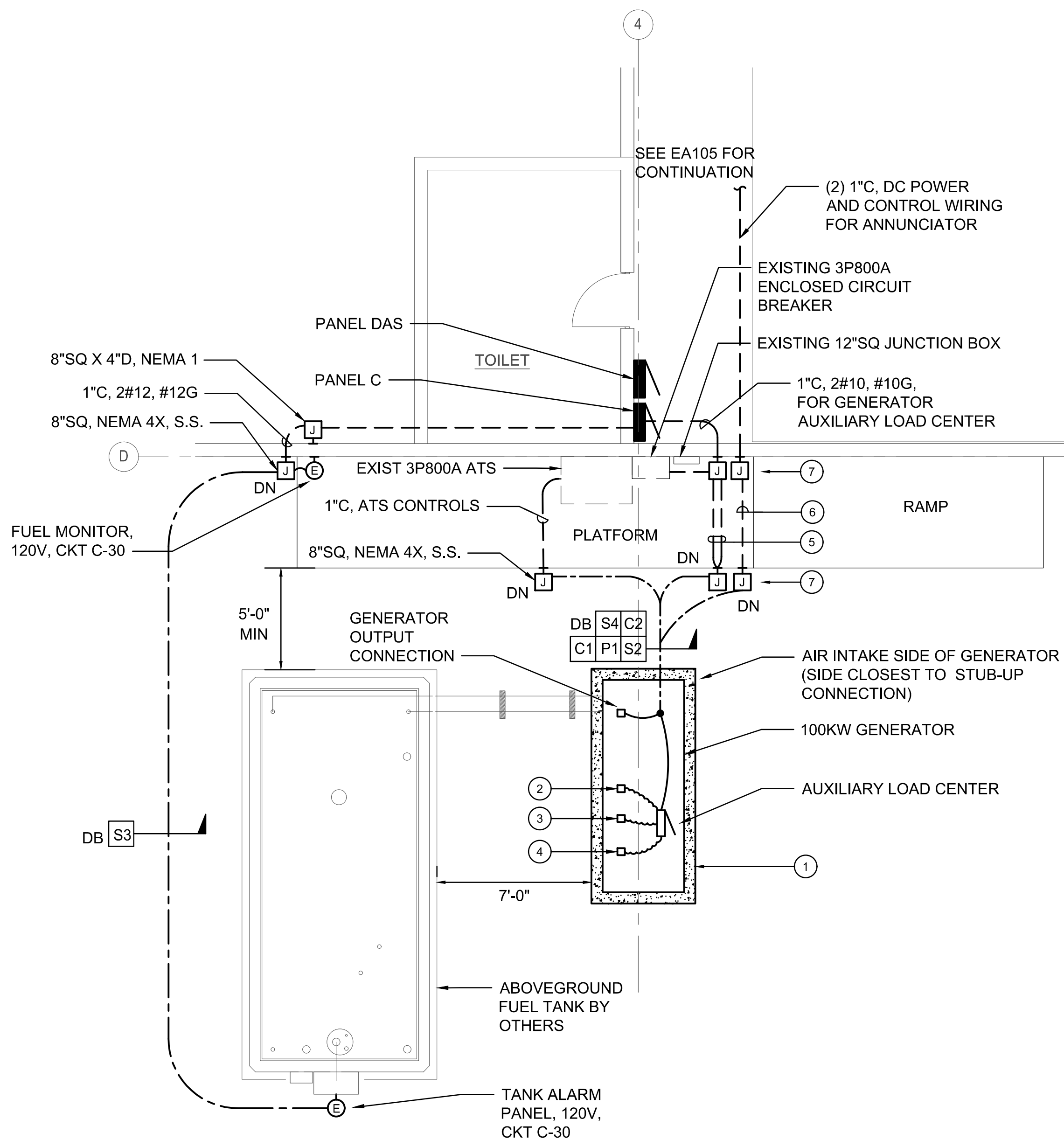
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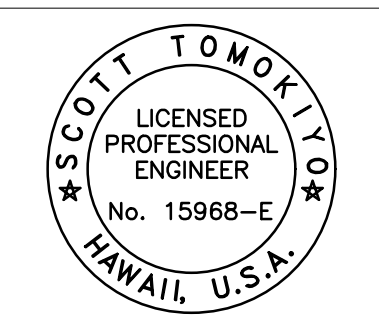


SHEET NOTES:

- CONDUITS ON THE PLATFORM FLOOR SHALL BE MOUNTED ON PYRAMID SUPPORT BLOCKS.

KEYNOTES:

- CONCRETE PAD, APPROXIMATELY 120"L X 50"W. COORDINATE WITH ACTUAL SIZE OF GENERATOR ENCLOSURE. CONCRETE PAD SHALL EXTEND 6" ON ALL SIDES OF THE GENERATOR ENCLOSURE. SEE STRUCTURAL DRAWINGS FOR CONCRETE PAD DETAIL.
- JACKET WATER HEATER, 120V, 3/4"C, 2#10, 1#10G
- BATTERY CHARGER, 120V, 3/4"C, 2#10, 1#10G
- SPACE HEATER, 120V, 3/4"C, 2#10, 1#10G
- 4"C, 4-500KCMIL, #2G, FOR GENERATOR OUTPUT
1"C, 2#10, #10G, FOR GENERATOR AUXILIARY LOAD CENTER
- 1"C, CONTROLS FOR ANNUNCIATOR
1"C, DC POWER FOR ANNUNCIATOR
- (1) 32"SQ X 8"D, NEMA 4X, S.S. JUNCTION BOX FOR POWER CONDUCTORS AND (1) 8"SQ, NEMA 4X, S.S., JUNCTION BOX FOR THE ANNUNCIATOR DC POWER AND CONTROLS.



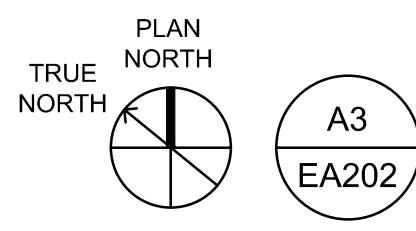
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DATE	APPR.	DESCRIPTION

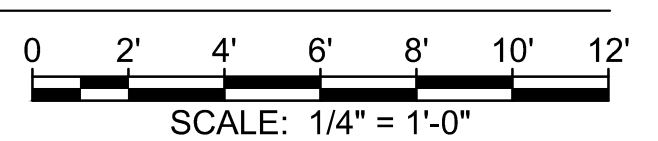
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CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

DEPARTMENT OF DEFENSE
 TMJK: 3-1-042:600

DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
**BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS**
 ENLARGED GENERATOR POWER PLAN



ENLARGED GENERATOR POWER PLAN
 SCALE: 1/4" = 1'-0"



SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
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 SHEET 95 OF 123
EA202

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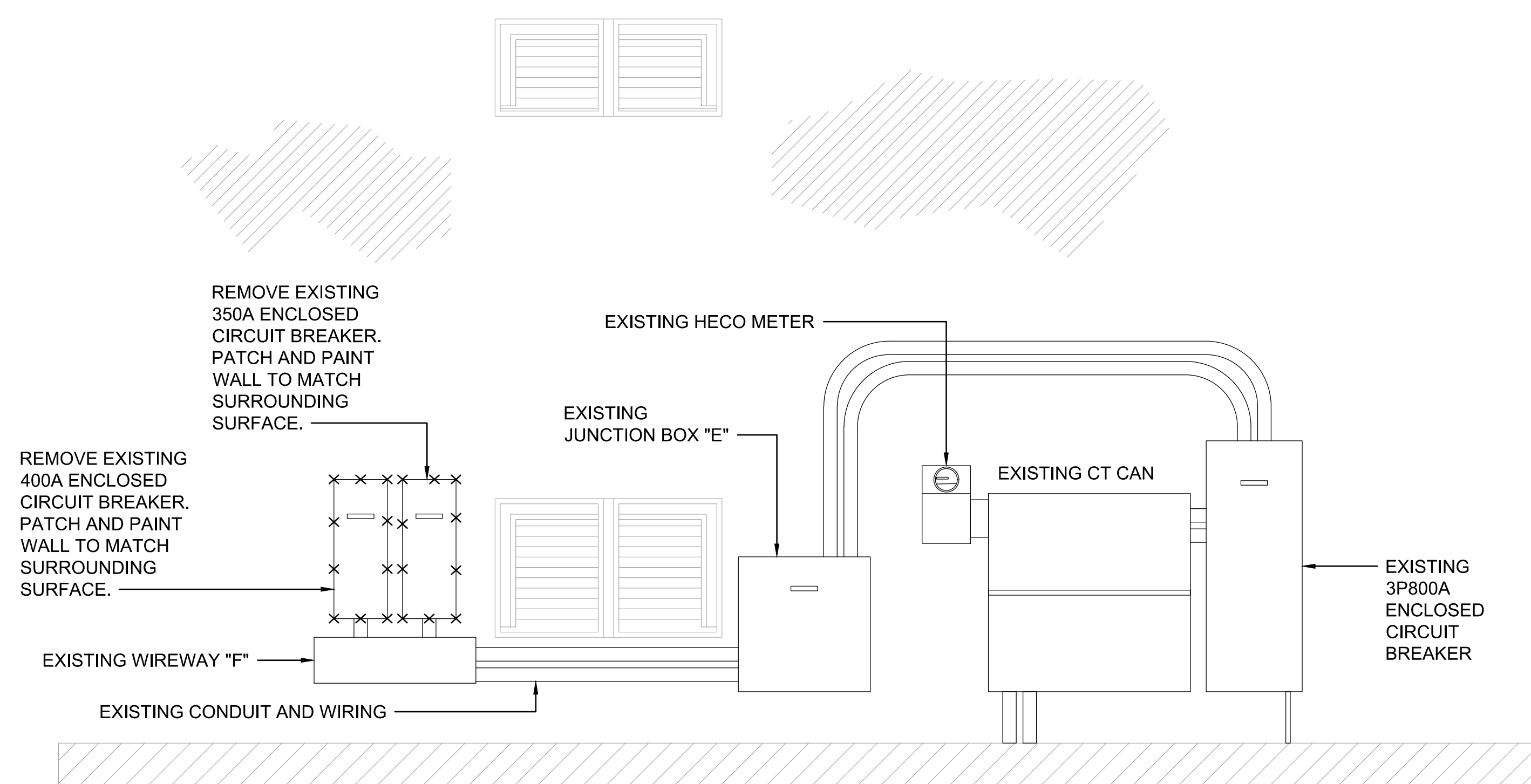
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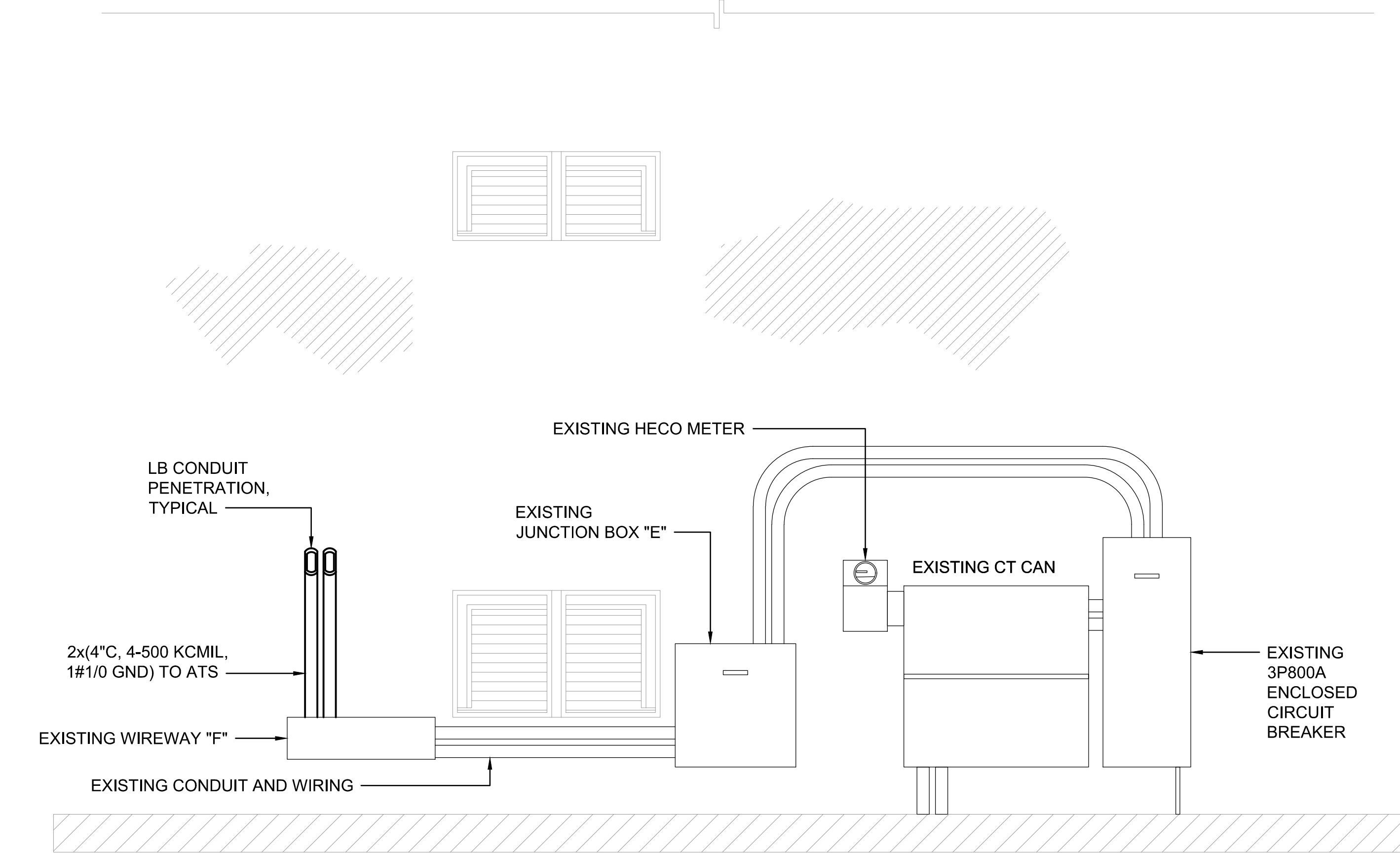
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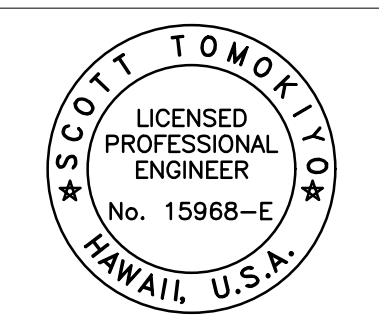
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C3 ELECTRICAL SERVICE ELEVATION - DEMO
EA501 SCALE: NTS



A3 ELECTRICAL SERVICE ELEVATION
EA501 SCALE: NTS



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 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ELECTRICAL ELEVATION DETAILS

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 96 OF 123
EA501

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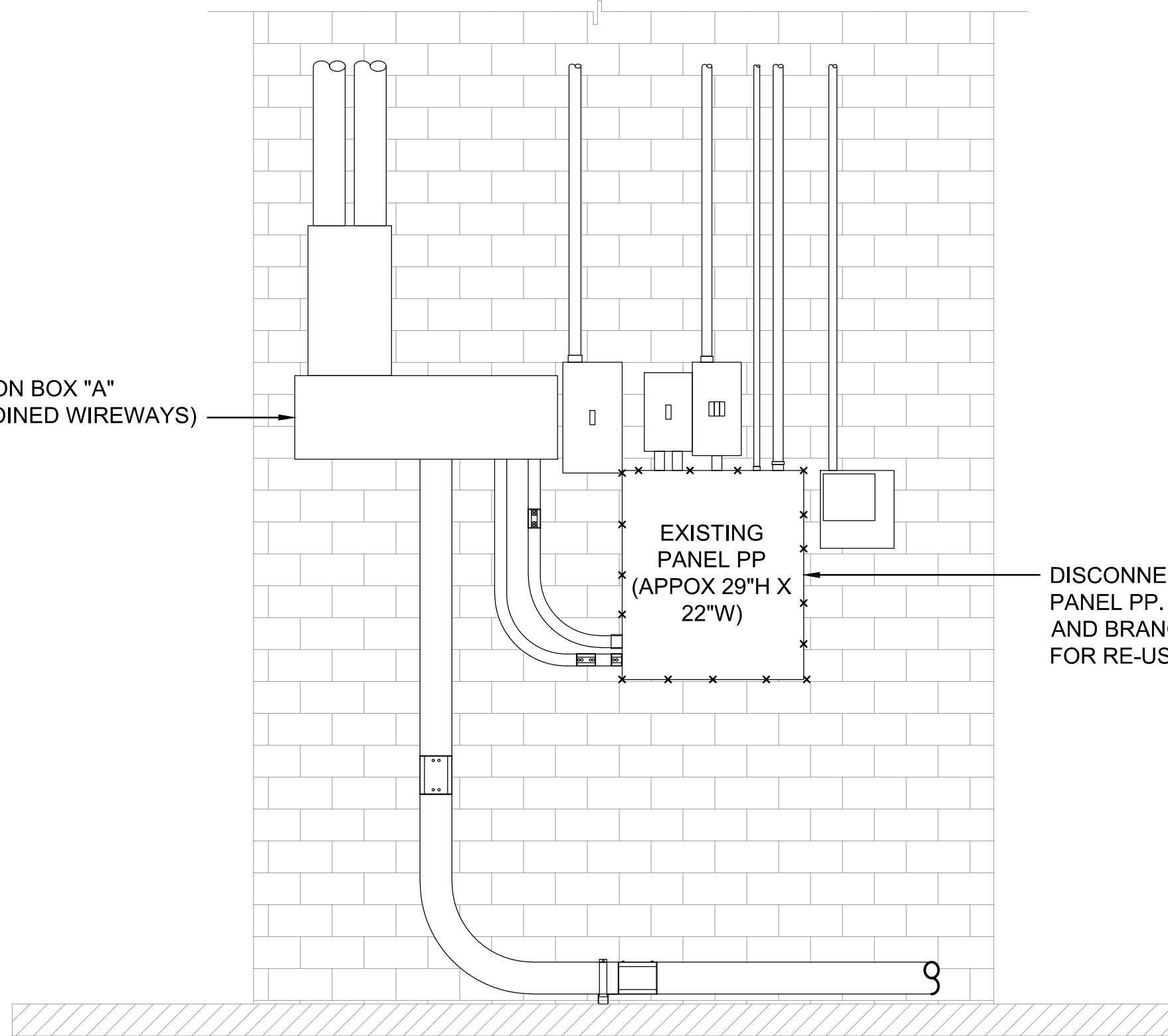
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JUNCTION BOX "A"
(2 CO-JOINED WIREWAYS)

EXISTING
PANEL PP
(APPOX 29"H X
22"W)

DISCONNECT AND REMOVE EXISTING
PANEL PP. RETAIN EXISTING FEEDER
AND BRANCH CIRCUIT CONDUCTORS
FOR RE-USE.



C1 PANEL PP ELEVATION - DEMO
EA502 SCALE: NTS

CUT CONDUIT

REMOVE EXISTING 1"C

DISCONNECT AND REMOVE
EXISTING PANEL C. RETAIN
EXISTING FEEDER AND BRANCH
CIRCUIT CONDUCTORS FOR
RE-USE.

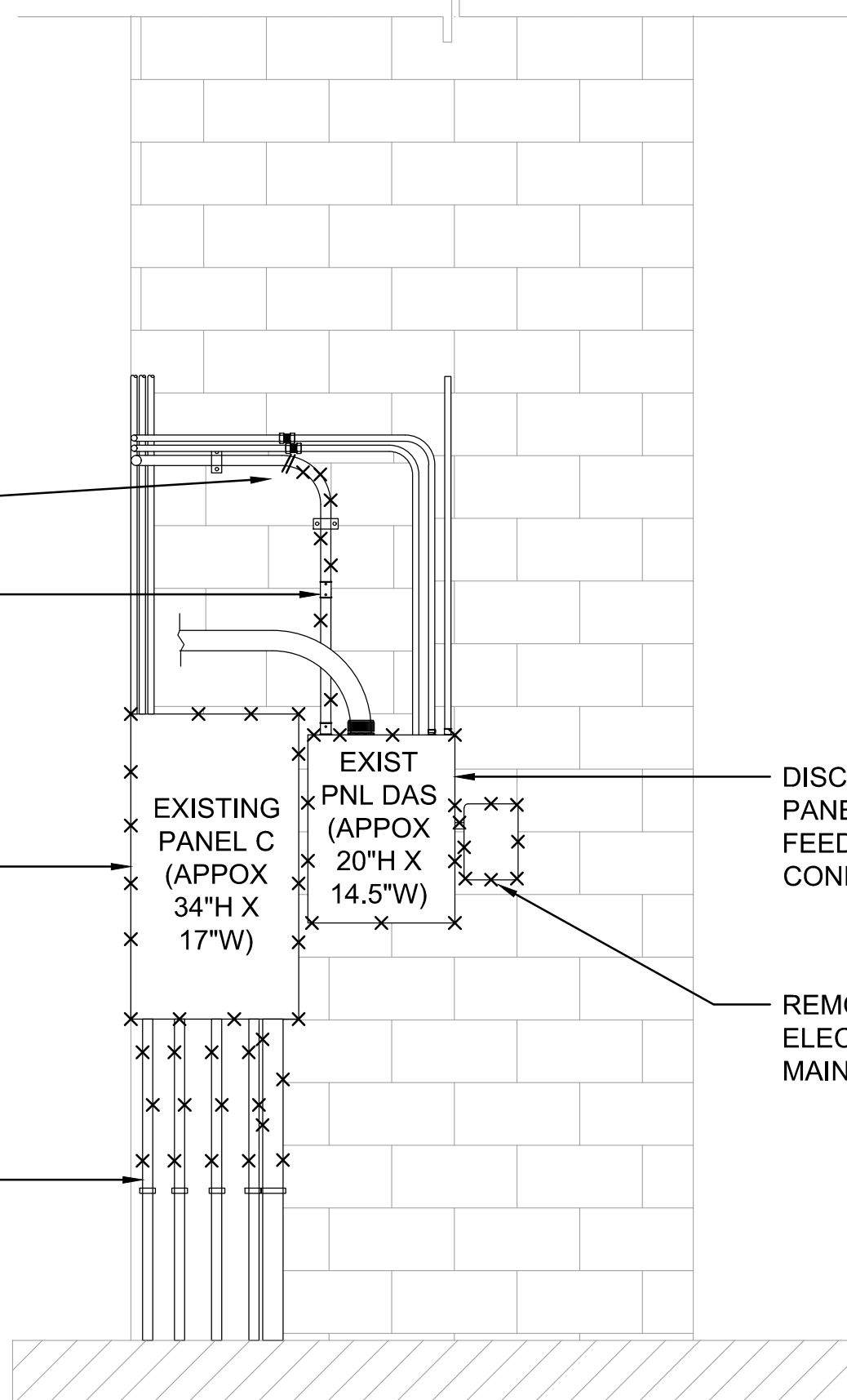
REMOVE EXISTING (6) 1"C
AND (1) 3"C ABOVE THE COUPLING

EXISTING
PANEL C
(APPOX
34"H X
17"W)

EXIST
PNL DAS
(APPOX
20"H X
14.5"W)

DISCONNECT AND REMOVE EXISTING
PANEL DAS. RETAIN EXISTING
FEEDER AND BRANCH CIRCUIT
CONDUCTORS FOR RE-USE.

REMOVE EXISTING
ELECTRICAL EQUIPMENT.
MAINTAIN FOR RE-USE.

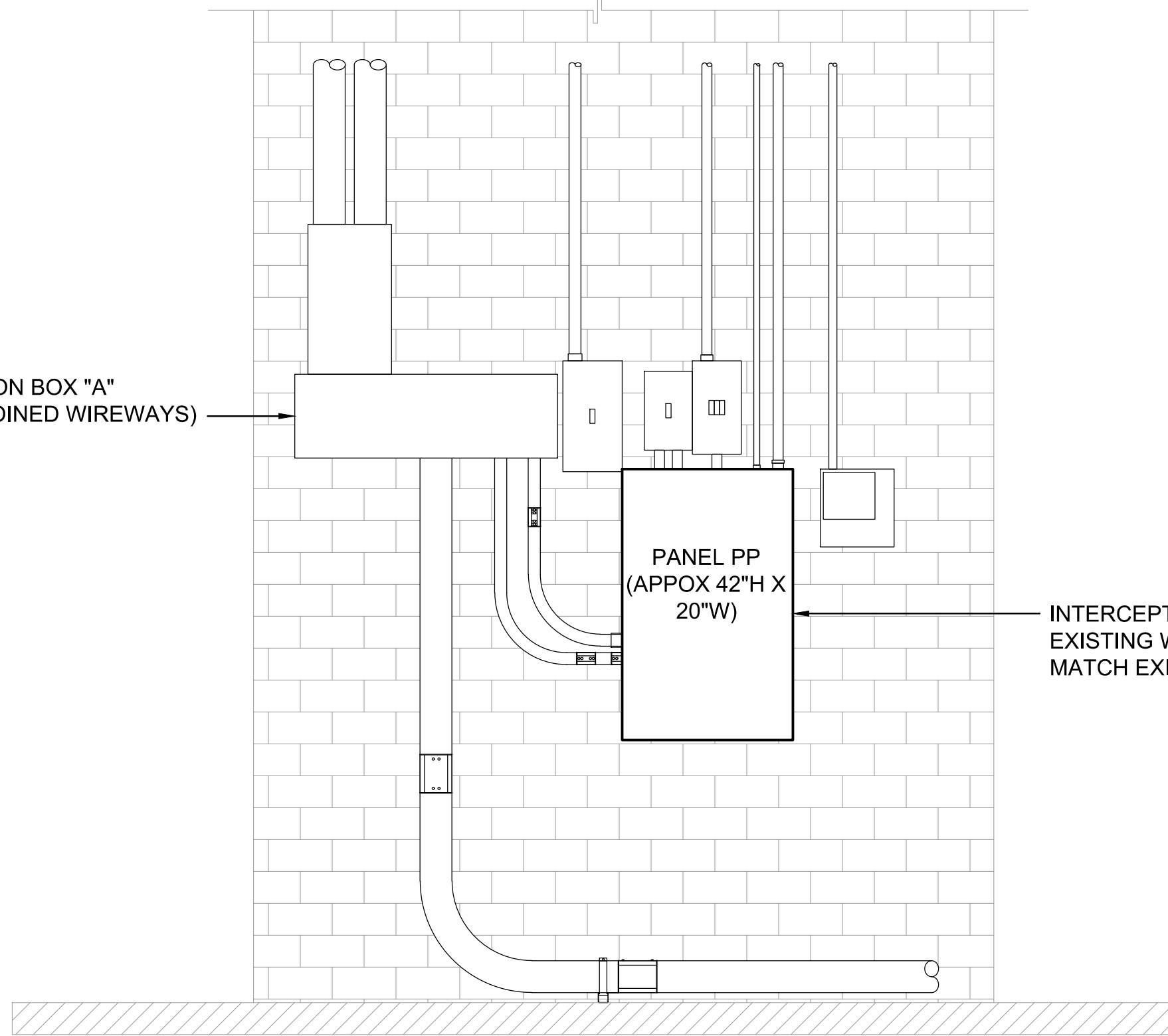


C4 PANEL C AND DAS ELEVATION - DEMO
EA502 SCALE: NTS

JUNCTION BOX "A"
(2 CO-JOINED WIREWAYS)

PANEL PP
(APPOX 42"H X
20"W)

INTERCEPT AND EXTEND
EXISTING WIRING TO PANEL AND
MATCH EXISTING CONDITIONS.



A1 PANEL PP ELEVATION
EA502 SCALE: NTS

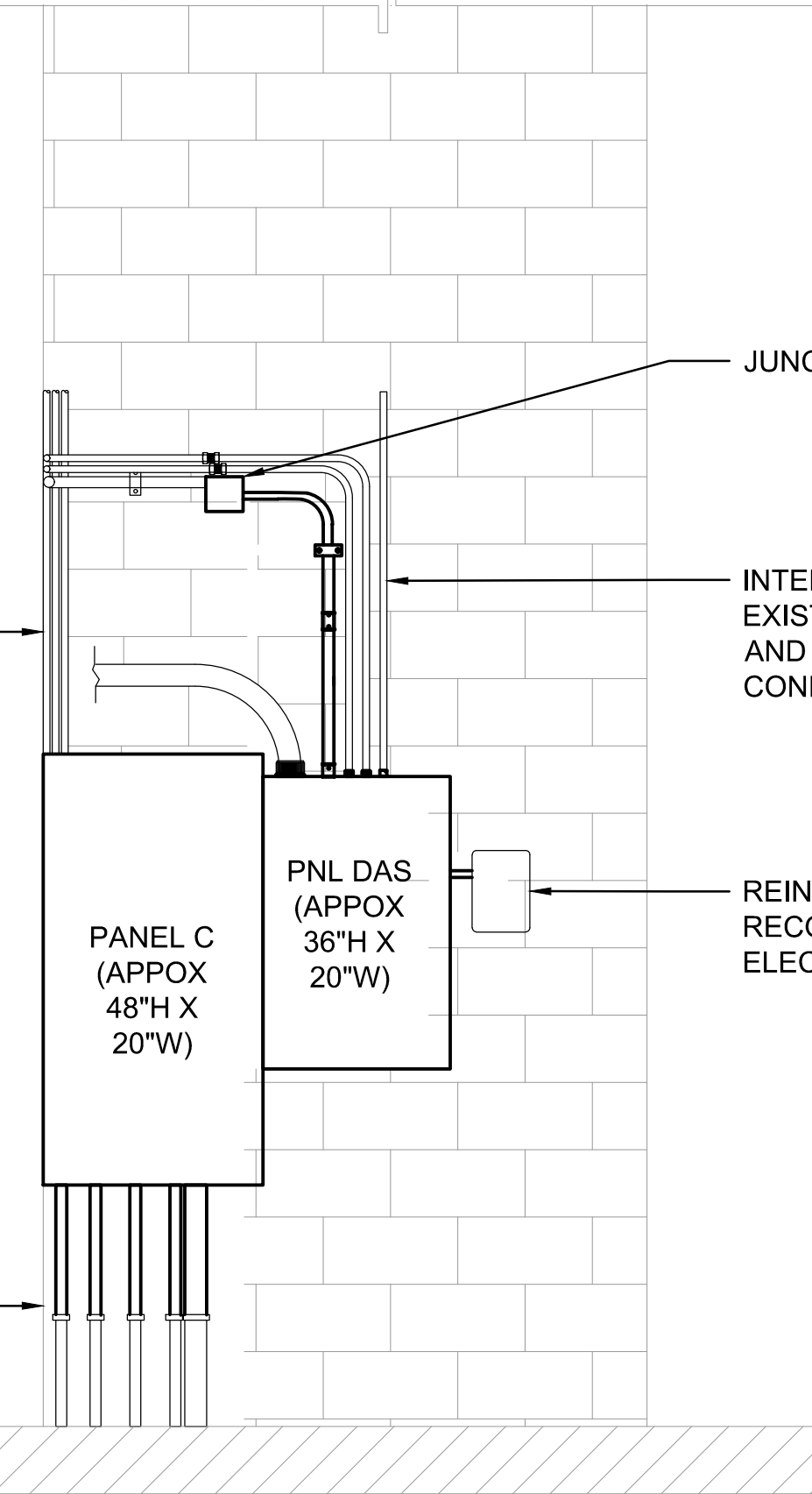
INTERCEPT AND EXTEND
EXISTING WIRING TO PANEL AND
MATCH EXISTING CONDITIONS.

JUNCTION BOX

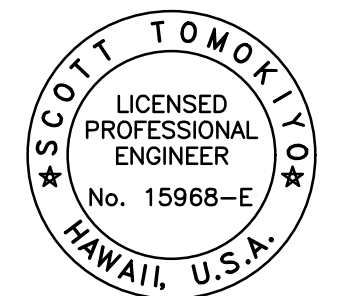
INTERCEPT AND EXTEND
EXISTING WIRING TO PANEL
AND MATCH EXISTING
CONDITIONS.

REINSTALL AND
RECONNECT EXISTING
ELECTRICAL EQUIPMENT

(6) 1"C AND (1) 3"C. CONNECT
NEW CONDUITS TO EXISTING
COUPLINGS. FIELD VERIFY
CONDUIT SIZES TO MATCH EXISTING.
RECONNECT WIRING TO MATCH
EXISTING CONDITIONS.



A4 PANEL C AND DAS ELEVATION
EA502 SCALE: NTS



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DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS
ELECTRICAL ELEVATION DETAILS

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

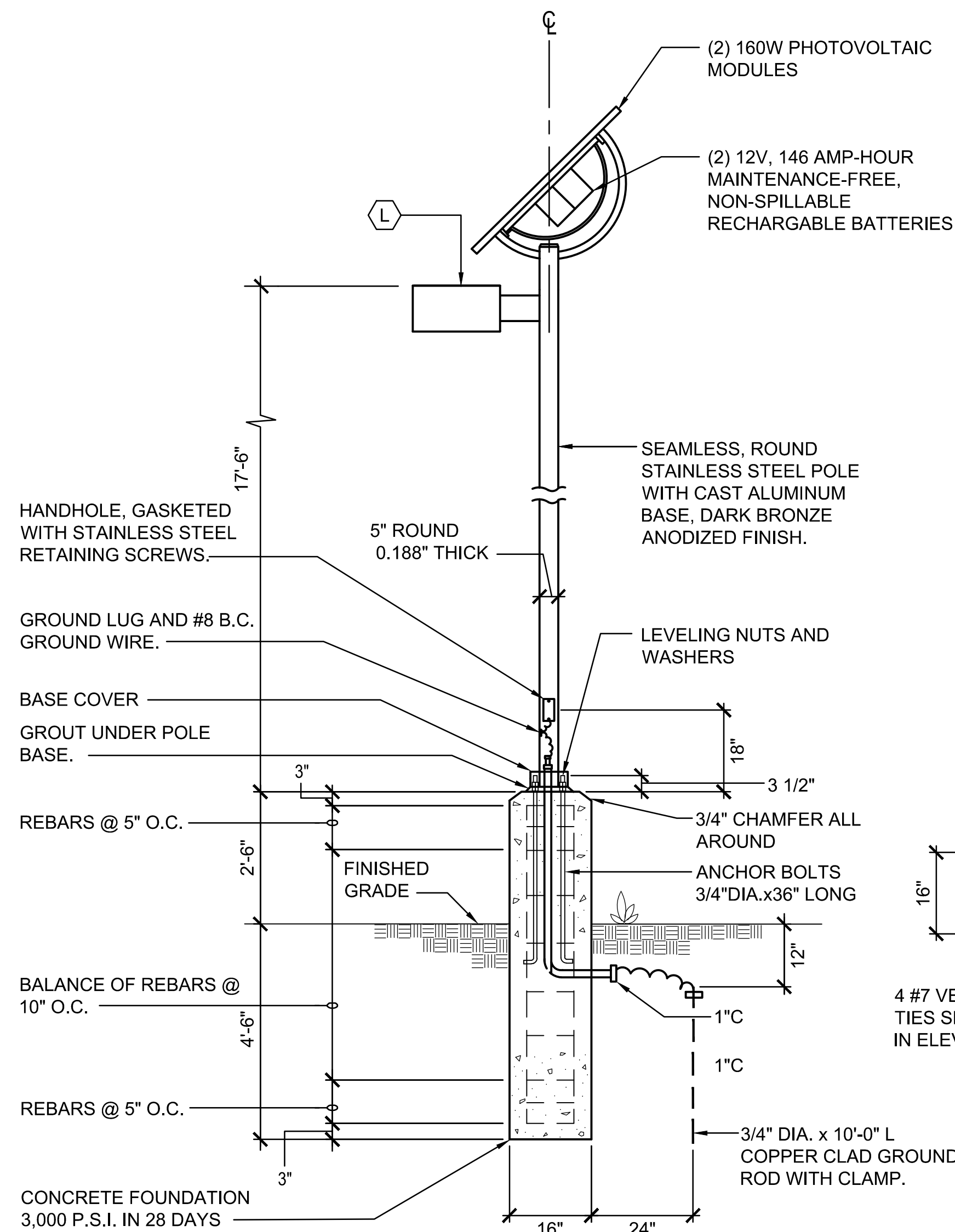
FEDERAL PROJECT NO. -

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EA502

NOTES:

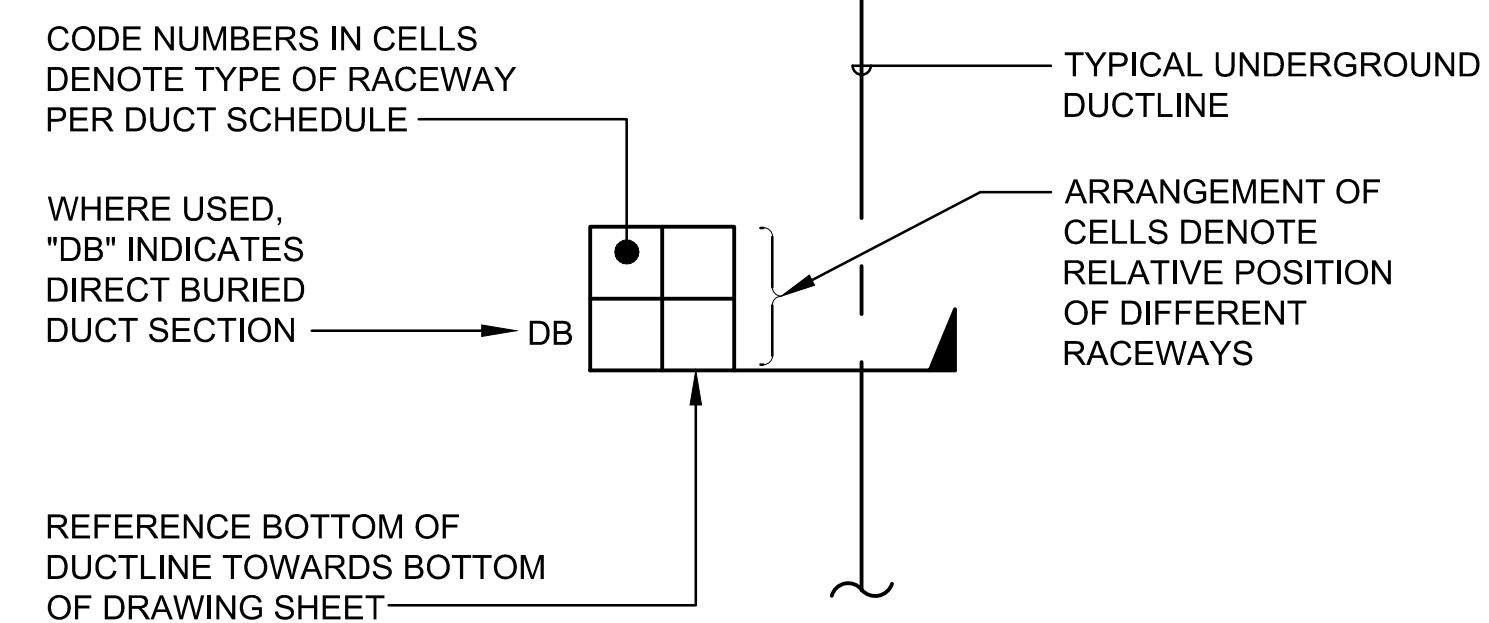
1. AREA LIGHT ASSEMBLY, INCLUDING POLE, LUMINAIRE, AND FOUNDATION SHALL WITHSTAND WINDS UP TO 130 MPH GUSTING WITHOUT PERMANENT DEFORMATION.
2. PROVIDE VIBRATION DAMPERS FOR POLE LIGHTS.



A2 LIGHT POLE DETAIL
EA503 SCALE: NTS

DUCT SCHEDULE

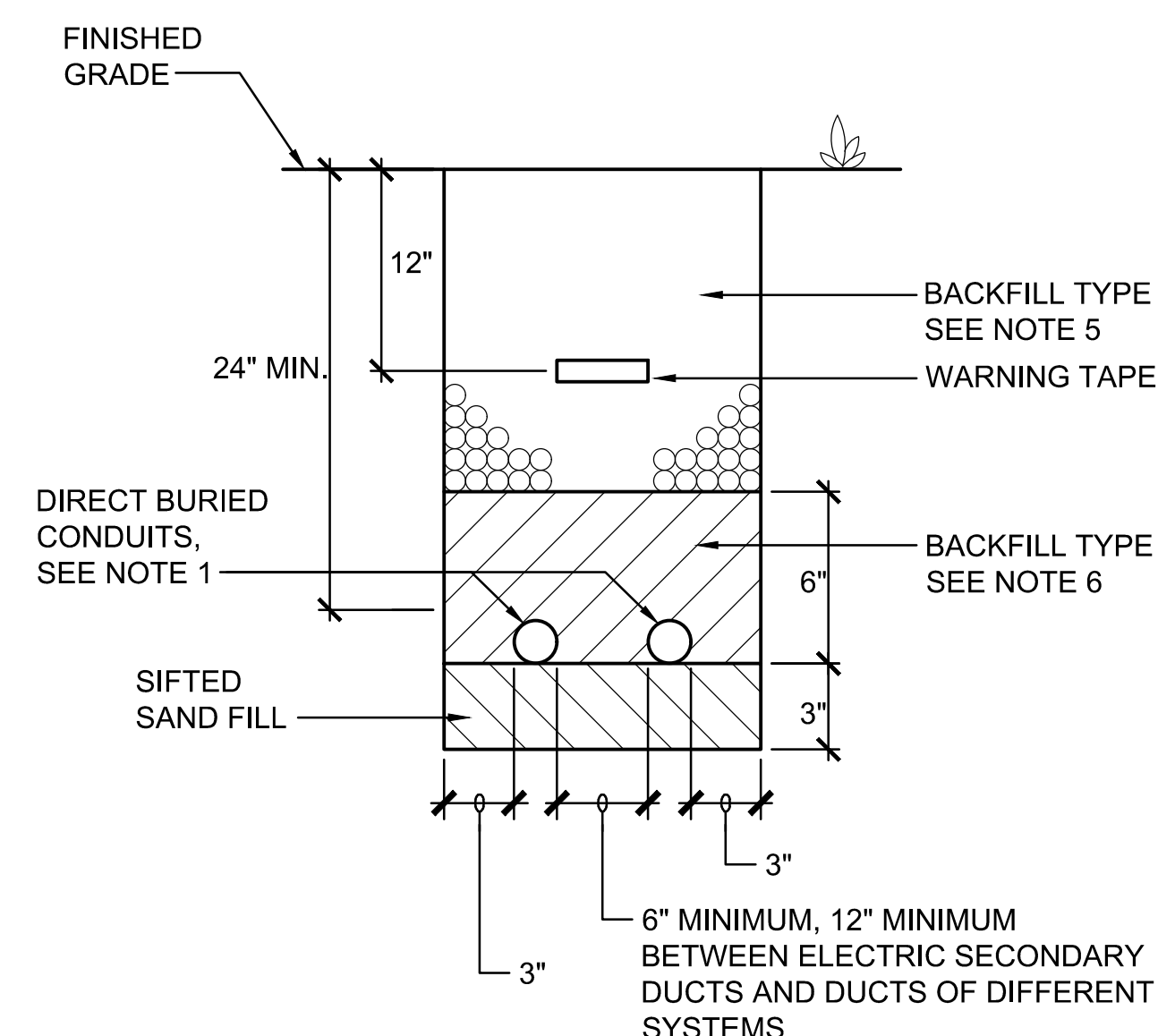
NO.	DESCRIPTION	CONDUCTORS / CABLES
P1	4" PVC, ELECTRIC GENERATOR STANDBY CIRCUIT	4-500KCMIL, #2 GND
S1	1" PVC, ELECTRIC SECONDARY CIRCUIT	3#10, #10 GND
S2	1" PVC, ELECTRIC SECONDARY CIRCUIT	2#10, #10 GND
S3	1" PVC, ELECTRIC SECONDARY CIRCUIT	2#12, #12 GND
S4	1" PVC, GENERATOR TO ANNUNCIATOR, DC POWER	COORDINATE WITH GENERATOR MANUFACTURER.
C1	1" PVC, GENERATOR TO ATS CONTROLS	COORDINATE WITH GENERATOR MANUFACTURER.
C2	1" PVC, GENERATOR TO ANNUNCIATOR, CONTROLS	COORDINATE WITH GENERATOR MANUFACTURER.



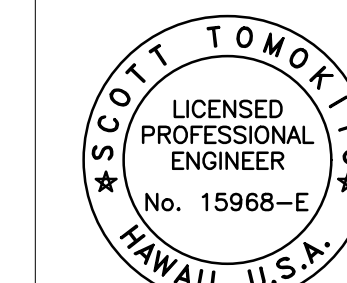
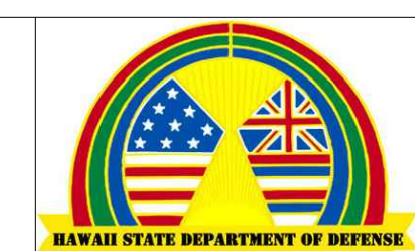
C4 DUCT SECTION FLAG CODE
EA503 SCALE: NTS

DUCT SECTION NOTES:

1. CONDUITS SHALL BE PVC SCHEDULE 40 UNLESS OTHERWISE NOTED.
2. CUT EXISTING CONCRETE AND ASPHALT SURFACES TO TRENCH NEW DUCTLINES. RESTORE DISTURBED SURFACES TO MATCH THE EXISTING SURROUNDING SURFACES INCLUDING ALL CONCRETE AND ASPHALT SURFACES.
3. WARNING TAPE SHALL BE 5 MIL THICK X 3" WIDE AND SHALL BE LAID THE ENTIRE LENGTH OF THE DUCTLINE. TAPE SHALL HAVE A CONTINUOUS METALLIC BACKING AND CORROSION RESISTANT FOIL CORE. WARNING AND IDENTIFICATION TO BE IMPRINTED ON THE TAPE SHALL READ "CAUTION BURIED ELECTRICAL (OR TELECOMMUNICATIONS) CABLE BELOW." MESSAGE SHALL BE REPEATED APPROXIMATELY EVERY 10 FEET, MINIMUM. TAPE COLOR SHALL BE AS FOLLOWS:
ELECTRICAL - RED COLOR
4. BACKFILL TYPE "A": NON-CONTAMINATED NATIVE SOIL MATERIAL WHICH DOES NOT CONTAIN MORE THAN 50% GRAVEL AND ALSO DOES NOT CONTAIN HARD LUMPS OF EARTH 3 INCHES IN GREATEST DIMENSION, ROCKS LARGER THAN 1 INCH IN LARGEST DIMENSION, HIGHLY PLASTIC CLAY, POORLY GRADED SAND AND GRAVEL, ORGANICS, DEBRIS, OR OTHER UNSUITABLE OR DELETERIOUS MATERIALS. 95% COMPACTION.
5. BACKFILL TYPE "B": NON-CONTAMINATED NATIVE SOIL MATERIAL WHICH DOES NOT CONTAIN MORE THAN 20% BY VOLUME OF ROCK PARTICLES. MIXTURE MUST PASS THROUGH A 1/2" MESH SCREEN. 95% COMPACTION.
6. WHERE ELECTRICAL OR TELECOMMUNICATIONS DUCTLINES CROSS OTHER UTILITIES, MAINTAIN A MINIMUM OF 12" VERTICAL SEPARATION BETWEEN THE ELECTRICAL/TELECOMMUNICATIONS DUCTS AND THE OTHER UTILITY LINES (GAS, WATER, SEWER, DRAIN, ETC.).



C4 TYPICAL DIRECT BURIED DUCT SECTION
EA503 SCALE: NTS



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STATE OF HAWAII
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 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS
 ELECTRICAL ELEVATIONS

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
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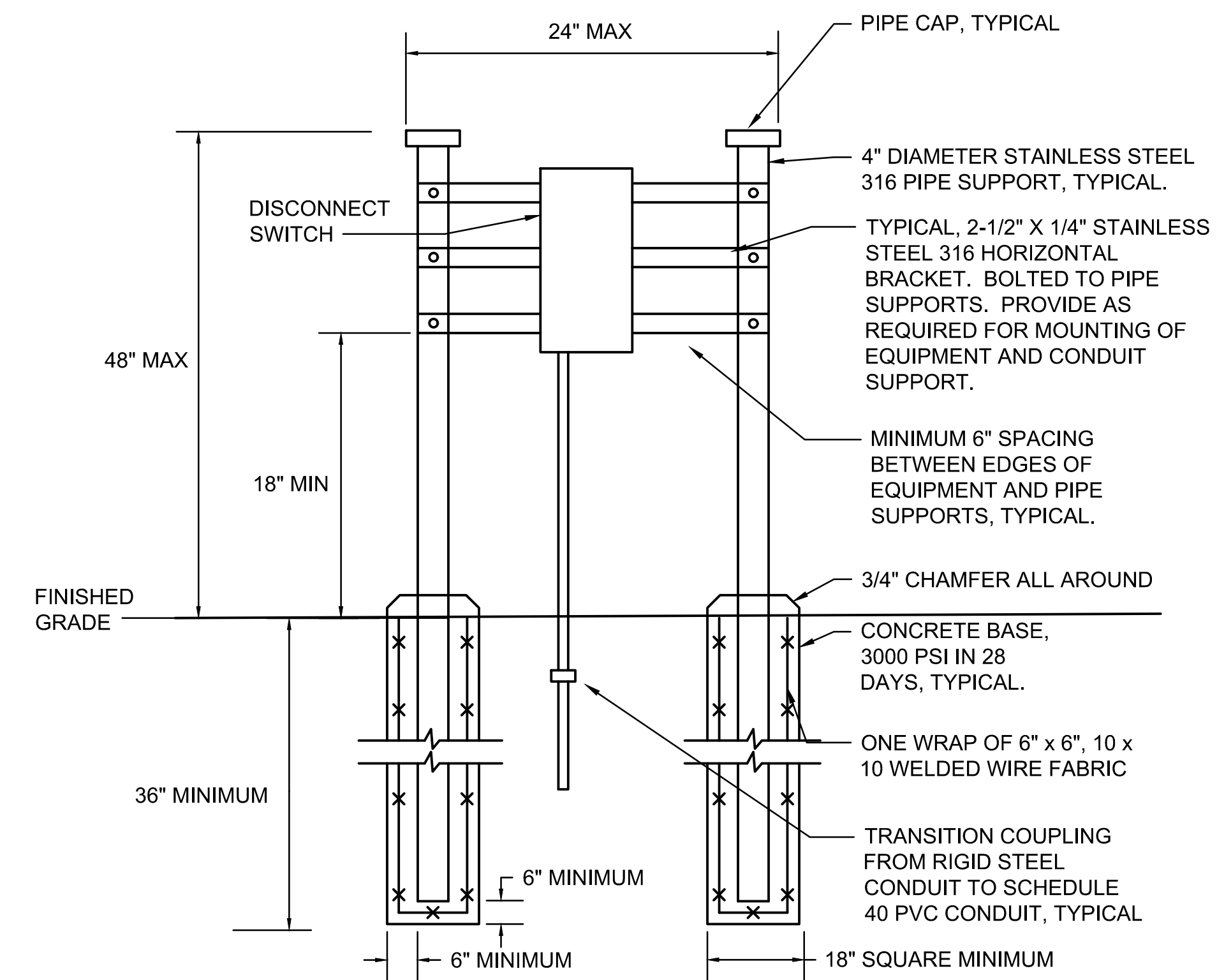
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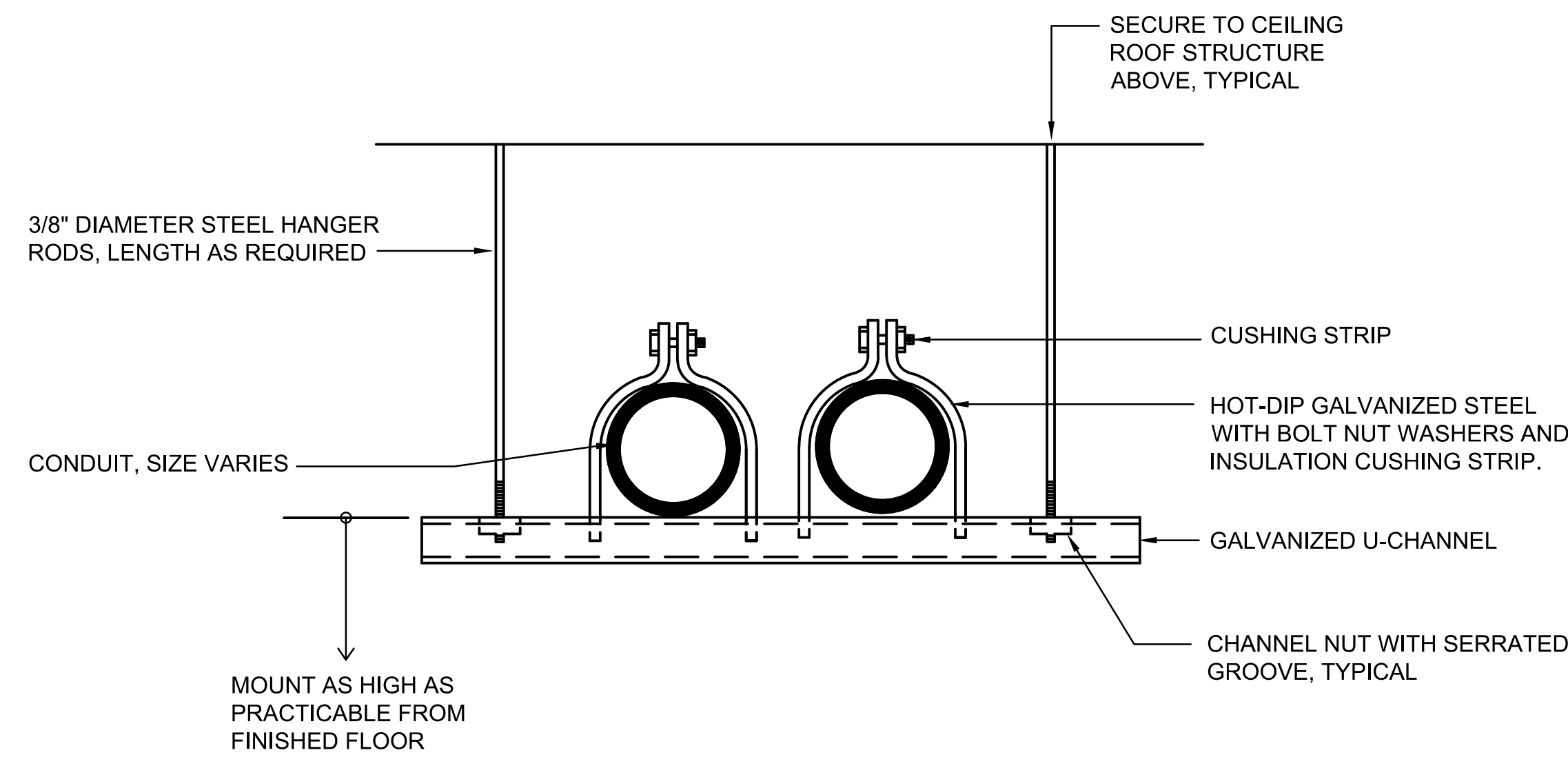
NOTES:

1. CONTRACTOR TO VERIFY EQUIPMENT DIMENSIONS BEFORE FABRICATING EQUIPMENT RACK.
2. PAINT EXPOSED CONDUITS, PIPES, AND BRACKETS WHITE.

C4
EA504

FREE-STANDING EQUIPMENT SUPPORT STRUCTURE DETAIL

SCALE: NTS



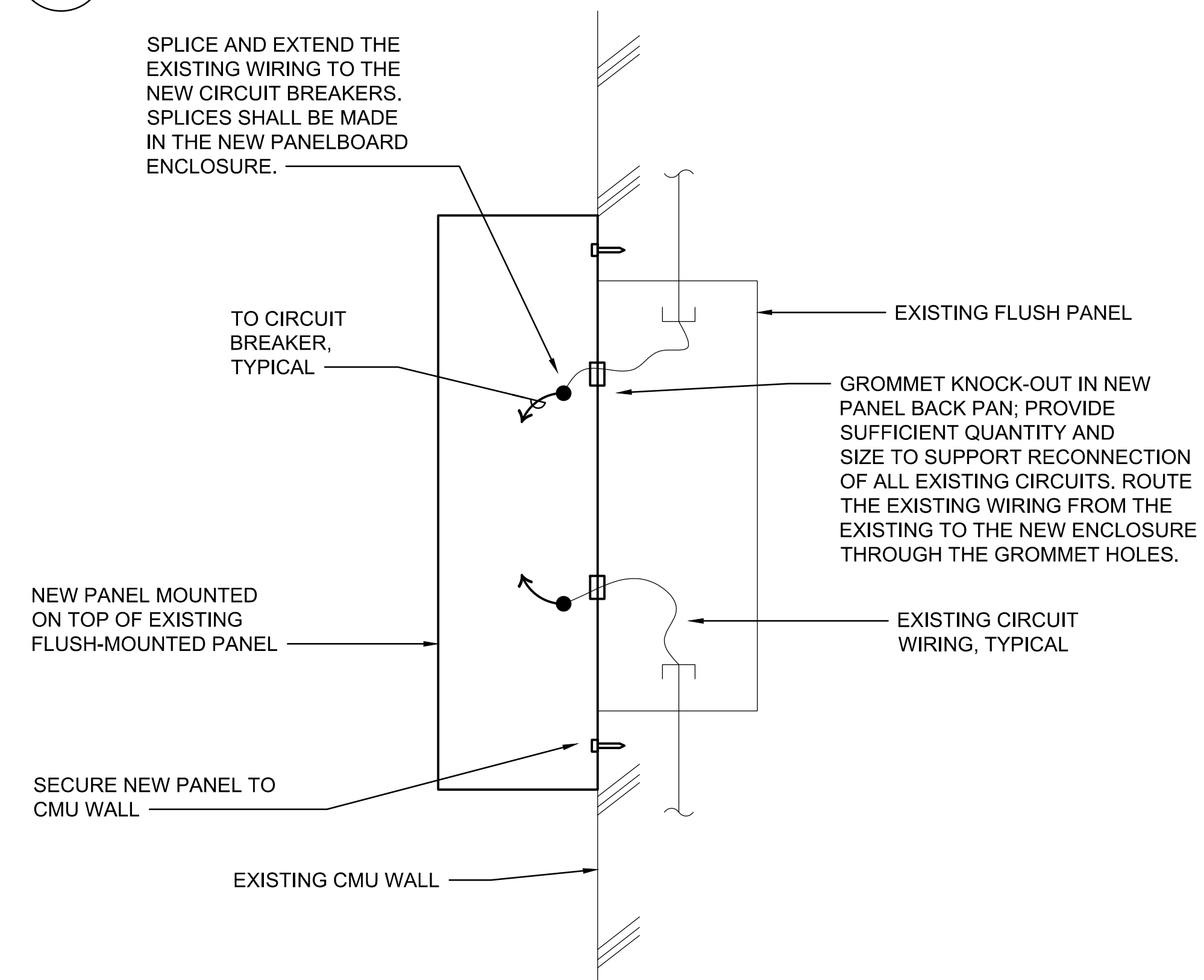
NOTES:

1. PROVIDE ALL NECESSARY HARDWARE FOR MOUNTING.

A2
EA504

TYPICAL HANGER SUPPORT DETAIL

SCALE: NTS



A4
EA504

NEW PANEL MOUNTED ON EXISTING FLUSH PANEL DETAIL

SCALE: NTS

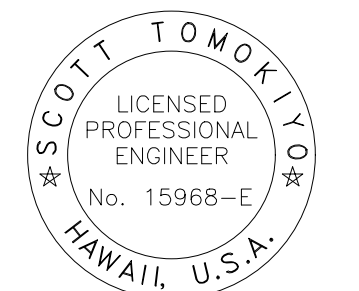
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DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600

BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS

DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 ELECTRICAL DETAILS

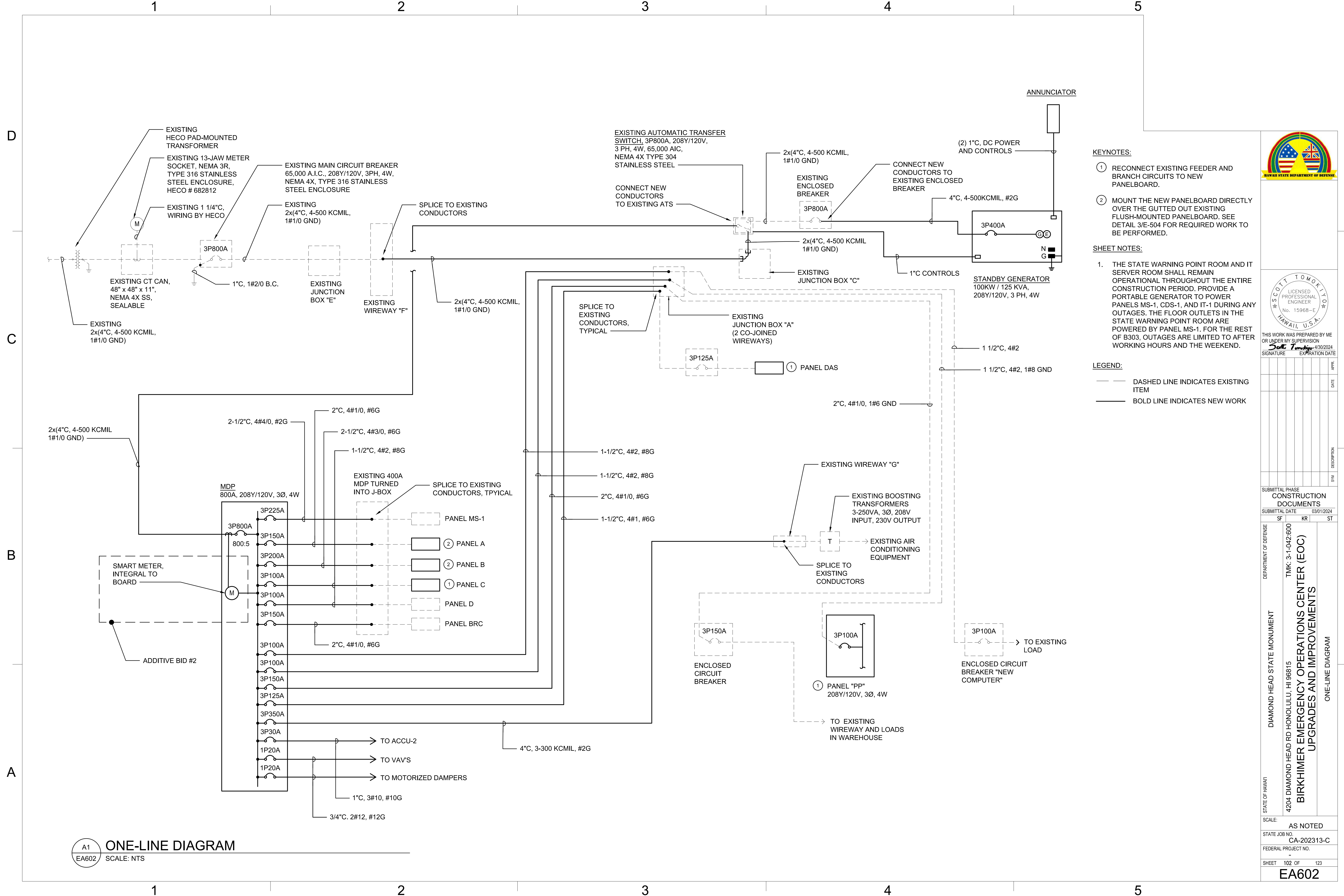
SCALE: AS NOTED

STATE JOB NO. CA-202313-C

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EA504



KEYNOTES:

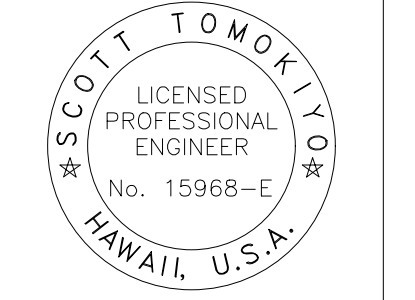
- RECONNECT EXISTING FEEDER AND BRANCH CIRCUITS TO NEW PANELBOARD.
- MOUNT THE NEW PANELBOARD DIRECTLY OVER THE GUTTED OUT EXISTING FLUSH-MOUNTED PANELBOARD. SEE DETAIL 3/E-504 FOR REQUIRED WORK TO BE PERFORMED.

SHEET NOTES:

- THE STATE WARNING POINT ROOM AND IT SERVER ROOM SHALL REMAIN OPERATIONAL THROUGHOUT THE ENTIRE CONSTRUCTION PERIOD. PROVIDE A PORTABLE GENERATOR TO POWER PANELS MS-1, CDS-1, AND IT-1 DURING ANY OUTAGES. THE FLOOR OUTLETS IN THE STATE WARNING POINT ROOM ARE POWERED BY PANEL MS-1. FOR THE REST OF B303, OUTAGES ARE LIMITED TO AFTER WORKING HOURS AND THE WEEKEND.

LEGEND:

- DASHED LINE INDICATES EXISTING ITEM
- BOLD LINE INDICATES NEW WORK



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature: *Scott Tomokiyama* DATE: 4/30/2024

DATE	APPROVAL	DESCRIPTION

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS

SUBMITTAL DATE: 03/01/2024

DATE	SYN	DESCRIPTION

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ONE-LINE DIAGRAM

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 102 OF 123

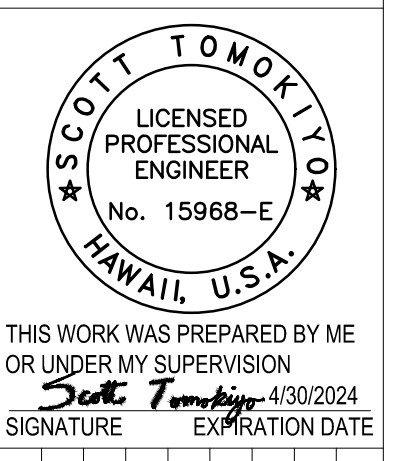
EA602

A1 ONE-LINE DIAGRAM
 EA602 SCALE: NTS

LIGHT FIXTURE SCHEDULE															
TYPE	GENERAL DESCRIPTION	MOUNTING STYLE	CHASSIS / FINISH	DRIVER / BALLAST	SHIELDING / REFLECTOR	NOMINAL DIMENSIONS	LAMP TYPE	INPUT WATTS	LUMEN OUTPUT	COLOR TEMP	CRI	VOLTAGE	SPECIAL CERTIFICATIONS OR LISTINGS	MANUFACTURER + MODEL NUMBER	REMARKS
A	SHALLOW LED ARCHITECTURAL TROFFER	CEILING RECESSED	DIE FORMED CODE-GAUGE COLD-ROLLED STEEL, HIGH-REFLECTIVITY MATTE WHITE PAINT	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE ACRYLIC LENS	2' X 4'	LED	29.6W	4207 LU	3500K	82 CRI	120-277V		COLUMBIA LCAT24-S-35L042G OR ACCEPTED EQUIVALENT	1. 10% DIMMING DRIVER FOR 0-10V DIMMING
B	SHALLOW LED ARCHITECTURAL TROFFER	CEILING RECESSED	DIE FORMED COLD ROLLED STEEL HOUSING WITH 96 LOW GLOSS WHITE FINISH	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE ACRYLIC LENS	1' X 4'	LED	28.4 W	2998 LU	3500K	80 CRI	120-277V		FINELITE HPR-LED-ANR-1X4-S-835-DCO-96LG-VOLT-SC-FC-DALI-1%-SM-96LG OR ACCEPTED EQUIVALENT	1. 10% DIMMING DRIVER FOR 0-10V DIMMING
BE	SHALLOW LED ARCHITECTURAL TROFFER	CEILING RECESSED	DIE FORMED COLD ROLLED STEEL HOUSING WITH 96 LOW GLOSS WHITE FINISH WITH EMERGENCY BATTERY PACK	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE ACRYLIC LENS	1' X 4'	LED	28.4 W	2998 LU	3500K	80 CRI	120-277V		FINELITE HPR-LED-ANR-1X4-S-835-DCO-96LG-VOLT-SC-FC-DALI-1%-SM-96LG-LGD10W OR ACCEPTED EQUIVALENT	1. 10% DIMMING DRIVER FOR 0-10V DIMMING
D	ENCLOSED AND GASKETED	CEILING SURFACE MOUNTED	OUTDOOR POWDER COAT, BLACK	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE ACRYLIC LENS	1' X 4'	LED	24 W	3000 LU	3500K	80 CRI	120-277V	WET LOCATION LISTED	STARTEK HYDRO BEAM OR ACCEPTED EQUIVALENT	
E	ENCLOSED AND GASKETED PENDANT	CEILING PENDANT MOUNTED	UL 5VA FIBERGLASS, WHITE	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE POLYCARBONATE LENS	1' X 8'	LED	45 W	6398 LU	3500K	82 CRI	120-277V		COLUMBIA LXEM8-35-VW-RFA-ED-U OR ACCEPTED EQUIVALENT	1. 10% DIMMING DRIVER FOR 0-10V DIMMING. 2. PROVIDE WATTSTOPPER PHOTO/MOTION SENSOR
EE	ENCLOSED AND GASKETED PENDANT	CEILING PENDANT MOUNTED	UL 5VA FIBERGLASS, WHITE WITH EMERGENCY BATTERY PACK	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE POLYCARBONATE LENS	1' X 8'	LED	45 W	6398 LU	3500K	82 CRI	120-277V		COLUMBIA LXEM8-35-VW-RFA-ED-U-ELL14 OR ACCEPTED EQUIVALENT	
F	ENCLOSED AND GASKETED PENDANT	VANITY WALL MOUNT	UL 5VA FIBERGLASS, WHITE	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE POLYCARBONATE LENS	1' X 4'	LED	22.5 W	3199 LU	3500K	82 CRI	120-277V		COLUMBIA LXEM4-35-VW-RFA-ED-U OR ACCEPTED EQUIVALENT	1. 10% DIMMING DRIVER FOR 0-10V DIMMING
G	ENCLOSED AND GASKETED PENDANT	CEILING SURFACE MOUNTED	UL 5VA FIBERGLASS, WHITE	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE POLYCARBONATE LENS	1' X 4'	LED	22.5 W	3199 LU	3500K	82 CRI	120-277V		COLUMBIA LXEM8-40VW-RFA-EDU OR ACCEPTED EQUIVALENT	1. 10% DIMMING DRIVER FOR 0-10V DIMMING
GE	ENCLOSED AND GASKETED PENDANT	CEILING SURFACE MOUNTED	UL 5VA FIBERGLASS, WHITE WITH EMERGENCY BATTERY PACK	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE POLYCARBONATE LENS	1' X 4'	LED	22.5 W	3199 LU	3500K	82 CRI	120-277V		COLUMBIA LXEM8-40-VW-RFA-ED-U-ELL14 OR ACCEPTED EQUIVALENT	
H	ENCLOSED AND GASKETED PENDANT	CEILING SURFACE MOUNTED	UL 5VA FIBERGLASS, WHITE	INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE POLYCARBONATE LENS	1' X 4'	LED	22.5 W	3199 LU	3500K	82 CRI	120-277V		COLUMBIA LXEM8-40VW-RFA-EDU OR ACCEPTED EQUIVALENT	1. 10% DIMMING DRIVER FOR 0-10V DIMMING
I	CIRCULAR PENDANT	CEILING PENDANT MOUNTED		INTEGRAL ELECTRONIC DRIVER	DIFFUSE MATTE PLASTIC LENS	11.2" X 3.5"	LED			3500K	82 CRI	120-277V			
J	FLOODLIGHT	WALL SURFACE MOUNTED	ALUMINUM DIE CASE HOUSING, GRAY FINISH	INTEGRAL ELECTRONIC DRIVER	IMPACT RESISTANT TEMPERED GLASS	27" H X 20" W	LED	150W	18900 LU	3000K	82 CRI	120-277V	WET LOCATION LISTED	EVOLVE EFH-01-0-CC-65-7-35 OR ACCEPTED EQUIVALENT	1. BUTTON PHOTOCELL
K	WALL PACK	WALL SURFACE MOUNTED	FADE AND ABRASION RESISTANT, ELECTROSTATICALLY APPLIED, THERMALLY CURED TRIGLYCIDAL ISOCYANURATE POLYESTER POWDERCOAT	INTEGRAL ELECTRONIC DRIVER	INJECTION MOLDED PMMA ACRYLIC, CLEAR	8.9" X 13"	LED	30 W	3267 LU	3000K	80 CRI	120-277V	WET LOCATION LISTED	WDS-D-24L-30-3K8-4W-UNV-BLT-PC OR ACCEPTED EQUIVALENT	1. BUTTON PHOTOCELL
L	SOLAR POLE LIGHT	POLE MOUNTED	POLYESTER POWDER COATING	INTEGRAL ELECTRONIC DRIVER	TEMPERED AND SCREENED GLASS LENS	16 11/16" x 17 11/16"	LED	50W	6000 LU	3000K	82 CRI	12VDC	WET LOCATION LISTED	SELLUX AV4LS-R3W-1-L50-30 LED SOLAR OR ACCEPTED EQUIVALENT	INTEGRAL SMART CONTROLLER, MOTION SENSOR, 12V BATTERIES, AND SOLAR PANELS REFER TO 1/EA503 FOR POLE DETAIL.
X	EXIT LIGHT	CEILING SURFACE MOUNTED	HIGH STRENGTH DIE-CAST ALUMINUM HOUSING, TEXTURE WHITE FINISH	INTEGRAL ELECTRONIC DRIVER	COLOR-MATCHED SILK-SCREEN COATING DIFFUSER. RED LETTERS.	1' X 9"	LED	2.6W	N/A	N/A	N/A	120-277V			

LIGHTING CONTROLS SCHEDULE						
ROOM NO. / ID	ROOM NAME	LOW VOLTAGE	SWITCH TYPE	RECEPTACLE CONTROL	LIGHTING CONTROL REQUIREMENTS	CONTROL DIAGRAM REFERENCE
	JIC OFFICE	YES	2-BUTTON WALL SWITCH + ROOM CONTROLLER + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 50% OF LIGHTS MANUAL ON FOR REMAINDER OF LIGHTS AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A1/EA505
	STATE WARNING POINT	NO	MANUAL TOGGLE	NO	MANUAL ON MANUAL OFF	
	MEDIA CENTER	YES	2-BUTTON WALL SWITCH + ROOM CONTROLLER + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 50% OF LIGHTS MANUAL ON FOR REMAINDER OF LIGHTS AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A1/EA505
	AIR CONDITIONING MACHINE ROOM	NO	MANUAL TOGGLE	NO	MANUAL ON MANUAL OFF	
	IT SERVER ROOM	NO	MANUAL TOGGLE	NO	MANUAL ON MANUAL OFF	
	CONFERENCE ROOM	YES	3-BUTTON KEYPAD + OCCUPANCY SENSOR	NO	BUTTON #1 - MANUAL ON FOR 100% OF LIGHTS BUTTON #2 - AV MODE (ALL LIGHTS DIMMED TO 10%) BUTTON #3 - MANUAL ALL OFF AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A1/EA505
	OPEN WORK AREA #1	YES	2-BUTTON WALL SWITCH + ROOM CONTROLLER + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 50% OF LIGHTS MANUAL ON FOR REMAINDER OF LIGHTS AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A1/EA505
	PASSAGE	YES	2-BUTTON WALL SWITCH + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 100% OF LIGHTS (SAFETY) AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A3/EA505
	VESTABULE	YES	2-BUTTON WALL SWITCH + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 100% OF LIGHTS (SAFETY) AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A3/EA505
	MEN RESTROOM	YES	1-BUTTON WALL SWITCH + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 100% OF LIGHTS (SAFETY) AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A3/EA505
	WOMEN RESTROOM	YES	1-BUTTON WALL SWITCH + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 100% OF LIGHTS (SAFETY) AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A3/EA505

LIGHTING CONTROLS SCHEDULE						
ROOM NO. / ID	ROOM NAME	LOW VOLTAGE	SWITCH TYPE	RECEPTACLE CONTROL	LIGHTING CONTROL REQUIREMENTS	CONTROL DIAGRAM REFERENCE
	STORAGE ROOM #1	NO	WALLBOX OCCUPANCY SENSOR WITH DUAL SWITCHES/RELAYS	NO	AUTOMATIC ON FOR 50% OF LIGHTS MANUAL ON FOR REMAINDER OF LIGHTS AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A5/EA505
	STORAGE ROOM #2	NO	WALLBOX OCCUPANCY SENSOR WITH DUAL SWITCHES/RELAYS	NO	AUTOMATIC ON FOR 50% OF LIGHTS MANUAL ON FOR REMAINDER OF LIGHTS AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A5/EA505
	LUNCH ROOM	NO	2-BUTTON WALL SWITCH + ROOM CONTROLLER + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 50% OF LIGHTS MANUAL ON FOR REMAINDER OF LIGHTS AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A1/EA505
	WAREHOUSE AREA #1, #2, #3, #4	NO	2-BUTTON WALL SWITCH + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 100% OF LIGHTS DIM TO 20% AFTER 5 MINUTES OF INACTIVITY AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A1/EA505
	OFFICE #1, #2, #3	YES	2-BUTTON WALL SWITCH + ROOM CONTROLLER + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 50% OF LIGHTS MANUAL ON FOR REMAINDER OF LIGHTS AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A3/EA505
	CORRIDOR A, B, C, D	NO	2-BUTTON WALL SWITCH + OCCUPANCY SENSOR	NO	AUTOMATIC ON FOR 100% OF LIGHTS DIM TO 20% AFTER 5 MINUTES OF INACTIVITY AUTOMATIC OFF AFTER 20 MINUTES OF INACTIVITY	A3/EA505



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
 Scott Tomokiyo 4/30/2024
 SIGNATURE EXPIRATION DATE

DATE	APPR.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

STATE OF HAWAII
 DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ELECTRICAL SCHEDULES
 SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 103 OF 123
EA701

PANELBOARD: NEW C

LOCATION: CORRIDOR
SUPPLY FROM: MDP
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 208Y/120
PHASES: 3
WIRES: 4
CABINET WIDTH: 20"

A.I.C RATING: 10,000
MAINS TYPE: MCB
BUS RATING: 225
MCB RATING: 100

Table with columns: GND, WIRE, CKT, CIRCUIT DESCRIPTION, ID, TRIP, POLES, A, B, C, POLES, TRIP, ID, CIRCUIT DESCRIPTION, CKT, WIRE, GND. Lists various electrical loads and their specifications.

TOTAL LOAD: 7.7 KVA, 8.2 KVA, 6.7 KVA
TOTAL AMPS: 21.4 A, 22.8 A, 18.6 A

ID LEGEND:
*L DENOTES LOCKABLE BREAKER ACCESSORY

Table with columns: LOAD CLASSIFICATION, CONNECTED LOAD, DEMAND FACTOR, DEMAND LOAD, PANEL TOTALS. Summary of load data.

NOTES:
1. REPLACES EXISTING PANEL C. FIELD VERIFY EXISTING BREAKER SIZES. NEW BREAKER SHALL MATCH EXISTING.
2. BOLD INDICATES NEW CIRCUITING ADDED TO THE PANEL.

PANELBOARD: NEW DAS

LOCATION: CORRIDOR
SUPPLY FROM: MDP
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 208Y/120
PHASES: 3
WIRES: 4
CABINET WIDTH: 20"

A.I.C RATING: 10,000
MAINS TYPE: MLO
BUS RATING: 125
MCB RATING: N/A

Table with columns: GND, WIRE, CKT, CIRCUIT DESCRIPTION, ID, TRIP, POLES, A, B, C, POLES, TRIP, ID, CIRCUIT DESCRIPTION, CKT, WIRE, GND. Lists various electrical loads.

TOTAL LOAD: 4.0 KVA, 4.0 KVA, 4.0 KVA
TOTAL AMPS: 11.1 A, 11.1 A, 11.1 A

ID LEGEND:

Table with columns: LOAD CLASSIFICATION, CONNECTED LOAD, DEMAND FACTOR, DEMAND LOAD, PANEL TOTALS. Summary of load data.

NOTES:
1. REPLACES EXISTING PANEL DAS. FIELD VERIFY EXISTING BREAKER SIZES. NEW BREAKER SIZES SHALL MATCH EXISTING.

PANELBOARD: NEW PP

LOCATION: WAREHOUSE AREA #1
SUPPLY FROM: MDP
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 208Y/120
PHASES: 3
WIRES: 4
CABINET WIDTH: 20"

A.I.C RATING: 10,000
MAINS TYPE: MCB
BUS RATING: 100
MCB RATING: 100

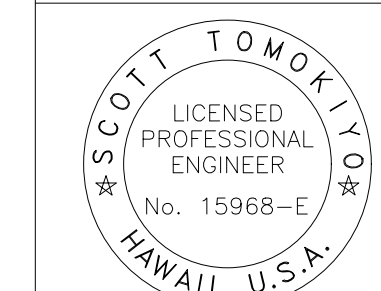
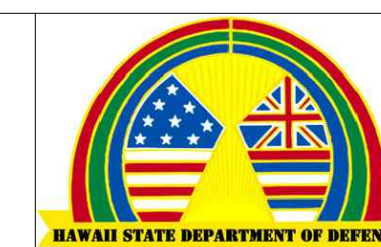
Table with columns: GND, WIRE, CKT, CIRCUIT DESCRIPTION, ID, TRIP, POLES, A, B, C, POLES, TRIP, ID, CIRCUIT DESCRIPTION, CKT, WIRE, GND. Lists various electrical loads.

TOTAL LOAD: 4.0 KVA, 3.0 KVA, 4.0 KVA
TOTAL AMPS: 11.1 A, 8.3 A, 11.1 A

ID LEGEND:

Table with columns: LOAD CLASSIFICATION, CONNECTED LOAD, DEMAND FACTOR, DEMAND LOAD, PANEL TOTALS. Summary of load data.

NOTES:
1. FIELD VERIFY EXISTING BREAKER SIZES. NEW BREAKERS SHALL MATCH EXISTING.
2. REPLACES EXISTING PANEL PP.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
DATE: 4/30/2024
SIGNATURE: Scott Tomokiyo
EXPIRATION DATE:

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS
SUBMITTAL DATE: 03/01/2024

SF KR ST

DIAMOND HEAD STATE MONUMENT

STATE OF HAWAII

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO.
SHEET 104 OF 123

EA702

PANELBOARD: NEW A

LOCATION: WAREHOUSE CORRIDOR
SUPPLY FROM: MDP
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 208Y/120
PHASES: 3
WIRES: 4
CABINET WIDTH: 20"

A.I.C RATING: 10,000
MAINS TYPE: MLO
BUS RATING: 225
MCB RATING: N/A

Table with columns: GND, WIRE, CKT, CIRCUIT DESCRIPTION, ID, TRIP, POLES, A, B, C, POLES, TRIP, ID, CIRCUIT DESCRIPTION, CKT, WIRE, GND. Lists various electrical loads and their specifications.

TOTAL LOAD: 14.0 KVA, 14.0 KVA, 13.0 KVA
TOTAL AMPS: 38.9 A, 38.9 A, 36.1 A

ID LEGEND:

Table with columns: LOAD CLASSIFICATION, CONNECTED LOAD, DEMAND FACTOR, DEMAND LOAD, PANEL TOTALS. Summarizes load data by category.

- NOTES:
1. REPLACES EXISTING PANEL A.
2. FIELD VERIFY EXISTING BREAKER SIZES. NEW BREAKERS SHALL MATCH EXISTING.

PANELBOARD: NEW B

LOCATION: WAREHOUSE CORRIDOR
SUPPLY FROM: MDP
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 208Y/120
PHASES: 3
WIRES: 4
CABINET WIDTH: 20"

A.I.C RATING: 10,000
MAINS TYPE: MLO
BUS RATING: 225
MCB RATING: N/A

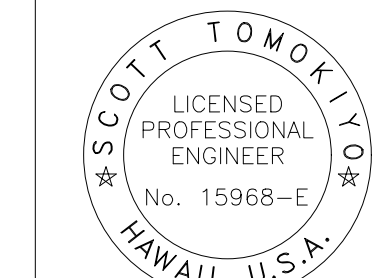
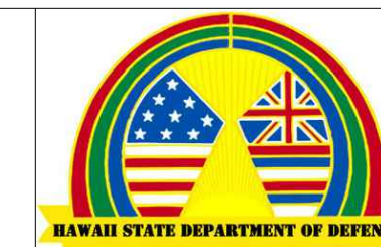
Table with columns: GND, WIRE, CKT, CIRCUIT DESCRIPTION, ID, TRIP, POLES, A, B, C, POLES, TRIP, ID, CIRCUIT DESCRIPTION, CKT, WIRE, GND. Lists various electrical loads and their specifications.

TOTAL LOAD: 12.0 KVA, 13.0 KVA, 10.0 KVA
TOTAL AMPS: 33.3 A, 36.1 A, 27.8 A

ID LEGEND:

Table with columns: LOAD CLASSIFICATION, CONNECTED LOAD, DEMAND FACTOR, DEMAND LOAD, PANEL TOTALS. Summarizes load data by category.

- NOTES:
1. REPLACE EXISTING PANEL B.
2. FIELD VERIFY EXISTING BREAKER SIZES. NEW BREAKERS SHALL MATCH EXISTING.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Table with columns: SIGNATURE, EXPIRATION DATE, DATE, APPR. Includes signature and dates.

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS

SUBMITTAL DATE: 03/01/2024

Table with columns: SF, KR, ST. Summary of submittal counts.

STATE OF HAWAII
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
PANEL SCHEDULES

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO.
SHEET 105 OF 123
EA703

1

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D

C

B

A

D

C

B

A

EXISTING PANEL "PR"
120Y/208V, 3Ø, 4W

OFFICE 4 - 115

OFFICE 5 - 116

CONTROL POINT ROOM - 131

OFFICE 11 - 117

OFFICE 9 - 124

OFFICE 12 - 118

CONFERENCE 1 - 130

CONFERENCE 2 - 127

EXISTING FCU
208V, 1Ø, 1.6 FLA

OFFICE 6 - 134

OFFICE 13 - 119

RADIO ROOM - 136

OFFICE 7 - 126

OFFICE 14 - 120

OFFICE 3 - 112

EMP ROOM - 135

STATE WARNING POINT - 129

OFFICE 10 - 123

OFFICE 15 - 121

OFFICE 1 - 114

OFFICE 2 - 113

TELECOM ROOM - 133

CORRIDOR 3

EXISTING FCU
208V, 1Ø, 1.6 FLA

COPIER ROOM - 132

OFFICE 8 - 125

STORAGE ROOM 5 - 128

EXISTING FIRE ALARM
CONTROL PANEL

EXISTING AHU
208V, 3Ø
COOLING FAN: 5.8 FLA

EXISTING PANEL "B"
208Y/120V, 3Ø, 4W

CORRIDOR 2

EXISTING AHU
208V, 3Ø, 10HP

CORRIDOR 1

WOMENS - 106

EXISTING PANEL "C"
208Y/120V, 3Ø, 4W

AC ROOM - 122

EXISTING PANEL "NO I.D."
120Y/208V, 3Ø, 4W

J-19,21,23

EXISTING ACCU
208V, 1Ø
COOLING FAN: 0.3 x 2 FLA
COMPRESSOR: 17.6 RLA

EM-26,28,30

KITCHEN - 104

STORAGE ROOM 3 - 103

VESTIBULE -101

PUMP ROOM - 111

MENS - 107

EXISTING ACCU
208V, 3Ø, 12.5HP

STORAGE ROOM 4 - 102

EXISTING PANEL "J"
208Y/120V, 3Ø, 4W

STORAGE ROOM 1 - 110

XFMR ROOM - 108

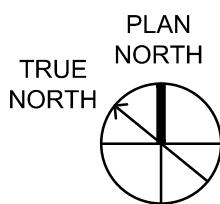
MECHANICAL ROOM - 105
EM-25,27,29

EXISTING ACCU
208V, 1Ø
COOLING FAN: 0.5 x 2 FLA
COMPRESSOR: 8.0 RLA

EXISTING MAIN SWBD TO REMAIN
208/120V, 3Ø, 4W

STORAGE ROOM 2 - 109

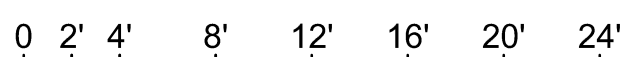
EXISTING PANEL "EM"
208Y/120V, 3Ø, 4W



1

FIRST FLOOR MECH POWER PLAN - DEMO

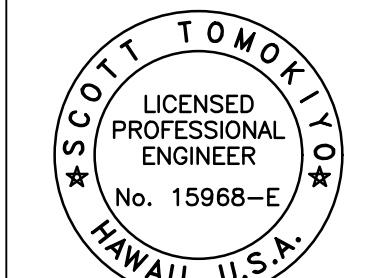
SCALE: 1/8" = 1'-0"



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

KEYNOTES:

- 1 TRACE AND VERIFY EXISTING CIRCUITS. REMOVE CONDUIT AND CONDUCTORS BACK TO DESIGNATED PANEL.
- 2 POWERED BY ASSOCIATED ACCU IN MECHANICAL ROOM-105. REMOVE CONDUIT AND CONDUCTORS BACK TO SOURCE.
- 3 MAINTAIN EXISTING HOMERUN FOR REUSE.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

DATE: 4/30/2024

SIGNATURE: Scott Tomkiyo

EXPIRATION DATE:

APPR:

DATE:

DESCRIPTION:

SYN:

SUBMITTAL PHASE:

CONSTRUCTION DOCUMENTS

SUBMITTAL DATE: 03/01/2024

SF KR ST

DEPARTMENT OF DEFENSE

TMNK: 3-1-042:600

4204 DIAMOND HEAD RD HONOLULU, HI 96815

DIAMOND HEAD STATE MONUMENT

BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC)

UPGRADES AND IMPROVEMENTS

FIRST FLOOR MECH POWER PLAN - DEMO

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO. -

SHEET 106 OF 123

EB101

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C

B

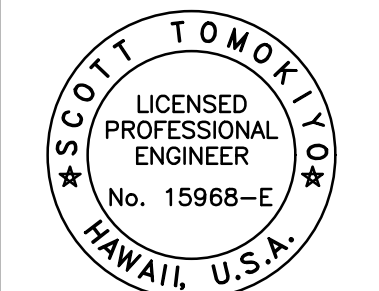
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Scott Tomokiyoo 4/30/2024
SIGNATURE EXPIRATION DATE

DATE	APPR.	DATE	APPR.

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 03/01/2024

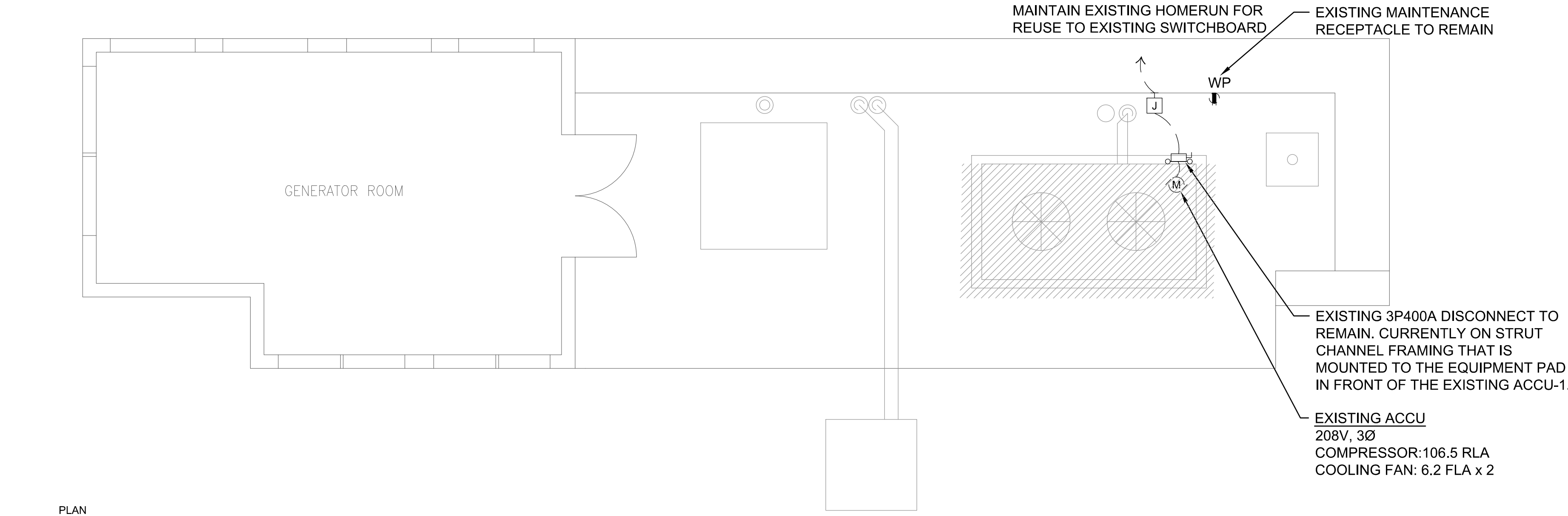
SF	KR	ST

DEPARTMENT OF DEFENSE
 TMK: 3-1-042:600
 BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS
 ROOF MECH POWER PLANS

STATE OF HAWAII
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 DIAMOND HEAD STATE MONUMENT

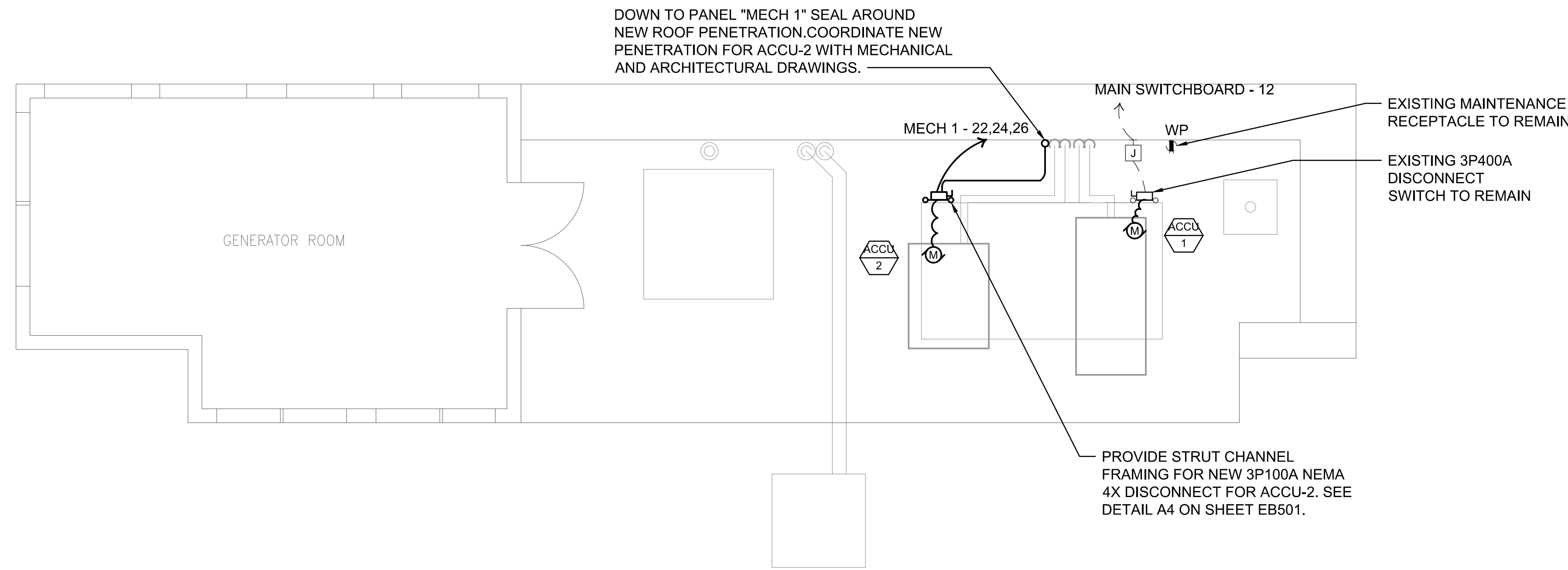
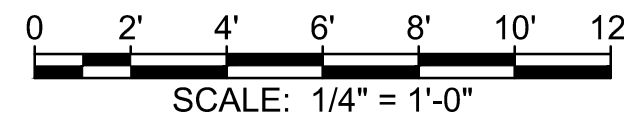
SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 107 OF 123

EB102



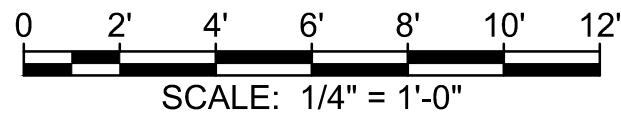
PLAN NORTH TRUE NORTH

C1
 EB102 SCALE: 1/4" = 1'-0"



PLAN NORTH TRUE NORTH

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 EB102 SCALE: 1/4" = 1'-0"



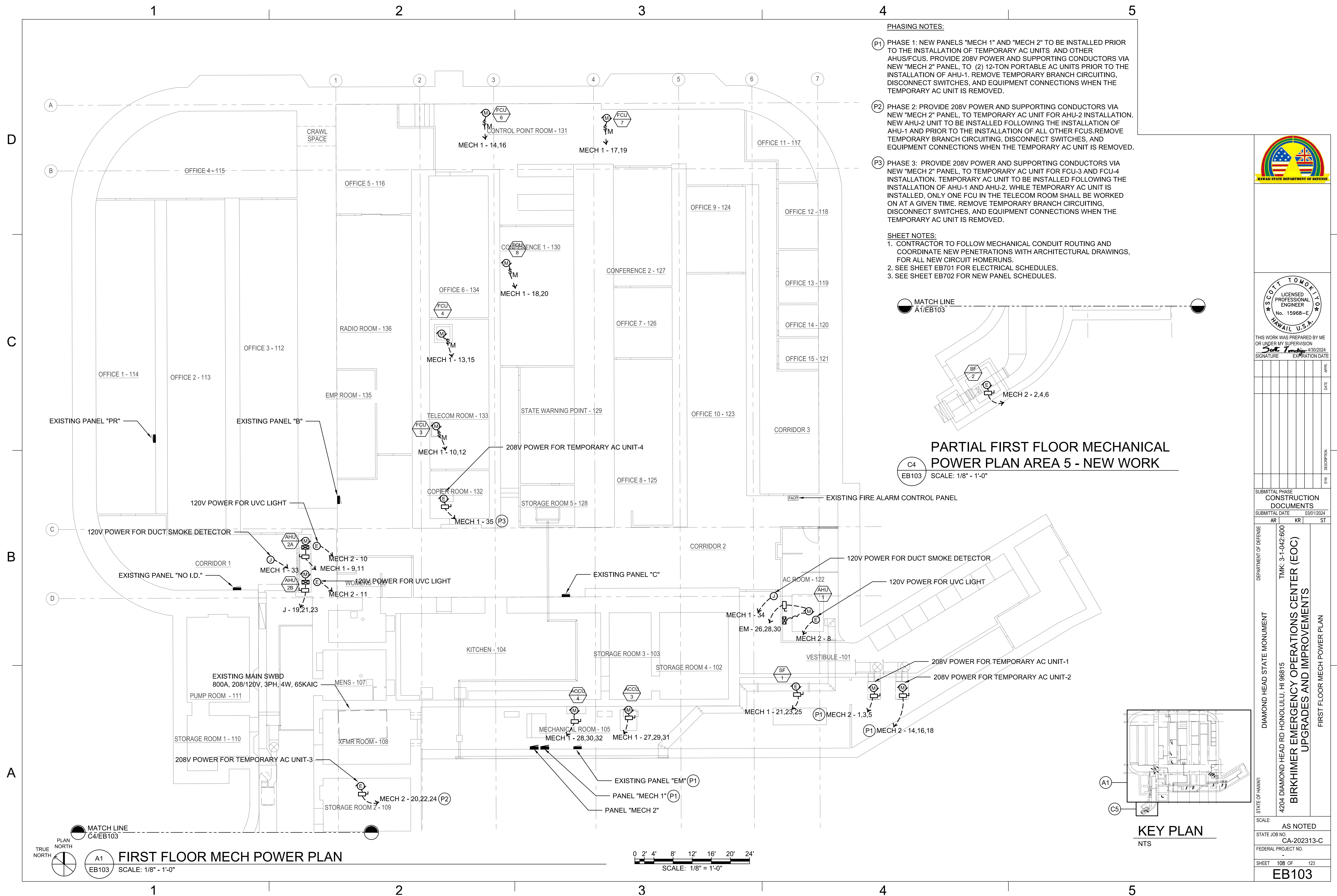
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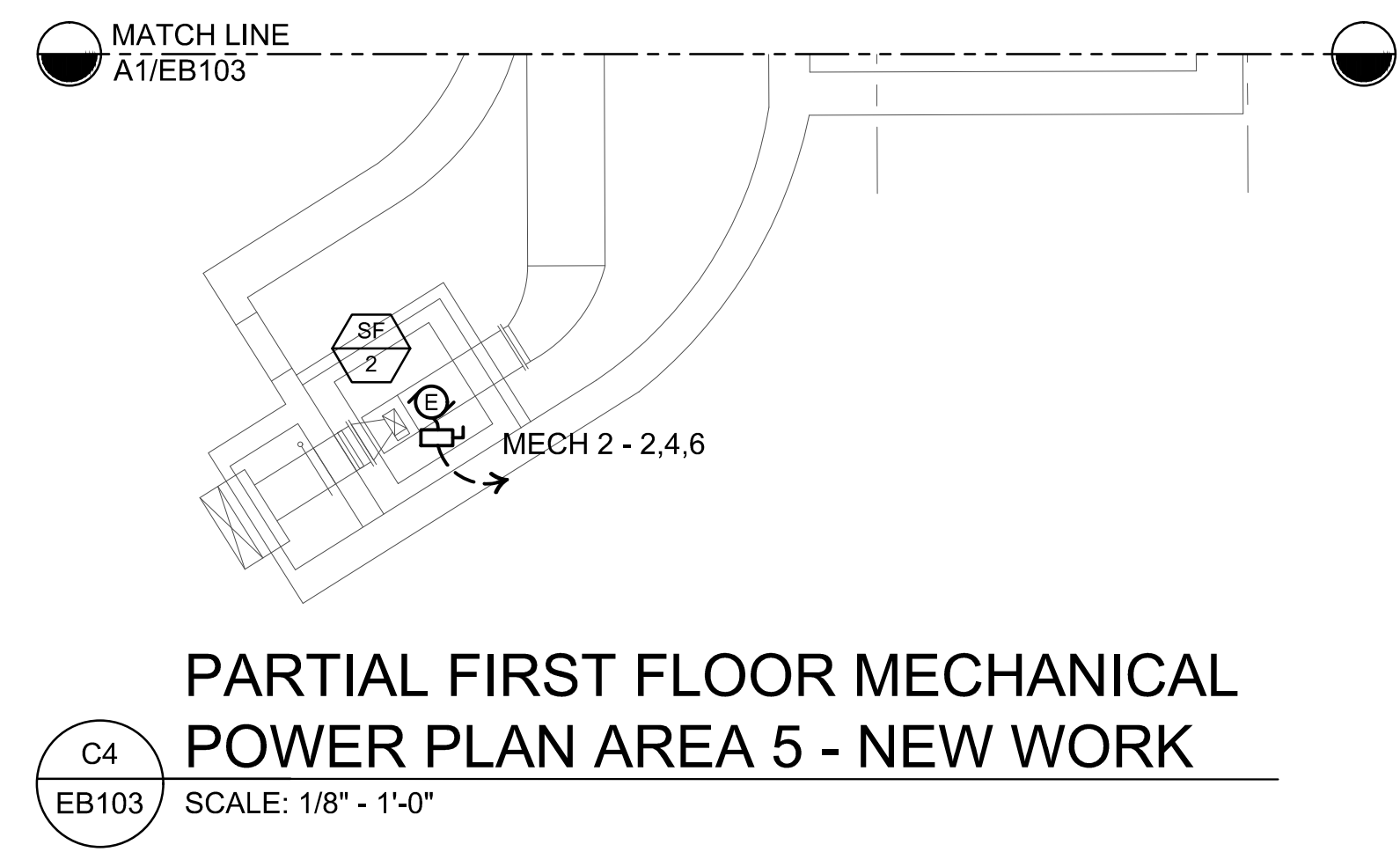
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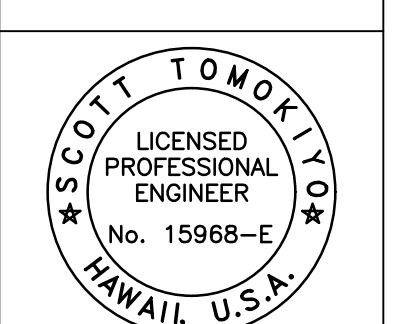
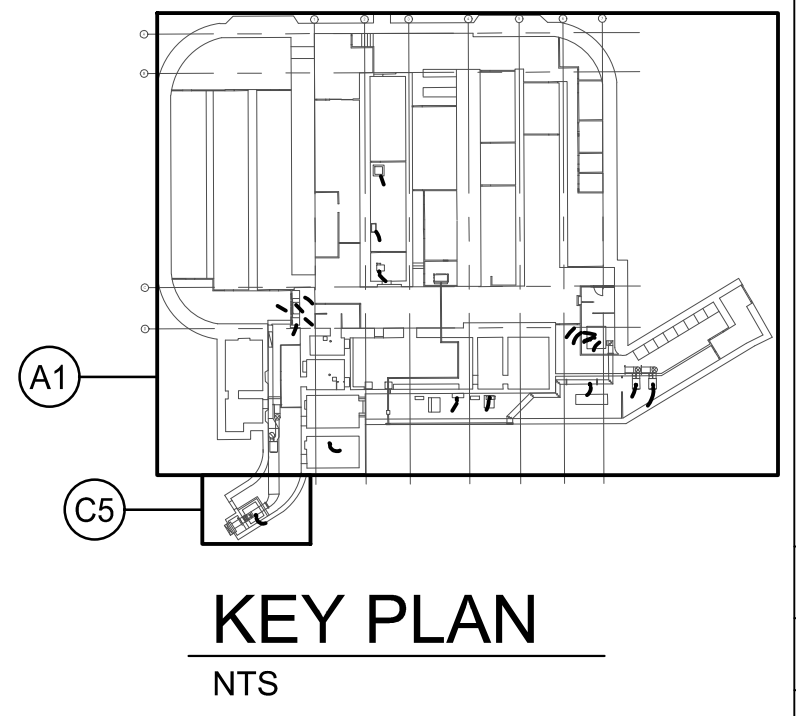
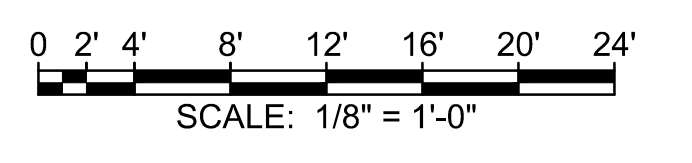


- PHASING NOTES:**
- (P1) PHASE 1: NEW PANELS "MECH 1" AND "MECH 2" TO BE INSTALLED PRIOR TO THE INSTALLATION OF TEMPORARY AC UNITS AND OTHER AHUS/FCUS. PROVIDE 208V POWER AND SUPPORTING CONDUCTORS VIA NEW "MECH 2" PANEL, TO (2) 12-TON PORTABLE AC UNITS PRIOR TO THE INSTALLATION OF AHU-1. REMOVE TEMPORARY BRANCH CIRCUITING, DISCONNECT SWITCHES, AND EQUIPMENT CONNECTIONS WHEN THE TEMPORARY AC UNIT IS REMOVED.
 - (P2) PHASE 2: PROVIDE 208V POWER AND SUPPORTING CONDUCTORS VIA NEW "MECH 2" PANEL, TO TEMPORARY AC UNIT FOR AHU-2 INSTALLATION. NEW AHU-2 UNIT TO BE INSTALLED FOLLOWING THE INSTALLATION OF AHU-1 AND PRIOR TO THE INSTALLATION OF ALL OTHER FCUS. REMOVE TEMPORARY BRANCH CIRCUITING, DISCONNECT SWITCHES, AND EQUIPMENT CONNECTIONS WHEN THE TEMPORARY AC UNIT IS REMOVED.
 - (P3) PHASE 3: PROVIDE 208V POWER AND SUPPORTING CONDUCTORS VIA NEW "MECH 2" PANEL, TO TEMPORARY AC UNIT FOR FCU-3 AND FCU-4 INSTALLATION. TEMPORARY AC UNIT TO BE INSTALLED FOLLOWING THE INSTALLATION OF AHU-1 AND AHU-2. WHILE TEMPORARY AC UNIT IS INSTALLED, ONLY ONE FCU IN THE TELECOM ROOM SHALL BE WORKED ON AT A GIVEN TIME. REMOVE TEMPORARY BRANCH CIRCUITING, DISCONNECT SWITCHES, AND EQUIPMENT CONNECTIONS WHEN THE TEMPORARY AC UNIT IS REMOVED.
- SHEET NOTES:**
1. CONTRACTOR TO FOLLOW MECHANICAL CONDUIT ROUTING AND COORDINATE NEW PENETRATIONS WITH ARCHITECTURAL DRAWINGS, FOR ALL NEW CIRCUIT HOMERUNS.
 2. SEE SHEET EB701 FOR ELECTRICAL SCHEDULES.
 3. SEE SHEET EB702 FOR NEW PANEL SCHEDULES.



PARTIAL FIRST FLOOR MECHANICAL POWER PLAN AREA 5 - NEW WORK
SCALE: 1/8" = 1'-0"

FIRST FLOOR MECH POWER PLAN
SCALE: 1/8" = 1'-0"



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SYN	DESCRIPTION	DATE	APPR.

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

AR	KR	ST

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 STATE OF HAWAII
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 FIRST FLOOR MECH POWER PLAN

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 108 OF 123
EB103

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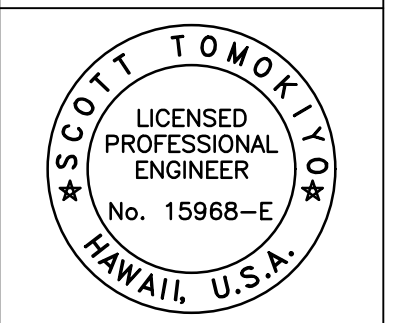
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- KEYNOTES:**
- ① REMOVE ALL ASSOCIATED CONDUIT AND POWER CONDUCTORS BACK TO PUMP CONTROL PANEL, DISCONNECT SWITCH, AND PANEL "J". CONTROL WIRES TO BE REMOVED BY OTHERS. COORDINATE ALL REMOVAL WORK WITH OTHER CONTRACTORS PRIOR TO REMOVAL.
 - ② REMOVE ALL ASSOCIATED CONDUIT AND WIRES BACK TO PANEL "J".



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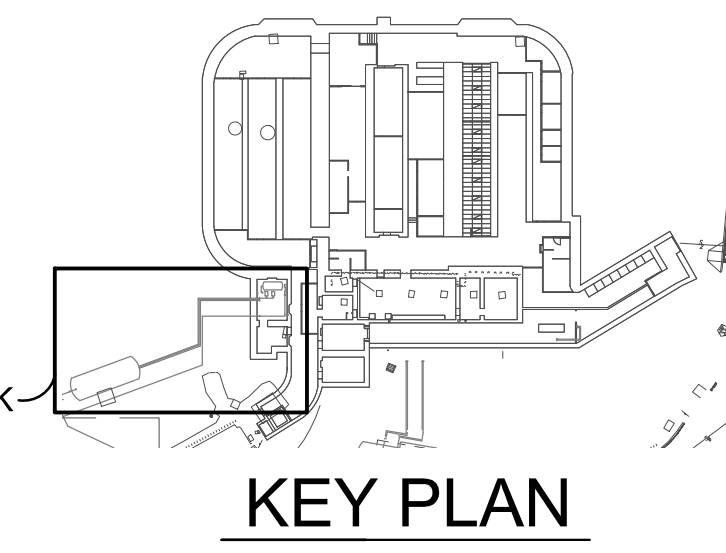
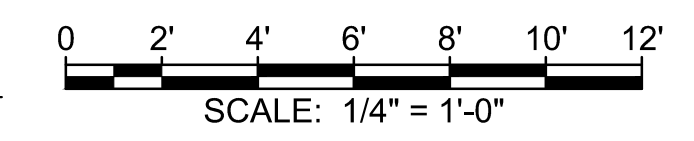
DATE	APPR.	DESCRIPTION

SUBMITTAL PHASE
 CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

STATE OF HAWAII	DEPARTMENT OF DEFENSE	TMK: 3-1-042:600
DIAMOND HEAD STATE MONUMENT		
4204 DIAMOND HEAD RD HONOLULU, HI 96815		
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC)		
UPGRADES AND IMPROVEMENTS		
ENLARGED PUMP ROOM POWER PLAN - DEMO		
SCALE:	AS NOTED	
STATE JOB NO.	CA-202313-C	
FEDERAL PROJECT NO.	-	
SHEET	110 OF	123
EB202		

PLAN NORTH
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ENLARGED PUMP ROOM POWER PLAN - DEMO
 EB202
 SCALE: 1/4" = 1'-0"



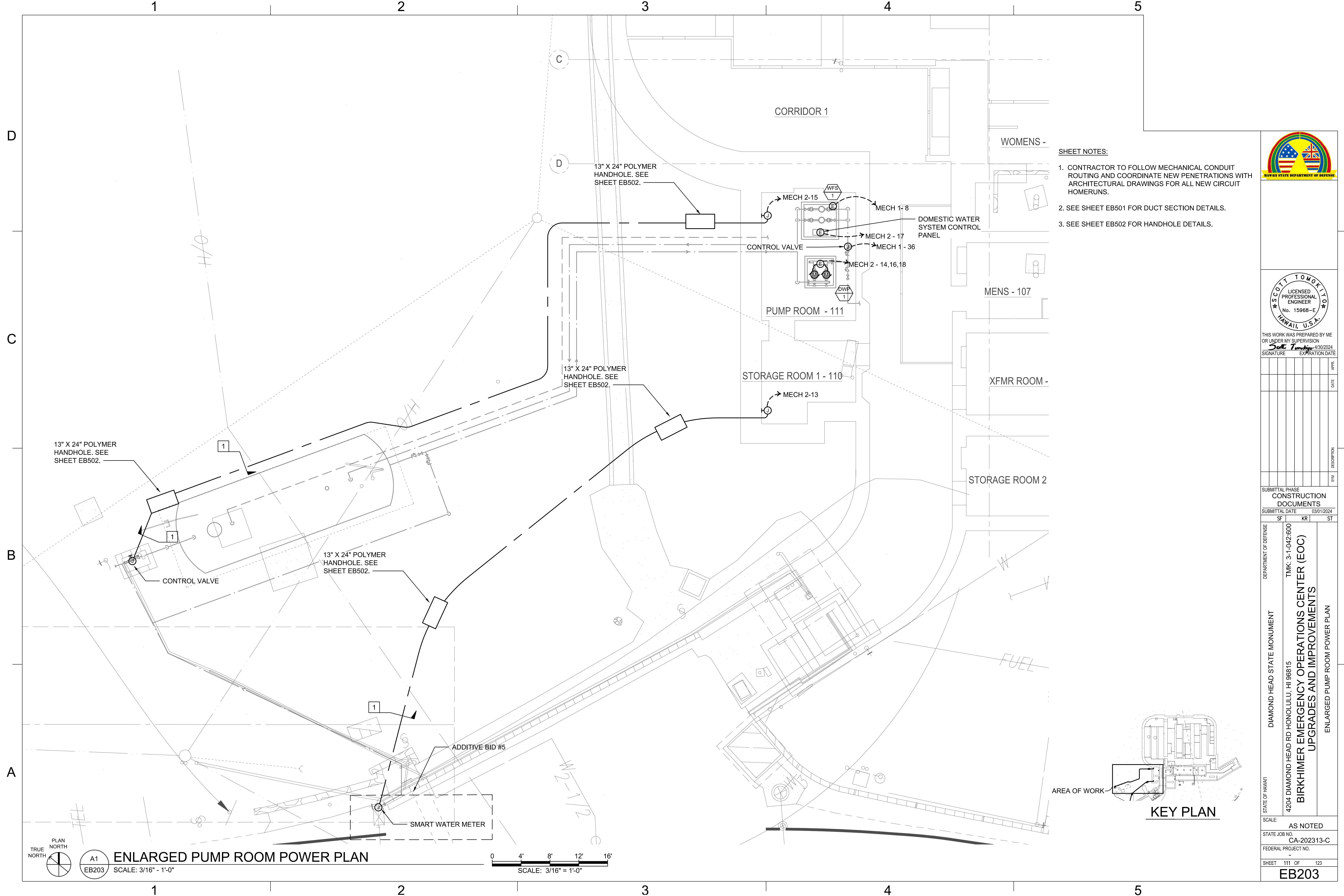
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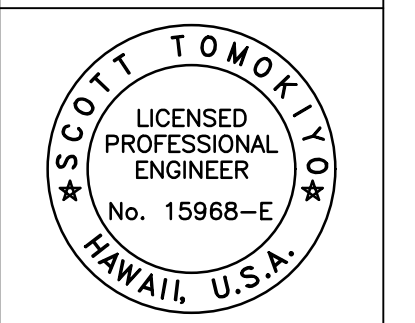
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- SHEET NOTES:**
1. CONTRACTOR TO FOLLOW MECHANICAL CONDUIT ROUTING AND COORDINATE NEW PENETRATIONS WITH ARCHITECTURAL DRAWINGS FOR ALL NEW CIRCUIT HOMERUNS.
 2. SEE SHEET EB501 FOR DUCT SECTION DETAILS.
 3. SEE SHEET EB502 FOR HANDHOLE DETAILS.

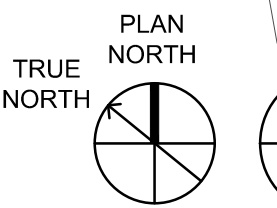


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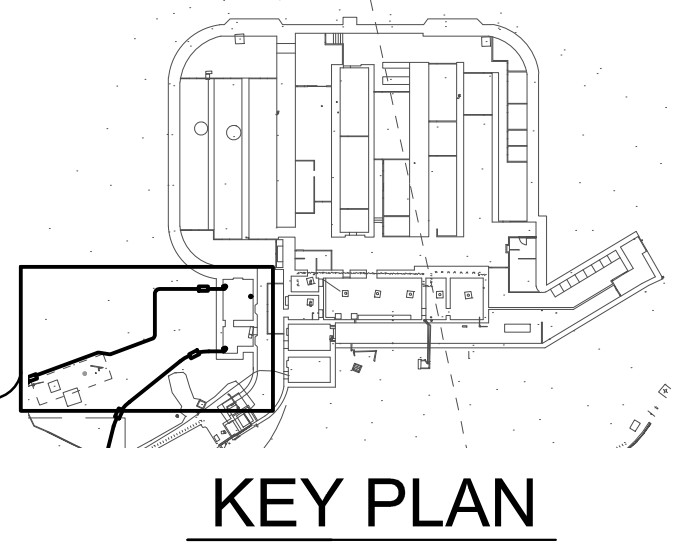
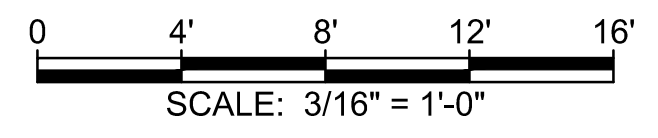
DATE	APPR.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

STATE OF HAWAII	DEPARTMENT OF DEFENSE	TMMK: 3-1-042:600
DIAMOND HEAD STATE MONUMENT	4204 DIAMOND HEAD RD HONOLULU, HI 96815	BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
ENLARGED PUMP ROOM POWER PLAN		
SCALE:	AS NOTED	
STATE JOB NO.	CA-202313-C	
FEDERAL PROJECT NO.		
SHEET	111 OF 123	
EB203		



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ENLARGED PUMP ROOM POWER PLAN
 SCALE: 3/16" = 1'-0"



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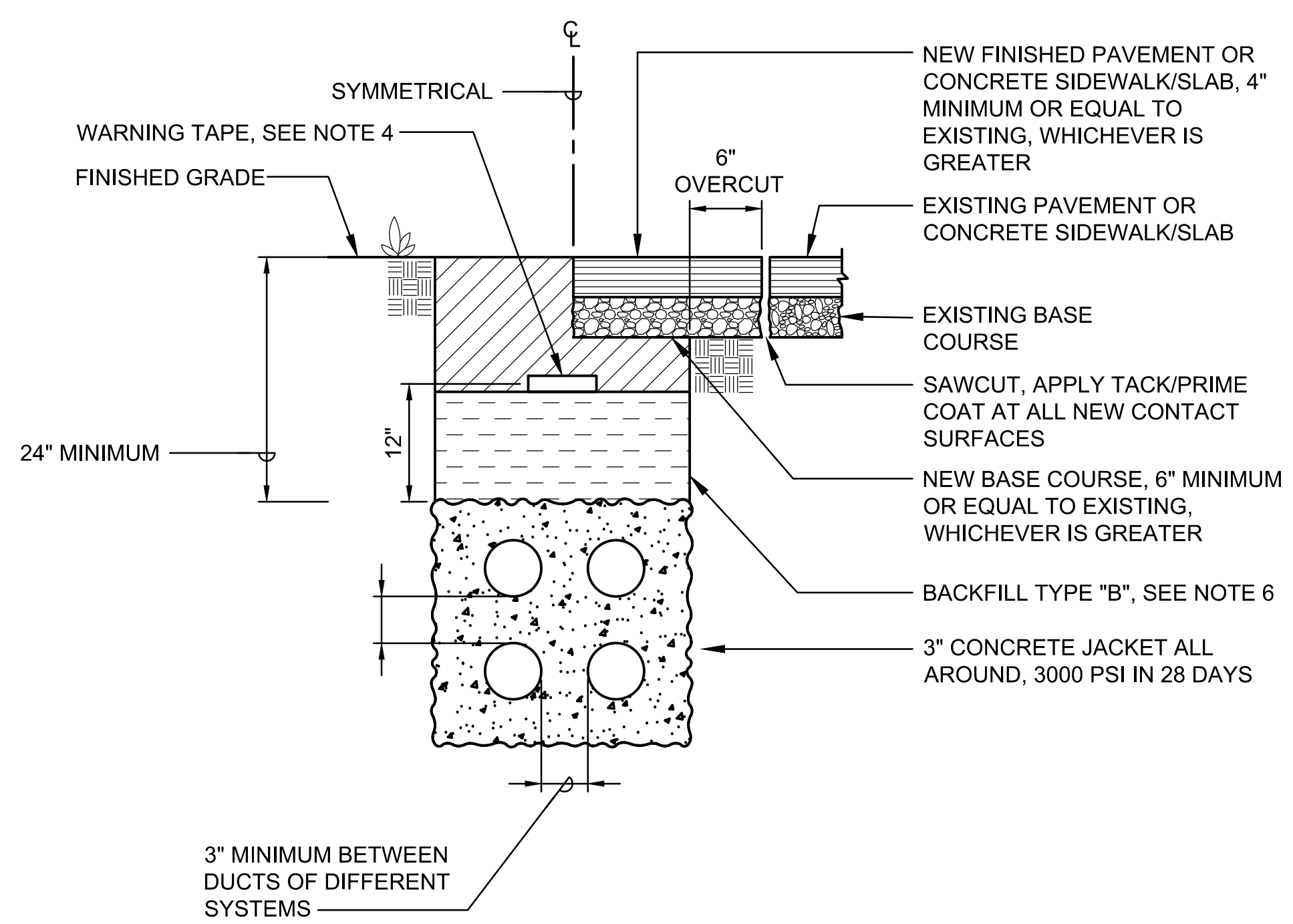
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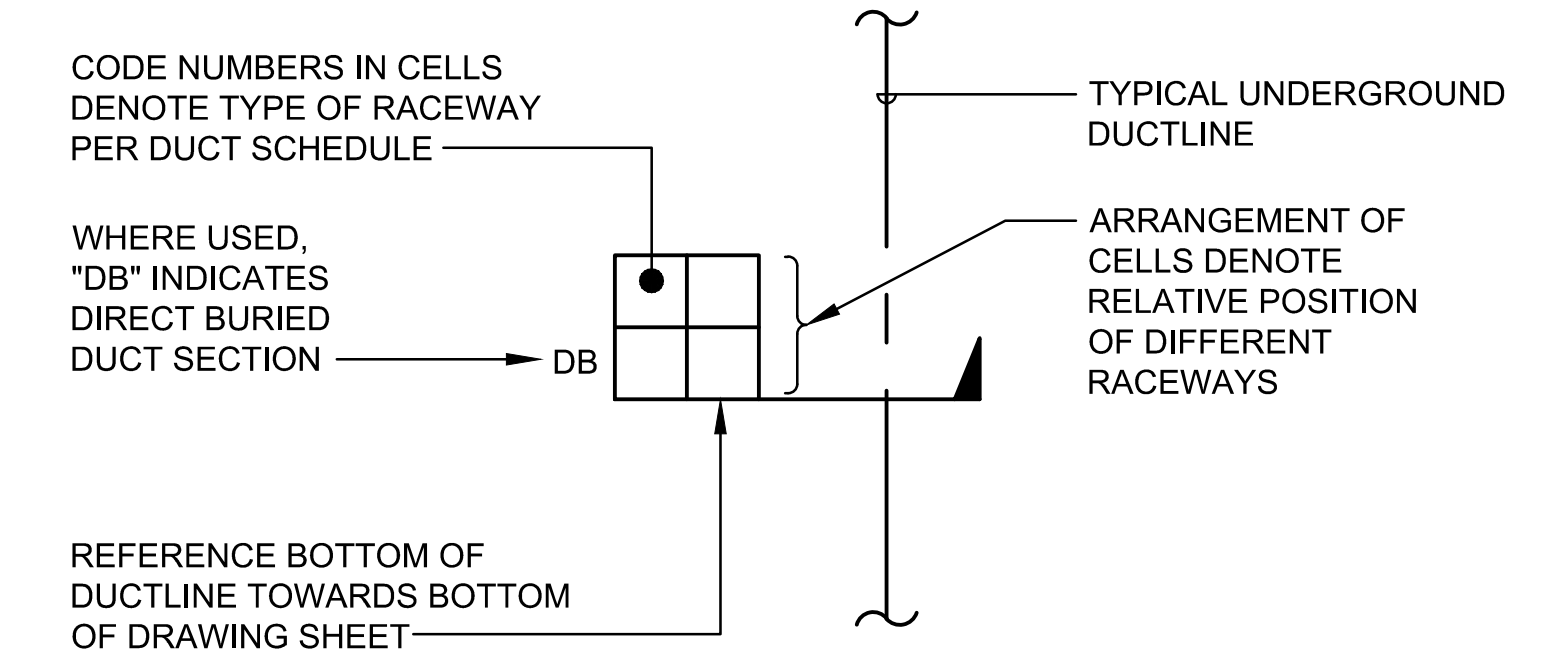
DUCT SECTION NOTES:

- CONDUITS SHALL BE PVC SCHEDULE 40 UNLESS OTHERWISE NOTED.
- AT LANDSCAPED AREAS, RESTORE DISTURBED SURFACES TO MATCH THE EXISTING SURROUNDING SURFACES.
- WARNING TAPE SHALL BE 5 MIL THICK X 3" WIDE AND SHALL BE LAID THE ENTIRE LENGTH OF THE DUCTLINE. TAPE SHALL HAVE A CONTINUOUS METALLIC BACKING AND CORROSION RESISTANT FOIL CORE. WARNING AND IDENTIFICATION TO BE IMPRINTED ON THE TAPE SHALL READ "CAUTION BURIED ELECTRICAL CABLE BELOW." MESSAGE SHALL BE REPEATED APPROXIMATELY EVERY 10 FEET. MINIMUM. TAPE COLOR SHALL BE AS FOLLOWS:
ELECTRICAL - RED COLOR
- BACKFILL TYPE "A": NON-CONTAMINATED NATIVE SOIL MATERIAL WHICH DOES NOT CONTAIN MORE THAN 50% GRAVEL AND ALSO DOES NOT CONTAIN HARD LUMPS OF EARTH 3 INCHES IN GREATEST DIMENSION, ROCKS LARGER THAN 1 INCH IN LARGEST DIMENSION, HIGHLY PLASTIC CLAY, POORLY GRADED SAND AND GRAVEL, ORGANICS, DEBRIS, OR OTHER UNSUITABLE OR DELETERIOUS MATERIALS. 95% COMPACTION.
- BACKFILL TYPE "B": NON-CONTAMINATED NATIVE SOIL MATERIAL WHICH DOES NOT CONTAIN MORE THAN 20% BY VOLUME OF ROCK PARTICLES. MIXTURE MUST PASS THROUGH A 1/2" MESH SCREEN. 95% COMPACTION.
- WHERE ELECTRICAL DUCTLINES CROSS OTHER UTILITIES, MAINTAIN A MINIMUM OF 12" VERTICAL SEPARATION BETWEEN THE ELECTRICAL DUCTS AND THE OTHER UTILITY LINES (GAS, WATER, SEWER, DRAIN, ETC.).

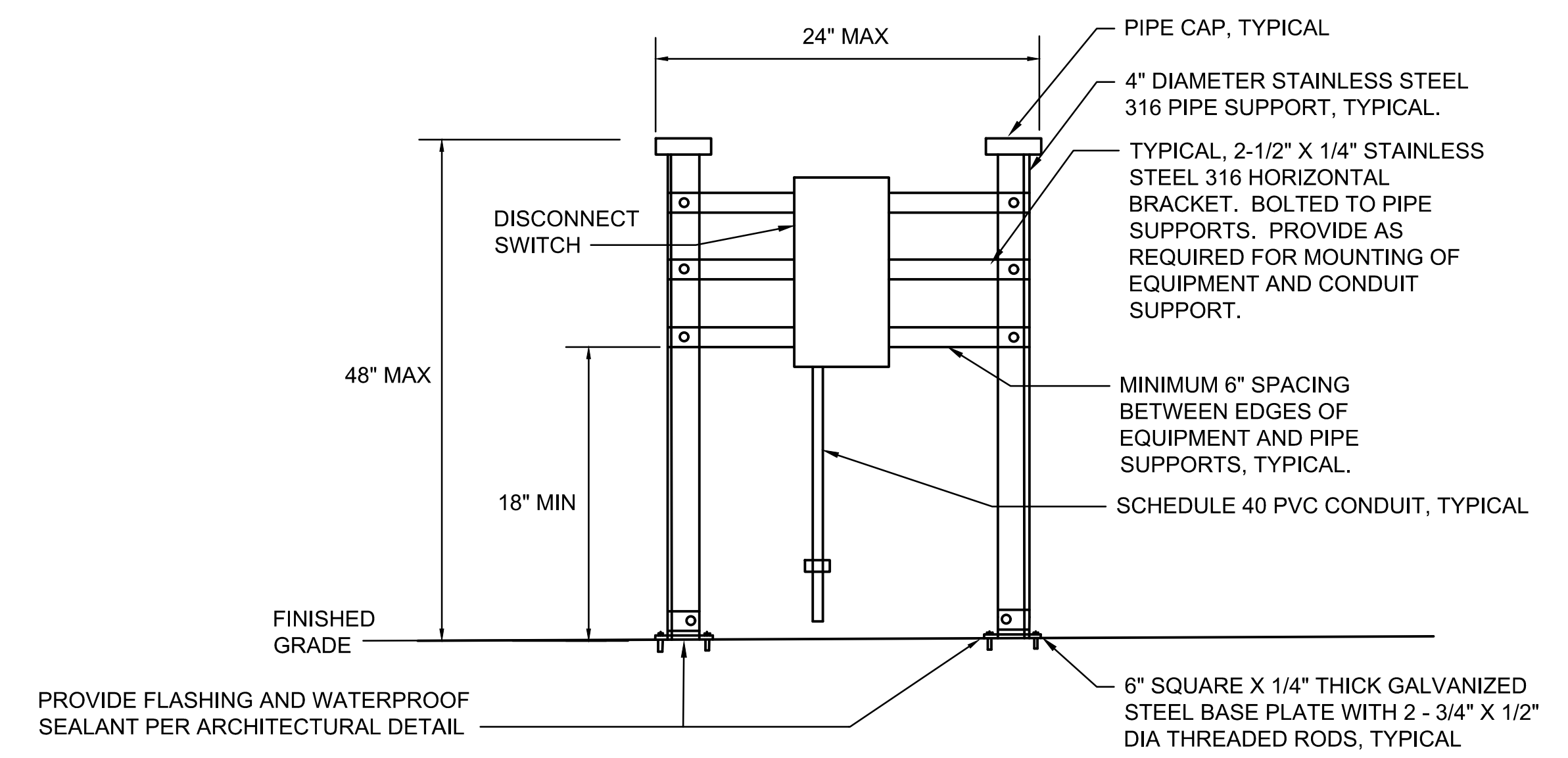


A2 TYPICAL CONCRETE ENCASED DUCT SECTION
EB501 SCALE: NTS

DUCT SCHEDULE		
NO.	DESCRIPTION	CONDUCTORS / CABLES
1	1" PVC SCHEDULE 40, BRANCH CIRCUIT	2 #12, 1#12 GND

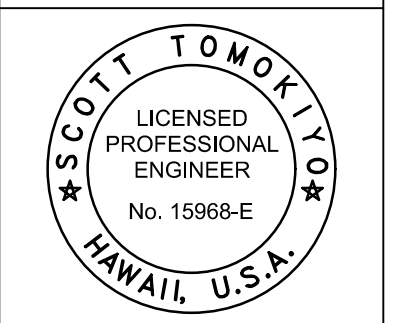


C4 DUCT SECTION FLAG CODE
EB501 SCALE: NTS



- NOTES:**
- CONTRACTOR TO VERIFY EQUIPMENT DIMENSIONS BEFORE FABRICATING EQUIPMENT RACK.

A4 FREE-STANDING EQUIPMENT SUPPORT STRUCTURE DETAIL
EB501 SCALE: NTS



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SUBMITTAL DATE: 03/01/2024

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
UNISTRUT AND DUCT SECTION DETAILS

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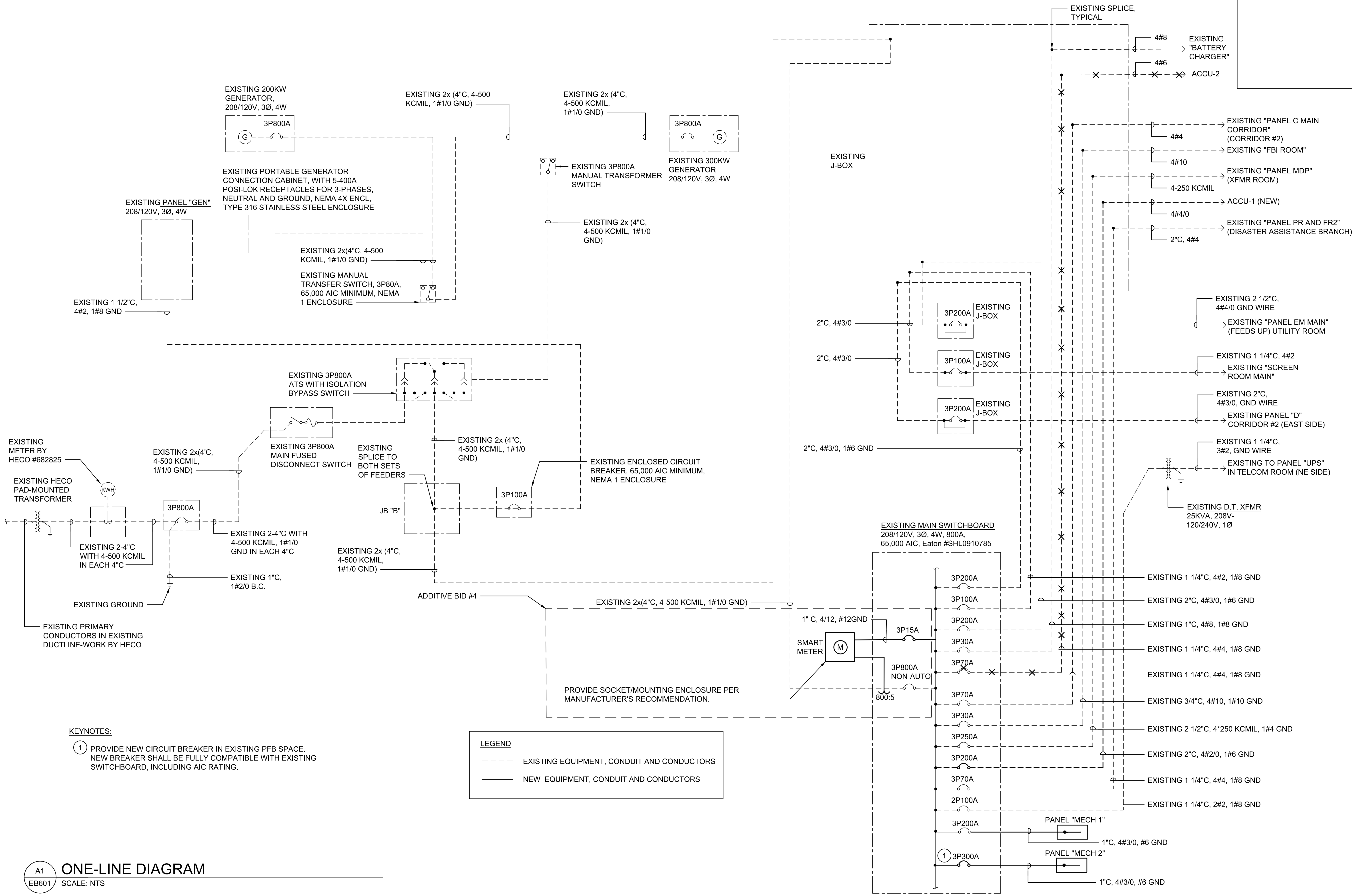
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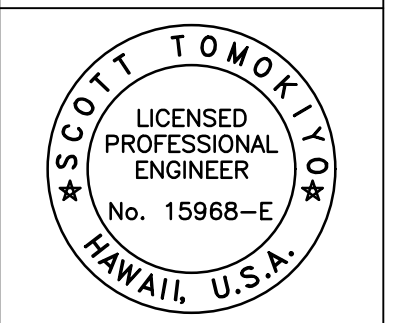
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KEYNOTES:
 ① PROVIDE NEW CIRCUIT BREAKER IN EXISTING PFB SPACE. NEW BREAKER SHALL BE FULLY COMPATIBLE WITH EXISTING SWITCHBOARD, INCLUDING AIC RATING.



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DATE	APPR.	DATE	DESCRIPTION

SUBMITTAL PHASE
 CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE 03/01/2024

SF	KR	ST

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
 BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
 UPGRADES AND IMPROVEMENTS
 ONE-LINE DIAGRAM

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 116 OF 123
EB601

A1 ONE-LINE DIAGRAM
 EB601 SCALE: NTS

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MECHANICAL EQUIPMENT SCHEDULE

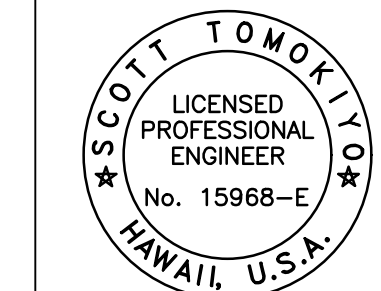
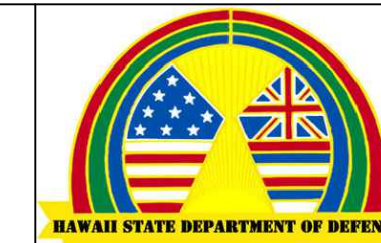
Table with columns: EQUIPMENT ID, EQUIPMENT DESCRIPTION, SPECIFIED RATING (HP / KW), VOLTAGE / PHASE, FLA / RLA, MOC, MCA, TERMINATION TYPE, DISCONNECT SWITCH POLES / AMPS, ENCLOSURE, BRANCH CIRCUIT REQUIREMENT, REMARKS. Includes items like ACCU-1, AHU-1, CD-1, DWP-1, EF-2, etc.

LIGHT FIXTURE SCHEDULE

Table with columns: TYPE, GENERAL DESCRIPTION, MOUNTING STYLE, CHASSIS / FINISH, DRIVER / BALLAST, SHIELDING / REFLECTOR, NOMINAL DIMENSIONS, LAMP TYPE, INPUT WATTS, LUMEN OUTPUT, COLOR TEMP, CRI, VOLTAGE, SPECIAL CERTIFICATIONS OR LISTINGS, MANUFACTURER + MODEL NUMBER, REMARKS. Includes items G and I.

LIGHTING CONTROLS SCHEDULE

Table with columns: ROOM NO. / ID, ROOM NAME, LOW VOLTAGE, SWITCH TYPE, RECEPTACLE CONTROL, LIGHTING CONTROL REQUIREMENTS, CONTROL DIAGRAM REFERENCE, KEYPAD DETAIL REFERENCE. Includes MEN RESTROOM and WOMEN RESTROOM.



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Signature: Scott Tomokiyo, Date: 4/30/2024

SUBMITTAL PHASE: CONSTRUCTION DOCUMENTS

SUBMITTAL DATE: 03/01/2024

SF KR ST

DEPARTMENT OF DEFENSE

TMK: 3-1-042:600

4204 DIAMOND HEAD RD HONOLULU, HI 96815

BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)

UPGRADES AND IMPROVEMENTS

ELECTRICAL SCHEDULES

SCALE: AS NOTED

STATE JOB NO. CA-202313-C

FEDERAL PROJECT NO.

SHEET 117 OF 123

EB701

PANELBOARD: NEW MECH 1 PANEL

LOCATION: MECH ROOM
SUPPLY FROM: MAIN SWITCHBOARD
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 208Y/120
PHASES: 3
WIRES: 4
CABINET WIDTH: 17"

A.I.C RATING: 10,000
MAINS TYPE: MCB
BUS RATING: 200A
MCB RATING: 200A

Table with columns: GND, WIRE, CKT, CIRCUIT DESCRIPTION, ID, TRIP, POLES, A, B, C, POLES, TRIP, ID, CIRCUIT DESCRIPTION, CKT, WIRE, GND. Lists various electrical circuits and their specifications.

TOTAL LOAD: 13.5 KVA, 12.8 KVA, 18.4 KVA
TOTAL AMPS: 37.3 A, 35.4 A, 51.2 A

ID LEGEND:

Table with columns: LOAD CLASSIFICATION, CONNECTED LOAD, DEMAND FACTOR, DEMAND LOAD, PANEL TOTALS. Summarizes load data for the panel.

NOTES:

PANELBOARD: NEW MECH 2 PANEL

LOCATION: MECH ROOM
SUPPLY FROM: MAIN SWITCHBOARD
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 208Y/120
PHASES: 3
WIRES: 4
CABINET WIDTH: 17"

A.I.C RATING: 10,000
MAINS TYPE: MCB
BUS RATING: 300A
MCB RATING: 300A

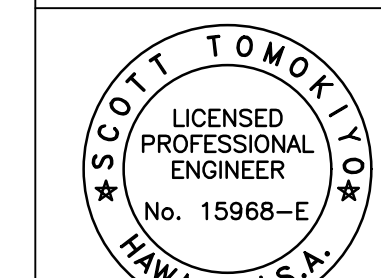
Table with columns: GND, WIRE, CKT, CIRCUIT DESCRIPTION, ID, TRIP, POLES, A, B, C, POLES, TRIP, ID, CIRCUIT DESCRIPTION, CKT, WIRE, GND. Lists various electrical circuits and their specifications.

TOTAL LOAD: 24.4 KVA, 24.4 KVA, 23.9 KVA
TOTAL AMPS: 67.8 A, 67.8 A, 66.4 A

ID LEGEND:

Table with columns: LOAD CLASSIFICATION, CONNECTED LOAD, DEMAND FACTOR, DEMAND LOAD, PANEL TOTALS. Summarizes load data for the panel.

NOTES:



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DATE: 4/30/2024
SIGNATURE: Scott Tomkiyo

Table with columns: DATE, APRR, SYN, DESCRIPTION. A grid for tracking document revisions.

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SUBMITTAL DATE: 03/01/2024

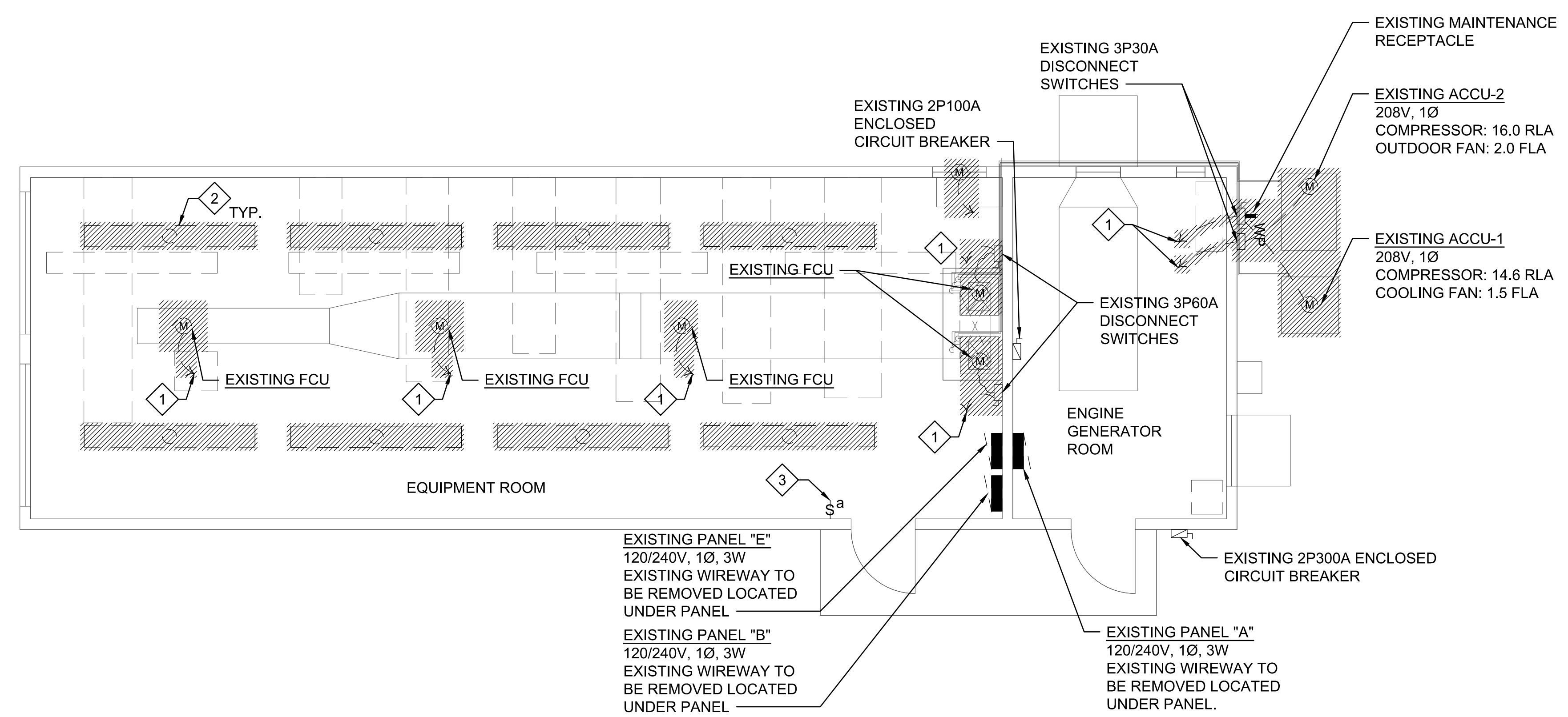
Table with columns: SF, KR, ST. A small grid for document tracking.

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMK: 3-1-042:600
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
PANEL SCHEDULES

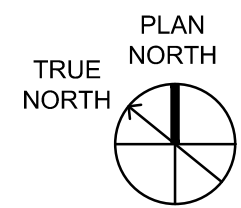
SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO.

SHEET 118 OF 123
EB702

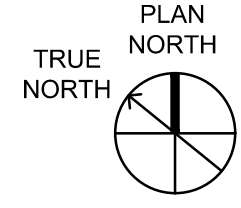
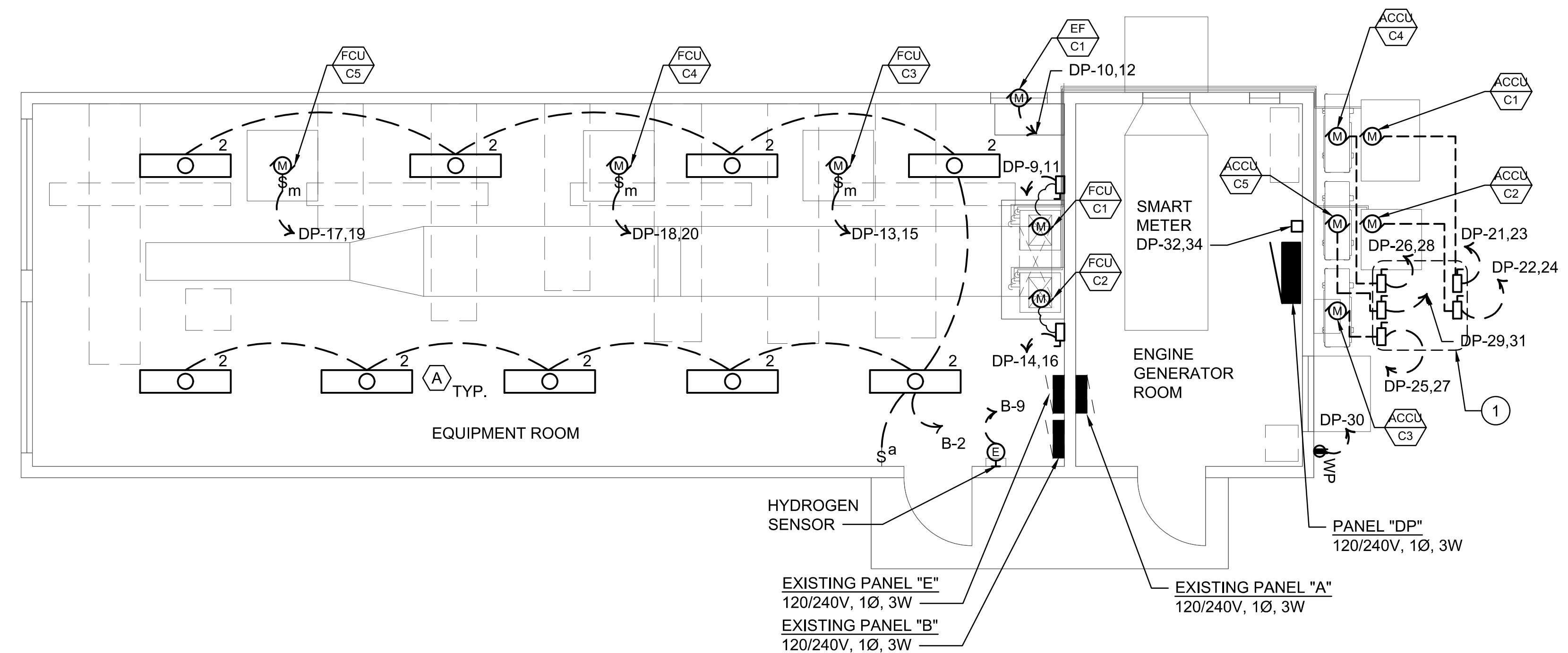
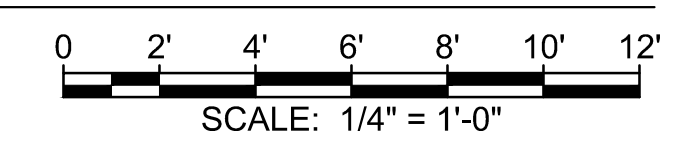
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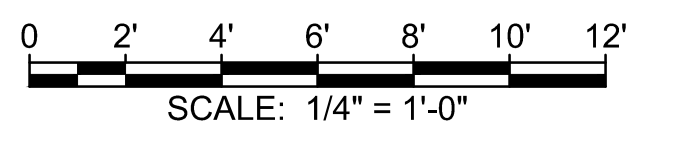
- DEMOLITION PLAN KEYNOTES:**
- 1 REMOVE CONDUIT AND CONDUCTORS BACK TO WIREWAY.
 - 2 REMOVE EXISTING LIGHTING CONDUIT AND CONDUCTORS.
 - 3 MAINTAIN EXISTING LIGHT SWITCH FOR RE-USE FOR NEW LIGHTING FIXTURES
- POWER PLAN KEYNOTES:**
- 1 3P60A DISCONNECT SWITCHES LOCATED UNDER ACCU-C3. REFER TO B1/MC901 FOR LAYOUT.



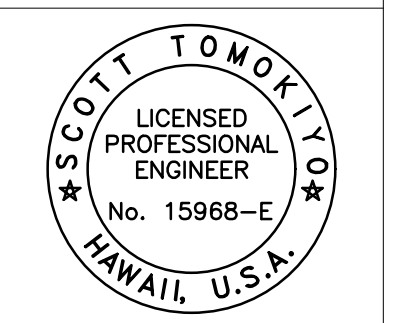
C1
EC101
ELECTRICAL PLAN - DEMO
 SCALE: 1/4" = 1'-0"



A1
EC101
ELECTRICAL PLAN
 SCALE: 1/4" = 1'-0"



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 EXPIRATION DATE: 4/30/2024

DATE	APPR.	SYN.	DESCRIPTION

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BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ELECTRICAL PLANS

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 119 OF 123
EC101

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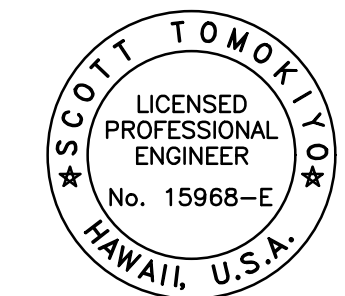
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KEYNOTES:

1 REMOVE CONDUCTORS UP TO CIRCUIT BREAKER. MAINTAIN CIRCUIT BREAKER FOR REUSE.



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Signature: Scott Tomokiyo 4/30/2024
EXPIRATION DATE

DATE	APPROVAL	DESCRIPTION

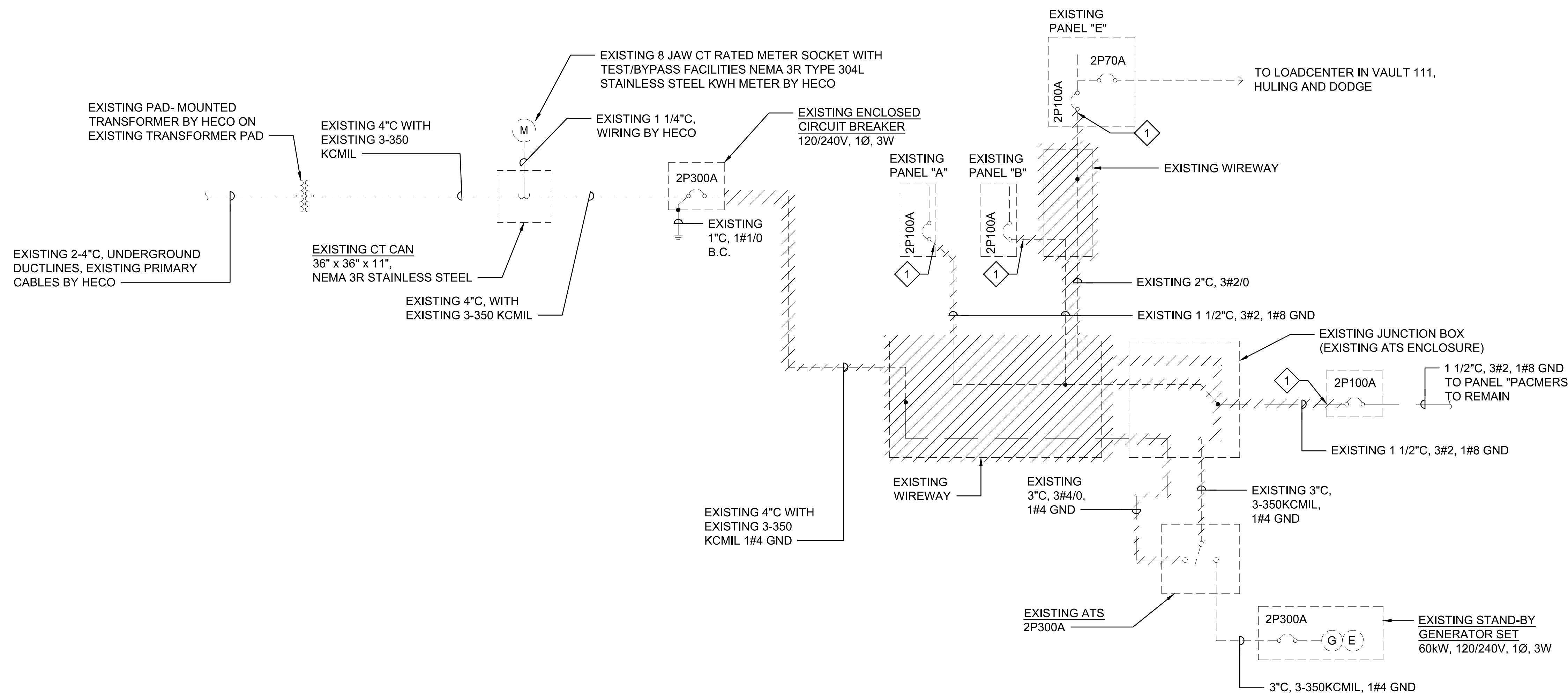
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CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 03/01/2024

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DEPARTMENT OF DEFENSE
TMNK: 3-1-042:600

DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHAMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS
ONE-LINE DIAGRAM - DEMO

SCALE: AS NOTED
STATE JOB NO. CA-202313-C
FEDERAL PROJECT NO. -
SHEET 120 OF 123
EC601



A1 ONE-LINE DIAGRAM - DEMO
EC601 SCALE: NTS

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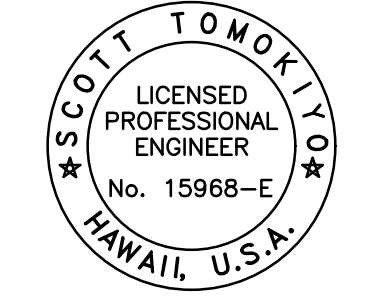
C

B

A

LEGEND:

- - - - - DASHED LINE INDICATES EXISTING ITEM
- BOLD LINE INDICATES NEW WORK



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
 Signature: *Scott Tomkiyo* 4/30/2024
 Signature: _____ EXPIRATION DATE: _____

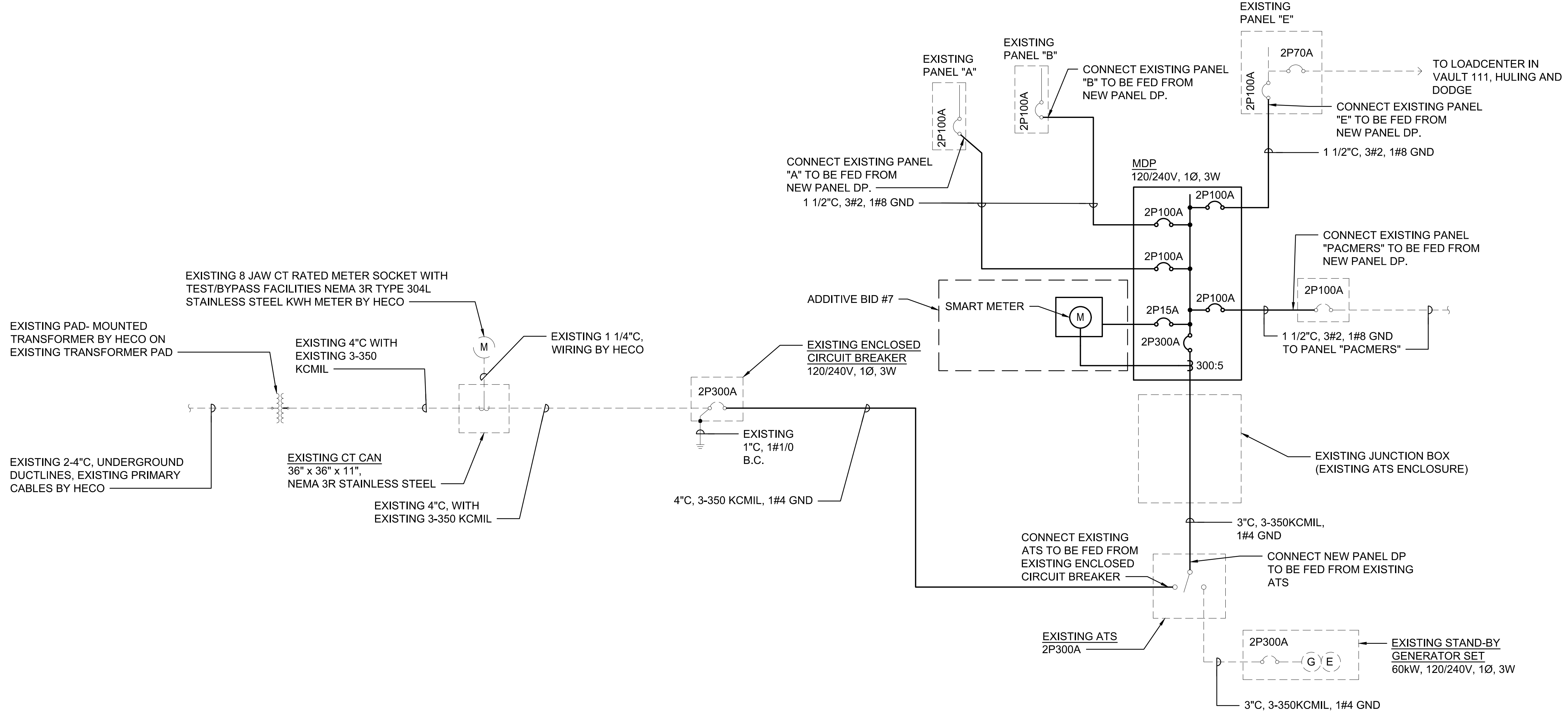
DATE	APPR.	DATE	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
 SUBMITTAL DATE: 03/01/2024

SF	KR	ST

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIRMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ONE-LINE DIAGRAM

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 121 OF 123
EC602



A1 ONE-LINE DIAGRAM
 SCALE: NTS

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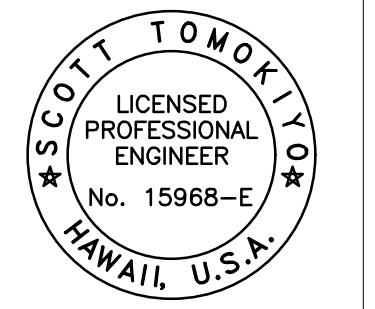
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EQUIPMENT SCHEDULE											
EQUIPMENT ID	EQUIPMENT DESCRIPTION	SPECIFIED RATING (HP / KW)	VOLTAGE / PHASE	FLA / RLA	MOCP	MCA	TERMINATION TYPE	DISCONNECT SWITCH		BRANCH CIRCUIT REQUIREMENT	REMARKS
								POLES / AMPS	ENCLOSURE		
ACCU-C1	AIR COOLED CONDENSING UNIT		240V / 1PH		2P40A	29A	HARDWIRED	3P60A	NEMA 4X SS	1"C, 3 #8, 1 #10 GND	
ACCU-C2	AIR COOLED CONDENSING UNIT		240V / 1PH		2P40A	29A	HARDWIRED	3P60A	NEMA 4X SS	1"C, 3 #8, 1 #10 GND	
ACCU-C3	AIR COOLED CONDENSING UNIT		240V / 1PH		2P40A	29A	HARDWIRED	3P60A	NEMA 4X SS	1"C, 3 #8, 1 #10 GND	
ACCU-C4	AIR COOLED CONDENSING UNIT		240V / 1PH		2P40A	29A	HARDWIRED	3P60A	NEMA 4X SS	1"C, 3 #8, 1 #10 GND	
ACCU-C5	AIR COOLED CONDENSING UNIT		240V / 1PH		2P40A	29A	HARDWIRED	3P60A	NEMA 4X SS	1"C, 3 #8, 1 #10 GND	
EF-C1	EXHAUST FAN	1/2 HP	240V / 1PH	4A	2P15A	5A	HARDWIRED	2P30A	NEMA 1	3/4" C, 3 #12, 1 #12 GND	
FCU-C1	FAN COIL UNIT		240V / 1PH		2P15A	5.63A	HARDWIRED	2P30A	NEMA 1	3/4" C, 3 #12, 1 #12 GND	
FCU-C2	FAN COIL UNIT		240V / 1PH		2P15A	5.63A	HARDWIRED	2P30A	NEMA 1	3/4" C, 3 #12, 1 #12 GND	
FCU-C3	FAN COIL UNIT		240V / 1PH	1.01A	2P15A	1.27A	HARDWIRED	2P30A	NEMA 1	3/4" C, 3 #12, 1 #12 GND	
FCU-C4	FAN COIL UNIT		240V / 1PH	1.01A	2P15A	1.27A	HARDWIRED	2P30A	NEMA 1	3/4" C, 3 #12, 1 #12 GND	
FCU-C5	FAN COIL UNIT		240V / 1PH	1.01A	2P15A	1.27A	HARDWIRED	2P30A	NEMA 1	3/4" C, 3 #12, 1 #12 GND	

LIGHT FIXTURE SCHEDULE															
TYPE	GENERAL DESCRIPTION	MOUNTING STYLE	CHASSIS / FINISH	DRIVER / BALLAST	SHIELDING / REFLECTOR	NOMINAL DIMENSIONS	LAMP TYPE	INPUT WATTS	LUMEN OUTPUT	COLOR TEMP	CRI	VOLTAGE	SPECIAL CERTIFICATIONS OR LISTINGS	MANUFACTURER + MODEL NUMBER	REMARKS
A	FULLY ENCLOSED AND GASKETED	CEILING SURFACE MOUNTED	5VA (F1) FIBERGLASS HOUSING WITH WHITE PHOSPHATE FINISH	INTEGRAL ELECTRONIC DRIVER	FROSTED RIBBED ACRYLIC DIFFUSER	7.17"W x 4.40"H x 51-2/3"L	LED	25W	2942 LU	3500K	80 CRI	120-277V		COLUMBIA LIGHTING LXEM4-40VW-RFP-EDU OR ACCEPTED EQUIVALENT	

PANELBOARD: NEW DP																
LOCATION: ENGINE GENERATOR ROOM				VOLTS: 240/120V				A.I.C RATING: 10,000								
SUPPLY FROM: EXISTING ATS				PHASES: 1				MAINS TYPE: MAIN BREAKER								
MOUNTING: SURFACE				WIRES: 3				BUS RATING: 400								
ENCLOSURE: NEMA 1				CABINET WIDTH: 30"				MCB RATING: 300								
GND	WIRE	CKT	CIRCUIT DESCRIPTION	ID	TRIP	POLES	A	B	POLES	TRIP	ID	CIRCUIT DESCRIPTION	CKT	WIRE	GND	
8	2	1	O-PANEL A	100	2	2.4	2.4		2	100	O-PANEL B		2	2	8	
--	2	3	O-PART OF 1	100	--			2.4	2.4	--	100	O-PART OF 2		4	2	--
8	2	5	O-PANEL E	100	2	2.4	2.4		2	100	O-PANEL PACMERS		6	2	8	
--	2	7	O-PART OF 5	100	--			2.4	2.4	--	100	O-PART OF 6		8	2	--
12	12	9	H-FCU-C1	15	2	0.54	0.48		2	15	H-EF-C1		10	12	12	
--	12	11	H-PART OF 9	15	--			0.54	0.48	--	15	H-PART OF 10		12	12	--
12	12	13	H-FCU-C3	15	2	0.12	0.54		2	15	H-FCU-C2		14	12	12	
--	12	15	H-PART OF 13	15	--			0.12	0.54	--	15	H-PART OF 14		16	12	--
12	12	17	H-FCU-C5	15	2	0.12	0.12		2	15	H-FCU-C4		18	12	12	
--	12	19	H-PART OF 17	15	--			0.12	0.12	--	15	H-PART OF 18		20	12	--
10	8	21	H-ACCU-C1	40	2	2.78	2.78		2	40	H-ACCU-C2		22	8	10	
--	8	23	H-PART OF 21	40	--			2.78	2.78	--	40	H-PART OF 22		24	8	--
10	8	25	H-ACCU-C3	40	2	2.78	2.78		2	40	H-ACCU-C4		26	8	10	
--	8	27	H-PART OF 25	40	--			2.78	2.78	--	40	H-PART OF 26		28	8	--
10	8	29	H-ACCU-C5	40	2	2.78	0.12		1	15	R-MAINTENANCE		30	12	12	
--	8	31	H-PART OF 29	40	--			2.78		1	20	SPARE		32	--	--
--	--	33	SPARE	20	1				1	20	SPARE		34	--	--	
--	--	35	SPARE	20	1				1	20	SPARE		36	--	--	
--	--	37	SPARE	20	1				1	20	SPARE		38	--	--	
--	--	39	SPARE	20	1				1	20	SPARE		40	--	--	
TOTAL LOAD:				25.54 KVA				25.42 KVA								
TOTAL AMPS:				106.4 A				105.9 A								
ID LEGEND:																
LOAD CLASSIFICATION																
LIGHTING	CONNECTED LOAD		DEMAND FACTOR		DEMAND LOAD		PANEL TOTALS									
RECEPTACLES	0.0 KVA	100.0%	0.0 KVA		TOTAL CONNECTED LOAD: 51.0 KVA											
HVAC	0.1 KVA	100.0%	0.1 KVA		TOTAL DEMAND LOAD: 50.9 KVA											
MOTOR LOAD	31.6 KVA	100.0%	31.6 KVA		TOTAL CONNECTED CURRENT: 212.3 A											
FIRE ALARM	0.0 KVA	100.0%	0.0 KVA		TOTAL DEMAND CURRENT: 212.1 A											
KITCHEN EQUIPMENT	0.0 KVA	65.0%	0.0 KVA													
OTHER LOADS	0.0 KVA	100.0%	0.0 KVA													
NOTES:																



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
 SIGNATURE: Scott Tomkiyo DATE: 4/30/2024 EXPIRATION DATE: _____

NO.	DATE	APPR.	DESCRIPTION

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS

SUBMITTAL DATE 03/01/2024

SF KR ST

DEPARTMENT OF DEFENSE
 DIAMOND HEAD STATE MONUMENT
 TMJK: 3-1-042:600
 4204 DIAMOND HEAD RD HONOLULU, HI 96815
BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC) UPGRADES AND IMPROVEMENTS
 ELECTRICAL SCHEDULES

SCALE: AS NOTED
 STATE JOB NO. CA-202313-C
 FEDERAL PROJECT NO. -
 SHEET 122 OF 123

EC701

PANELBOARD: NEW DP

LOCATION: ENGINE GENERATOR ROOM
SUPPLY FROM: EXISTING ATS
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 120/240V
PHASES: 1
WIRES: 3
CABINET WIDTH: 20"

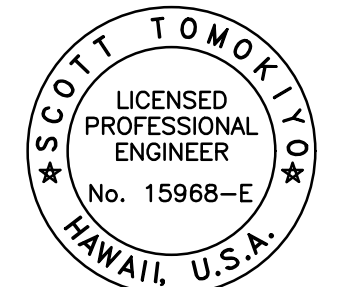
A.I.C RATING: 10,000
MAINS TYPE: MCB
BUS RATING: 400
MCB RATING: 300

GND	WIRE	CKT	CIRCUIT DESCRIPTION	ID	TRIP	POLES	A	B	C	POLES	TRIP	ID	CIRCUIT DESCRIPTION	CKT	WIRE	GND	
8	2	1	O-PANEL A	100	2		0.0	0.0		2	100		O-PANEL B	2	2	8	
-	2	3	O-PART OF 1	100	-			0.0	0.0		-	100	O-PART OF 2	4	2	-	
8	2	5	O-PANEL E	100	2				0.0	0.0		2	100	O-PANEL PACMERS	6	2	8
-	2	7	O-PART OF 5	100	-		0.0	0.0			-	100	O-PART OF 6	8	2	-	
12	12	9	O-SMART METER	20	2			0.1	0.3		2	20	H-EF-C1	10	12	12	
-	12	11	O-PART OF 9	20	2				0.1	0.3		-	20	H-PART OF 10	12	12	-
12	12	13	H-FCU-C1	20	1		0.0	0.0			2	20	H-FCU-C2	14	12	12	
-	12	15	H-PART OF 13	20	1			0.0	0.0		-	20	H-PART OF 14	16	12	-	
12	12	17	H-FCU-C3	20	1				0.0	0.0		2	20	H-FCU-C5	18	12	12
-	12	19	H-PART OF 17	20	-		0.0	0.0			-	20	H-PART OF 18	20	12	-	
-	-	21	SPARE	20	1			0.0	0.0		1	20	SPARE	22	-	-	
-	-	23	SPARE	20	1				0.0	0.0		1	20	SPARE	24	-	-
-	-	25	SPARE	20	1		0.0	0.0			1	20	SPARE	26	-	-	
-	-	27	PFB	20	-			0.0	0.0		-	20	PFB	28	-	-	
-	-	29	PFB	20	-				0.0	0.0		-	20	PFB	30	-	-
TOTAL LOAD:							0.0 KVA	0.4 KVA	0.4 KVA								
TOTAL AMPS:							0.0 A	1.9 A	1.9 A								

ID LEGEND:

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	DEMAND LOAD	PANEL TOTALS
LIGHTING	0.0 KVA	100.0%	0.0 KVA	
RECEPTACLES	0.0 KVA	#DIV/0!	0.0 KVA	TOTAL CONNECTED LOAD: 0.8 KVA
HVAC	0.6 KVA	100.0%	0.6 KVA	TOTAL DEMAND LOAD: 0.8 KVA
MOTOR LOAD	0.0 KVA	100.0%	0.0 KVA	TOTAL CONNECTED CURRENT: 3.8 A
FIRE ALARM	0.0 KVA	100.0%	0.0 KVA	TOTAL DEMAND CURRENT: 3.8 A
KITCHEN EQUIPMENT	0.0 KVA	65.0%	0.0 KVA	
OTHER LOADS	0.2 KVA	100.0%	0.2 KVA	

NOTES:



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Scott Tomokiy 4/30/2024
SIGNATURE EXPIRATION DATE

SUBMITTAL PHASE
CONSTRUCTION DOCUMENTS
SUBMITTAL DATE 03/01/2024

DEPARTMENT OF DEFENSE
DIAMOND HEAD STATE MONUMENT
4204 DIAMOND HEAD RD HONOLULU, HI 96815
TMWK: 3-1-042:600
**BIRKHIMER EMERGENCY OPERATIONS CENTER (EOC)
UPGRADES AND IMPROVEMENTS**
PANEL SCHEDULE

SCALE:
AS NOTED
STATE JOB NO.
CA-202313-C
FEDERAL PROJECT NO.
-

SHEET 123 OF 123
EC702

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01100 - PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: The work generally includes but is not limited to the following for the three buildings of the State of Hawaii Department of Defense (Birkhimer EOC).
- B. Building #303:
 1. Properly remove and dispose of existing air conditioning ductwork as shown in the contract demolition plan which includes, but not limited to the following equipment:
 - a. Provide a new dedicated Direct Expansion (DX) heat pump a/c system to State Warning Point Room.
 - b. Replace existing duct board ductwork with new Sheetmetal duct.
 - c. Provide stand-alone Variable Air Volume (VAV) Terminal units to all areas serve by AHU-1
 - d. Convert existing AHU-1 to a VAV unit.
 2. Install a new emergency generator as indicated and specified.
 - a. Provide a new emergency generator with an outdoor rated enclosure.
 - b. Provide a new aboveground double wall fuel tank with a manual refueling port and fuel level monitoring system.
 3. Replace light fixtures with new throughout the building as indicated in the contract drawing.
 4. Provide new battery powered parking lot light fixtures.
 5. Provide all indicated electrical removal and new work as indicated.
 6. Provide all finish work for a clean and finished project.
 7. Complete all testing and balancing and commissioning of the new HVAC systems.
 8. Repave the existing parking lot as indicated.
 9. ACM and lead paint removal work as indicated by the Targeted Hazardous Material Survey Report and related specifications. The hazmat removal applies only to those areas that are directly disturbed due to this project's mechanical, electrical, and other incidental work.
 10. All incidental related work shall be included in this project.
 11. Refer to phasing plan for the required phasing work for this project.

12. Provide new louvers where indicated
 13. Provide ceiling tile, and grid, restoration work as indicated in architectural work.
 14. Access to the site is also limited and restricted. The Contractor is forewarned that the building will be in operation during the construction period and all extremely disruptive work shall be performed during nights, mornings, weekends or other non-operating hours. The work schedule shall be coordinated with the building administration and shall be approved by the Contracting Officer before implementation. This is particularly true for any Crane lifts that are required for the project. All reasonable efforts shall be made by the Contractor to limit these times. Refer to section item entitled "Hours of Work".
 15. Repave the existing parking lot as indicated.
- C. Public Services Building:
1. Provide heat pump DX air conditioning units and associated electrical, and refrigerant piping work.
 2. Replace existing light fixtures with new to install a/c units.
- D. Birkhimer:
1. Properly remove and dispose of existing air conditioning system as shown in the contract demolition plan which includes, but not limited to the following equipment:
 - a. Provide a new dedicated Direct Expansion (DX) air conditioning systems.
 - b. Test and Balance the installed systems.
 2. Install a new emergency potable water system as indicated and specified.
 - a. Provide new underground water tank.
 - b. Route new water piping from the underground tank to the Birkhimer building.
 - c. Provide water booster pumps, water re-circulation filtration, and water monitoring panel as required.
 3. Provide new domestic cold and hot water piping in the men and women's bathroom, and kitchen.
 4. Replace an existing underground diesel fuel tank with a new aboveground tank as indicated.
 5. Provide an underground fuel storage tank closure report in coordination with the State Department of Health.
 6. Provide all indicated electrical removal and new work as indicated.
 7. Provide all finish work for a clean and finished project.

8. Complete all testing and balancing and commissioning of the new HVAC systems.
 9. ACM and lead paint removal work as indicated by the Targeted Hazardous Material Survey Report and related specifications. The hazmat removal applies only to those areas that are directly disturbed due to this project's mechanical, electrical, and other incidental work.
 10. All incidental related work shall be included in this project.
 11. Refer to the phasing notes for the required phasing work for this project.
 12. Provide ceiling tile, and grid, restoration work as indicated in architectural work.
- E. Perform operations and furnish equipment, fixtures, appliances, tools, materials, related items and labor necessary to execute, complete and deliver the Work as required by the Contract Documents.
- F. The Division and Sections into which these specifications are divided shall not be considered an accurate or complete segregation of work by trades. This also applies to work specified within each section.
- G. Contractor shall not alter the Drawings and Specification. If an error or discrepancy is found, notify the Contracting Officer.

1.02 HOURS OF WORK

- A. Work can be performed at the construction site seven days a week, except State and Federal Holidays at any time over a 24-hour period provided there is no considerable disruption to DOD operations or other adjacent agencies. Working days/hours shall be submitted to the designer for approval.
- B. The Birkhimer EOC is located in Diamond Head Crater. Access is via a gated tunnel open between 6:00 am to 6:00 pm, everyday except national holidays. Outside of these hours, the gate will be opened once for the ingress or egress of the Contractor work force.
- C. Building 303 and Birkhimer tunnel are typically staffed from 6:15 am to 5:30 pm, except the State Warning Point office in Building 303, which is staffed 24/7. DOD staff will not relocate during construction.
- D. The PSB is not staffed and the equipment shall not be disturbed/damaged.
- E. Work involving any disturbing noise that will impair office work, including demolition, shall only occur between 5:30 p.m. to 2:30 a.m.,
- F. Contractor shall coordinate work activities with the Engineer. Submit a proposed construction schedule to Engineer for review and approval within 14 calendar days prior to start of work. The Contractor shall coordinate their schedule with the Engineer if rescheduling of work or intermittent work is required, such work shall be performed at no extra cost to the State.

- G. If the Contractor elects to work overtime, compensation for State employees and for the construction management consultant, as authorized by the State, shall be the Contractor's obligation to pay in accordance with Section 7.11 – “Overtime and Night Payment for State Inspection Service” of the General Provisions of Construction Projects (2016).
- H. Contractor shall clean work areas and effected spaces at the end of each working shift. Rubbish, loose materials, construction dust/debris, etc. shall be disposed of daily. **Tools and equipment shall not be left unattended during work hours.** This includes tools left in unlocked vehicles, in the bed of pickup trucks, or in unlocked job sites. Materials shall be safely secured and stored in an area designated by the DOD.

1.03 SAFETY

- A. The Contractor shall take the necessary precautions to protect his workers and other personnel from injuries. The rules and regulations promulgated by the Occupational Safety and Health Acts are applicable and made a part of these specifications.
- B. Barricades and warning signs shall be erected by the Contractor in the work area to properly protect all personnel in the area.
- C. During the progress of the work, debris, empty crates, waste, material drippings, etc., shall be removed, as well as, exposed work such as ceilings be secured by the Contractor at the end of each work day, and the work area shall be left clean and orderly. This includes any other locations that the Contractor has utilized during the course of work.
- D. Contractor shall protect all DOD property from damage, dust and debris from construction work to include, but not limited to, covering staff workspaces from any work above it, laying of protective floor coverings, installing floor to ceiling dust barriers, etc.

1.04 OPERATION OF DOD FACILITIES DURING CONSTRUCTION

- A. The Contractor shall coordinate the phases of work under this contract with the Engineer to permit the continuing operation of existing DOD facilities and to minimize disruption to staff, pedestrian and vehicular traffic.
- B. Utility Maintenance: During the construction of this contract, existing utility services serving occupied or used facilities shall not be disrupted except where authorized in writing by authorities having jurisdiction. Contractor shall provide temporary services during interruptions to existing utilities, as acceptable to the Engineer. Damages to the existing utility facilities by the Contractor will be repaired at the Contractors expense.
- C. Outages for water, power, communications, sewer, air conditioning or any other utility, if necessary, coupled with temporary services, shall be kept to a minimum and scheduled for off-peak hours, as much as possible, generally from 5:30 p.m. to 2:30 a.m. The Contractor shall submit written requests to the Engineer for such outages no later than fourteen (14) calendar days in advance on a form to be provided by the DOD. The request shall include a description of work and the duration of the outage with the provisions of adequate temporary service. Should

sewer service be stopped, the Contractor shall provide a minimum of four (4) porta-pottys per facility at a location indicated by the DOD. The Contractor shall not proceed with such outages until written approval is received from the State. See Exhibit A for further information.

- D. The facilities have their own backup power generators. However, the Contractor shall provide its own equipment and means of providing backup power to the facility during planned electrical outages.
- E. The Contractor shall be made aware that all facilities (Building 303, Birkhimer Tunnel and PSB) contain stored items (not shown in plans) that may be blocking construction access. This is especially true with Building 303, which is part warehouse. The Contractor shall perform a space assessment and notify the DOD what movable items will need to be relocated in writing. The Contractor shall provide DOD with at least TEN (10) working days to relocate such items. Such items that are secured or too large to relocate will not be moved.

1.05 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated and include incomplete sentences. Omission of words or phrases such as “the Contractor shall”, “as shown on the drawings”, “a”, “an”, and “the” are intentional. Omitted words and phrases shall be provided by inference to form complete sentences. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred, as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates. Where devices, or items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items or parts as are required to properly complete the Work.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words “shall”, “shall be”, or “shall comply with”, depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 3. Abbreviations and Acronyms for Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research’s “Encyclopedia of Associations” or in Columbia Books’ “National Trade & Professional Associations of the U.S.”.
- B. Terms:
 - 1. Directed: Terms such as “directed”, “requested”, “authorized”, “selected”, “approved”, “required”, and “permitted” mean directed by Contracting Officer, requested by Contracting Officer, and similar phrases.

2. Indicated: The term “indicated” refers to graphic representations, notes, or schedules on drawings or to other paragraphs or schedules in specifications and similar requirements in the Contract Documents. Terms such as “shown”, “noted”, “scheduled”, and “specified” are used to help the user locate the reference.
 3. Furnish: The term “furnish” means to supply and deliver to project site, ready for unloading, unpacking, assembly, and similar operations.
 4. Install: The term “install” describes operations at project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
 5. Provide: The terms “provide” or “provides” means to furnish and install, complete and ready for the intended use.
 6. Installer: An installer is the Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-Subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 7. Submit: Terms such as “submit”, “furnish”, “provide”, and “prepare” and similar phrases in the context of a submittal, means to submit to the Contracting Officer.
- C. Industry Standards:
1. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
 2. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
 3. Conflicting Requirements: If compliance with 2 or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer for a decision before proceeding.

1.06 CONTRACT

- A. Refer to SPECIAL PROVISIONS FOR CONSTRUCTION CONTRACTS for other contract conditions.

1.07 WORK SEQUENCE

- A. Refer to contract drawings for the suggested phasing and work sequence notes for each of the three buildings.

- B. General:

1. Contractor shall perform work concurrently at all three buildings.
 2. All facilities shall have continual utilities.
 3. Certain scope of work will require phasing for demolition and new work as shown in the plan, and described below.
- C. Building 303:
1. Ductwork replacement and VAV conversion scope of work shall be completed over multiple phases that have allocated durations as shown below. See plans for details of work.
 - a. Phase 1: Three (3) – 8 hour working shifts.
 - b. Phase 2: Two (2) – 8 hour working shifts.
 - c. Phase 3: Two (2) – 8 hour working shifts
 - d. Phase 4: Four (4) – 8 hour working shifts.
- D. Public Services Building (PSB):
1. See notes on contractor plans.
- E. Birkhimer:
1. HVAC replacement shall be complete over 2 separate phases that have allocated durations as shown below. See plans for details of work.
 - a. Phase 1: Twelve (12) - 8 hour working shifts.
 - b. Phase 2: Twelve (12) - 8 hour working shifts.
 2. Plumbing replacement for interior domestic water and specified sanitary/vent shall be complete over a single phase with the allocated duration as shown below. See plans for details of work.
 - a. Phase 1: Eight (8) - 8 hour working shifts.
 3. Plumbing replacement for the exterior domestic water, including the underground water storage tank, booster pumps, and filtration system, shall be complete over a single phase with the allocated duration as shown below. See plans for details of work.
 - a. Phase 1: Fifteen (15) – 8 hour working shifts.
 4. Plumbing replacement of the fuel storage system shall be complete over a single phase with the allocated duration as shown below. See plans for details of work.
 - a. Phase 1: Fifteen (15) - 8 hour working shifts.

1.08 CONTRACTOR USE OF PREMISES AND WORK RESTRICTIONS

- A. Birkhimer EOC which includes building 303, PSB and the Birkhimer tunnel is a secure facility that is operational 24/7. As such, the facility shall remain accessible and habitable to the facility's staff and patrons for the duration of the construction period. No additional compensation or time will be granted to the Contractor for failure to acknowledge, account and accommodate for the

requirements of this section in his bid. If access needs to be restricted, inform the project manager through the outage request process (see paragraph 1.04.C) which may or may not be approved. All buildings shall remain secure for the duration of the construction period.

- B. DOD restrooms will not be available for Contractor use. The Contractor shall provide temporary toilets and wash facilities for all construction personnel.
- C. Sign in for a Visitor Badge at Birkhimer tunnel and Building 303.
- D. Request keys as needed. Provide five working days notice.
- E. Contractor's use of premises is restricted as follows:
 - 1. Noise and Dust Control:
 - a. In adjacent locations surrounding the project site, noise, dust and other disrupting activities, resulting from construction operations, are detrimental to the conduct of the Facility activities. Therefore, Contractor shall monitor its construction activities and exercise precaution when using equipment and machinery to keep the noise and dust levels to a minimum.
 - b. To reduce loud disruptive noise levels, ensure mufflers and other devices are provided on equipment, internal combustion engines and compressors.
 - c. Use noise and dust control measures such as erecting dust barriers, floor to ceiling barriers, water trucks, etc. Contractor will be responsible for clean up of significant dust on windows, buildings, equipment, interior spaces, etc. after each work day.
 - 2. Other Conditions:
 - a. Contractor is responsible to dispose of all construction related trash.
 - b. Operate machinery and equipment with discretion and with minimum interference to parking lot and walkways. Do not leave machinery and equipment unattended on roads or in the parking lot.
 - c. A storage area for materials, supplies and equipment is designated on the plans. The Contractor is responsible to secure the assigned site. The Department will not be held responsible for damaged or missing items.

- d. Keep access roads to the project site free of dirt and debris. Provide, erect and maintain lights, barriers, signs, etc. when working on facility roads, driveways and walkways to protect pedestrians and moped/bicycle riders. Obey facility traffic and safety regulations.

1.09 PROVISIONS FOR STAGING AREA (FIELD OFFICE/STORAGE SPACE)

- A. Should the Contractor choose to use it, space has been allocated for a Contractor staging area on the plans. The space may be used for a field office, staging of materials and equipment, vehicle parking, or other uses subject to the approval of the DOD. All costs to provision and secure the site such as utilities, fencing, field office, security, etc., shall be borne by the Contractor. At the conclusion of the project, the Contractor shall remove all provisions and repair the site to existing conditions. Should there be other Contractors that need to utilize the staging area, the Contractor must accommodate the other Contractor.

1.10 MISCELLANEOUS PROVISIONS

- A. Historic Building: The Birkhimer EOC, built in 1916, is a contributing element to the 1983 National Register of Historic Places, Fort Ruger Historic District
- B. Historical Archaeological Artifacts: All items having any apparent historical or archaeological interest discovered in the course of construction activities shall be carefully preserved. Should historic remains such as artifacts, burials, concentrations of shell or charcoal be encountered during the construction activities, work shall cease immediately in the adjacent vicinity of the find and the applicable site shall be protected from further damage. The Contractor shall immediately contact the Contracting Officer and the State Historic Preservation Division (SHPD) DLNR at (808) 692-8015. SHPD will assess the significance of the find and recommend an appropriate mitigation measure if necessary.

1.11 SPECIAL PROJECT REQUIREMENTS

- A. Upon receipt of the Contract, the Contractor shall process and return the Contract to the State' Contract Office within five (5) calendar days.
- B. The State intends to issue the Notice to Proceed for the Project to the Contractor within sixty (60) calendar days after bid award. The Contractor shall be able to commence work on this date.
- C. As mentioned previously, the Birkhimer EOC is a 24/7 operation, all staffing may not be present, but Contractor shall make accommodations if they were. The staff and equipment in the State Warning office located in Building 303 are always staffed and therefore, all work at that location must be done while staff is present with the least interruptions.
- D. Upon award, the Contractor shall submit all long lead items for review and approval via the submittal process. Upon receipt, the design consultant shall have five (5) working days to review and respond. Upon receipt of approval of equipment, Contractor shall place order within 2 working days thereafter.
- E. The access to the Diamond Head Crater project facilities has a 10' lane with 1' shoulders on each side and a peak tunnel height of 13'-6". Contractor shall verify prior to bringing in large equipment required for the project. Hauling of large equipment shall be coordinated with DOD, and conducted during off peak hours.

1.12 SCHEDULE OF ALLOWANCES

- A. Allowance i: Include one work stoppage of up to 14 consecutive calendar days for an emergency event that might require the full, uninterrupted use of the Birkhimer Tunnel, PSB, and B303 facilities, including use of the access roads and parking lot, by the Hawaii Emergency Management Agency (HI-EMA).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

UTILITY AND/OR ACCESS OUTAGE REQUEST

State of Hawaii
Department of Defense
3949 Diamond Head Road
Honolulu, Hawaii 96816

Date: _____

The following interruption of Utilities Services and/or pedestrian/vehicle Access is required in conjunction with:

Project Title _____

Project No. _____

BEGIN DATE: _____ BEGIN TIME: _____

END DATE: _____ END TIME: _____

TYPE OF SERVICE: UTILITY _____ ACCESS _____

THE NATURE OF WORK TO BE PERFORMED (Be Specific): _____

LOCATION OF WORK: _____

AREAS AFFECTED: _____

SPEC. SECTION AND/OR CONTRACT DRAWING PAGE: _____

NECESSITY/REMARKS: _____

GENERAL CONTRACTOR: _____ PHONE NO: _____

CONTACT NAME: _____ EMERGENCY NO: _____

SUBCONTRACTOR: _____ PHONE NO: _____

CONTACT NAME: _____ EMERGENCY NO: _____

TO BE COMPLETED BY CONSTRUCTION MANAGER

C.M. Company: _____ Phone No: _____

Name & Title of Authorized Representative _____ Signature _____ Date _____

REMARKS _____

TO BE COMPLETED BY DOD

RECOMMENDED BY: _____ Date _____
Project Manager

CONCURRED BY: _____ Date _____
HIEMA

APPROVED BY: _____ Date _____
HIENG

SECTION 01190 - GENERAL REQUIREMENTS FOR COMMISSIONING

PART 1 - GENERAL

1.01 SUMMARY

- A. There are various mechanical, electrical, and plumbing upgrades and improvements at three buildings in this contract. The commissioning process shall include equipment, components, signaling and software at Building 303, Public Services Building, and Birkhimer. A Commissioning Authority, who is hired by the general contractor of this project, acting as the Government's (The State's) representative will conduct the commissioning in order to meet the requirements set forth by The State's project requirement, basis of design and design documents. Other than the design and construction documents, the Contractor & its sub-tier Contractors shall review The State's Basis of Design (BOD). The Contractor shall provide labor and services to the Commissioning Authority to accomplish the work specified herein as they apply to the requirements provided in the Commissioning of the new systems in three buildings. Secretarial services need to be provided by the Contractor.
- B. Commissioning is a process intended to provide The State with a greater degree of assurance that building systems function in compliance with criteria set forth in the contractor documents and satisfy The State's operational needs based on the BOD. This section covers the HVAC, Plumbing and POL Systems Commissioning.
- C. The work generally includes but is not limited to the following for the three buildings of the State of Hawaii Department of Defense (Birkhimer EOC).
 1. Scope of Work:
 - a. Replace the existing, DX AHU/FCU/ACCU, and supply fans.
 - b. Provide new supply fans
 - c. Provide power to the new HVAC equipment.
 - d. Replace ductwork, air diffusers/registers, and volume dampers as indicated.
 - e. Provide motorized dampers on outside air intake ducts for VFD FCU/AHUs.
 - f. Provide a new aboveground fuel tank, associated fuel piping, and monitoring system at B303, and Birkhimer.
 - g. Provide an emergency potable water system including underground water storage tank, booster pump, and controls.
 - h. Provide a limited asbestos and lead paint survey for the areas affected by the work to confirm that the areas to be disturbed by the work are ACM and lead paint free and prepare remediation plans and specifications for design if required.

- i. Provide fundamental commissioning services as part of the project to comply with the Energy Code
 2. Engineering design services include:
 - a. Field survey of existing site to observe conditions.
 - b. One set of drawings on reproducible tracings and PDF files. Additional prints or mylar sets will be charged on a reimbursable basis.
 - c. One set of typed specifications on reproducible bond paper.
 - d. Preparation of cost estimate.
 - e. Processing of Building Permit.
 - f. Review of substitution requests during bidding.
 - g. Review of shop drawings and equipment submittals.
 - h. Mechanical System fundamental commissioning.
 - i. Site visits: Preliminary, Design, Construction, and Final Observation
 3. Commissioning services include:
 - a. Review of the construction documents including plans, and specifications, equipment submittals, and test and balance reports.
 - b. Field survey of existing site to observe conditions.
 - c. Attend and lead meeting with project contractors to coordinate all commissioning related activities.
 - d. Provide commissioning plans.
 - e. Perform commissioning of the new mechanical and its control systems.
 - f. Document commissioning activities.
- D. Commissioning requires cooperation and direct involvement by all parties throughout the construction process. Successful commissioning requires that installation of all building systems and assemblies not only comply with contract requirements but also that this should be achieved early enough in the construction phase to provide full operational check-out, testing and adjustments prior to substantial completion. In addition to fulfilling scheduling and planning requirements, the Contractor is further responsible for documenting the equipment and system installation and operational verification for all systems and assemblies.
- E. Quality Assurance/Quality Control (QA/QC): The Commissioning Authority provides quality assurance and quality control on this project by performing the following tasks:
 1. Review of Shop Drawings and material descriptions and certifications.
 2. Qualifications and approvals of certain specified sub-tier Contractors and testing agencies or laboratories.

3. Inspection, testing and certifications by agencies provided by The State including onsite and laboratory testing.
 4. Inspection, testing and certifications by agencies provided by the Contractor including onsite and laboratory testing.
 5. Inspection and testing by regulatory agencies.
 6. Contractor and The State checks, inspections, tests and certifications.
 7. Mock-ups and evaluations.
 8. Commissioning may cover the QA/QC of certain static building elements or assemblies. Some QA/QC activities will be witnessed by the Commissioning Authority, while other QA/QC activities will be witnessed by the Contractor, the Architect or The State. In general, the QA/QC activities such as concrete testing, inspection of static building elements, and regulatory or code inspections remain outside of the formal commissioning umbrella. However, compiling the documentation of some of these traditional activities may be within the commissioning scope as specified herein.
- F. Commissioning Process Overview: The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
1. Commissioning during construction begins with a planning meeting where the commissioning process is reviewed with all of the commissioning team members followed by a kick-off meeting where the revised Commissioning Plan is reviewed in detail.
 2. Additional meetings will be required throughout construction with appropriate parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
 3. Equipment and assembly documentation is submitted to the Commissioning Authority during normal submittals, including detailed startup procedures and early copies of Operation and Maintenance (O&M) data. Contractor provides additional information as needed by the Commissioning Authority for preparing the functional performance test (FPT) checklists.
 4. Compile and submit startup documentation package data for selected equipment as requested by the Commissioning Authority.
 5. The Commissioning Authority compiles the pre-functional checklist (PC) forms to be included in startup documentation. These checklists are included as a supplement to SECTION 15995 - MECHANICAL HVAC COMMISSIONING.
 6. The Commissioning Authority performs periodic construction observation.
 7. Provide execution and documentation of the startup documentation packages. The Contractor and Commissioning Authority should provide documentations to ensure the checklists are completed with Commissioning Authority reviewing and spot witnessing Contractor's functional and performance tests and witnessing all functional testing. The functional

performance tests shall proceed from simple to complex; from component level to equipment to systems and intersystem levels with functional testing being completed before performance testing.

8. Items of non-compliance in material, installation or setup are corrected by the Contractor and the system is re-tested.
 9. The Commissioning Authority reviews the O&M manuals for clarity, accessibility and completeness.
 10. The Commissioning Authority reviews, pre-approves and coordinates the training provided by the Contractor and verifies that it is completed.
 11. Commissioning is completed before substantial completion, except for trend log monitoring, seasonal testing near-warranty end activities, verification of controls systems' training sessions and review of final record drawings.
 12. Deferred testing and near-warranty-end activities are conducted as specified.
- G. All general references to equipment in this document refer only to equipment that is to be commissioned. The responsibility for developing and reviewing forms, overseeing, documenting, and witnessing execution and reviewing reports of checks and tests is distributed among constructors, designers and The State parties and differs for different equipment types. Commissioning will be witnessed by Commissioning Authority under the direction of The State.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions, applicable requirements of all Divisions of the Contract Specifications and all Contract Drawings, apply to the work of this Section. In the event of conflict between specific requirements of the various documents, the more restrictive or extensive requirement shall govern.
- B. Section pertaining to the Operation and Maintenance Data: Description of O&M manual format and content.
- C. SECTION 15995 - MECHANICAL HVAC COMMISSIONING: Commissioning requirements for the mechanical, HVAC systems including the component testing requirements.

1.03 DEFINITIONS

- A. The common abbreviations used in this document are outlined:
 1. A/E: Architect and Design Engineers.
 2. BAS: Building Automation System.
 3. CA: Commissioning Authority.
 4. CC: Controls Contractor.
 5. Cx: Commissioning.
 6. CM: Construction Manager
 7. EC: Electrical Contractor.

8. FPT: Functional Performance Test.
 9. GC: General Contractor
 10. MC: Mechanical Contractor.
 11. MFR: Manufacturer.
 12. OR: The State's (Government's) Representatives.
 13. PC: Pre-start & Start-up Checklist (a.k.a. Pre-functional Checklist)
 14. SUBS: Sub-tier Contractors to GC
 15. TAB Testing, Adjusting and Balancing work
 16. TC: Testing, Adjusting and Balancing Contractor.
 17. QC: Quality Control Manager
 18. NA: Not applicable.
- B. Active Test: Using hand-held instruments, immediate control system readouts or direct observation to verify performance.
- C. Approval: Acceptance that a piece of equipment, system or issue related to it complies with the Contract Documents.
- D. Architect/Engineer: The prime consultant (Architect) and sub-tier consultants who comprise the design team, generally the mechanical HVAC Engineer and the electrical Engineer.
- E. Basis of Design (BOD): See design basis provided by A/E.
- F. Certified Testing Company: An industry certified company utilizing industry certified technicians on this project who will perform inspections and testing for equipment and systems. This company is not affiliated or owned by the equipment manufacturer.
- G. Commissioning: Commissioning is a process intended to provide The State with a greater degree of assurance that building systems function in compliance with criteria set forth in The State's Project Requirements (OPR) to satisfy The State's operational needs.
- H. Commissioning Authority: An independent party, not otherwise associated with the A/E team members or the Contractor. The Commissioning Authority witnesses the day-to-day commissioning activities of the Contractor.
- I. Commissioning Plan: An overall plan provided by the Commissioning Authority to The State prior to the start of construction that details the Commissioning Authorities scope of work.
- J. Commissioning Team: A group of individuals or firms consisting of The State, Architect, Contractor, Commissioning Authority, sub-tier consultants, sub-tier

contractors, suppliers and anyone else who will be involved in commissioning building systems.

- K. Contractor: The general Contractor or authorized representative.
- L. Control System: Standalone electric control for individual system
- M. Construction Checklist: A list of items to include in the installation, startup and initial checkout of a piece of equipment or assembly.
- N. Data logging: Monitoring flows, currents, status, pressures, etc., of equipment using standalone data loggers separate from the control system.
- O. Deferred Tests: Tests that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.
- P. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with The State's objectives).
- Q. Design Basis: The basis and assumptions for calculations, decisions, schemes and product selections to meet the OPR and objectives and to satisfy applicable regulatory requirements, standards and guidelines.
- R. Design Record: The compilation of the following five elements: The State's Project Requirements, The State Objectives, Design Narrative, Design Basis and Performance Metrics.
- S. Documenting Tests: The recording of what actions were taken to perform each individual test procedure, along with the results or system response of the procedure, with deficiencies noted.
- T. Essential Power and Fire Alarm Response Matrix: A matrix listing all equipment and components (air handlers, dampers, valves, fire doors, elevators, control system, security system, lighting, etc.) with their status and action after each fire alarm initiation type, under essential power and the requirements to bring each system back on line.
- U. Function - Individual function of a piece of equipment, system or assembly: A group of related actions contributing to a larger action or purpose. Examples of individual functions are: the operation of the outside air economizer on an air handler, of a humidifier, of valve positive closure and of a chilled water temperature reset schedule or of the efficacy of the caulking or flashing in a window wall assembly.
- V. General Contractor: The prime construction Contractor for this Project.
- W. Indirect Indicators: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed.
- X. Installation and Startup Booklet: The manufacturers' booklet that is included with a particular piece of equipment. Contained within this booklet may be safety, operational, maintenance and startup information and checklists.

- Y. Issues Log: Ongoing record of the issues identified during the commissioning process that require or did require correction. For each entry the log includes a unique identification number, identification date, identification party, a short description of the issue, the equipment or assembly it is associated with, a long description of the issue, including cause, implications of the issue, recommendations for correction, assignment of responsibility for correction, an issue closed date and the name of the party verifying the correction. The Commissioning Authority is responsible to maintain the log.
- Z. Manufacture's Service Representative (MSR): A company that is certified and trained by a manufacturer to provide startup, testing, and troubleshooting service for equipment.
- AA. Monitoring: Recording of parameters (flow, current, status, pressure, etc.) of equipment operation including the data loggers or the trending capabilities of control systems.
- BB. NETA: Inter-National Electrical Testing Association, Inc.
- CC. Noncompliance: See Deficiency.
- DD. Nonconformance: See Deficiency.
- EE. Over-written Value: Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation). See also "Simulated Signal".
- FF. The State: The representative on the project that has the authority to act in The State's behalf in all issues.
- The State-Contracted Tests: Tests paid for by The State outside of the Contractor's contract and for which the Commissioning Authority does not witness.
- The State Objectives: A distillation of the most salient concepts within the OPR considered important to The State to have in writing and to be tracked through design and construction. The State Objectives are sometimes referred to as the design intent.
- GG. The State Project Requirements (OPR): Documentation of the functional requirements of the facility and the expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets and schedules and supporting information. This document is analogous to what has traditionally been referred to as the Owner (The State) Program.
- HH. Performance Metrics: Measurable indicators that allow verification that The State's objectives or requirements or elements in the Design Narrative has been met. Performance Metrics are identified throughout the design of the project with as many as possible being generated during the development of The State's Objectives. Metrics are most applicable for The State's Objectives that allow for a numerical quantitative evaluation. However, some of The State's Objectives may have Performance Metrics that are not numerical.

- II. Phased Commissioning: Commissioning that is completed in phases (by level, for example) due to the remoteness of the structure or other scheduling issues, in order minimize the total construction time.
- JJ. Sampling: Testing or checking only a fraction of the total number of issues or elements.
- KK. Seasonal Tests: Tests that are deferred until the system(s) will experience conditions closer to their design conditions.
- LL. Simulated Condition: Condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).
- MM. Simulated Signal: Disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.
- NN. Specifications: The construction Specifications of the Contract Documents.
- OO. Startup: The initial starting or activating of dynamic equipment, including executing construction checklists.
- PP. Startup Report: Original equipment manufacturers or service provider's checklist and summary form used for the startup of equipment.
- QQ. Static Assemblies: An element in a building which, though machinery in nature, may require Commissioning.
- RR. Subcontractor: A sub-tier Contractor to the General Contractor
- SS. Systems Manual: A manual prepared by the Commissioning Authority to provide the operating staff information needed to understand and operate each system. The manual is in addition to the O&M Manuals submitted by the Contractor. The systems manual focuses on operating, rather than maintaining the equipment, particularly the interactions between equipment. Some components of the manual may reside in the Contractor-submitted O&M Manuals.
- TT. Test: Assessments that verify specific components, assemblies, systems, and interfaces among systems function and perform in accordance with The State's objectives and the Contract Documents. Testing may include using manual (direct observation) or monitoring methods. Testing is the dynamic testing of specific and interacting equipment and systems in full operation. Tests are generally performed after construction checklists, startup reports, completion of all associated documentation and actual startup procedures are complete. Some procedures in construction checklists test components, but reference to "testing" generally refers to those equipment and system tests conducted after Contractor startup and initial checkout.
- UU. Test Procedures (TP): The written procedures and documentation forms of tests used to guide and record testing. For mechanical systems, TPs are composed of repeatable, step-by-step procedures and include the test prerequisites, the test process, the expected outcomes and acceptance criteria. Forms or space for recording the results of tests may be included integrally in the written procedures

or attached on separate sheets. For electrical component testing, the procedures may be less step-by-step-like than for dynamic mechanical equipment. For each piece of equipment, checks and test procedures and their documentation record forms may be different documents or combined in the same document, but checks and tests should be grouped. Responsibility for test procedure development is shared between the Commissioning Authority and the Contractor.

VV. Test Requirements: Requirements specifying what modes and functions, etc., are to be tested. The test requirements are not the detailed test procedures.

WW. Trending: Monitoring using the building control system.

XX. Vendor: Supplier of equipment

YY. Warranty Period: Refer to DIVISION 1 for a technical definition relative to equipment. For commissioning purposes and where referenced in a commissioning section, Warranty Period is defined as one year from substantial completion.

1.04 SUBMITALS

- A. Provide the Commissioning Authority with information required to facilitate the commissioning process.
- B. Standard Equipment and Assembly Submittals:
 - 1. Prior to standard equipment and assembly submittals being issued, provide the Commissioning Authority with a submittal register. The Commissioning Authority will check which submittals they desire to review and comment on and which they need only copies of the approved submittals.
 - 2. Submittal review may be done in parallel with A/E reviews or in series with them, depending on protocol set by The State.
 - 3. Provide a reasonably complete first draft of the control drawings and sequences submittal for review and use during controls integration meetings.
- C. Other Equipment and Assembly Information: When not included with the standard submittals, provide to the Commissioning Authority requested shop drawings, the manufacturer's printed installation and detailed startup procedures, full sequences of operation, O&M data, performance data, performance test procedures, control drawings and details of The State's contracted tests. In addition, provide installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms for use by the factory or field technicians to the Commissioning Authority. This documentation will be required prior to the normal O&M manual submittals.
- D. Provide completed construction checklists prior to start of functional testing.
- E. Provide the startup documentation as indicated in the Commissioning Plan
- F. Provide equipment and assembly documentation requested by the Commissioning Authority in the O&M manuals.
- G. Provide company and required staff qualifications.

1.05 QUALITY ASSURANCE

- A. Test Equipment:
 - 1. Provide testing equipment required to perform installation, startup and initial checkout and required testing.
 - 2. Provide special tools and instruments, only available from vendor, specific to a piece of equipment, required for testing equipment.
 - 3. Provide data logging equipment for setting up and testing required to perform specified electrical equipment testing.
- B. Test Equipment Calibration Verification:
 - 1. Within 90 days of notice to proceed and 30 days before testing is performed, provide documentation of the calibration requirements specified below.
 - 2. Electrical equipment testing instruments must be calibrated in accordance with the following frequency:
 - a. Field Instruments: Analog, 6 months maximum, digital, 12 months maximum.
 - b. Laboratory Instruments: 12 months.
 - c. Leased specialty (Simulator) equipment 12 months where accuracy is guaranteed by lessor.
 - 3. Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance 'with the tolerances specified in the Specifications.
 - a. If not otherwise given, the following minimum requirements apply:
Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5 degree F and a resolution of plus or minus 0.1 degree F. Pressure sensors shall have an accuracy of plus or minus 2 percent of the value range being measured (not full range of meter) and have been calibrated within the last year. Calibrate equipment according to the manufacturer's recommended intervals and when dropped or damaged. Provide calibration tags affixed to equipment or certificates demonstrating calibration and serial number of device.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 GENERAL

- A. Provide commissioning of the following equipment, systems, assemblies and features as itemized in Paragraph 1.01.B.1 (Mechanical HVAC Systems Commissioning)
- B. Integrate commissioning requirements into the overall construction schedule.

- C. Alert the Commissioning Authority of deficiencies in compliance with the contract documents identified through the commissioning process or other means.
- D. Provide additional requested documentation, prior to normal O&M manual submittals, to the Commissioning Authority for development of installation, startup and testing procedures. Typically this will include detailed manufacturer installation, startup, operating, troubleshooting and maintenance procedures, full details of The State's-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of The State to keep the warranty in force clearly identified. In addition, provide the installation, startup and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians to the Commissioning Authority.
- E. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training that will meet the requirements of the Specifications.
- F. Respond to notices of issues identified during the commissioning process. Make required corrections or clarifications and return prompt notification to the Commissioning Authority.
- G. When completion of a task or other issue has been identified as holding up commissioning process, particularly functional testing, within 2 days of identification of the issue, notify the Commissioning Authority and provide an expected date of completion. Notify the Commissioning Authority 'within one day of completion. It is not the responsibility of the Commissioning Authority to obtain this status information through meeting attendance, asking questions or field observation.
- H. Planning Meeting: Attend a commissioning planning meeting to be held within 30 days of start of construction with the full Commissioning Team in attendance. During this meeting, the Commissioning Authority will describe the overall scope and process of the commissioning effort for this project, address issues and suggestions from all parties, finalize management and reporting protocols, present the project schedule discussed and the draft commissioning plan thoroughly.
- I. Kick-off Meeting: Attend the commissioning kick-off meeting with the entire commissioning team in attendance. One week prior to this meeting, the updated commissioning plan will be distributed to all members for their review. The commissioning plan, the overall commissioning process and general responsibilities of each team member, reporting and communication protocols and next steps will be discussed.
- J. Temporary or Early Startup of Equipment. When equipment will be used, in a temporary mode prior to operating the equipment permanently, develop a plan to address the issues surrounding indoor environmental quality, moisture intrusion, building pressurization, duct and equipment cleanliness, checkout of safeties and fire alarm and protection, etc. Obtain plan approval from The State prior to such startup.

- K. **Miscellaneous Meetings:** Attend the weekly meetings conducted by the Commissioning Authority to address deficiencies, status, and coordination and planning. Require members of the commissioning team to attend commissioning meetings as requested by the Commissioning Authority or necessary to address specific systems.
- L. **Controls Integration Meetings:** Attend two controls integration meetings conducted by the Commissioning Authority to go over the control drawings, sequences of operation, points list and database and controls submittal requirements. These meetings are held prior to a formal control drawing submittal and before programming. The intent is to clarify control related issues for the controls contractor, mechanical, fire alarm and electrical contractor, The State's facility staff and Commissioning Authority prior to final point database development, programming and the formal control drawing submittal.
1. Require the controls sub-contractor to attend all meetings, require the mechanical, electrical and. general contractor to attend when issues regarding equipment they are responsible for are discussed. Invite the mechanical and electrical designers to attend as needed.
 2. Provide complete control drawing submittals and sequences to Commissioning Authority and The State. These drawings are not preliminary in content or accuracy.
 3. Parties will review the drawings and sequences and provide formal written comments on forms provided by the Commissioning Authority. The Commissioning Authority will submit these comments to the Contractor who shall respond in writing to each comment on forms provided. The comments and responses will be distributed by the Commissioning Authority prior to the meeting(s).
 4. Primary issues discussed and clarified are:
 - a. Unresolved issues from the controls review.
 - b. New issues from meeting attendees.
 - c. Issues and clarifications needed from the controls contractor.
 - d. Control drawing content and format.
 - e. Point database (monitored points, software points, naming conventions, alarms, and report format).
 - f. Sequences of operation and set points (clarity, completeness, design intent, functionality, and enhancements for control, energy and O&M).
 - g. Interlocks to packaged controls and other systems, including filling in the fire alarm and essential power response matrices.
 - h. Operator workstation graphics.
 - i. Field sensor and panel locations.

5. Conduct a site walk-through with the Controls Contractor, Commissioning Authority and Engineer shall to identify precise locations of panels, sensors, thermometers, flow meters and stations and valve taps will be identified.

3.02 CONSTRUCTION STARTUP DOCUMENTATION PACKAGE & CHECKLISTS

- A. The following documents and related procedures apply to all equipment and assemblies to be commissioned.
 1. For dynamic systems and static assemblies so designated in the Commissioning Plan, prior to startup provide a proposed startup documentation package, using the manufacturer's installation and startup procedures, consisting of the following:
 - a. Construction Checklist.
 - b. Startup Report
 2. Existing written testing requirements and procedures in accepted or required standards, guidelines or Specifications will suffice as the test procedures for the following: Regulated tests such as fire alarm, fire suppression, elevators, NETA electrical equipment tests, test procedures within these specifications and common Contractor tests such as duct and piping tests.
 3. All commissioned equipment will require the Construction Checklist:
 - a. In general, larger more complex equipment may require the startup report.
 - b. In addition to the Construction Checklist defined in Item a).
 4. Provide trend logs to the Commissioning Authority as requested and in the specified format
 5. Provide assistance to the Commissioning Authority in interpreting apparent system performance problems from monitored and test data.
 6. Provide time in selected construction meetings to cover commissioning-related issues.
 7. Construction Checklists:
 - a. For each piece of commissioned equipment (including each fan coil unit) complete the appropriate construction checklist according to the Commissioning Plan. Include items in the checklists as requested by the Commissioning authority. Blank checklists for mechanical and electrical systems are found as a supplement to this Section.
 - b. Calibrations: Calibration requirements for this project are provided in the Construction Checklist Supplement to this.
 - c. On each Construction Checklist, identify which trade or contractor is responsible for executing and documenting each line item.
 - d. Assist in clarifying the operation and control of commissioned equipment or assemblies in areas where the Specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

8. Functional Performance Test Procedures:
 - a. Prior to execution, test procedures developed by the Commissioning Authority are provided to the Contractor who shall review the tests for feasibility, safety, and equipment and warranty protection.
 - b. Prior to execution, test forms developed by the Contractor are reviewed and approved by the Commissioning Authority.
 - c. Schedule functional performance testing with the Commissioning Authority at least 14 days prior to executing the functional performance tests.
 - d. Perform tests following the approved test procedures, witnessed by the Commissioning Authority.
- B. Test Procedure Format: Test forms for commissioned mechanical equipment are provided as a supplement to this Section. Test procedure forms include (but not be limited to) the following information:
 1. System and equipment or component name(s).
 2. Equipment location and ID number.
 3. Unique test ID number and reference to unique construction checklist and startup documentation ID numbers for the piece of equipment
 4. Date
 5. Project name.
 6. Participating parties.
 7. A copy of the specific sequence of operations or other specified parameters being verified.
 8. Formulas used in calculations.
 9. Required pm-test field measurements.
 10. Instructions for setting up the test.
 11. Special cautions, alarm limits, etc.
 12. Specific step-by-step procedures to execute the test for each sequence or feature being verified, in a clear, sequential and repeatable format.
 13. Acceptance criteria of proper performance with a "Yes/No" check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
 14. A section for comments.
 15. Signatures and date block for the Commissioning Authority.
 16. Execution of Startup:

- a. Provide a full construction startup and checkout by the following the procedures included and approved in the Startup Document Package. Use no sampling strategies. Allow only individuals that have direct knowledge and have witnessed the corresponding line item task on included checklists to initial or check completion of that item.
- b. Complete all pre-start procedures in the Startup Document Package prior to starting equipment, including, but not limited to, verification of completion of wiring, safeties, lubrication, drive rotation and proper electrical test readings. Notify the Commissioning Authority at least 5 days in advance of equipment startup to allow the Commissioning Authority to witness.
- c. The Commissioning Authority will observe installation, startup and checkout of selected systems. Procedures in the Startup Documentation Package will be reviewed by the Commissioning Authority prior to Functional Testing.
- d. At the completion of the successful startup of the system or equipment (no issues outstanding), provide the completed, signed and dated Startup Documentation Package to the Commissioning Authority within 5 days after startup, and at least 3 days prior to Functional Testing or testing, adjusting and balancing of the equipment.
- e. Operate each commissioned device or assembly to the full extent of its capability, from minimum to maximum, under automatic and manual control and verify that the equipment, system and assembly is functioning according to the specifications, manufacturer's recommendations and good operating practice.
- f. Where final balancing of a system or particular components thereof are not specifically indicated to be performed by The State or The State's consultants, provide final balancing and adjustments for operation within specified tolerances prior to testing and demonstration of such system.
- g. The Commissioning Authority will review installation, startup and checkout documentation and identify incomplete areas.
- h. Correct all areas that are deficient or incomplete in the checklists in a timely manner. Provide progress submittals detailing the corrective measures to be taken and indicate issues that may impact testing schedules.

3.03 PHASED STARTUP

- A. Project will require startup and initial checkout to be executed in phases. Plan and schedule the phasing in coordination meetings. Results will be added to the master schedule.
- B. Provide a written plan to The State and Commissioning Authority for temporary startup of equipment to be used for space conditioning during construction. Obtain The State's approval of this plan prior to implementation.

- C. Notify The State and Commissioning Authority, when the installation will begin for static assemblies that are being commissioned, dates for pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and starting of testing adjusting and balancing. Notify the Construction Manager and Commissioning Authority, ahead of time, when commissioning activities not yet performed or not yet scheduled may delay construction.
- D. Re-test equipment started up or tested and later modified to confirm that the entire system including sequences and interlocks or assembly functions properly.

3.04 TESTING AND STARTUP

- A. Remedy outstanding Architect “punch list” items that may affect equipment operation before testing. Complete air and water adjusting and balancing and remedy discrepancies and problems before testing of the respective air or water related systems.
- B. Review test procedures developed by the Commissioning Team for feasibility, safety, and equipment and warranty protection. Provide alarm limits to be used during the tests for personal safety and equipment protection.
- C. Provide testing and startup of equipment and systems in accordance with the Commissioning Plan following the test procedures included in Supplement 2.
- D. Provide all tools to start, checkout and functionally test equipment and systems.
- E. Provide testing under the direction of skilled technicians for equipment and assemblies specified for testing in this Section. For example, provide an individual tasked with operating the HVAC control system during testing who is familiar with this building and control program. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete necessary tests, adjustments and problem-solving.
- F. Provide documentation of installation, startup and initial checkout for selected systems and assemblies, as listed in the Commissioning Plan provided as a supplement to this Section, by parties having direct knowledge of each item being checked off and provide a copy to the Commissioning Authority. Use forms developed and contained within the Startup Documentation Packages for this purpose.
- G. Schedule Commissioning activities to enable Commissioning Authority to make efficient use of its time to witness and sign off on the test forms provided in the Supplement. Provide a minimum of 2 weeks’ notice prior to the date of testing to The State and Commissioning Authority. Notify The State and Commissioning Authority 36 hours in advance if tests are canceled or rescheduled.
- H. Maintain a daily diary in which to record all issues identified from testing and balancing work, such as damaged or missing duct or insulation, sensors, wiring, valves, dampers, controls, programming, equipment, components, etc. or items that will reduce the effectiveness of the installation or prevent accurate air and water balancing or systems or building control. During balancing, provide the Commissioning Authority this list of issues once a week within 1 day of the end of the reported week.

- I. Correct areas that fail to meet the acceptance criteria and retest.
- J. Provide tests for a given systems or assemblies only after they are fully operational under normal and reliable control with control calibrations, programming and control system graphics complete and checked out.
- K. Objectives and Scope:
 - 1. The objective of testing is-to demonstrate that each system is operating according to the documented The State's Objectives and Contract Documents. For dynamic systems, testing facilitates bringing the systems from a state of initial operation to full dynamic operation. For static elements, testing verifies the performance of the assembly in its installed state under conditions specified in the testing requirements. Additionally, during the testing process, areas of deficient performance are identified and corrected.
 - 2. Test each sequence in the sequence of operation, other significant modes, sequences and control strategies not mentioned in the written sequences; including, but not limited to startup, shutdown, unoccupied and manual modes, modulation up and down the units range of capacity, power failure, alarms, component staging and backup upon failure, interlocks with other equipment, and sensor and actuator calibrations. Test all interlocks and interactions between systems. Test all larger equipment individually. Test like units or assemblies that are numerous (exhaust fans) with an appropriate sampling strategy applied.
- L. Test and Verification Methods:
 - 1. Provide testing and. verification for most dynamic equipment by an appropriate combination of active testing (persons manipulate the equipment and observe its function) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. Document tests with photographs where appropriate. Use methods described in the Functional Performance Test Plans included as a Supplement for each test. Include additional or substituted test methods recommended by the Commissioning Authority and approved by The State.
 - 2. Simulated Conditions: Test systems under actual conditions when possible. Simulate conditions by overwriting values when necessary.
 - 3. Overwritten Values: Whenever possible, avoid overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is. Only when absolutely necessary use this method with caution. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable, e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate set point to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
 - 4. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.

5. **Altering Set Points:** Rather than overwriting sensor values, and when simulating conditions is difficult, altering set points to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55 degrees F, when the outside air temperature is above 55 degrees F, temporarily change the lockout set point to be 2 degrees F above the current outside air temperature.
6. **Indirect Indicators:** Rely on indirect indicators for responses or performance only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during construction checklists and calibrations.
7. **Setup:** Perform each function and test under conditions that simulate actual conditions as close as is practically possible. Provide all necessary materials, system modifications, etc., to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
8. **Sampling:** Multiple pieces of similar non-life-safety or otherwise noncritical equipment may be; functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in equipment invalidates their common similarity. The specific recommended sampling rates and retesting samples are specified in this Section. It is noted that no sampling by the Contractor is allowed in construction checklist execution. The procedure for sampled testing is:
 - a. If a specified number of the same individual function fails among the sample of tested equipment, systems or assemblies, then the test individual function on another specified number of units. If a specified number of functions fail in the second sample, test and document results of all remaining units on their own and submit the test results to the Commissioning Authority.
 - b. The following is a sampling strategy for the equipment to be commissioned:

System Description	Sample Size
Chillers	100%
Pumps	100%
Exhaust Fans	100%
EMCS and DDC points PVT	100% (10% verified by OR and CA)
9. **Testing Order:** In general, testing is conducted after construction check listing and startup has been satisfactorily completed. The control system is sufficiently tested and approved by the Commissioning Authority before it is used for testing, adjusting and balancing or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before testing of air-related or water- related equipment or

systems. Testing generally proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is verified.

10. Trend Logs and Monitoring: Provide trend logs required in the testing requirements to be analyzed by the Commissioning Authority. Monitoring using data loggers will be conducted by the Commissioning Authority. Trend logs and monitoring are normally conducted after active testing and subsequent trouble-shooting are complete and systems are in normal operation without frequent service shutdowns, etc.
 - a. Trending and monitoring may illuminate issues that require additional trending, -monitoring or manual/active testing o resolve. Execute needed tests to resolve such issues. The Commissioning Authority's time for the first round this testing is considered within their base scope.

M. Problem Solving: The burden of problem solving is on the Contractor and the Architect, though the Commissioning Authority may recommend solutions to problems found.

3.05 ISSUES AND NONCONFORMANCE

A. Issue Management:

1. Provide troubleshooting of identified deficiencies.
2. Provide written least as often as commissioning meetings are being scheduled concerning the status of each outstanding issue. Present explanations of disagreements and proposals for resolution.

B. Approval and Acceptance: The Commissioning Authority will note each satisfactorily demonstrated function on the test form. However, formal approval of an entire test form is not normally given. Functional approval or acceptance of a system is indicated after all testing and monitoring is complete and there are no outstanding issues for that equipment or assembly in the Commissioning Authority's Issues Log.

3.06 DOCUMENTATION

A. Provide the following Documentation:

1. Startup Documentation Package.
2. Completed test forms and record of deficiencies and incomplete items for tests they are responsible to document.
3. Flow Diagrams: Provide professionally drawn ladder type system flow diagrams (see examples in supplement to this Section) in 11-inch by 17-inch format. They may be reduced from larger formats if font and figures are still clearly legible.
 - a. Show all pieces of equipment associated with the system arranged in such a manner as to minimize offsets, turns, bends, and crossing of the lines representing the piping or duct circuit. Provide a drawing similar in format to an electrical ladder diagram on its side with the supply header at the top of the page, the return header at the bottom of the page, and the loads and prime movers and auxiliary equipment connected in between.

- b. Show all major system components and all major duct or pipe branches. Show minor loads, such as fan coil units as a typical connection on each branch on which they are located with a count of the number of units on the branch indicated. If there is more than one type of typical connection for a minor load (for instance reheat coils with two-way and three way valves) then show an example of each and the count on each branch. Show all hydraulically important connections on the Drawing (for instance, reverse returns or loads with three-way valves at the end of a branch where the typical load has a two-way valve).
 - c. Show the basic performance Specifications (flow rates, pressure drops, motor horsepower, break horsepower, power requirements, spring ranges, normal position, etc.) for each load and prime mover on the drawings. Show all service valves, control valves, drain valves, expansion tanks, specialty fittings, gauges, thermometer wells, flow meters and any other specialty equipment that is not simply a piece of pipe. Indicate valve position for manually positioned valves that have special functions.
 - d. Provide diagrams for the Following Systems: chiller, pumps and building automation system network and architecture.
- B. O&M Documentation Completion and Review: Review deficiency list provided by Commissioning Authority and provide additional data.
- C. Summary of Written Work Products: Written work products generated as part of the commissioning process are described in various parts of the Specifications and in the Commissioning Plan. In summary, the written products are:

	Product	Developed By
1.	The State's requirements and objectives	The State
2.	Design narratives and design basis	Architect and design engineers
3.	Final commissioning plan	Commissioning Authority
4.	Commissioning meeting minutes	Commissioning Authority
5.	Commissioning schedules	The State and Contractor with input from the CA
6.	Special equipment/assembly submittals	Contractor
7.	Sequence clarifications	Contractor and Architect, as needed
8.	Construction checklist forms	Commissioning Authority
9.	Startup Documentation Package	Contractor and Commissioning Authority
10.	Startup Documentation Package filled out by Contractor	Contractor
11.	Issues Log	Commissioning Authority

	Product	Developed By
12.	Commissioning Progress Record	Commissioning Authority
13.	Test forms	Commissioning Authority
14.	Filled out tests	Commissioning Authority and Contractor
15.	Commissioning Record	Commissioning Authority

3.07 WARRANTY PERIOD

- A. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty during occupancy. Provide this information to the Commissioning Authority.
- B. Execute deferred testing, witnessed by the Commissioning Authority, according to the Specifications.
- C. Correct deficiencies and make necessary adjustments to O&M manuals and Record Documents for applicable issues identified in seasonal or warranty period testing.

END OF SECTION

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.
- B. The description of alternates is not intended to give a detailed description of all additional or deductive work required by the alternate item(s), as only the principal features of such additional or deductive work are listed.
- C. Should any one or all of the alternates become a part of the contract, the cost of all additional or deductive work required by the alternate item(s), even though not specifically mentioned herein, are included in the lump sum bid price.

1.02 DEFINITIONS

- A. Alternate: An amount proposed by Bidders (Offerors) and stated on the Bid Form for certain work defined herein that may be added to or deducted from the Total Lump Sum Bid Price amount if State decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Total Lump Sum Bid Price.

1.03 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into the Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in the schedule contain requirements for materials necessary to achieve the work described under each alternate.

<u>Additive Bid Alternates</u>	<u>Location</u>	<u>Description</u>	<u>Additional Calendar Days</u>
#1	B303	All work associated with light fixture replacement in the Admin section of building B303	21
#2	B303	All work associated with the installation of the new smart electric meter	7
#3	B303	All work associated with the installation of the new smart water meter	7
#4	Birkhimer	All work associated with the installation of the new smart electric meter	7
#5	Birkhimer	All work associated with the installation of the new smart water meter	7
#6	Birkhimer	All work associated with Bathroom plumbing upgrades	21
#7	PSB	All work associated with the installation of the new smart electric meter	7

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The General Provisions for Construction Projects (2016), Special Provisions and General Requirements of the Specifications, apply to the work specified in this section.

1.02 PROJECT DOCUMENTATION

- A. The contract will not be considered complete until required submittals have been received and accepted by the State.
- B. At the discretion of the Project Manager, the number of copies to be submitted may differ from that specified in this Section.

1.03 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path and control the total length of the project. They must start and finish on the planned early start and finish times.
 - 2. Predecessor activity is an activity that must be completed before a given activity can be started.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of project.
- C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either the Department or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Price to various portions of the Work and used as the basis for

reviewing Contractor's Payment Applications.

1.04 DETAILED CONSTRUCTION SCHEDULE

- A. The Contractor shall submit a detailed construction schedule to the Engineer for review, no later than 30 calendar days after execution of the contract. The detailed construction schedule shall be based on a detailed critical path analysis of construction activities and sequence of operations needed for the orderly performance and completion of any separable parts of any work and all work in accordance with the contract. The schedule shall be Critical Path Method (CPM) type in the form of an arrow diagram and activity listing or comprehensive bar graph. The network diagram shall show in detail and in orderly sequence all activities on a time scale, their descriptions, durations and dependencies, necessary and required to complete all work and any separable parts thereof. The schedule shall show in detail the following information for each activity:
1. Identification by code numbers and description;
 2. Duration;
 3. Craft and Equipment;
 4. Earliest start and finish dates;
 5. Latest start and finish dates;
 6. Total and free float time; and
 7. Highlighted Critical Path
- B. The construction schedule shall be complete in all respects, covering in addition to activities at the site of work, off-site activities such as design, fabrication, and procurement of equipment; the scheduled delivery dates of such equipment; submittal and approval of shop drawings and samples; ordering and delivery of materials; inspections; and testing. The schedule shall also include a manpower forecast by crafts. The detailed construction schedule shall be supplemented by a 3-week schedule prepared by the Contractor and submitted to the Engineer on a weekly basis. The Contractor shall promptly inform the Engineer of any proposed change in the schedule and shall furnish the Engineer with a revised schedule and cash flow diagram within 15 calendar days after approval of such change.

The schedule shall be kept up to date, taking into account the actual progress of work and shall be updated, if necessary, every 30 calendar days. The updated schedule shall, as determined by the Engineer, be sufficient to meet the requirements for the completion of the separable parts of work and the entire projects as set forth in the contract.

Upon commencing work, the Contractor shall submit at the start of each week to the Engineer for review, a detailed 3 week construction schedule.

- C. If at any time during the progress of the Work, the Contractor's actual progress appears to the Engineer to be inadequate to meet the requirements of the

contract, the Engineer will notify the Contractor of such imminent or actual noncompliance with the contract. The Contractor shall thereupon take such steps as may be necessary to improve his progress and the Engineer may require an increase in the labor force, the number of shifts, and/or overtime operations, days of work and/or the amount of construction plants all without additional cost to the State. Neither such notice by the Engineer nor the Engineer's failure to issue such notice shall relieve the Contractor from his obligation to achieve the quality of work and rate of progress required by the contract. Failure of the Contractor to comply with instructions of the Engineer under these provisions may be grounds for determination by the State that the Contractor is not prosecuting work with such diligence as will assure completion within the times specified. Upon such determination, the State may employ labor and equipment and charge the Contractor for the cost thereof, including depreciation for plant and equipment or may terminate the Contractor's right to proceed with the performance of the contract, or any separable part thereof, in accordance with the applicable provisions of the contract.

- D. The Contractor shall submit to the Engineer one reproducible and 3 prints of the detailed construction schedule and of each revised schedule submitted thereafter.

1.05 SCHEDULE OF VALUES

- A. The Contractor shall submit the Schedule of Values to the Engineer for review, no later than 30 calendar days after execution of the Contract.
- B. Format and Content: Use Proposal Schedule and/or the Project Specifications table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each Specification Section. Provide a breakdown of the contract sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principle work or subcontract amounts down into several smaller identifiable items of work.
- C. Identification: Include the following Project identification on the schedule of values:
 - 1. Project name and location
 - 2. Project number
 - 3. Contractor's name and address
 - 4. Contract No.
 - 5. Date of submittal
- D. Arrange the Schedule of Values in tabular form with separate columns to indicate the following items listed:
 - 1. Related Specification Section or Division
 - 2. Description of work
 - 3. Dollar value and percent complete

- E. Correlate line items in the Schedule of Values with other required administrative schedules and forms including;
 - 1. Construction Schedule
 - 2. Application for Payment forms including continuation sheets
 - 3. List of Subcontractors
 - 4. List of principle suppliers and fabricators
 - 5. Schedule of submittals
- F. Round amount to nearest whole dollar; the total shall equal the contract sum.
- G. Provide a separate line item in the Schedule of Values for each part of the work where Applications for Payment may include materials or equipment, purchased, fabricated or stored, but not yet installed.
- H. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment or when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.06 OTHER SUBMITTALS REQUIRED BEFORE CONSTRUCTION

- A. The Contractor shall submit the following items prior to or at the pre-construction meeting or unless otherwise noted:
 - 1. Name, residence phone number, addresses and scope of authority for the following persons:
 - a. Superintendent
 - b. Contractor's authorized representative to sign documents.
 - c. 2 additional persons who can be contacted during non-working hours for emergencies.
 - d. Field Office location and phone numbers (cellular, pager, fax, etc.)
- B. Name of Safety Officer.
- C. Notice of Materials to be furnished.
- D. 3 copies each of Certificates of Insurance. The State of Hawaii, Department of Defense shall be named as additionally insured. The project number and project title shall be referenced in the Description of Operations/Locations/Vehicles. If canceled, 30 days written notice to the State of Hawaii, Department of Defense must be given. If certificates are not correct, work cannot proceed.
- E. 3 copies each Insurance and Tax Rates.
- F. List of apprentices who will be working on the project supported with the

Statement of Apprenticeship or copy of the Apprenticeship Agreements registered with the State Board, for each apprentice.

- G. List of equipment to be used on the job. Designate maximum working height and capacity of equipment involved and their respective rental rates.
- H. 3 copies of an expenditure (cash flow) plan consisting of an anticipated work completion graph plotting contract time and gross payment anticipated.

1.07 SHOP DRAWINGS, SAMPLES, CATALOG CUTS, AND CERTIFICATES

- A. Submittal Schedule: Prior to the submission of any shop drawings or submittals, the Contractor shall submit to the Engineer for review, a submittal schedule. The schedule shall identify the subject matter of each submittal, the corresponding specification section number and the proposed date of submission. During the progress of work, the Contractor shall revise and resubmit the submittal schedule as directed by the Engineer.
- B. The Contractor shall submit for review to the Engineer, or to a representative designated by the Engineer, 6 copies of all shop drawings, samples, catalog cuts and certificates. 3 copies will be returned to the Contractor with information of review action. The Contractor shall submit additional quantities for their subcontractor's or supplier's use. Each shop drawing, certificate of compliance, sample, and equipment list shall be checked and certified correct by the Contractor and shall be identified with the applicable information specified hereinafter under "Submittal Identification."

Items are to be reviewed prior to commencing fabrication or delivery of material to the job site.

- C. Each copy of the drawings, certificates, catalog cuts, and lists reviewed by the Engineer will be stamped "REVIEW ACTION" with the appropriate action noted therein. The review of the Engineer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory. Acceptance of such drawings will not relieve the Contractor the responsibility of conforming to the contract drawings and specifications or for any error or omission which may exist as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work. Each shop drawing submitted for review shall have, in the lower right-hand corner just above title, a white space 4" x 4" in which the Engineer can place the stamp and indicate action taken. The Contractor shall also inform their subcontractors to provide this space in their preparation of shop drawings.

1.08 MAINTENANCE DATA AND OPERATING INSTRUCTIONS

- A. 3 copies of maintenance data and operating instructions shall be submitted by the Contractor at the conclusion of the equipment installation. The manuals shall be assembled in one or more binders, each with a title page, typed table of contents, and heavy section dividers with numbered plastic index tabs. The binders shall be a minimum of 2 inches thick, three ring, "D slant" with hard covers. All data shall be punched for binding and composition and printing shall be arranged so that punching does not obliterate any data. The project number,

project title, and location shall be inserted in the front and backbone binder cover. The manual shall also be provided on CD, labeled appropriately.

- B. The Contractor shall submit a draft to the Engineer for review prior to the submission of the final copies.
- C. The manual shall include separate sections describing each equipment. Provide a general description of the equipment, instructions for operation, maintenance, recommended inspection points and periods for inspection, testing, adjustments, calibration procedures with illustrations, wiring diagrams, trouble shooting situations and solutions, and repair methods in a practical, complete, and comprehensive manner.
- D. For each equipment, include information on detailed parts listings (part numbers and costs) with the manufacturer's name, address, contact person, e-mail address and phone/fax numbers. Provide the contact name, address, e-mail address and phone/fax numbers of the distributor in the State of Hawaii for each equipment.
- E. Include a separate section on warranty information on all products and equipment. Provide this information in a tabular format with a listing on all products and equipments with warranty start and completion dates for each item.
- F. Include separate sections on all approved submittals, test reports, certifications, etc.
- G. All information shall be arranged in a logical, orderly sequence. Manuals submitted by the manufacturer will not be accepted.

1.09 TEST REPORTS

- A. Six copies of test reports for any material used in this Contract shall be submitted when specified or required by the Engineer.

1.10 SUBMITTAL IDENTIFICATION

- A. To avoid rejection and to clarify each submittal, the General Contractor shall have a rubber stamp made up in the following format:

B. _____
General Contractor's Name

PROJECT TITLE: _____

LOCATION: _____

STATE PROJECT NO: _____

THIS SUBMITTAL HAS BEEN CHECKED BY THIS GENERAL CONTRACTOR AND IS CERTIFIED CORRECT AND IN COMPLIANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS.

ITEM NO. _____

SUBMITTAL NUMBER _____

DATE RECEIVED _____
SPECIFICATION SECTION # _____
SPECIFICATION PARAGRAPH # _____
DRAWING NUMBER _____
SUBCONTRACTOR NAME _____
SUPPLIER NAME _____
MANUFACTURER NAME _____

CERTIFIED BY _____ (Contractor's Signature, Date)

(Contractor's Name and Title)

- C. This stamp "filled in" should appear on each reproducible shop drawing, on the cover sheet of copies of test and mill reports, certificates of compliance, catalog cuts, brochures, etc. The stamp should be placed on a heavy stock paper merchandise (approximately 3" x 6") and one tag tied to each sample submitted for approval. The tag on the samples should state what the sample is, so that if the tag is accidentally separated from the sample, they can be matched up again. The back of this tag will be used by the Engineer for receipt, approval, and log stamp for any comments that relates to the sample.
- D. Submission Number: Each submission is to be sequentially numbered in the space provided in the Contractor's stamp. Correspondence and transmittal will refer to this number.
- E. The Contractor shall ensure that all submittals, including shop drawings, are complete and in conformance to the requirements of the Contract specifications prior to submission to the State for review and acceptance. Incomplete submittals will not be processed by the State and returned to the Contractor for correction. Any cost impacts and delays in the Project schedule as a result of incomplete submittals shall be the responsibility of the Contractor.

1.11 AS-BUILT DRAWINGS

- A. As-built drawings shall conform to the requirements of Section 5.8 - "Coordination Between the Contractor and the Department" of the General Provisions for Construction Projects (2016), and the following requirements:
- B. The Contractor shall maintain on the job site a 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.
- C. Where a choice of material or method is permitted herein or where variations in scope of character of work from that of the original contract or authorized, the drawings shall be marked to define the construction actually provided. Where equipment installation is involved, the size, manufacturer's name, model number, power input or output characteristics 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 stamp, sign, and date each sheet with the following stamp:

AS-BUILT DRAWINGS/SPECIFICATIONS

This certifies that the dimensions and details shown on this sheet reflect the dimensions and details, and specifications as constructed in the field.

CONTRACTOR'S NAME

Signature

Date

Monthly and final payments to the Contractor shall be subject to prior approval of the drawings. On completion of the work, both sets of marked-up drawings shall be delivered to the Engineer and shall be subject to approval before acceptance.

1.12 GUARANTEES

- A. Guarantee periods shall start at time of acceptance in writing by the State.
- B. All guarantees and warranties shall be made out to the "State of Hawaii." Supplier and subcontractor guarantees shall be co-signed by the Contractor.
- C. The Contractor is solely responsible for coincidence or non-coincidence of factory warranties or equipment guarantees, and the Contractor's own warranties and guarantees as required by the contract. The Contractor is solely responsible for scheduling and coordinating the installation of equipment and materials so as to take maximum advantage of factory warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Project meetings.

1.02 PERFORMANCE AND COORDINATION

- A. Contractor is in charge of the Work within the Project Contract Limits, and shall direct and schedule the Work. Include general supervision, management and control of the Work of this project, in addition to other areas more specifically noted throughout the Specifications. Final responsibility for performance, interface, and completion of the Work and the Project is the Contractor's.
- B. The Contractor is responsible for jobsite Administration. Provide a competent superintendent on the job and provide an adequate staff to execute the Work. In addition, all workers shall dress appropriately and conduct themselves properly at all times. Loud abusive behavior, sexual harassment and misconduct will not be tolerated. Workers found in violation of the above shall be removed from the job site as directed by the Contracting Officer.
- C. The State will hold the Contractor liable for all the acts of Subcontractors and shall deal only with the Prime Contractor in matters pertaining to other trades employed on the job.
- D. Coordination: Provide project interface and coordination to properly and accurately bring together the several parts, components, systems, and assemblies as required to complete the Work pursuant to the GENERAL CONDITIONS and SPECIAL CONDITIONS.
 - 1. Provide interface and coordination of all trades, crafts and subcontracts. Ensure and make correct and accurate connections of abutting, adjoining, overlapping, and related work. Provide anchors, fasteners, accessories, appurtenances, and incidental items needed to complete the Work, fully, and correctly in accordance with the Contract Documents.
 - 2. Provide additional structural components, bracing, blocking, miscellaneous metal, backing, anchors, fasteners, and installation accessories required to properly anchor, fasten, or attach material, equipment, hardware, systems and assemblies to the structure.
 - 3. Provide excavation, backfilling, trenching and drilling for trades to install their work.
 - 4. Provide concrete foundations, pads, supports, bases, and grouting for trades as needed to install their work.

5. Equipment, appliances, fixtures, hardware, and systems requiring electrical services shall be provided with such electrical services, including outlets, switches, overload protection, interlocks, panelboard space, disconnects, circuit breakers, and connections.
6. Materials, equipment, component parts, accessories, incidental items, connections, and services required to complete the Work which are not provided by Subcontractors shall be provided by the Contractor.
7. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation connection, and operation.

1.03 COOPERATION WITH OTHER CONTRACTORS

- A. The State reserves the right at any time to contract for or otherwise perform other or additional work within the Project Contract Limits. The Contractor of this project shall to the extent ordered by the Contracting Officer, conduct its work so as not to interfere with or hinder the progress or completion of the work performed by the State or other Contractors.

1.04 COORDINATION WITH OTHER PRIME CONTRACTORS

- A. Multiple prime Contractors performing work under separate agreements with the State may be present near the project location, adjacent to and abutting the Project Contract Limits. This Contractor shall coordinate activities, sequence of work, protective barriers and any and all areas of work interfacing with other Prime Contractor's work. Contractor shall provide a continuity of finishes, walks, landscape, etc. at abutting Contract Limits so no additional work will be required. Any damage to other Prime Contractor's Work committed by this Contractor (or its Subcontractor) shall be repaired promptly at no additional cost to the State.
- B. Coordinate Subcontractors and keep them informed of any work from the other Projects that may affect the site or the Subcontractor's work. If the Contractor has any questions regarding its coordination responsibilities or needs clarification as to the impact in scheduling of its work and the work of other projects, this Contractor shall notify the Contracting Officer in writing.
- C. Subject to approval by the Contracting Officer, this Contractor shall amend and schedule its work and operations to minimize disruptions to the work and operations of other projects.
 1. Relocate or remove and replace temporary barriers, fencing supports or bracing to allow work by others to proceed unimpeded. Do not remove required barriers supporting work until specified time or as approved by the Contracting Officer. This does not relieve the Contractor of the responsibility of proper coordination of the work. If directed by the Contracting Officer, leave in place any temporary barriers.
 2. Coordinate work that abuts or overlaps work of the other projects with the Contracting Officer and other Prime Contractors to mutual agreement so that work is 100 percent complete with continuity of all materials, systems and finishes.

3. When directed by the Contracting Officer, provide access into the construction zone to allow the other project's Contractor(s) to perform their Work and work that must be interfaced.
 4. Contractor shall adjust and coordinate its Work and operations as required by the other projects as part of the Work of this contract without additional cost or delay to the State.
 5. When directed by the Contracting Officer provide a combined Contractor's construction schedule.
- D. Other Contracts: If known, they are listed in SECTION 01100 - PROJECT REQUIREMENTS.

1.05 SUBMITTALS

- A. Photo Documentation: Prior to the start of jobsite work, the Contractor shall photo document the existing conditions at the site and file with the Contracting Officer one complete set of documents.

1.06 PROJECT MEETINGS

- A. General: Participate in meetings and conferences as directed by the Contracting Officer at the HIENG Office, unless otherwise indicated.
- B. Preconstruction Conference: Contracting Officer shall schedule a preconstruction conference before the start of construction, at a time convenient to the Contracting Officer, but no later than 7 days before the Project start date or jobsite start date whichever is later. Contractor will attend. Conference will be held at the Project site or another convenient location. The Contracting Officer shall conduct the meeting to review responsibilities and personnel assignments.
- C. The meeting shall cover items of significance that could affect progress, including the following:
 1. Construction schedule.
 2. Phasing.
 3. Critical work sequencing and coordination.
 4. Designation of responsible personnel.
 5. Use of the premises.
 6. Responsibility for temporary facilities and controls.
 7. Parking availability.
 8. Office, work, and storage areas.
 9. Equipment deliveries and priorities.
 10. First aid.

11. Security.
 12. Progress cleaning.
 13. Working hours.
- D. Progress Meetings: Attend weekly progress meetings or other intervals as determined by the Contracting Officer.
1. Agenda: Review and correct minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Outstanding Requests for information (clarification).
 - 2) Interface requirements.
 - 3) Sequence of operations.
 - 4) Status of outstanding submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Force Account work.
 - 15) Change Orders and Change Proposals.

16) Documentation of information for payment requests.

- c. Corrective Action Plan: Contractor shall provide a plan of corrective action for any item which is delayed or expected to be delayed, then that item impacts the contractual dates.
2. Schedule Updating: Revise three week Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01400 - CONTRACTOR QUALITY CONTROL PROGRAM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The General Provisions for Construction Projects (2016), Special Provisions and General Requirements of the Specifications, apply to the work specified in this Section.

1.02 CONTRACTOR QUALITY CONTROL PROGRAM

- A. General: The Contractor shall establish, provide, and maintain an effective Quality Control Program that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The intent of this section is to enable the Contractor to establish a necessary level of control that will:

1. Adequately provide for the production of acceptable quality materials.
 2. Provide sufficient information to assure both the Contractor and the Engineer that the specification requirements can be met.
 3. Allow the Contractor as much latitude as possible to develop his or her own standard of control. The Contractor shall be prepared to discuss and present, at the pre-construction conference, his/her understanding of the quality control requirements. The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the Quality Control Program has been reviewed and approved by the Engineer and State Project Manager. No partial payment will be made for materials subject to specific quality control requirements until the Quality Control Program has been reviewed and approved.
- B. Description Of Program:
 1. General Description. The Contractor shall establish a Quality Control Program to perform inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. This Quality Control Program shall ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of quality control.
 2. Quality Control Program. The Contractor shall describe the Quality Control

Program in a written document which shall be reviewed and approved by the Engineer and State Project Manager prior to the start of any production, construction, or off-site fabrication. The written Quality Control Program shall be submitted to the Engineer for review no later than thirty (30) calendar days after execution of the Contract.

3. The Quality Control Program shall be organized to address, as a minimum, the following items:
 - a. Quality control organization;
 - b. Submittals schedule;
 - c. Inspection requirements;
 - d. Quality control testing plan;
 - e. Documentation of quality control activities; and
 - f. Requirements for corrective action when quality control and/or
 - g. acceptance criteria are not met.
 - h. A listing of the definable features of work for the project.

The Contractor is encouraged to add any additional elements to the Quality Control Program that he/she deems necessary to adequately control all production and/or construction processes required by this contract.

C. Quality Control Organization: The Contractor's Quality Control Program shall be implemented by the establishment of a separate quality control organization that is not a part of the production organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel. The organizational chart shall identify all quality control staff by name and function and shall indicate the total staff required to implement all elements of the Quality Control Program, including inspection and testing for each item of work. At the top of the chart, an overall Contractor Quality Control System Manager, CQCSM, shall be named and his/her subordinates shall follow thereafter. The quality control organization shall consist of the following minimum personnel:

1. Contractor Quality Control System Manager. The CQCSM shall be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The CQCSM shall have a minimum of 5 years of experience in airport and/or paving and building construction and shall have had prior quality control experience on a project of comparable size and scope as the contract. The CQCSM shall be on the project full time and shall have no production duties. The CQCSM shall NOT be the point of contact for the production organization.

The CQCSM shall have full authority to institute any and all actions necessary for the successful implementation of the Quality Control Program to ensure compliance with the contract plans and technical specifications

including authority to independently stop any work not in compliance with the contract. The CQCSM shall report directly to a responsible officer of the construction firm, such officer not being the project superintendent or foreman. The CQCSM may supervise the Quality Control Program on more than one project provided that person can be at the job site within 2 hours after being notified of a problem and a Quality Control Technician is present on the job site full time.

2. Quality Control Technicians: A sufficient number of quality control technicians necessary to adequately implement the Quality Control Program shall be provided. These personnel shall be either engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate fields and shall have a minimum of 2 years of experience in their area of expertise. The quality control technicians shall report directly to the CQCSM and shall perform the following functions:
 - a. Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by Section 1.02E.
 - b. Performance of all quality control tests as required by the technical specifications and Section 1.02F.
3. Staffing: The Contractor shall provide sufficient qualified quality control personnel to monitor each work activity at all times. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The Quality Control Program shall state where different technicians will be required for different work elements. All personnel shown on the organizational chart shall have, in resume form, all information regarding their education, any licenses, their present position, previous work experience, etc. included in the Quality Control Program written documentation. These resumes shall be verified by the CQCSM.
- D. Submittals Schedule: The Contractor shall submit a detailed listing of all submittals (e.g., mix designs, material certifications, color samples) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:
 1. Specification item number:
 2. Item description;
 3. Description of submittal;
 4. Specification paragraph requiring submittal; and
 5. Scheduled date of submittal.
- E. Inspection Requirements: Quality control inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor.

Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the particular feature of work.

Before any definable feature of work is started, the CQCSM shall notify the Engineer and State Project Manager of such work at least 48 hours in advance. Upon notification, the Engineer or State Project Manager shall determine if a meeting shall be held to discuss the condition of the work area, material and equipment status, what is to be expected and any questions or possible problems. No definable feature work shall commence without the consent of the Engineer and State Project Manager.

- F. Quality Control Testing Plan: As a part of the overall Quality Control Program, the Contractor shall implement a quality control testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes. The testing plan can be developed in a spreadsheet fashion and shall, a minimum, include the following:
1. Specification item number;
 2. Item description (e.g., concrete cylinder test);
 3. Test type (e.g., concrete compressive strength);
 4. Test standard (e.g., ASTM or AASHTO test number, as applicable);
 5. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated);
 6. Responsibility (e.g., plant technician, independent lab); and
 7. Control requirements (e.g., target, permissible deviations).

The testing plan shall contain a statistically based procedure of random sampling for acquiring test samples in accordance with ASTM D 3665. The Engineer and State Project Manager shall be provided the opportunity to witness quality control sampling and testing. The CQCSM shall make every effort to inform the Engineer and State Project Manager at least 24 hours, or more if stated in the specifications, before such testing occurs.

All quality control test results shall be documented by the Contractor as required by Section 1.02G.

- G. Documentation: The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these

records shall be furnished to the Engineer and State Project Manager daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCSM. Specific Contractor quality control records required for the contract shall include, but are not necessarily limited to, the following records:

1. Daily Inspection Reports. Each Contractor quality control technician shall maintain a daily log of all inspections performed for both Contractor and Subcontractor operations on a form acceptable to the Engineer and State Project Manager. These technician's daily reports shall provide factual evidence that continuous quality control inspections have been performed and shall, as a minimum, include the following:
 - a. Technical specification item number and description and location of work performed;
 - b. A comprehensive breakdown of the work force including the number of workers and total hours for each trade.
 - c. Compliance with approved submittals;
 - d. Proper storage of materials and equipment;
 - e. Proper operation of all equipment;
 - f. Adherence to plans and technical specifications;
 - g. Review of quality control tests; and
 - h. Safety Inspection: The daily inspection reports shall identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible quality control technician and the CQCSM. The Engineer and State Project Manager shall be provided at least one copy of each daily inspection report on the workday following the day of record.

2. Daily Test Reports: The Contractor shall be responsible for establishing a system which will record all quality control test results. Daily test reports shall document the following information:
 - a. Technical specification item number and description;
 - b. Test designation;
 - c. Location;
 - d. Date of test;
 - e. Control requirements;
 - f. Test results;
 - g. Causes for rejection;

- h. Recommended remedial actions; and
- i. Retests.

Test results from each day's work period shall be submitted to the Engineer and State Project Manager prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical quality control charts. The daily test reports shall be signed by the responsible quality control technician and the CQCSM.

- H. Corrective Action Requirements: The Quality Control Program shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the Quality Control Program as a whole, and for individual items of work contained in the technical specifications.

The Quality Control Program shall detail how the results of quality control inspections and tests will be used for determining the need for corrective action and shall contain clear sets of rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and utilize statistical quality control charts for individual quality control tests. The requirements for corrective action shall be linked to the control charts.

- I. Surveillance by the Engineer and State Project Manager: All items of material and equipment shall be subject to surveillance by the Engineer or State Project Manager at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate quality control system in conformance with the requirements detailed herein and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to surveillance by the Engineer or State Project Manager at the site for the same purpose.

Surveillance by the Engineer or State Project Manager does not relieve the Contractor of performing quality control inspections of either on-site or off-site Contractor's or subcontractor's work.

- J. Noncompliance:
 - 1. The Engineer or State Project Manager will notify the Contractor of any noncompliance with any of the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Engineer or State Project Manager or his/her authorized representative to the Contractor or his/her authorized representative at the site of the work, shall be considered sufficient notice.
 - 2. In cases where quality control activities do not comply with either the Contractor's Quality Control Program or the Contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, as determined by the Engineer or State Project Manager, the

Engineer or State Project Manager may:

- a. Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors in accordance with Section 7.2 - "Character of Workers or Equipment" of the General Provisions for Construction Projects (2016).
- b. Order the Contractor to stop operations in accordance with Section 7.24 – "Suspension of Work" of the General Provisions for Construction Projects (2016).
- c. Determine work performed by the Contractor during periods of noncompliance to be unacceptable and subject to inspection, removal or non-payment in accordance with Section 5.10 - "Removal of Defective, Non-conforming and Unauthorized Work" of the General Provisions for Construction Projects (2016).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

- A. Requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include but are not limited to, the following:
 - 1. Water service and distribution.
 - 2. Sanitary facilities, including toilets, wash facilities, and drinking water facilities.
 - 3. Electric power service.
 - 4. Lighting.
 - 5. Telephone service.
- C. Support facilities include, but are not limited to, the following:
 - 1. Project signs.
 - 2. Storage and fabrication sheds.
 - 3. Trash, refuse disposal.
 - 4. Temporary roads and paving.
 - 5. Erosion controls and site drainage.
 - 6. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities and measures include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Stormwater control.
 - 3. Related Sections: Refer to Divisions 2 through 10 for other temporary requirements.

1.02 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to the State and shall be included in the Contract Price. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Other Contractors with agreements with the State working within the contract limits.
 - 2. Occupants of Project.

3. Testing agencies.
4. Contracting Officer and personnel of authorities having jurisdiction.

1.03 SUBMITTALS

- A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. Landfill Disposal Receipts: Submit copies of receipts issued by a landfill facility. Include receipts with Contractor Daily Progress Report

1.04 QUALITY ASSURANCE

- A. Standards: Comply with IBC Chapter 33, "Safeguards During Construction", ANSI A10.6, NECA's "Standard for Installing and Maintaining Temporary Electric Power at Construction Sites", and NFPA 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations".
 1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70, "National Electrical Code".
 - a. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.05 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to the Contracting Officer, change over from use of temporary service to use of permanent service.
 1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Contracting Officer's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
 1. Keep temporary services and facilities clean and neat.
 2. Relocate temporary services and facilities as required by progress of the Work.

1.06 PREPARATION AND PROTECTION

- A. Protection of Property: Continually maintain adequate protection of the Work from damage and protect all property, including but not limited to buildings, equipment, furniture, grounds, vegetation, material, utility systems located at and adjoining the job site. Repair, replace or pay the expense to repair damages resulting from Contractor's fault or negligence as soon as possible. The DOD will not be responsible for further damage by others.
- B. Before starting work to be applied to previously erected constructions, make a thorough and complete investigation of the recipient surfaces and determine their

suitability to receive required additional construction and finishes. Make any repair that is required to properly prepare surfaces, and coordinate the Work to provide a suitable surface to receive following Work.

- C. Commencing work by any trade implies acceptance of existing conditions and surfaces as satisfactory for the application of subsequent work, and full responsibility for finished results and assumption of warranty obligations under the Contract.
- D. Protect existing (including interiors) work to prevent damage by vandals or the elements. Provide temporary protection. Use curtains, barricades, or other appropriate methods. Take positive measures to prevent breakage of glass and damage to plastic, aluminum and other finishes.
- E. Repairs and Replacements: Promptly replace and repair damages to the approval of the Contracting Officer. Additional time required to secure replacements and to make repairs does not justify a time extension.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Contracting Officer. Provide materials suitable for use intended.
- B. Water: Potable.

2.02 EQUIPMENT

- A. Drinking Water Fixtures: Drinking water fountains or containerized, tap dispenser, bottled water drinking water units, or water cooler dispensing water at 45 - 55 degree F available at project site including paper cup supply.
- B. Electrical Outlets: Properly configured, NEMA polarized outlets to prevent insertion of 110 to 120 V plugs into higher voltage outlets; equipped with ground fault circuit interrupters, reset button, and pilot light.
- C. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125 V ac, 20 A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
 - 1. Secure approval from Contracting Officer before modifications are made to the State Inspector's Field Office.

- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. Engage appropriate local utility company to install temporary service or connect to existing service where directed by the Contracting Officer. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
 - 1. Arrange with utility company, the Department, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked in services.
- B. Storm Drainage: Drainage due to construction related activities into any storm drain and any major water runoff from the project site is generally prohibited. Drainage ditches, ponds or similar facilities capable of holding drainage water is recommended if possible. NPDES (National Pollutant Discharge Elimination System) permit is required for a project site one acre or more of land area (depending on configuration of a project site, it is possible that land area assumed to be less than one acre could be determined to be one acre or more and require a NPDES permit). Supporting documents such as Storm Water Pollution Control Plan, Spill Prevention and Response Plan, Storm Water Monitoring Plan, Best Management Practices Plan and other possible documents may be required for the permit application. The State Department of Health, Clean Water Branch should be contacted to determine all submission requirements for the permit application.
- C. Sewer Drainage: The respective environmental departments regulating wastewater for each County should be contacted to obtain a wastewater discharge permit if there is any intention to discharge effluents into any existing sewer manhole or to make a piping connection into any existing sewer line, if allowed by the County. A construction permit application may also be required if the intent is to make a temporary piping connection into the existing sewer line if the initial permit application for the project and associated design documents submitted did not include these details. There are regulations to determine what effluents may or may not be allowed to be discharged into the existing sewer system with temporary filtration, separators or other devices determined to be acceptable.
- D. Water Service: Make arrangements with the utility company for temporary use of water, and pay for all expenses. However, at the option of the Contractor, a temporary tap into the facility's existing water system is allowed, subject to the following conditions:
 - 1. Comply with the Department of Health's and County water provider's requirements when tapping into the existing water system.
 - 2. Reasonable amounts of water will be available without charge.

3. Meter the tapped line and prior to water use, notify the Contracting Officer to observe an initial meter reading.
 4. Take monthly meter readings. Pay the State, on a monthly basis, for water used at the current rate per 1,000 gallons.
 5. Payments are to be by check, made payable to the "Director of Finance, State of Hawaii" and mailed as directed by the Contracting Officer:
 6. Checks shall be accompanied by the following information:
 - a. Name of facility, Project Name and Title and DAGS Job No.
 - b. Contractor's name
 - c. Initial meter reading for the month and final meter reading for the month.
 - d. Volume of water used and the amount due in payment for that water
 7. Upon completion of the project and just prior to removal of the water meter, notify the Contracting Officer to observe a final meter reading.
 8. Should the Contractor at any time fail to comply with any or all of the above conditions, the Department may terminate the use of water. The Contractor shall remove the hookup within 48 hours of notification of such termination.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 2. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
 3. Locate toilets and drinking water fixtures so personnel need not walk more than 2 stories vertically or 200-feet horizontally to facilities.
- F. Electric Power Service: Contractor to provide its own power.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
- H. Telephone Service: Provide a portable wireless telephone with voice-mail or messaging service for superintendent's use in making and receiving telephone calls when at the construction site.

3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:

1. Locate storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access or where shown on Contract Drawings or as directed by the Contracting Officer.
 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion.
- B. Site Drainage:
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
 2. Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.
- C. Project Sign and Temporary Sign(s):
1. Provide and install project identification sign and other signs as listed. Sign designs are attached to Part 3 of this Section:
 - a. Project Sign
 2. Install signs where directed by the Contracting Officer or where indicated on the plans.
 3. Provide temporary signs to provide directional information to constructional personnel and visitors.
 4. Construct signs with durable materials, properly supported or mounted, and visible.
- D. Trash, Refuse Disposal:
1. Department of Health – Illegal Dumping Notice. See attachment to Part 3 of this section.
 - a. This Notice to be printed out on 8.5x11” paper.
 - b. This Notice to be posted at the job site field office and/or in locations visible to all contractors, subcontractors, suppliers, vendors, etc. throughout the duration of the project.
 2. Illegal Dumping of solid waste could subject the Contractor to fines and could lead to felony prosecution in accordance with Chapter 342H, HRS. For more information, see the following web site:
<http://www.hawaii.gov/health/environmental/waste/sw/pdf/Illdump.pdf>
 3. Provide waste collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste.
 4. Do not burn debris or waste materials on the project site.
 5. Do not bury debris or waste material on the project site unless specifically allowed elsewhere in these specifications as backfill material.

6. Haul unusable debris and waste material to an appropriate off site dump area.
 - a. Water down debris and waste materials during loading operations or provide other measures to prevent dust or other airborne contaminants.
 - b. Vacuum, wet mop, or damp sweep when cleaning rubbish and fines which can become airborne from floors or other paved areas. Do not dry sweep.
 - c. Use enclosed chutes or containers to conveying debris from above the ground floor level.
 7. Clean up shall include the collection of all waste paper and wrapping materials, cans, bottles, construction waste materials and other objectionable materials, and removal as required. Frequency of clean up shall coincide with rubbish producing events.
- E. Janitorial Services: Provide janitorial services on a weekly basis for the Contracting Officer's field office, first aid stations, toilets, wash facilities, lunchrooms, and similar areas.
- F. Existing Stair Usage: Use of existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to State and User. At Substantial Completion, restore stairs to condition existing before initial use.
1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.04 ENVIRONMENTAL CONTROLS

- A. General: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Dust Control:
1. Prevent dust from becoming airborne at all times including non working hours, weekends and holidays in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 60.1 Air Pollution Control.
 2. Contractor is responsible for and shall determine the method of dust control. Subject to the Contractor's choice, the use of water or environmentally friendly chemicals may be used over surfaces that create airborne dust.
 3. Contractor is responsible for all damage claims due to their negligence to control dust.
- C. Noise Control:
1. Keep noise within acceptable levels at all times in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 46 Community Noise Control. Obtain and pay for the Community Noise Permit

when construction equipment or other devices emit noise at levels exceeding the allowable limits.

2. Ensure mufflers and other devices are provided on equipment, internal combustion engines and compressors to reduce loud disruptive noise levels and maintain equipment to reduce noise to acceptable levels.
3. Unless specified elsewhere, do not start construction equipment exceeding allowable noise levels prior to 5:30 P.M.

D. Erosion Control:

1. During grading operations, maintain the grade to prevent damage to adjoining property from water and eroding soil.
2. Install temporary berms, cut off ditches and other provisions needed for construction methods and operations. Should there be a question if the temporary measures are insufficient to prevent erosion, the Contracting Officer shall make the final determination.
3. Construct and maintain drainage outlets and silting basins where shown on the Drawings and when required to minimize erosion and pollution of waterways during construction.

3.05 VIOLATION OF ENVIRONMENTAL PROVISIONS

- A. Violations of any of the above environmental control requirements or any other pollution control requirements; which may also be specified in the other Specifications sections, shall be resolved under the SUSPENSION and CORRECTIVE WORK Section of the GENERAL CONDITIONS.

3.06 TEMPORARY FIRE PROTECTION

- A. Install and maintain temporary fire protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 1. Locate fire extinguishers where convenient and effective for their intended purpose.
 2. Store combustible materials in containers in fire safe locations.
 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire exposure areas.
 4. Supervise welding operations, combustion type temporary heating units, and similar sources of fire ignition.

3.07 REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by heat [or freezing] temperatures and similar elements.
- B. Termination and Removal: Remove each temporary facility when need for its service has ended, or when it has been replaced by authorized use of a

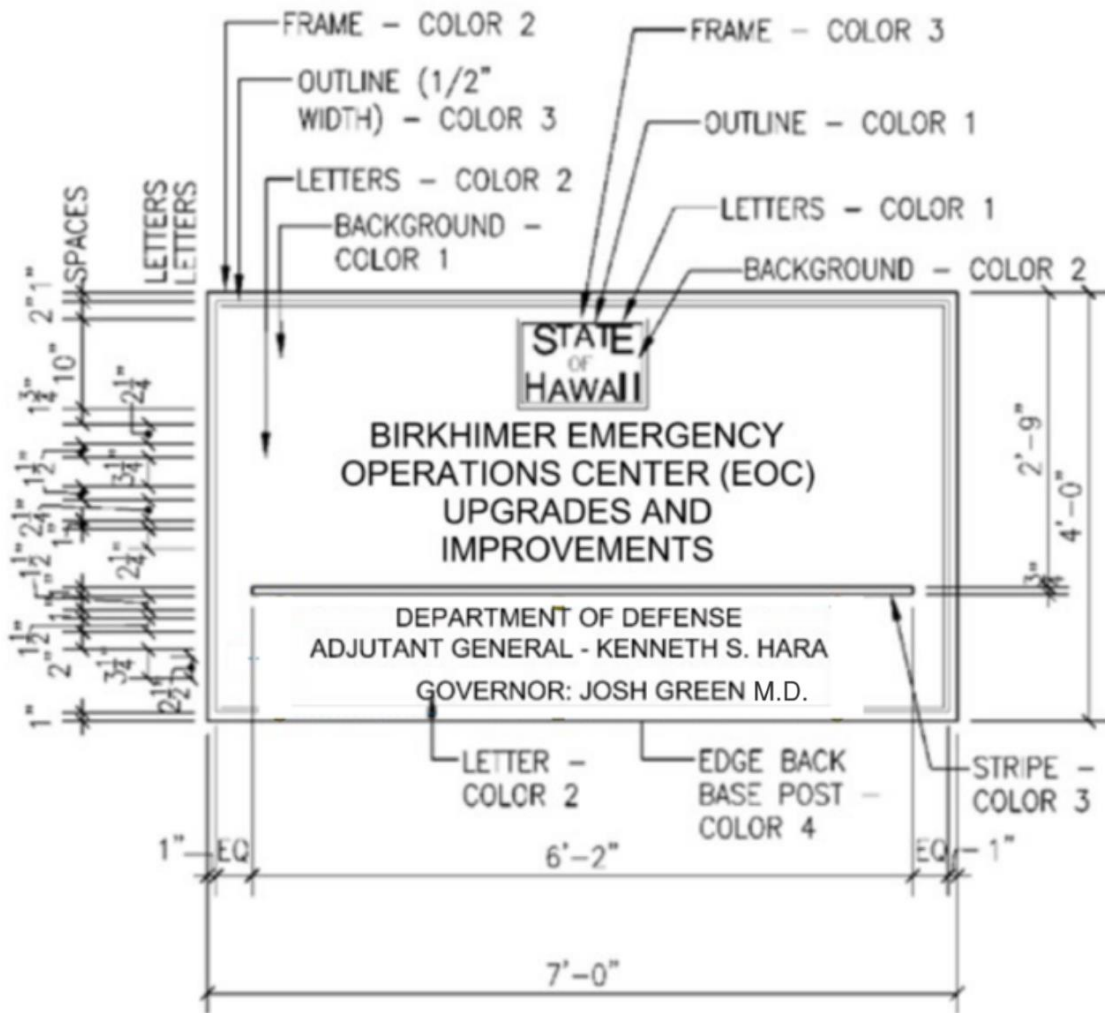
permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. The Department reserves the right to take possession of Project identification signs.

3.08 ATTACHMENTS

- A. Project Sign Drawings:
 1. Standard Detail for Project Sign Layout - DETAIL A/TG 01500.
 2. Standard Detail for Project Sign Specifications - DETAIL B/TG 01500.
 3. Standard Detail for Project Sign Details - DETAIL C/TG 01500.
- B. Dust Control Fence Drawings: Standard Detail for Dust Control Fence - DETAILS D and E/TG 01500.
- C. Department of Health - Illegal Dumping Notice.

END OF SECTION



A PROJECT SIGN LAYOUT
 TC 01500 SCALE: NTS

LETTER STYLE

COPY IS CENTERED AND SET IN ADOBE TYPE FUTURA HEAVY. IF THIS SPECIFIC TYPE IS NOT AVAILABLE, FUTURA DEMI BOLD MAY BE SUBSTITUTED. COPY SHOULD BE SET AND SPACED BY A PROFESSIONAL TYPESETTER AND ENLARGED PHOTOGRAPHICALLY FOR PHOTO STENCIL SCREEN PROCESS.

ART WORK

CONSTANT ELEMENTS OF THE SIGN LAYOUT – FRAME, OUTLINE, STRIPE, AND OFFICIAL STATE INFORMATION – MAY BE DUPLICATED FOLLOWING WORKING DRAWING MEASUREMENTS, OR BE REPRODUCED AND ENLARGED PHOTOGRAPHICALLY USING A LAYOUT TEMPLATE IF PROVIDED. THE "STATE OF HAWAII" MASTHEAD SHOULD BE REPRODUCED AND ENLARGED AS SPECIFIED, USING THE ARTWORK AS SHOWN.

TITLES

THE SPECIFIC MAJOR WORK OF THE PROJECT UNDER CONSTRUCTION IS EMPHASIZED BY USING 3 3/4" TYPE, ALL CAPITALS. SECONDARY INFORMATION SUCH AS LOCATIONS OR BUILDINGS USES 2 1/4" TYPE, ALL CAPITALS. OTHER RELATED INFORMATION OF LESSER IMPORTANCE USES 2 1/4" (CAPITAL HEIGHT) IN LOWER CASE LETTERS. ALL LINES OF TYPE SHOULD NOT EXCEED THE WIDTH OF THE 6'-2" STRIPE.

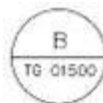
MATERIALS

PANEL IS 3/4" EXTERIOR GRADE HIGH DENSITY OVERLAID PLYWOOD, WITH RESIN BONDED SURFACES ON BOTH SIDES.

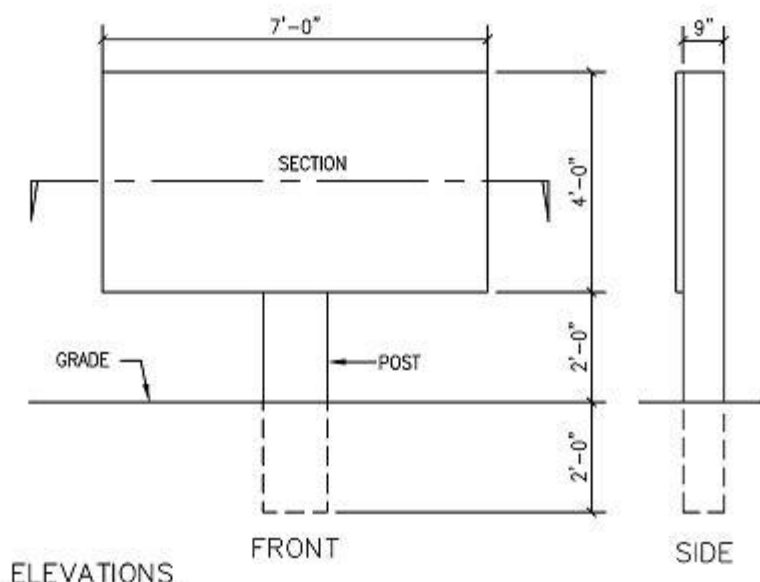
PAINTS & INKS

SCREEN PRINT INKS ARE MATTE FINISH. PAINTS ARE SATIN FINISH, EXTERIOR GRADE. REFERENCES TO AMERITONE COLOR KEY PAINT ARE FOR COLOR MATCH ONLY.

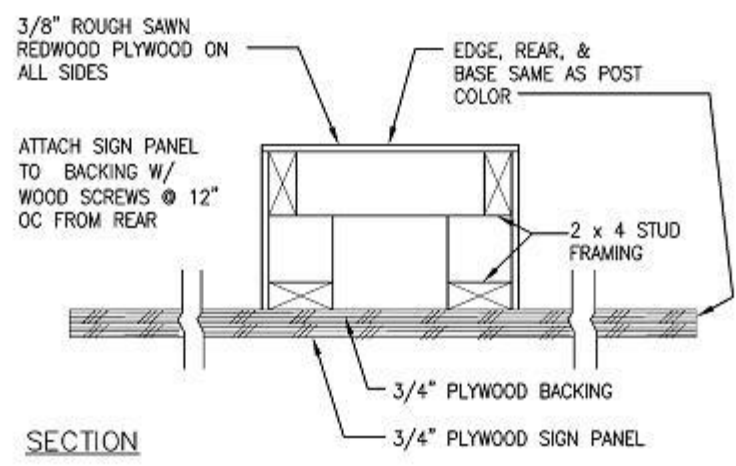
COLOR:	1.	1BL10A	BOHEMIAN BLUE
	2.	2H16P	SOFTLY (WHITE)
	3.	2VR2A	HOT TANGO (RED)
	4.	1M52E	TOKAY (GRAY)



PROJECT SIGN SPECIFICATIONS



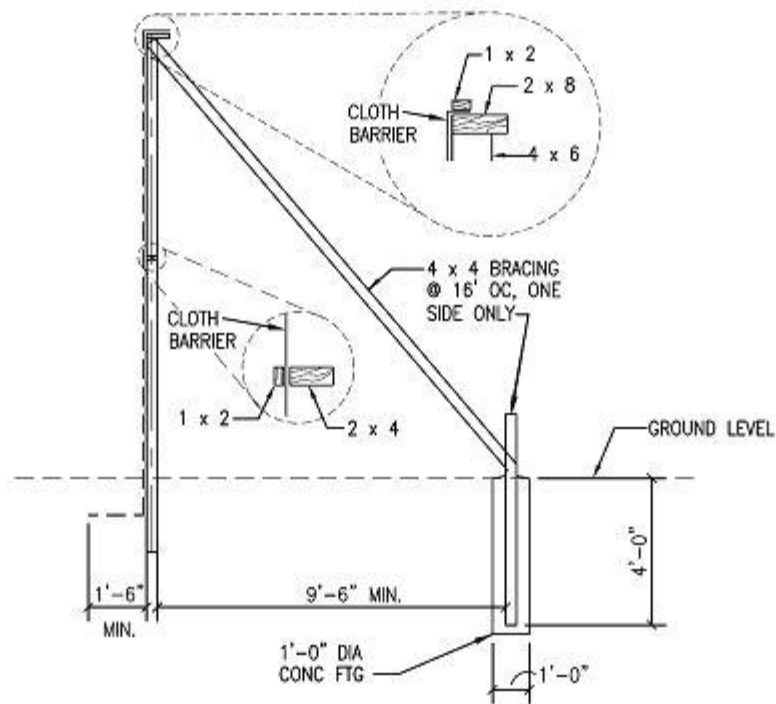
ELEVATIONS



SECTION

C
 TO 01500

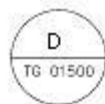
 PROJECT SIGN DETAILS
 SCALE: NTS



SECTION

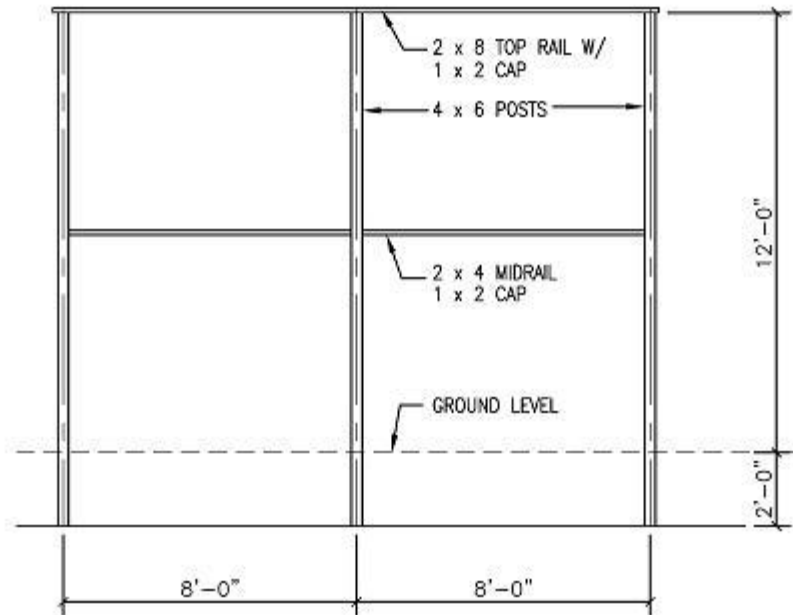
NOTES:

1. CLOTH BARRIER NOT SHOWN IN FRONT VIEW.
2. CLOTH BARRIER TO BE "GEOTEXTILE" OR "NURSERY SHADE".
3. LUMBER SIZES ARE NOMINAL INCHES.
4. AS SHOWN CLOTH TO BE BURIED AT BASE TO INDICATED DIMENSION.
5. 1 x 2 CLOTH BARRIER CAPS TO BE NAILED @ 12" OC.
6. BURLAP IS NOT ACCEPTABLE AS THE CLOTH BARRIER.
7. CLOTH TO HAVE NO HORIZONTAL SEAMS.
8. VERTICAL SEAMS TO BE MADE OVER UPRIGHTS ONLY.
9. ALL SEAMS TO BE CAPPED WITH MINIMUM 1 x 2.
10. ALL JOINTS TO BE SECURELY FASTENED BY MECHANICAL MEANS.



STANDARD DETAIL FOR
DUST CONTROL FENCE

SCALE: NTS



ELEVATION

NOTES:

1. CLOTH BARRIER NOT SHOWN IN FRONT VIEW.
2. CLOTH BARRIER TO BE "GEOTEXTILE" OR "NURSERY SHADE".
3. LUMBER SIZES ARE NOMINAL INCHES.
4. AS SHOWN CLOTH TO BE BURIED AT BASE TO INDICATED DIMENSION.
5. 1 x 2 CLOTH BARRIER CAPS TO BE NAILED @ 12" OC.
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10. ALL JOINTS TO BE SECURELY FASTENED BY MECHANICAL MEANS.



STANDARD DETAIL FOR
DUST CONTROL FENCE

SCALE: NTS

**DEPARTMENT OF HEALTH
ILLEGAL DUMPING NOTICE**

The law requires you to dispose solid waste only at recycling or disposal facilities permitted by the Department of Health.

“Solid waste” includes municipal refuse, construction and demolition waste, household waste, tires, car batteries, derelict vehicles, green wastes, furniture, and appliances.

**Illegal dumping of solid waste
or allowing illegal disposal of solid waste on your property even if contractual or other arrangements are made could subject you to fines from \$10,000 to \$25,000 per occurrence
and could lead to felony prosecution
in accordance with Chapter 342H, HRS.**

**Contact the Department of Health,
Solid Waste Section at 586-4226
to report illegal dumping activities
or if you have further questions.**

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including the following:
 1. Construction layout. Field engineering and surveying.
 2. General installation of products.
 3. Progress cleaning.
 4. Starting and adjusting.
 5. Protection of installed construction.
 6. Correction of the Work.

1.02 SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.03 NOTIFICATION

- A. Contact the Contracting Officer and the Project Contact Person at least five (5) working days prior to starting any onsite work.

1.04 PROJECT AND SITE CONDITIONS

- A. Project Contract Limits (Contract Zone Limits) indicate only in general the limits of the work involved. Perform necessary and incidental work, which may fall outside of these demarcation lines. Confine construction activities within the Project Contract Limits and do not spread equipment and materials indiscriminately about the area.
- B. Disruption of Utility Services: Submit outage request form per section 01100. Due to the nature of this project, Contractor must provide continuous temporary service during the outage.
- C. Contractor's Operations - Provide means and methods to execute the Work and minimize interruption or interference to the facility's operations. Rearrange the construction schedule when construction activities result in interruptions that hamper the operations of the facilities.
- D. Maintain safe passageway to and from the facility's occupied buildings, rooms and other occupied spaces for the using agency personnel and the public at all times.
- E. Contractor, Subcontractor(s) and their employees will not be allowed to park in zones assigned to Users or facility personnel. Subject to availability, the Contracting Officer may designate areas outside of the Contract Zone Limits to

be used by the Contractor. Restore any lawn area damaged by construction activities to original condition.

1.05 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor with a license to practice in Hawaii.

- B. Professional Engineer Qualifications: A professional engineer with a license to practice in Hawaii.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINING THE SITE

- A. Contractor and Subcontractors are expected to visit the site and make due allowances for difficulties and contingencies to be encountered. Compare contract documents with work in place. Become familiar, with existing conditions, the conditions to be encountered in performing the Work, and the requirements of the drawings and specifications.

- B. Verify construction lines, grades, dimensions and elevations indicated on the drawings before any clearing, excavation or construction begins. Bring any discrepancy to the attention of the Contracting Officer, and make any change in accordance with the Contracting Officer instruction.

- C. Obtain all field measurements required for the accurate fabrication and installation of the Work included in this Contract. Verify governing dimensions and examine adjoining work on which the Contractor or Subcontractor's work is in any way dependent. Submit differences discovered during the verification work to the Contracting Officer for interpretations before proceeding with the associated work. Exact measurements are the Contractor's responsibility.

- D. Furnish or obtain templates, patterns, and setting instructions as required for the installation of all Work. Verify dimensions in the field.

- E. Contractor shall accept the site and the existing building(s) in the condition that exists at the time access is granted to begin the Work. Verify existing conditions and dimensions shown and other dimensions not indicated but necessary to accomplish the Work.

- F. Locate all general reference points and take action to prevent their destruction. Lay out work and be responsible for lines, elevations and measurements and the work executed. Exercise precautions to verify figures and conditions shown on drawings before layout of work.

3.02 SITE UTILITIES AND TONING

- A. Cooperate, coordinate and schedule work to maintain construction progress, and accommodate the operations and work of the owners of underground or overhead utility lines or other property in removing or altering the lines or providing new services.
- B. Contact all the various utility companies before the start of the work to ascertain any existing utilities and to develop a full understanding of the utility requirements with respect to this Project. Furnish the Contracting Officer with evidence that the utility companies were contacted.
- C. Should the Contractor discover the existence and location of utilities in the contract drawings are not correct, do not disturb the utilities and immediately notify the Contracting Officer.
- D. Do not disturb or modify any utilities encountered, whether shown or not on the Contract Drawings, unless otherwise instructed in the drawings and specifications or as directed by the Contracting Officer. Repair and restore to pre-damaged condition any utilities or any other property damaged by construction activities.
- E. Transfer to "Field Posted As-Built" drawings the location(s) and depth(s) of new and existing utilities that differ from the Contract Drawings. Locate by azimuth and distance and depth(s) from fixed referenced points.
- F. Toning: Prior to the start of grading, or excavation or trenching work verify and confirm the presence, location and depth of existing underground utility lines in the area affected by the project, by "toning" or by other appropriate means acceptable to the Contracting Officer. The intent of this advanced toning is to afford the Contracting Officer an opportunity to identify utility lines that may or may not be shown on the drawings and issue a directive to address the existing conditions.
 - 1. Perform toning using instruments specifically developed and designed for the detection of underground pipes and cable utilities.
 - 2. Notify the Contracting Officer 4 working days in advance before toning operations. Provide information on the proposed toning method and other pertinent information.
- G. Recording Toning Information: Upon completion of the toning operation, submit drawings that show the location and approximate depth of the existing and newly discovered utility lines. Identify the type of utility lines. Also, identify where utility lines indicated on the drawings are not shown in their approximate location or where new utility lines are found or pointed out in the field.
- H. After ascertaining the exact location and depth of utilities within the project area, mark and protect the locations.
 - 1. Acquaint personnel working near utilities with the type, size, location, depth of the utilities, and the consequences that might result from disturbances.
 - 2. Do not start trenching or start similar operations until reasonable and appropriate precautions to protect the utilities are taken.

For newly identified utility lines, if directed by the Contracting Officer, manually excavate within 2-feet of the utility line to avoid damage. Under this directive, manual excavation is considered additional work.

3.03 FIELD MEASUREMENTS

- A. Take field measurements to fit and install the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Submit a Request For Information (RFI) immediately upon discovery of the need for clarification of the Contract Documents. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.04 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing conditions. If discrepancies are discovered, notify the Contracting Officer promptly.
- B. General: Engage a licensed land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks, control points, lines and levels at each story or level of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify the Contracting Officer when deviations from required lines and levels exceed allowable tolerances.
 - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by the Contracting Officer.

3.05 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent or temporary benchmarks, control points and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without the Contracting Officer's approval. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to the Contracting Officer before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base all replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of 2 permanent or temporary benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.06 INSTALLATION

- A. Install materials, items, fixtures required by the various Divisions and Sections of the Specifications in accordance with Contract Documents, by workers specially trained and skilled in performance of the particular type of work, to meet guarantee and regulatory agency requirements. Should the drawings or specifications be void of installation requirements, install the materials, items, and fixtures in accordance with the manufacturer's current specifications, recommendations, instructions and directions.

3.07 CUTTING AND PATCHING

- A. Oversee cutting and patching of concrete, masonry, structural members and other materials where indicated on drawings and as required by job conditions. Unless noted elsewhere in the contract documents, do not cut or patch existing or new structural members without previously notifying the Contracting Officer.
- B. Provide patch materials and workmanship of equal quality to that indicated on the drawings or specified for new work.

3.08 CLEANING

- A. General: Clean the Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold waste more than 7 days unless approved otherwise by the Contracting Officer.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use only cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.09 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

- B. Comply with manufacturer's written instructions to provide proper temperature and relative humidity conditions.

3.10 CORRECTION OF THE WORK

- A. Repair or replace defective construction. Restore damaged substrates and finishes. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair defective components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 01715 - EXISTING CONDITIONS - ASBESTOS / LEAD / HAZARDOUS MATERIAL SURVEY

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes hazardous material survey data for lead-containing materials, for the Birkhimer EOC, Diamond Head, Island of Oahu, and is provided for the Contractor's information.
- B. Related Sections include the following:
 - 1. SECTION 13283 - LEAD HAZARD CONTROL for requirements of work which disturbs lead-containing paints which, for the purpose of this Section, is defined as paint with any measurable levels of lead.
 - 2. SECTION 13288 - TESTING/AIR MONITORING for requirements for monitoring and clearance for compliance.

1.02 LEAD CONTAINING PAINT

- A. Inform employees, subcontractors, and other persons engaged in the project that lead containing paints (LCP) are present in the project site. Follow the requirements of all Federal and State regulations.
- B. Review the attached lead testing data which identify locations where LCP was found. Lead testing was for design purposes only, and the results do not satisfy any of the requirements for worker exposure assessment.
- C. Contractor may conduct additional lead testing of existing painted surface at his/her own expense.
- D. Contractor shall follow applicable rules and regulations pertaining to the handling, removal, and disposal of lead paint.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.01 HAZARDOUS MATERIAL SURVEY

Hazardous Material Survey Report for Birkhimer EOC Upgrades and Improvements, Diamond Head, Oahu, 57 pages, dated November 22, 2023, prepared by Myounghee Noh & Associates, L.L.C.

- A. Contractor shall review existing survey report(s) and shall verify and understand the locations and volumes of hazardous materials.

HAZARDOUS MATERIAL SURVEY ATTACHED

END OF SECTION

**HAZARDOUS MATERIAL SURVEY REPORT
FOR
BIRKHIMER EOC UPGRADES AND IMPROVEMENTS
DIAMOND HEAD, OAHU**

MNA PROJECT 3447_2

NOVEMBER 22, 2023



MNA Environmental

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This report is prepared for:

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HAZARDOUS MATERIAL SURVEY REPORT FOR BIRKHIMER EOC UPGRADES AND IMPROVEMENTS DIAMOND HEAD, OAHU

CA-202313-C
MNA Project 3447_2

November 22, 2023



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EXECUTIVE SUMMARY

In June 2023, Myounghee Noh & Associates, L.L.C., dba MNA Environmental (MNA), was retained by InSynergy Engineering, Inc., to conduct a hazardous material survey at the Department of Defense, Hawaii Emergency Management Agency, Birkhimer Building Emergency Operations Center (EOC), Building PSB, Building 303, and the Birkhimer Building located at Diamond Head, Oahu. Targeted were those areas anticipated to be disturbed during the planned renovation.

The objective of the survey was to identify the presence, extent, and conditions of hazardous materials in and on the building in the areas anticipated to be disturbed, so that the information can be incorporated in the design.

During 17 - 18 October 2023, MNA conducted this hazardous material survey and identified 19 suspect building materials. Based on sampling and analysis of nine asbestos/bulk materials and 10 lead/ paints, MNA provides the following summary:

Summary of Hazardous Material Findings

Area	ACM	Paint/Coating	
		LCP	LBP
Building PSB			
Generator Room		☐	
Equipment Room		☐	
Exterior		☐	
Building 303			
Corridor			
JIC			
JIC Office			
Lunch Room			
Media Center			
Mezzanine		☐	
Plenum			
Warehouse			
Exterior		☐	
Birkhimer Building			
Roof			

☐ indicates presence of hazardous material
 ACM – Asbestos-Containing Material, 1% or higher
 LBP – Lead-Based Paint, ≥5,000 mg/kg
 LCP – Lead-Containing Paint, <5,000 mg/kg

Based on the visual survey and sampling and analysis of suspect bulk materials and paints, special hazard control measures are warranted for work involving lead-containing paint. These control measures are briefly described in Section 7 Recommendations for Renovation and Construction Work. General dust, respirable crystalline silica, and runoff controls and environmental protection are also warranted.

Paint samples were analyzed for lead content only. There is a potential for the presence of other hazardous chemicals in the lead-free or lead paint coatings, such as cadmium, chromium, arsenic, zinc, and other metals and chemical substances. Suspect asbestos materials may contain other hazardous substances, such as silica and other mineral fibers. Contractor must anticipate hazards and take all appropriate measures to prevent exposure to site workers, facility users, and the environment.

Contractors must verify, prior to bidding, the location and volumes of potentially hazardous materials and determine the appropriate dust and hazard control measures based on the area and material to be disturbed. Quantities of materials provided in this report are based on visual approximations only during the survey and should not be used for bidding purposes.

Analytical results provided in this report do not meet the requirements for waste characterizations. Contractor must coordinate with permitted landfills for waste characterization requirements.

Worker protection from exposures to respirable crystalline silica is enforced by the Occupational Safety and Health Administration (29 CFR 1926.1153; 29 CFR 1910.1053). All appropriate engineering controls must be implemented, and personal protective equipment may be considered as added protection.

All appropriate best management practices are required to contain materials and wastes. No runoff or visible emission should be allowed

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1.0 INTRODUCTION

Myounghee Noh & Associates, L.L.C., dba MNA Environmental (MNA), under an agreement with InSynergy Engineering, Inc., conducted a hazardous material survey for the Department of Defense, Hawaii Emergency Management Agency, Birkhimer Emergency Operations Center (EOC), Building PSB, Building 303, and the Birkhimer Building located at Diamond Head, Oahu.

MNA's survey was conducted in support of the planned upgrade and improvement project. Targeted were those areas anticipated to be disturbed by the renovation and construction work, as follows (Table 1):

- Hazardous building materials due to the suspected presence of asbestos.
- Paints/coatings suspected of containing lead.



Building PSB
October 2023



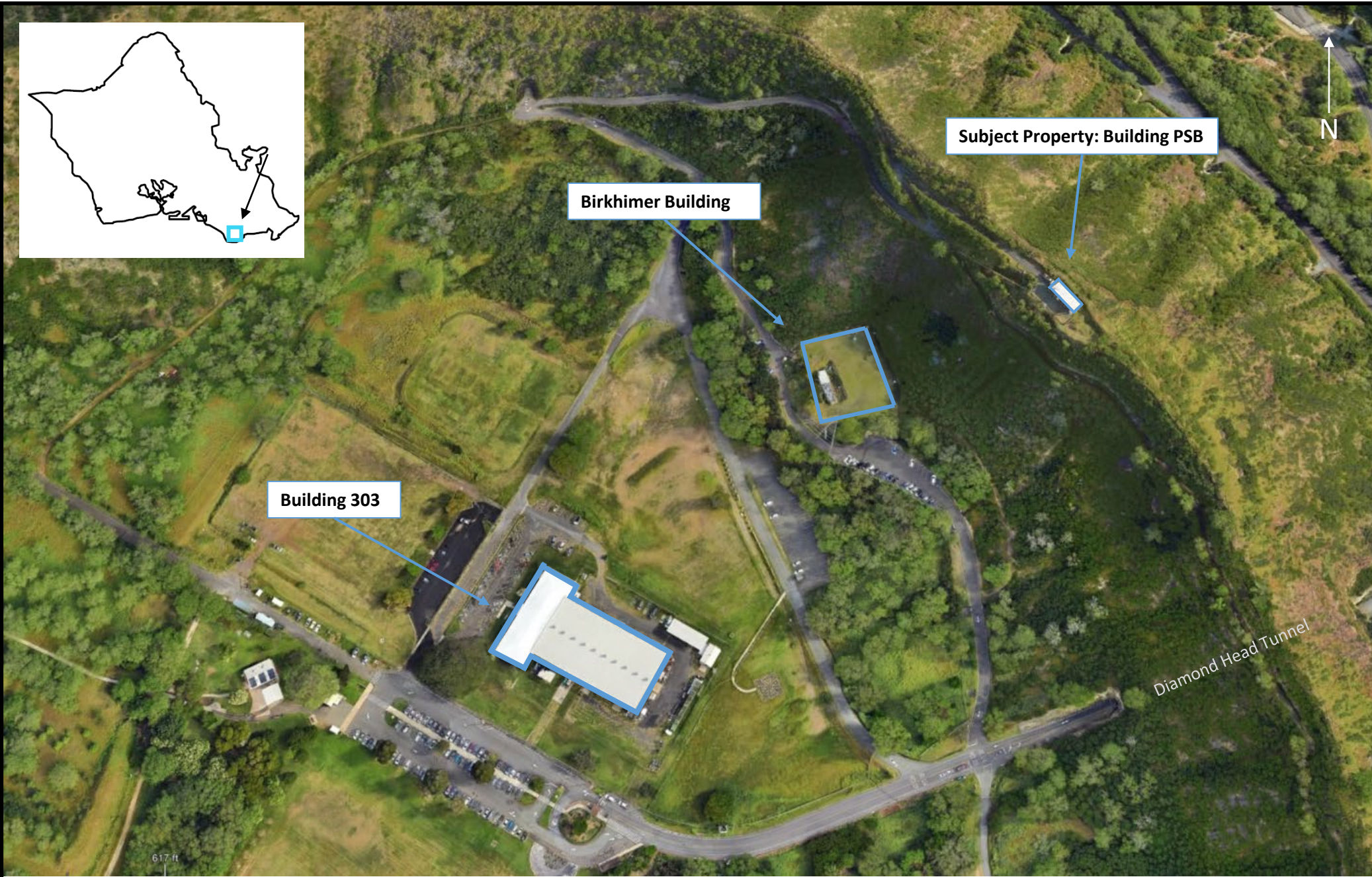
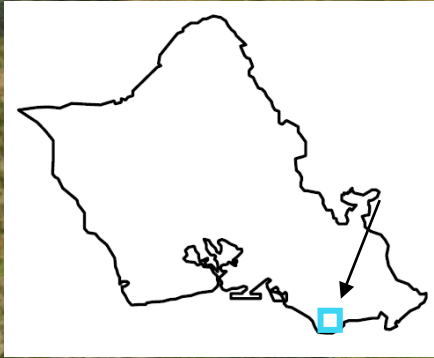
Building 303
October 2023



Birkhimer Building
October 2023

Table 1. Anticipated Design Scope of Work

Work Anticipated
Building PSB
<ul style="list-style-type: none"> • Replacement of heating • Replacement of ventilation • Replacement of air conditioning (HVAC) system • Provide a new air conditioning system. • Provide a larger generator if the existing one cannot support the added air conditioning load.
Building 303
<ul style="list-style-type: none"> • Plumbing line improvements/repair serving the kitchen sink. • Repair kitchen area interior/exterior wall cracks • Electrical improvements. Replace electrical breakers/(potential panels). Breakers are outdated and cannot find replacement parts anymore. • Lighting and backup power system improvements for entire building • Repaving/stripping improvement to parking area • Generator replacement. Consider both portable and indoor installation. • Additional air conditioning to State Warning Point room.
Birkhimer Building
<ul style="list-style-type: none"> • Architectural ceiling treatment • Replace underground fuel storage tank with new above ground fuel storage tank. • New HVAC systems for the entire building. • Rearrange both men and women bathrooms to meet ADA. • Lighting improvements for the entire building. • Repair existing 5K and 20K gallons water tanks.



MNA Environmental

LEGEND

 Birkhimer EOC

Figure 1. Vicinity Map
Hazardous Material
Site Assessment
Birkhimer
EOC Upgrades and
Improvements Diamond
Head, Oahu

617 ft

Scale: 400ft

2.0 SAMPLING AND SURVEY METHODS

During 17 – 18 October 2023, a State of Hawaii-certified building inspector, Danny Falanug, conducted the building material survey. The inspector performed a visual assessment of the project site, identified materials suspected of containing asbestos or lead and collected samples of these materials. Inspector certifications are presented in Appendix A.

2.1 Identifying Homogeneous Materials

The inspector identified building materials with the same appearance, color, and substrate as homogeneous materials. Interior homogeneous materials are considered unique per building and building floor, while exterior building materials are considered unique per area/structure. Building materials with the same characteristics (appearance, color, and substrate), as an identified homogeneous material, should be considered to possess the same hazard characteristics, unless specifically identified as otherwise in the report. As an example, if white paint on concrete is found to be lead-contained paint (LCP), then all identical white paint on concrete in the survey area should be treated as LCP. Table 2 provides an overview of sampling and a summary of hazardous materials identified in this survey.

Table 2. Summary of Sampling and Results

Materials Sampled	Samples Submitted/ Inspected	Suspect Material Locations	Identified Hazardous Materials
Building PSB			
Asbestos in bulk material or paint	6	Ceilings, floors, walls	None
Lead in paint	6	Ceilings, fan coil units, floors, walls	2 LCP (890 mg/kg – 1,300 mg/kg)
Building 303			
Asbestos in bulk material or paint	18	Ceilings, ducting, walls	None
Lead in paint	8	Brackets, conduits, purlins, walls	4 LCP (60 mg/kg – 2,400 mg/kg)
Birkhimer Building			
Asbestos in bulk material or paint	3	Roofing system	None
Lead in paint	6	Air cooled condensing unit, conduits, roofing system	None

LCP – Lead-Containing Paint, <5,000 mg/kg
 mg/kg – milligrams per kilogram (equivalent to parts per million)

2.2 Building Material Sampling

Bulk and paint samples were collected using a decontaminated chisel, razor, or hammer in a manner that minimized airborne dust. The inspector collected triplicate samples for asbestos and duplicate samples for lead. Samples were placed in sealable plastic bags, labeled with a unique identification number, and recorded on a chain-of-custody. For each sample, the date, sample appearance, analyte, and sample location were recorded on a field data form. Asbestos bulk and

paint samples were transported under chain-of-custody to Hawaii Analytical Laboratory, LLC, in Honolulu, Hawaii.

3.0 LABORATORY INFORMATION

Hawaii Analytical Laboratory analyzed the asbestos samples by polarized light microscopy using the Environmental Protection Agency (EPA) Method 600/R-93/116 and lead samples by flame atomic absorption spectroscopy using the NIOSH Method 7082m. Hawaii Analytical Laboratory, Honolulu, is certified by:

- National Voluntary Laboratory Accreditation Program (NVLAP), certification 200655-0
- State of Hawaii Department of Health (HDOH), certification L-14-002
- American Industrial Hygienist Association (AIHA) Environmental Lead Laboratory Accreditation Program (ELLAP), certification 101812

4.0 BULK ASBESTOS RESULTS

Materials determined to contain greater than, or equal to, 1% asbestos are considered regulated asbestos-containing material (ACM) under the National Emission Standards for Hazardous Air Pollutants (NESHAP) as specified in 40 Code of Federal Regulations (CFR) Part 61 Subpart M. The U.S. Occupational Safety and Health Administration (OSHA) Asbestos General Industry and Construction Standards also define ACM as 1% asbestos or more by volume under 29 CFR 1910.1001 and 29 CFR 1926.1101, respectively. However, any measurable levels of asbestos fibers are considered to be a health concern, in an uncontrolled work environment.

Nine homogeneous materials suspected of containing asbestos were identified and sampled, generating 27 samples for analysis. None of the samples contained measurable levels of asbestos. Therefore, it is concluded that no ACM is present in the area anticipated to be disturbed (Table 3).

Table 3. Asbestos-Containing Material Determination

Locations	HM ID	Material	Material Color	Substrate	Result (mg/kg)	Conditions	Estimated Quantity (sq. ft.)
Building PSB							
Ceilings, floors, walls	4	Paint/skim coat	Off-white	Concrete	ND	Good	120
Walls	5	Paint/skim coat	Off-white	Concrete	ND	Good	40
Building 303							
Walls	10	Paint/skim coat	White	Concrete	ND	Good	500
Ceilings	11	2' x 4' Acoustic tile	White w/streaks	None	ND	Good	9,000
Ceilings	12	2' x 2' Acoustic tile	White w/streaks	None	ND	Good	1,000

Locations	HM ID	Material	Material Color	Substrate	Result (mg/kg)	Conditions	Estimated Quantity (sq. ft.)
Ducting	13	Wrap TSI	Silver w/yellow	Metal	ND	Good	5,000
Walls	14	Paint/skim coat	White	Concrete	ND	Fair	1,000
Walls	15	Paint/skim coat	White	CMU	ND	Good	3,000
Birkhimer Building							
Roofing system	19	Roofing sheets w/coating	Tan w/gray	Concrete	ND	Good	40

Bold values indicate results above the reporting limit.

The asbestos was found to be chrysotile.

Good – Material is in an "as installed" condition. It is usable as is and may show cosmetic wear and tear or fading.

Fair – Material is functional for its installed purpose but shows initial signs of deterioration beyond the cosmetic.

Poor – Material shows significant deterioration and may not be functional for its installed purpose. The binding of the material has decreased integrity as indicated by peeling, cracking, or crumbling of the material.

Abbreviations and Acronyms

HM ID – Homogeneous Material Identifier

ln. ft. – Linear Feet

ND – Not Detected

sq. ft. – Square Feet

The suspected ACM descriptions and identifiers are provided in Appendix B. Sample location drawings are provided in Appendix C. Photographs of suspected materials are presented in Appendix D. Laboratory analytical reports, chain-of-custody, and field data forms are provided in Appendix E.

5.0 LEAD -CONTAINING PAINT RESULTS

The U.S. Department of Housing and Urban Development (HUD) and the EPA define paint containing 5,000 milligrams per kilogram (mg/kg), or 0.5% by weight, or more of lead to be lead-based paint (LBP). Paint containing any measurable concentration of lead is considered to be LCP and a health concern. When lead is detected in a multi-layer sample, it is assumed that all layers represented by the sample contain lead at the same concentration. Paints are determined to be hazardous when any measurable amount of lead is determined by laboratory analysis.

Ten suspected lead-containing paints were identified and sampled, generating 20 paint chip samples. All samples were analyzed for lead content. Six lead paint were identified in the survey area, with results ranging from 60 mg/kg to 2,400 mg/kg. None of the 20 lead paints were identified as LBP, exceeding 5,000 mg/kg, the threshold for LBP (Table 4).

Building PSB. Three suspected lead-containing paints were identified and sampled, generating six paint chip samples. Two lead paint were identified in the survey area, with results ranging from 890 mg/kg to 1,300 mg/kg.

Building 303. Four suspected lead-containing paints were identified and sampled, generating eight paint chip samples. Four lead paint were identified in the survey area, with results ranging from 60 mg/kg to 2,400 mg/kg.

Birkhimer Building. Three suspected lead-containing paints were identified and sampled, generating six paint chip samples. Laboratory analytical results indicated no measurable levels of lead. Therefore, it is concluded that no lead paints are present in the project area at Birkhimer Building.

Table 4. Lead -Containing Paint Determination

Locations	HM ID	Material	Material Color	Substrate	Result (mg/kg)	Conditions	Estimated Quantity (sq. ft.)
Building PSB							
Ceiling, floor, wall	1	Paint	Off-white	Concrete	1,100 - 1,300	Good	120
Fan coil units	2	Paint	Off-white	Metal	<38 - <40	Good	60
Walls	3	Paint	Off-white	Concrete	890 - 940	Good	40
Building 303							
Walls	6	Paint	White	Concrete	60 - 76	Good	500
Brackets, Conduits, purlins	7	Paint	White	Metal	550 - 700	Good	1,000
Walls	8	Paint	White	Concrete	2,100 - 2,400	Fair	1,000
Walls	9	Paint	White	CMU	1,900 - 2,200	Good	3,000
Birkhimer Building							
Conduits	16	Paint	Tan	Rubber	<40	Good	10
Air cooled condensing unit	17	Paint	Gray	Metal	<40	Good	80
Roofing system	18	Coating	Tan	Roofing sheets	<40	Good	40

Bold values indicate results above the reporting limit.

Good – Material is in an "as installed" condition. It is usable as is and may show cosmetic wear and tear or fading.

Fair – Material is functional for its installed purpose but shows initial signs of deterioration beyond the cosmetic.

Abbreviations and Acronyms

HM ID – Hazardous Material Identifier

LCP – Lead-Containing Paint, <5,000 mg/kg

mg/kg – milligrams per kilogram or parts per million

sq. ft. – Square Feet

Suspected lead-containing paint descriptions and identifiers are provided in Appendix B. Sample and hazardous material location drawings are in Appendix C. Photographs of suspected LCP are presented in Appendix D. Laboratory analytical reports, chain-of-custody, and field data forms are provided in Appendix E.

6.0 SUMMARY OF SURVEY RESULTS

MNA conducted a hazardous material survey at the Department of Defense, Hawaii Emergency Management Agency, Birkhimer EOC, including Building PSB, Building 303, and the Birkhimer

Building located at Diamond Head, Island of Oahu. MNA’s survey was conducted in support of the planned upgrades and improvements (design scope in Table 1).

Based on the analysis of nine asbestos-suspected materials and 10 lead-suspected paint coatings, MNA provides the following summary:

Summary of Hazardous Material Findings

Area	ACM	Paint/Coating	
		LCP	LBP
Building PSB			
Generator Room		☐	
Equipment Room		☐	
Exterior		☐	
Building 303			
Corridor			
JIC			
JIC Office			
Lunch Room			
Media Center			
Mezzanine		☐	
Plenum			
Warehouse			
Exterior		☐	
Birkhimer Building			
Roof			

☐ indicates presence of hazardous material
 LCP – Lead-Containing Paint, <5,000 mg/kg

7.0 RECOMMENDATIONS FOR RENOVATION AND CONSTRUCTION WORK

It is required that properly trained employees perform demolition and construction work that disturbs hazardous materials, in a manner protective of the site workers, facility users, and the environment. The following recommendations address OSHA and other applicable federal requirements. These recommendations provide guidance for the management of hazardous building materials and control of occupational and environmental hazards associated with operations, maintenance, renovation, and demolition. These recommendations are based on information gathered during the hazardous materials survey. These recommendations are not intended to constitute a formal work plan but are intended to provide a starting point for the development of a work plan.

7.1 Asbestos-Containing Materials

Based on sampling and analysis of nine homogeneous materials at Building PSB, Building 303, and the Birkhimer Building, no ACM were identified in the project areas during this survey. Therefore, no special asbestos control measures are provided.

7.2 Lead -Containing Paints

Employees involved in renovation or demolition activities that disturb lead -containing paints must conduct work in general accordance with 29 CFR 1926.62 OSHA Lead in Construction Standard. Work practices that would trigger these requirements include, but are not limited to, sanding, blasting, welding, cutting, scraping, and spot/whole paint removals. For each project, the contractor must determine the appropriate safety measures based on the area to be disturbed, the lead concentration, and the paint condition. Applicable work practice guidelines involving the disturbance of lead paints are summarized, but are not limited to:

- Contractors must anticipate hazards and utilize appropriate engineering controls and personal protective equipment (PPE).
- Employees must utilize respiratory protection until the initial air monitoring assessment documents safe working levels of airborne lead (29 CFR 1926.62[d][1] and [2][i][A]).
- An exposure assessment should be carried out when employees are disturbing LCP to ensure that they are not exposed to airborne lead concentrations greater than the Permissible Exposure Limit (PEL) of 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for lead, averaged over an 8-hour period. Additional periodic exposure monitoring may be required if the Action Level averaged over an 8-hour period is exceeded.
- Employees must implement stringent dust control procedures to prevent airborne dust containing lead.
- Employees must clean the work area thoroughly using wet methods and a high-efficiency particulate air (HEPA) vacuum. Dry sweeping or air blowing of debris and dust containing lead must be avoided.
- Lead-containing debris must be segregated from other wastes, collected, and containerized. Wastes must be characterized per State of Hawaii requirements, including a determination of the waste as hazardous or non-hazardous. Lead-containing waste must be handled and disposed of in accordance with applicable requirements.
- Visually inspect and verify the work area to ensure all lead-containing debris and dust has been properly removed and the project site is free of lead hazard.
- Conduct clearance in accordance with contract specifications.

7.3 Silica in Concrete

Silica exposure is a potential concern during demolition and cement/concrete related works. Worker protection from exposures to respirable crystalline silica is enforced by OSHA (29 CFR 1926.1153; 29 CFR 1910.1053). All appropriate engineering controls must be implemented and PPE may be considered as added protection.

8.0 LIMITATIONS

Industry standard effort was made to identify suspected hazardous building materials during the survey at the project area. However, this does not imply a guarantee that all suspected building materials and hazardous materials were identified by this assessment because certain building materials and/or surfaces may be hidden by walls, flooring/concrete slab, partitions, and/or other building components, or existing equipment. If any previously unforeseen suspected materials become known, such as any hazardous chemicals in the low-lead or lead-free paint coatings, engineering controls will be required prior to the planned construction.

Paint samples were analyzed for lead content only. There is a potential for the presence of other hazardous chemicals in the lead-free or low-lead paint coatings, such as cadmium, chromium, arsenic, zinc, and other metals and chemical substances. Suspect asbestos materials may contain other hazardous substances, such as silica or other mineral fibers. Contractor must anticipate hazards and take all appropriate measures to prevent exposures to site workers, tenants, student/faculty/staff, the public, and the environment.

Material quantities provided in this report are based on visual approximations taken at the time of the survey only and should not be used for bidding purpose. It is the Contractor's responsibility to verify the material quantities and volume of waste prior to bidding.

Analytical results provided in this report do not meet the requirements for waste characterizations. Contractor must coordinate with permitted landfills for waste characterization requirements.

Worker protection from exposures to respirable crystalline silica is also enforced by the OSHA (29 CFR 1926.1153; 29 CFR 1910.1053). All appropriate engineering controls must be implemented and PPE may be considered as added protection.

APPENDIX A: INSPECTOR CERTIFICATIONS

Danny Falanug



State of Hawai'i Asbestos Certification

Training Course Exp. Dates

W	n/a	MP	n/a
CS	n/a	PD	n/a
INS	07/26/24	PM	07/24/24

W= Worker
 CS= Cont/Sup
 INS= Inspector
 PD= Project Designer
 MP= Mgmt. Planner
 PM= Project Monitor

Falanug
Danny
 Myounghee Noh & Associates, L.L.C.
HIASB-3526
State Exp. Date 05/25/2024



State of Hawai'i Lead Based Paint Activities Certification

Expiration Dates:

Inspector	08/12/2025
Supervisor	06/12/2023
Risk Assessor	n/a
Project Designer	06/06/2023
Worker	n/a

Falanug
Danny

Certification # PB-0661



**APPENDIX B: HOMOGENEOUS MATERIALS IDENTIFIED AND
SAMPLE TYPES COLLECTED**

Homogeneous Materials Identified and Sample Types Collected

HM ID	Building	Floor	Rooms	Locations	Material Color	Material	Substrate	Asb	Pb (mg/kg)	Condition	Estimated Quantity (sq. ft)
4	PSB	1	Equipment Room, Generator Room	Ceilings, floors, walls	Off-White	Paint/skim coat	Concrete	ND		Good	120
5	PSB	1	Exterior	Walls	Off-White	Paint/skim coat	Concrete	ND		Good	40
10	303	1	Mezzanine	Walls	White	Paint/skim coat	Concrete	ND		Good	500
11	303	1	JIC, JIC Office, Media Center, Warehouse	Ceilings	White w/streaks	2' x 4' Acoustic tile	None	ND		Good	9,000
12	303	1	Corridor, JIC, JIC Office, Lunch Room, Media Center, Warehouse	Ceilings	White w/streaks	2' x 2' Acoustic tile	None	ND		Good	1,000
13	303	1	Mezzanine, Plenum	Ducting	Silver w/yellow	Wrap TSI	Metal	ND		Good	5,000
14	303	1	Exterior	Walls	White	Paint/skim coat	Concrete	ND		Fair	1,000
15	303	1	Exterior	Walls	White	Paint/skim coat	CMU	ND		Good	3,000
19	Birkhimer	Roof	Exterior	Roofing system	Tan w/gray	Roofing sheets w/coating	Concrete	ND		Good	40
18	Birkhimer	Roof	Exterior	Roofing system	Tan	Coating	Roofing sheets		<40	Good	40
1	PSB	1	Equipment Room, Generator Room	Ceilings, floors, wall	Off-white	Paint	Concrete		1,100 - 1,300	Good	120
2	PSB	1	Equipment Room	Fan coil units	Off-white	Paint	Metal		<38 - <40	Good	60
3	PSB	1	Exterior	Walls	Off-white	Paint	Concrete		890 - 940	Good	40
6	303	1	Mezzanine	Walls	White	Paint	Concrete		60 - 76	Good	500
7	303	1	Mezzanine	Brackets, conduits, purlins	White	Paint	Metal		550 - 700	Good	1,000
8	303	1	Exterior	Walls	White	Paint	Concrete		2,100 - 2,400	Fair	1,000
9	303	1	Exterior	Walls	White	Paint	CMU		1,900 - 2,200	Good	3,000
16	Birkhimer	Roof	Exterior	Conduits	Tan	Paint	Rubber		<40	Good	10
17	Birkhimer	Roof	Exterior	Air cooled condensing unit	Gray	Paint	Metal		<40	Good	80

Homogeneous Materials Identified and Sample Types Collected

Bold values indicate results above the reporting limit.

Abbreviations and Acronyms

Asb - Asbestos

CMU - Concrete Masonry Unit

HM ID - Homogeneous Material Identifier

LCP - Lead-Containing Material <5,000 mg/kg

mg/kg - milligrams per kilogram, equivalent to parts per million

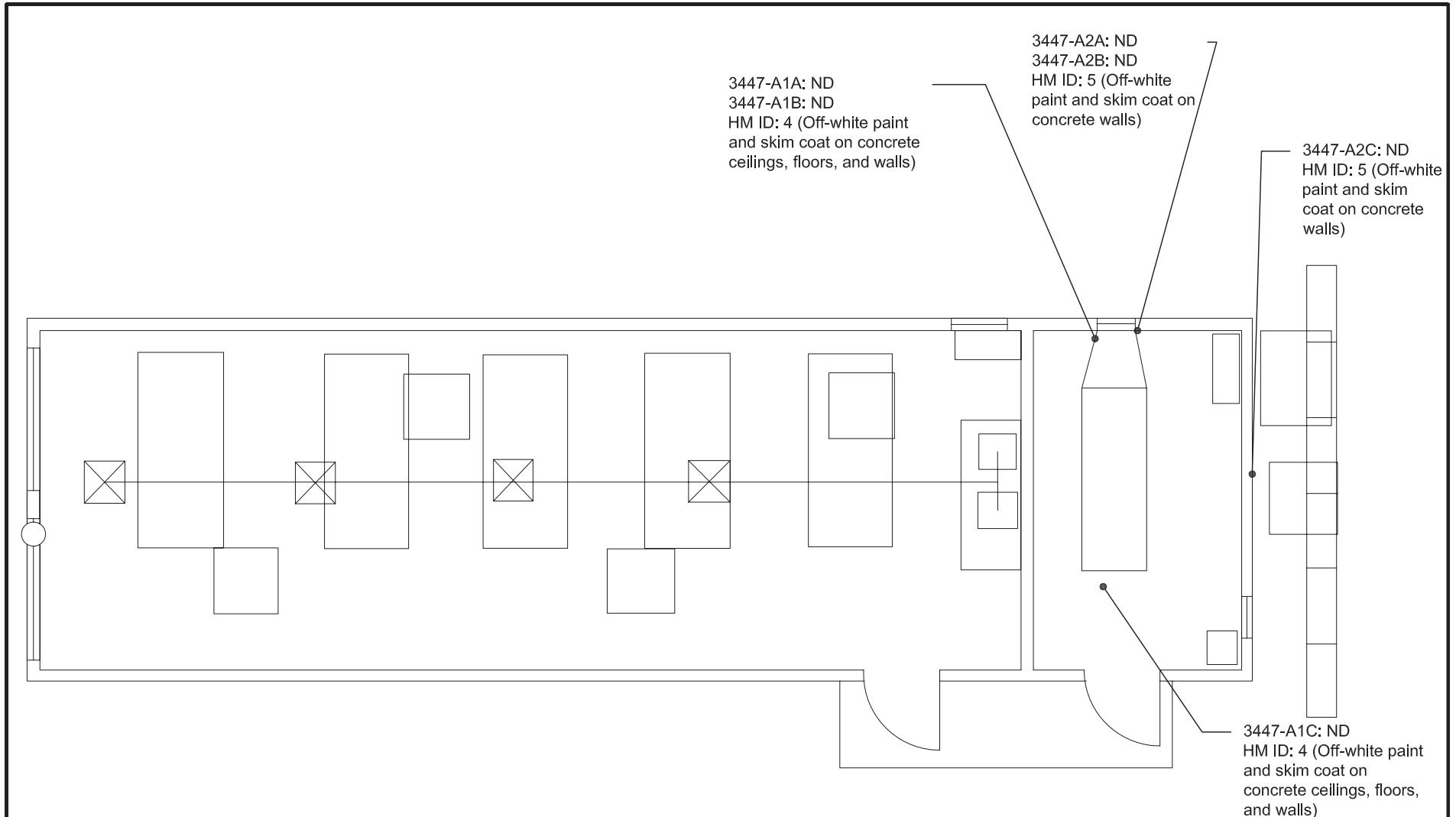
ND - Not Detected

TSI - Thermal System Insulation

sq. ft. - square feet

**APPENDIX C: SAMPLE AND HAZARDOUS MATERIAL LOCATION
DRAWINGS**

List of Drawings	
Asbestos Sample Locations - Building PSB	C-1, C-3, C-6
Lead Paint Sample and Hazardous Material Locations – Building PSB	C-2, C-4, C-5



Not to Scale

Legend and Notes

- CMU - Concrete Masonry Unit
- HM ID - Hazardous Material Identifier
- ND - Not Detected

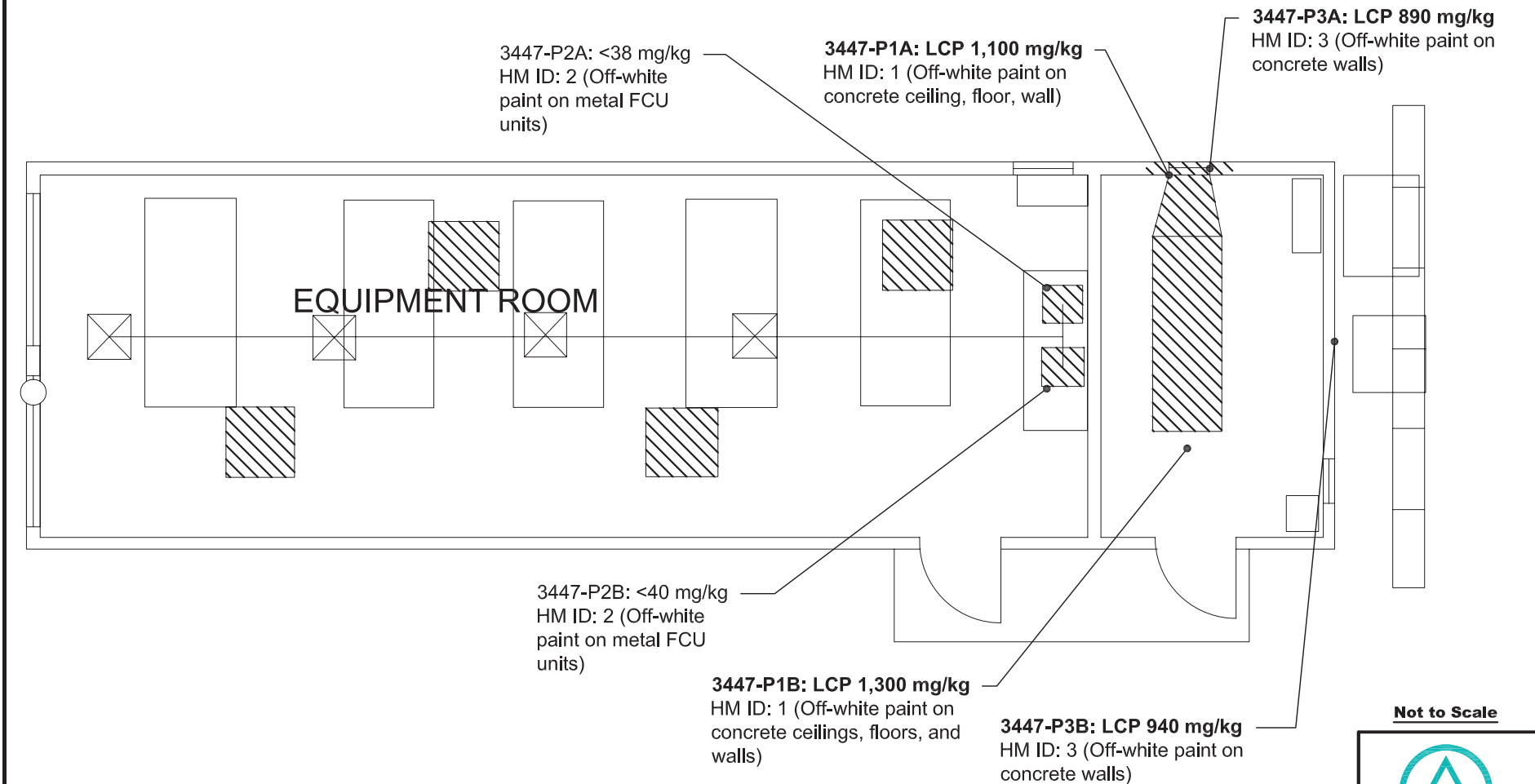


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Asbestos Sample Locations
 Birkhimer EOC Upgrades and Improvements
 Diamond Head, Oahu

Sheet Number
 C - 1

HM ID	Locations	Paint Color	Substrate	Results (mg/kg)
1	Ceilings, floors, walls	Off-white	Concrete	1,100 - 1,300
3	Walls	Off-white	Concrete	890 - 940



Not to Scale



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Legend and Notes

Visual Extent of Lead Paint

Bold values indicate results above the detection limit.

CMU - Concrete Masonry Unit

HM ID - Hazardous Material Identifier

mg/kg - milligrams per kilogram (equivalent to ppm- parts per million)

Lead Paint Sample and Hazardous Material Locations
Birkhimer EOC Upgrades and Improvements
Diamond Head, Oahu

Sheet Number

C - 2

3447-A5A: ND
 3447-A5B: ND
 3447-A5C: ND
 HM ID: 12 (acoustic tile with streaks on ceiling)

3447-A6C: ND
 HM ID: 13 (Silver wrap with yellow TSI on metal ducting)

3447-A4C: ND
 HM ID: 11 (acoustic tile with streaks on ceiling)

3447-A4A: ND
 3447-A4B: ND
 HM ID: 11 (acoustic tile with streaks on ceiling)

3447-A7C: ND
 HM ID: 14 (White paint and skim coat on concrete)

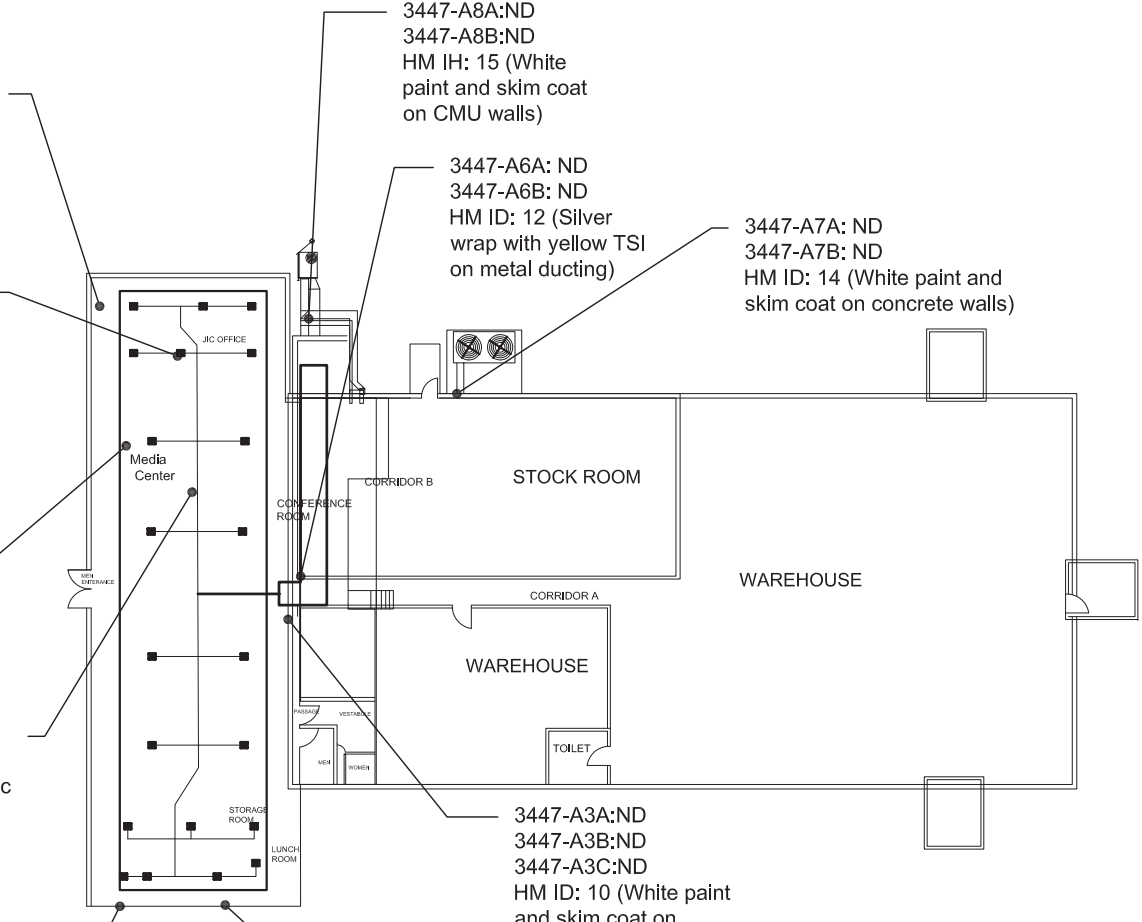
3447-A8A:ND
 3447-A8B:ND
 HM IH: 15 (White paint and skim coat on CMU walls)

3447-A6A: ND
 3447-A6B: ND
 HM ID: 12 (Silver wrap with yellow TSI on metal ducting)

3447-A7A: ND
 3447-A7B: ND
 HM ID: 14 (White paint and skim coat on concrete walls)

3447-A3A:ND
 3447-A3B:ND
 3447-A3C:ND
 HM ID: 10 (White paint and skim coat on concrete walls)

3447-A8C:ND
 HM ID: 15 (White paint and skim coat on CMU walls)



Legend and Notes

CMU - Concrete Masonry Unit
 HM ID - Hazardous Material Identifier
 ND - Not Detected

Not to Scale

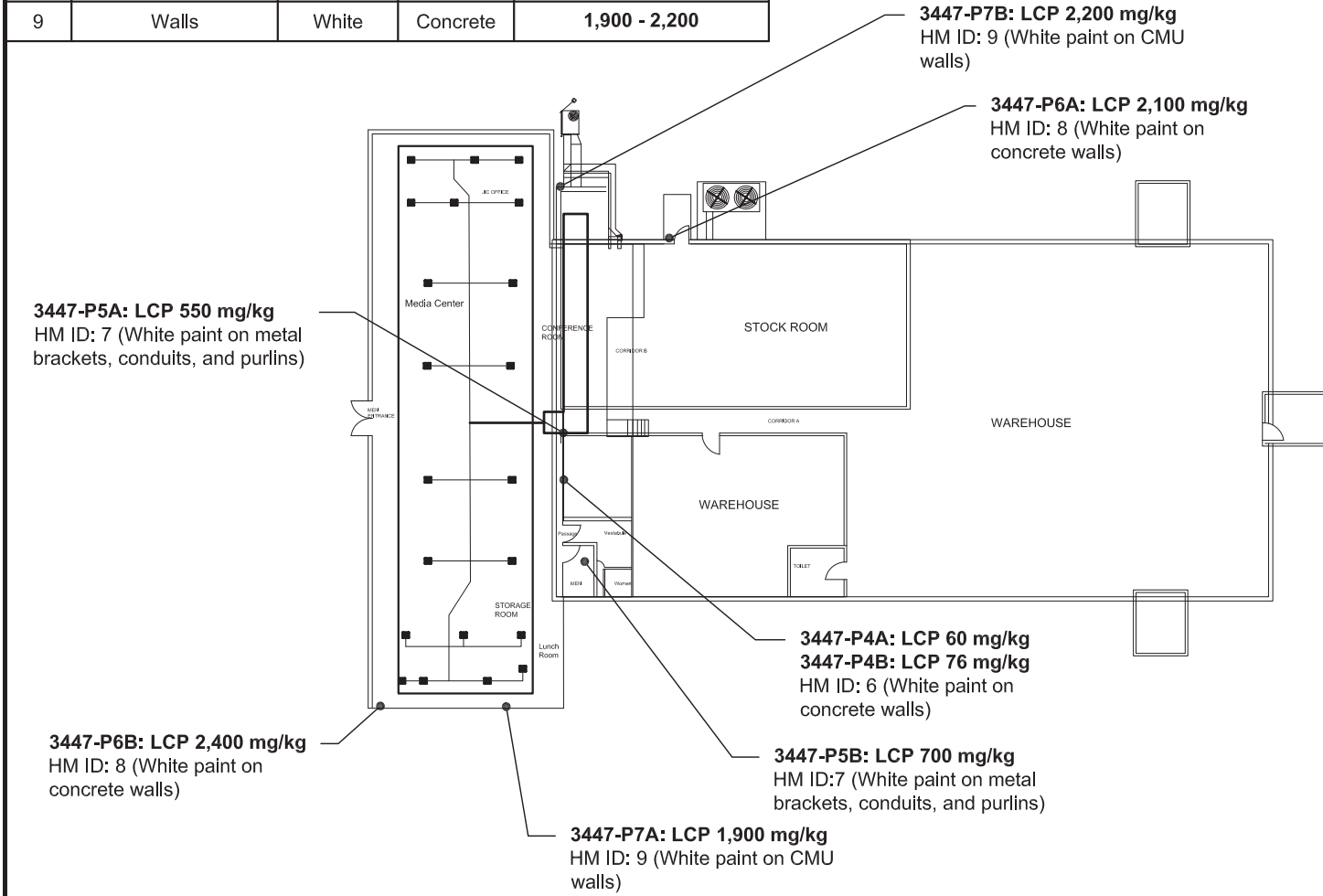


MNA Environmental

Asbestos Sample Locations
 Birkhimer EOC Upgrades and Improvements
 DiaMONd Head, Oahu

Sheet Number
 C - 3

HM ID	Locations	Paint Color	Substrate	Results (mg/kg)
6	Walls	White	Concrete	60 - 70
7	Brackets, conduits, purlins	White	Metal	550 - 700
8	Walls	White	Concrete	2,100 - 2,400
9	Walls	White	Concrete	1,900 - 2,200



Legend and Notes

Bold values indicate results above the detection limit.

HM ID - Hazardous Material Identifier

CMU - Concrete Masonry Unit

mg/kg - milligrams per kilogram (equivalent to ppm- parts per million)

Not to Scale

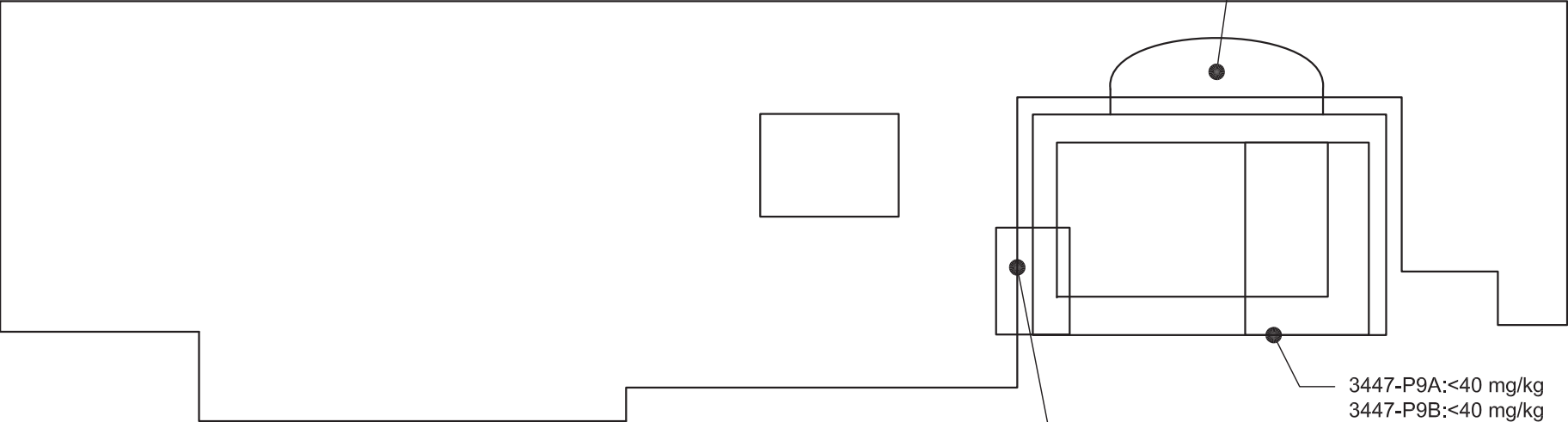


MNA Environmental

Lead Paint Sample and Hazardous Material Locations
Birkhimer EOC Upgrades and Improvements
Diamond Head, Oahu

Sheet Number
C - 4

EXTERIOR



3447-P8A: <40 mg/kg
 3447-P8B: <40 mg/kg
 HM ID: 16 (Tan paint on rubber conduits)

3447-P10A: <40 mg/kg
 3447-P10B: <40 mg/kg
 HM ID: 18 (Tan coating on roofing sheets on roofing system)

3447-P9A: <40 mg/kg
 3447-P9B: <40 mg/kg
 HM ID: 17 (Gray paint on metal Air Cooled Condensing unit)

Not to Scale



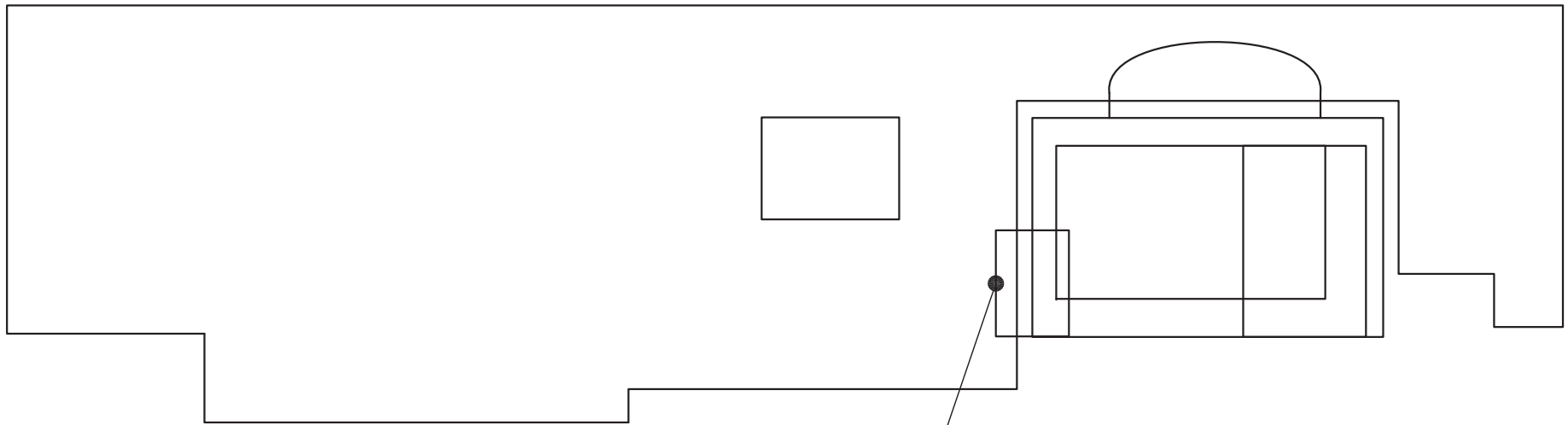
MNA Environmental

Legend and Notes
 HM ID - Hazardous Material Identifier
 mg/kg - milligrams per kilogram (equivalent to ppm- parts per million)

Lead Paint Sample Locations
 Birkhimer EOC Upgrades And Improvements
 Diamond Head, Oahu

Sheet Number
 C - 5

EXTERIOR



3447-A9A: ND
3447-A9B: ND
3447-A9C: ND
HM ID: 19 (Tan coating
with gray roofing
sheets on concrete
roofing system)

Not to Scale



MNA Environmental

Legend and Notes

HM ID - Hazardous Material Identifier
ND - Not Detected

Asbestos Sample Locations
Birkhimer EOC Upgrades and Improvements
Diamond Head, Oahu

Sheet Number

C - 6

APPENDIX D: PHOTOGRAPHS



HM ID: 1
Building PSB

Equipment Room
Off-white paint on concrete wall.

LCP: 1,100 mg/kg and 1,300 mg/kg



HM ID: 2
Building PSB

Equipment Room
Off-white paint on metal fan coil unit.

Non-LCP



HM ID: 3
Building PSB

Exterior
Off-white paint on concrete wall.

LCP: 890 mg/kg and 940 mg/kg



HM ID: 4
Building PSB

Equipment Room
Off-white paint and skim coat on concrete wall.

Non-ACM



HM ID: 5
Building PSB

Exterior
Off-white paint and skim coat on concrete wall.

Non-ACM



HM ID: 6
Building 303

Mezzanine
White paint on concrete wall.

LCP: 60 mg/kg and 76 mg/kg



HM ID: 7
Building 303

Mezzanine
White paint on metal purlin.

LCP: 550 mg/kg and 700 mg/kg



HM ID: 8
Building 303

Exterior
White paint on concrete wall.

LCP: 2,100 mg/kg and 2,400 mg/kg



HM ID: 9
Building 303

Exterior
White paint on concrete masonry unit wall.

LCP: 1,900 mg/kg and 2,200 mg/kg



HM ID: 10
Building 303

Mezzanine
White paint and skim coat on concrete wall.

Non-ACM



HM ID: 11
Building 303

JIC
White 2' x 4' acoustic ceiling tile with streaks.

Non-ACM



HM ID: 12
Building 303

Corridor
White 2' x 2' acoustic ceiling tile with streaks.

Non-ACM



HM ID: 13
Building 303

Mezzanine
Silver wrap with yellow thermal system insulation on metal ducting.

Non-ACM



HM ID: 14
Building 303

Exterior
White paint and skim coat on concrete wall.

Non-ACM



HM ID: 15
Building 303

Exterior
White paint and skim coat on concrete masonry unit wall.

Non-ACM



HM ID: 16
Birkhimer Building

Exterior
Tan paint on rubber conduits.

Non-LCP



HM ID: 17
Birkhimer Building

Exterior
Gray paint on metal air cooled condensing unit.

Non-LCP



HM ID: 18
Birkhimer Building

Exterior
Tan coating on roofing sheets on roofing system.

Non-LCP

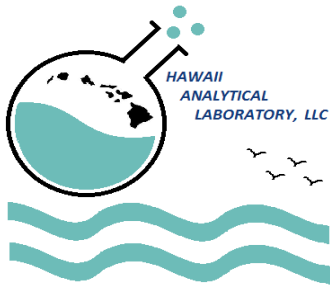


HM ID: 19
Birkhimer Building

Exterior
Tan w/gray coating & roofing sheets on concrete
roofing system.

Non-ACM

APPENDIX E: LABORATORY ANALYTICAL REPORTS



Hawaii Analytical Laboratory ANALYTICAL REPORT

Friday, October 27, 2023

Mr. Danny Falanug
 Myounghee Noh & Associates, LLC
 98-025 Hekaha St. Bldg. 2, Suite 215A
 Aiea HI 96701

Phone Number: (808)227-7730
Facsimile:
Email: dfalanug@mnaenvironmental.com

Lab Job No: 202310363
Date Submitted: 10/20/2023
Your Project: 3447_2, Birkhimer EOC Upgrades and Improvements, 10/18/23

Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v Matrix	Date Analyzed
202375839	3447-A1A		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>Off-white paint / skim coat</u>						
	Comments						
202375840	3447-A1B		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>Off-white paint / skim coat</u>						
	Comments						
202375841	3447-A1C		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>Off-white paint / skim coat</u>						
	Comments						
202375842	3447-A2A		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>Tan paint / skim coat</u>						
	Comments						
202375843	3447-A2B		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>Tan paint / skim coat</u>						
	Comments						
202375844	3447-A2C		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>Tan paint / skim coat</u>						
	Comments						

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Mr. Danny Falanug
 Myounghee Noh & Associates, LLC
 98-025 Hekaha St. Bldg. 2, Suite 215A
 Aiea HI 96701

Phone Number: (808)227-7730
Facsimile:
Email: dfalanug@mnaenvironmental.com

Lab Job No: 202310363
Date Submitted: 10/20/2023
Your Project: 3447_2, Birkhimer EOC Upgrades and Improvements, 10/18/23

Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v Matrix	Date Analyzed
202375845	3447-A3A		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						
202375846	3447-A3B		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						
202375847	3447-A3C		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						
202375848	3447-A4A		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65 Perlite + other	10/25/2023
	<u>Layer</u> <u>White acoustic ceiling tile</u>						
	Comments						
202375849	3447-A4B		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65 Perlite + other	10/25/2023
	<u>Layer</u> <u>White acoustic ceiling tile</u>						
	Comments						
202375850	3447-A4C		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65 Perlite + other	10/25/2023
	<u>Layer</u> <u>White acoustic ceiling tile</u>						
	Comments						
202375851	3447-A5A		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65 Perlite + other	10/25/2023
	<u>Layer</u> <u>White acoustic ceiling tile</u>						
	Comments						
202375852	3447-A5B		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65 Perlite + other	10/25/2023
	<u>Layer</u> <u>White acoustic ceiling tile</u>						
	Comments						

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Mr. Danny Falanug
 Myounghee Noh & Associates, LLC
 98-025 Hekaha St. Bldg. 2, Suite 215A
 Aiea HI 96701

Phone Number: (808)227-7730
Facsimile:
Email: dfalanug@mnaenvironmental.com

Lab Job No: 202310363
Date Submitted: 10/20/2023
Your Project: 3447_2, Birkhimer EOC Upgrades and Improvements, 10/18/23

Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v Matrix	Date Analyzed
202375853	3447-A5C		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65 Perlite + other	10/25/2023
	<u>Layer</u> <u>White acoustic ceiling tile</u>						
	Comments						
202375854	3447-A6A		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	30 Aluminum + other	10/25/2023
	<u>Layer</u> <u>Silver wrap</u>						
	Comments						
202375854	3447-A6A		NONE DETECTED		Fibrous glass (amorphous)	95 Other	10/25/2023
	<u>Layer</u> <u>Yellow insulation</u>						
	Comments						
202375855	3447-A6B		NONE DETECTED		Fibrous glass (amorphous)	95 Other	10/25/2023
	<u>Layer</u> <u>Yellow insulation</u>						
	Comments						
202375856	3447-A6C		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	30 Aluminum + other	10/25/2023
	<u>Layer</u> <u>Silver wrap</u>						
	Comments						
202375856	3447-A6C		NONE DETECTED		Fibrous glass (amorphous)	95 Other	10/25/2023
	<u>Layer</u> <u>Yellow insulation</u>						
	Comments						
202375857	3447-A7A		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						
202375858	3447-A7B		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						

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Mr. Danny Falanug
 Myounghee Noh & Associates, LLC
 98-025 Hekaha St. Bldg. 2, Suite 215A
 Aiea HI 96701

Phone Number: (808)227-7730
Facsimile:
Email: dfalanug@mnaenvironmental.com

Lab Job No: 202310363
Date Submitted: 10/20/2023
Your Project: 3447_2, Birkhimer EOC Upgrades and Improvements, 10/18/23

Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v Matrix	Date Analyzed
202375859	3447-A7C		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						
202375860	3447-A8A		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						
202375861	3447-A8B		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						
202375862	3447-A8C		NONE DETECTED		None detected	Paint + other	10/25/2023
	<u>Layer</u> <u>White paint / skim coat</u>						
	Comments						
202375863	3447-A9A		NONE DETECTED		None detected	Tar + aggregate	10/25/2023
	<u>Layer</u> <u>Black roofing</u>						
	Comments						
202375863	3447-A9A		NONE DETECTED		None detected	Binder	10/25/2023
	<u>Layer</u> <u>Tan coating</u>						
	Comments						
202375864	3447-A9B		NONE DETECTED		None detected	Tar + aggregate	10/25/2023
	<u>Layer</u> <u>Black roofing</u>						
	Comments						
202375864	3447-A9B		NONE DETECTED		None detected	Binder	10/25/2023
	<u>Layer</u> <u>Tan coating</u>						
	Comments						

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Mr. Danny Falanug
 Myounghee Noh & Associates, LLC
 98-025 Hekaha St. Bldg. 2, Suite 215A
 Aiea HI 96701

Phone Number: (808)227-7730
Facsimile:
Email: dfalanug@mnaenvironmental.com

Lab Job No: 202310363
Date Submitted: 10/20/2023
Your Project: 3447_2, Birkhimer EOC Upgrades and Improvements, 10/18/23

Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v Matrix	Date Analyzed
202375865	3447-A9C	None DETECTED	NONE DETECTED		None detected	Tar + aggregate	10/25/2023
	<u>Layer</u> <u>Black roofing</u>						
	Comments						
202375865	3447-A9C	None DETECTED	NONE DETECTED		None detected	Binder	10/25/2023
	<u>Layer</u> <u>Tan coating</u>						
	Comments						

General Comments

The bulk sample[s] analysis subject of this analytical report were conducted in general accordance with the procedures outlined in the United States Environmental Protection Agency's "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (EPA-600/M4-82-020, Dec. 1982) and / or "Method for Determination of Asbestos in bulk Building Materials" (EPA-600/R-93-116, July 1993). The analysis of each bulk sample relates only to the material examined, and may or may not represent the overall composition of its original source. Floor tile and other resinously bound materials, when analyzed by the EPA methods referenced above may yield false negative results because of limitations in separating closely bound fibers and in detecting fibers of small length and diameter. Alternative methods of identification, including Transmission Electron Microscopy (TEM) may or may not be applicable. We utilize calibrated visual area estimation on a routine basis and do not conduct point counting unless specifically requested to do so. Estimated error for the visual determinations presented are 75% relative (1 to 2%), 50% relative (3 to 5%); 25% relative (6 to 25%) and 20% (>26% v/v). We will not separate layers which in our opinion are not readily discernable. This report is not to be duplicated except in full without the expressed written permission of Hawaii Analytical Laboratory. This report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST or any agency of Federal Government. Unless otherwise indicated, the sample condition at the time of receipt was acceptable.

Results and Symbols Definitions

> This testing result is greater than the numerical value listed.

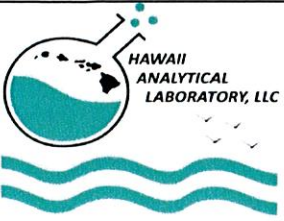
< This testing result is less than the numerical value listed.

None Detected = asbestos was not observed in the sample. If trace amount of asbestos was detected below our quantifiable limits of 1.0%, <1% (trace) would be indicated and the asbestos type listed. Point counting, where applicable, are recommended to improve accuracy.



Jennifer Hsu Liao
Laboratory Manager

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3615 Harding Avenue, Suite 308
 Honolulu, HI 96816
 Ph: 808-735-0422 - Fax: 808-735-0047
 https://analyzehawaii.com

New Client?

Report To* : Danny Falanug
 Myounghee Noh & Associates, L.L.C., dba
 Company : MNA Environmental
 Address* : 98-025 Hekaha Street, Suite 215A
 Aiea, Hawaii 96701
 Phone / Cell No.* : Cell: 808-227-7730
 Report results to : Danny Falanug
 Email / Fax : dfalanug@mnaenvironmental.com

Invoice To* : MNA Environmental
 Myounghee Noh & Associates, L.L.C., dba
 Company : MNA Environmental
 Address* : 98-025 Hekaha Street, Suite 215A
 Aiea, Hawaii 96701
 Phone / Cell No.* : Office: 808-484-9214
 Purchase Order No. : 03447_2
 Email Invoice To : ICampbell@mnaenvironmental.com
dfalanug@mnaenvironmental.com

Need Results By*:

- Working Days (WD)
 4 WD
 3 WD
 2 WD
 24 hours
 6 hours or less
 4 hours or less
 1-2 hours

Site/Project Name: Birkhimer EOC Updrages and Improvements	Client Project No.: 3447_2	Verbal results? <input type="checkbox"/>	Sampled By & Certif. # : Danny Falanug (HIASB-3526)
Special Instructions: Please see field forms. Positive stop analysis per samples.		PLM POSITIVE STOP Instructions: <input checked="" type="checkbox"/> + stop / SAMPLE <input type="checkbox"/> + stop / LAYER	Lab Report No.: 202310363

Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
1 3447-A1A	Please see field forms	10/18/2023	Bulk	_____	PLM	EPA 600R-93/116	
2 3447-A1B	↓	↓	↓	↓	↓	↓	↓
3 3447-A1C							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13 3447-A9A							
14 3447-A9B							
15 3447-A9C							

Relinquished By (Print and Sign) Miraj Mawae	Date/Time 10/19/23 12:30 pm	Received By (Print and Sign) Haley Leavitt	Date/Time 10-20-23 A10:28 IN
--	---------------------------------------	--	--

*Sample description can be paint chips, concrete, specific sample collection location, etc...
 If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.
 All samples submitted are subject to Hawaii Analytical Laboratory terms and conditions.
 *Required fields, failure to complete these fields may result in a delay in your samples being processed.

via HAC via USPS via drop box via FedEx via pick up

awb#: 173-.....

Hazardous Homogeneous Materials and Sampling Survey Field Form: Asbestos

Project Number: 3447 2

Location: Diamond Head

Inspector: DF

Survey Dates and Times: 10/17/23 & 10/18/23

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM Type	Area Sq. ft or L. ft	Hatch Color
									Y (N)		
4	PSB	1	Generator Rm., Equipment Rm	Ceiling, Floor, walls	Off-white (o/w)	Paint/ skim coat (PS)	CC	(G) F P	Y (N) TSI S (M)	120	///

Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 1 A	Generator Rm.	wall	0051	202375839
3447-A 1 B	↓	↓		202375840
3447-A 1 C	↓	Floor		202375841

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM Type	Area Sq. ft or L. ft	Hatch Color
									Y (N)		
5	PSB	1	Exterior (Ext.)	walls	O/W	P/SC	CC	(G) F P	Y (N) TSI S (M)	40	

Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 2 A	Ext.	wall	0052	202375842
3447-A 2 B	↓	↓		202375843
3447-A 2 C	↓	↓		202375844

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM Type	Area Sq. ft or L. ft	Hatch Color
									Y (N)		
10	303	1	Mazzanine	walls	White	P/SC	CC	(G) F P	Y (N) TSI S (M)	500	

Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 3 A	Mazzanine	wall	0062	202375845
3447-A 3 B	↓	↓		202375846
3447-A 3 C	↓	↓		202375847

10363

Hazardous Homogeneous Materials and Sampling Survey Field Form: Asbestos

Project Number: **3447 2**

Location: **Diamond Head**

Inspector: **DF**

Survey Dates and Times: **10/17/23 & 10/18/23**

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM	Area Sq. ft or L. ft	Hatch Color
									Type		
11	303	1	JIC, JIC office, Media Center, Warehouse	Ceiling	White w/ streaks	2'x4' ACT	None	F P	<input checked="" type="checkbox"/> N TSI <input checked="" type="checkbox"/> S <input checked="" type="checkbox"/> M	9,000	///

Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 4 A	JIC	ceiling	0069	202375848
3447-A 4 B	↓	↓		202375849
3447-A 4 C	Corridor	↓		202375850

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM	Area Sq. ft or L. ft	Hatch Color
									Type		
12	303	1	JIC, JIC office, Media center, warehouse, Lunch room, Corridor	Ceiling	White w/ streaks	2'x2' ACT	None	F P	<input checked="" type="checkbox"/> N TSI <input checked="" type="checkbox"/> S <input checked="" type="checkbox"/> M	1,000	///

Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 5 A	JIC	ceiling	0069	202375851
3447-A 5 B	↓	↓		202375852
3447-A 5 C	↓	↓		202375853

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM	Area Sq. ft or L. ft	Hatch Color
									Type		
13	303	1	Mazzanine, Plenum	Ducting	Silver wrap w/ yellow	TSI	Metal	G F P	<input checked="" type="checkbox"/> N TSI <input checked="" type="checkbox"/> S <input checked="" type="checkbox"/> M	5,000	///

Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 6 A	Mazzanine	Ducting	0061	202375854
3447-A 6 B	↓	↓		202375855
3447-A 6 C	Plenum	↓		202375856

Hazardous Homogeneous Materials and Sampling Survey Field Form: Asbestos

Project Number: **3447 2**

Location: **Diamond Head**

Inspector: **DF**

Survey Dates and Times: **10/17/23 & 10/18/23**

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM	Area Sq. ft or L. ft	Hatch Color
									Type		
14	303	1	Ext.	Walls	White	P/SC	CC	G F P	Y (N) TSI S (M)	1,000	

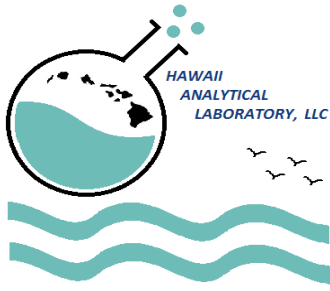
Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 7 A	Ext.	Wall	0063	202375857 202375858 202375859
3447-A 7 B	↓	↓		
3447-A 7 C	↓	↓		

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM	Area Sq. ft or L. ft	Hatch Color
									Type		
15	303	1	Ext.	Walls	White	P/SC	CC Bricks	G F P	Y (N) TSI S (M)	3,000	

Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 8 A	Ext.	Wall	0063	202375860 202375861 202375862
3447-A 8 B	↓	↓		
3447-A 8 C	↓	↓		

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Friable ACM	Area Sq. ft or L. ft	Hatch Color
									Type		
19	Birkhimer	R	Ext.	Roofing System	Tan w/ Gray	coating Roofing sheets	CC	G F P	Y (N) TSI S (M)	40	

Sample ID	Room Sampled	Sample Location	PIC ID	Notes
3447-A 9 A	Ext.	Roofing System	0077	Roofing system below ACU 202375863 202375864 202375865
3447-A 9 B	↓	↓		
3447-A 9 C	↓	↓		



Hawaii Analytical Laboratory ANALYTICAL REPORT

Friday, October 27, 2023

Mr. Danny Falanug
 Myounghee Noh & Associates, LLC
 98-025 Hekaha St. Bldg. 2, Suite 215A
 Aiea HI 96701

Phone Number: (808)227-7730
Facsimile:
Email: dfalanug@mnaenvironmental.com

Lab Job No: 202310362
Date Submitted: 10/20/2023
Your Project: 3447_2, Birkhimer EOC Upgrades and Improvements, 10/18/23

Total Lead (paint chips)

NIOSH Method: 7082m LEAD by FAAS

Sample No.	Your Sample ID / Description	Results	Units	Date Analyzed
202375819	3447-P1A	1300	mg/kg	10/24/2023
Comments				
202375820	3447-P1B	1100	mg/kg	10/24/2023
Comments				
202375821	3447-P2A	< 40	mg/kg	10/24/2023
Comments				
202375822	3447-P2B	< 38	mg/kg	10/24/2023
Comments Sample limited (<0.25g), final volume was adjusted to meet client's requested DL.				
202375823	3447-P3A	940	mg/kg	10/24/2023
Comments				
202375824	3447-P3B	890	mg/kg	10/24/2023
Comments				
202375825	3447-P4A	60	mg/kg	10/24/2023
Comments				
202375826	3447-P4B	76	mg/kg	10/24/2023
Comments				

Hawaii Analytical Laboratory (101812) is accredited by the AIHA LAP, LLC in the EMLAP, IHLAP, and ELLAP programs for the scope of work listed on www.aihaaccreditedlabs.org, in accordance with the recognized ISO/ IEC 17025:2005. AIHA is a NLLAP recognized accrediting body. Controlled doc.: Lead Report, rev. 3 – 20181015

Mr. Danny Falanug
Myounghee Noh & Associates, LLC
98-025 Hekaha St. Bldg. 2, Suite 215A
Aiea HI 96701

Phone Number: (808)227-7730
Facsimile:
Email: dfalanug@mnaenvironmental.com

Lab Job No: 202310362
Date Submitted: 10/20/2023
Your Project: 3447_2, Birkhimer EOC Upgrades and Improvements, 10/18/23

Total Lead (paint chips)

NIOSH Method: 7082m LEAD by FAAS

Sample No.	Your Sample ID / Description	Results	Units	Date Analyzed
202375827	3447-P5A	700	mg/kg	10/24/2023
Comments				
202375828	3447-P5B	550	mg/kg	10/24/2023
Comments				
202375829	3447-P6A	2400	mg/kg	10/24/2023
Comments				
202375830	3447-P6B	2100	mg/kg	10/24/2023
Comments				
202375831	3447-P7A	1900	mg/kg	10/24/2023
Comments				
202375832	3447-P7B	2200	mg/kg	10/24/2023
Comments				
202375833	3447-P8A	< 40	mg/kg	10/24/2023
Comments				
202375834	3447-P8B	< 40	mg/kg	10/24/2023
Comments				
202375835	3447-P9A	< 40	mg/kg	10/24/2023
Comments				
202375836	3447-P9B	< 40	mg/kg	10/24/2023
Comments				

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Mr. Danny Falanug
Myounghee Noh & Associates, LLC
98-025 Hekaha St. Bldg. 2, Suite 215A
Aiea HI 96701

Phone Number: (808)227-7730
Facsimile:
Email: dfalanug@mnaenvironmental.com

Lab Job No: 202310362
Date Submitted: 10/20/2023
Your Project: 3447_2, Birkhimer EOC Upgrades and Improvements, 10/18/23

Total Recoverable Lead

EPA Method: 3051m / 7000Bm

Sample No.	Your Sample ID / Description	Results	Units	Date Analyzed
202375837	3447-P10A	< 40	mg/kg	10/24/2023
Comments				
202375838	3447-P10B	< 40	mg/kg	10/24/2023
Comments				

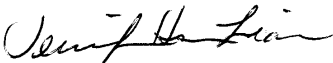
All Quality Control data are acceptable unless otherwise noted.
MRL for lead air is 5ug.
MRL for lead wipe is 10ug.
MRL for lead paint or soil is 40 mg/kg for a 0.25g sample.

General Comments

The sample[s] analysis subject of this analytical report were conducted in general accordance with the procedures associated with the "analytical method" referenced above. Modifications to this methodology may have been made based upon the analyst's professional judgment and / or sample matrix effects encountered. The analysis of sample relates only to the sample analyzed, and may or may not be representative of the original source of the material submitted for our analysis. All analysts participate in interlaboratory quality control testing to continuously document proficiency. This report is not to be duplicated except in full without the expressed written permission of Hawaii Analytical Laboratory. This report should not be construed as an endorsement for a product or a service by the AIHA LAP, LLC or any affiliated organizations. Sample and associated sampling / collection data is reported as provided by client. TWA values have been calculated based on information supplied by the client that the laboratory has not independently verified. Results have not been corrected for blank determinations unless noted in remarks. Unless otherwise indicated the sample condition at the time of receipt was acceptable.

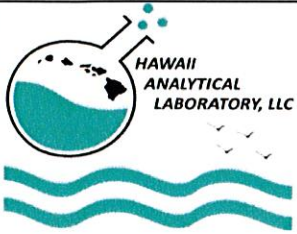
Results and Symbols Definitions

> This testing result is greater than the numerical value listed.
< This testing result is less than the numerical value listed.
= Analytical methods marked with an "#" are not within our AIHA LAP, LLC Scope of Accreditation.
MRL = Method Reporting Limit.



Jennifer Hsu Liao
Laboratory Manager

Hawaii Analytical Laboratory (101812) is accredited by the AIHA LAP, LLC in the EMLAP, IHLAP, and ELLAP programs for the scope of work listed on www.aihaaccreditedlabs.org, in accordance with the recognized ISO/ IEC 17025:2005. AIHA is a NLLAP recognized accrediting body. Controlled doc.: Lead Report, rev. 3 – 20181015



3615 Harding Avenue, Suite 308
 Honolulu, HI 96816
 Ph: 808-735-0422 - Fax: 808-735-0047
 https://analyzehawaii.com

New Client?

Report To* : Danny Falanug
 Company : Myounghee Noh & Associates L.L.C., dba MNA Environmental
 Address* : 98-025 Hekaha Street, Suite 215A
 Aiea, Hawaii 96701
 Phone / Cell No.* : Cell: 808-227-7730, Direct: 808-853-3152
 Report results to : Danny Falanug
 Email / Fax : dfalanug@mnaenvironmental.com

Invoice To* : MNA Environmental
 Company : Myounghee Noh & Associates, L.L.C., dba MNA Environmental
 Address* : 98-025 Hekaha Street, Suite 215A
 Aiea, Hawaii 96701
 Phone / Cell No.* : Office: 808-484-9214
 Purchase Order No. : 03447_2
 Email Invoice To : ICampbell@mnaenvironmental.com / dfalanug@mnaenvironmental.com

Need Results By*:

- 5 Working Days (WD)
- 4 WD
- 3 WD
- 2 WD
- 24 hours
- 6 hours or less
- 4 hours or less
- 1-2 hours

Site/Project Name: Birkhimer EOC Updrages and Improvements
 Client Project No.: 3447_2
 Verbal results?
 Sampled By & Certif. #: Danny Falanug

Special Instructions: Please analyze all samples for Lead. Please see Field Forms and Lead results down to 40 mg/kg.
 PLM POSITIVE STOP Instructions:
 + stop / SAMPLE
 + stop / LAYER
 Lab Report No.: 202310362

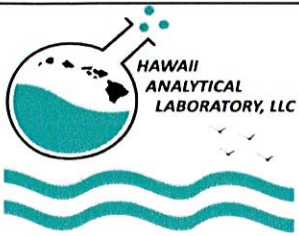
Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
3447-P1A	Please see field forms	10/18/2023	Paint Chips	_____	Pb		202375819
3447-P1B					Pb		202375820
3447-P2A					Pb		202375821
3447-P2B					Pb		202375822
3447-P3A					Pb		202375823
3447-P3B					Pb		202375824
3447-P4A					Pb		202375825
3447-P4B					Pb		202375826
3447-P5A					Pb		202375827
3447-P5B					Pb		202375828
3447-P6A					Pb		202375829
3447-P6B					Pb		202375830

Relinquished By (Print and Sign) <i>Miyai Mawae</i>	Date/Time 10/19/23 12:30 pm	Received By (Print and Sign) Haley Leavitt <i>Haley Leavitt</i>	Date/Time 10-20-23 A 10:30 IN
--	--------------------------------	---	----------------------------------

*Sample description can be paint chips, concrete, specific sample collection location, etc...
 If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.
 All samples submitted are subject to Hawaii Analytical Laboratory terms and conditions.
 *Required fields, failure to complete these fields may result in a delay in your samples being processed.

via HAC via USPS via drop box via FedEx via pick up

awb#: 173-.....



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 Honolulu, HI 96816
 Ph: 808-735-0422 - Fax: 808-735-0047
<https://analyzehawaii.com>

New Client?

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 Phone / Cell No.* : Cell: 808-227-7730, Direct: 808-853-3152
 Report results to : Danny Falanug
 Email / Fax : dfalanug@mnaenvironmental.com

Invoice To* : MNA Environmental
 Company : Myounghee Noh & Associates, L.L.C., dba MNA Environmental
 Address* : 98-025 Hekaha Street, Suite 215A
 Aiea, Hawaii 96701
 Phone / Cell No.* : Office: 808-484-9214
 Purchase Order No. : 03447_2
 Email Invoice To : ICampbell@mnaenvironmental.com / dfalanug@mnaenvironmental.com

Need Results By*:

- 5 Working Days (WD)
- 4 WD
- 3 WD
- 2 WD
- 24 hours
- 6 hours or less
- 4 hours or less
- 1-2 hours

Site/Project Name: Birkhimer EOC Updrages and Improvements Client Project No.: 3447_2 Verbal results? Sampled By & Certif. #: Danny Falanug

Special Instructions: Please analyze all samples for Lead. Please see Field Forms and Lead results down to 40 mg/kg. PLM POSITIVE STOP Instructions: + stop / SAMPLE + stop / LAYER Lab Report No.: 10362

Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
3447-P7A	Please see field forms	10/18/2023	Paint Chips	—	Pb		202375831
3447-P7B					Pb		202375832
3447-P8A					Pb		202375833
3447-P8B					Pb		202375834
3447-P9A					Pb		202375835
3447-P9B					Pb		202375836
3447-P10A					Pb		202375837
3447-P10B	✓	✓	✓	✓	Pb		202375838

Relinquished By (Print and Sign)	Date/Time	Received By (Print and Sign)	Date/Time
		Haley Leavitt <i>Haley Leavitt</i>	10-20-23 A10:30 IN

*Sample description can be paint chips, concrete, specific sample collection location, etc...
 If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.
 All samples submitted are subject to Hawaii Analytical Laboratory terms and conditions.
 *Required fields, failure to complete these fields may result in a delay in your samples being processed.

via HAC via USPS via drop box via FedEx via pick up
 awb#: 173-.....

Hazardous Homogeneous Materials and Sampling Survey Field Form: Lead Paint

Project Number: 3447 2

Location: Diamond Head

Inspector: DF

Survey Dates and Times: 10/17/23 & 10/18/23

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
1	PSB	1	Generator Rm., Equipment Rm.	Ceiling, Floor, wall	off-white (o/w)	Paint (P)	CC	Ⓞ F P	120	—
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 1 A		Generator Rm.		Wall		0051				
3447-P 1 B		↓		Floor						
HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
2	PSB	1	Equipment Rm.	FCU units	o/w	P	Metal	Ⓞ F P	60	□
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 2 A		Equipment Rm.		FCU unit		0057				
3447-P 2 B		↓		↓						
HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
3	PSB	1	Exterior (Ext.)	Walls	o/w	P	CC	Ⓞ F P	40	—
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 3 A		Ext.		Wall		0052				
3447-P 3 B		↓		↓						

Hazardous Homogeneous Materials and Sampling Survey Field Form: Lead Paint

Project Number: **3447 2**

Location: **Diamond Head**

Inspector: **DF**

Survey Dates and Times: **10/17/23 2 10/18/23**

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
6	303	1	Mezzanine	Wall	White	P	CC	G F P	500	
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 4 A		Mezzanine		Wall		0062				
3447-P 4 B		↓		↓						
HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
7	303	1	Mezzanine	Conduits, Brackets, Purlins	White	P	Metal	G F P	1,000	
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 5 A		Mezzanine		Purlins		0060				
3447-P 5 B		↓		↓						
HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
8	303	1	Exterior (Ext.)	Walls	White	P	CC	G F P	1,000	
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 6 A		Ext.		Wall		0063	Bottom Wall			
3447-P 6 B		↓		↓						

Hazardous Homogeneous Materials and Sampling Survey Field Form: Lead Paint

Project Number: **3447 2**

Location: **Diamond Head**

Inspector: **DF**

Survey Dates and Times: **10/17/23 & 10/18/23**

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area (Sq. ft or L. ft)	Hatch Color
9	303	1	Ext.	walls	White	P	cc bricks	⊙ F P	3,000	
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 7 A		Ext.		wall		0063	upper wall			
3447-P 7 B		↓		↓						
HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area (Sq. ft or L. ft)	Hatch Color
16	Birkhimer	R	Ext.	Conduits	Tan	P	Robber	⊙ F P	10	
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 8 A		Ext.		Conduit		0080	Robber conduits.			
3447-P 8 B		↓		↓						
HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area (Sq. ft or L. ft)	Hatch Color
17	Birkhimer	R	Ext.	Accu	Gray	P	Metal	⊙ F P	80	EA
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P 9 A		Ext.		Accu		0078				
3447-P 9 B		↓		↓						

Hazardous Homogeneous Materials and Sampling Survey Field Form: Lead Paint

Project Number: **3447 2**

Location: **Diamond Head**

Inspector: **DF**

Survey Dates and Times: **10/17/23 10/18/23**

HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
18	Birkhimer	R	Ext.	Roofing system	Tan	coating	Roofing sheets	G F P	40	☐
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P10A		Ext.		Roofing system		0077				
3447-P10B		↓		↓						
HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
								G F P		
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P A										
3447-P B										
HM ID	Building	Flr.	Rooms	Locations	Material Color	Material	Substrate	Condition	Area Sq. ft or L. ft	Hatch Color
								G F P		
Sample ID		Room Sampled		Sample Location		PIC ID	Notes			
3447-P A										
3447-P B										

DIVISION 2 – SITE CONSTRUCTION

SECTION 02050 – SITE DEMOLITION

PART 1 – GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, tools and equipment necessary to perform all demolition and removal work indicated on the drawings or required for the reception of the new construction.
- B. Related Sections include the following:
 - 1. Preliminary Environmental Hazard Evaluation requirements refer to Section 01560 – Environmental Controls
 - 2. Procedure for verifying existing underground utility lines is specified in Section 01700 - EXECUTION REQUIREMENTS.
 - 3. Hazardous Materials Work Plan requirements refer to Section 01715 – Existing Conditions
 - 4. Clearing and grubbing, is specified in Section 02100 - SITE PREPARATION.
 - 5. Earthwork, including excavation, filling, backfilling, rough and finish grading, is specified in Section 02210 - EARTHWORK.

1.02 CONDITION AT SITE

- A. The Contractor shall visit the site, examine and note all existing conditions and extent of work involved for the completion of the demolition and removal work.
- B. Obvious conditions of the existing premise at the time of award shall be accepted as part of the work, even though they may not be indicated on the drawings or may vary therefrom.

1.03 PERMITS, NOTICES, ETC.

- A. The Contractor shall procure and pay for all necessary permits or certificates that may be required in connection with this work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 EXECUTION OF WORK

- A. All work shall be executed in an orderly and careful manner, with proper safety precautions being observed at all times. Provide warning signs, lights, barricades, etc., as required or as directed by the Contracting Officer.

- B. Removed material having no salvage value, as determined by the Contracting Officer, shall become the property of the Contractor and shall be removed daily from the premises. Removed material with salvage value, as determined by the Contracting Officer, shall be stored where directed. Remove carefully and do not damage any existing related parts which are to be reused in this project.
- C. All voids created by the removal of plants, concrete slabs, footings, etc., shall be filled and compacted in accordance with the requirements of Section 02210 - EARTHWORK.

3.02 CONTRACT ZONE LIMITS

- A. The Contract Zone Limits shown on the drawings indicate only in general the limits of the work involved. The Contractor is also expected to confine all of his construction activities within the Contract Zone Limits and not to spread his equipment and materials indiscriminately about the area.

3.03 BARRICADE

- A. Erect temporary barricade to prevent people from entering into project area to extent as approved by the Contracting Officer. This work shall be accomplished at no extra cost to the Contracting Officer.

3.04 DEMOLITION AND REMOVAL

- A. Demolish, remove and clear area of obstacles, obstructions and objectionable material such as existing concrete walks and slabs, drainage structures, A.C. pavements, for the proper execution and completion of the work.

3.05 DEBRIS CONTROL

- A. All debris existing or accumulated from the demolition shall be completely and promptly removed from the site by the Contractor in a manner that will prevent spillage on streets or adjacent areas to the satisfaction of the Contracting Officer. Burning or burying of debris on the site will not be permitted. Local regulations regarding hauling and disposal shall be complied with.

3.06 DUST CONTROL

- A. Dust shall be kept within acceptable levels at all times including non- working hours, weekends and holidays in conformance with Chapter 60 - Air Pollution Control, as amended, of the State Department of Health Administrative Rules.
- B. The method of dust control and all costs incurred therefore shall be the responsibility of the Contractor.

END OF SECTION

SECTION 02100 – SITE PREPARATION

PART 1 – GENERAL

1.01 SUMMARY

- A. Furnish all equipment, tools, labor and materials necessary to clear the premises of all obstacles and obstructions, install protective barriers and warning signs, establish limits of work, and other preparatory site work for the proper reception, construction, execution and completion of the other work included in this contract.
- B. Related Sections include the following:
 - 1. Preliminary Environmental Hazard Evaluation requirements refer to Section 01560 – Environmental Controls
 - 2. Procedure for verifying existing underground utility lines is specified in Section 01700 - EXECUTION REQUIREMENTS.
 - 3. Hazardous Materials Work Plan requirements refer to Section 01715 – Existing Conditions

1.02 CONDITIONS AT SITE

- A. Visit the site. Examine the existing construction, note all conditions as to character and extent of work involved.

1.03 EXTENT OF WORK

- A. Areas of improvements as indicated on the drawings. Protect areas outside of work areas.

1.04 CONTRACT ZONE LIMITS

- A. The Contract Zone Limits shown in the drawings indicate only in general the limits of the work involved. The Contractor, however, is required to perform any and all necessary and incidental work which may fall outside of these demarcation lines. The Contractor is also expected to confine all of his construction activities within the Contract Zone Limits and not to spread his equipment and materials indiscriminately about the area.

1.05 EXECUTION OF WORK

- A. Execute work in an orderly and careful manner with due consideration for any and all surrounding areas which are to remain.
- B. Protect existing facilities.

1.06 PATCHWORK

- A. All areas or surfaces damaged as a result of alterations or new work shall be repaired to match existing adjacent surfaces and/or areas.

1.07 PROTECTIVE BARRIERS AND WARNING SIGNS

- A. The Contractor shall confine his work to within the project areas, and shall keep other areas opened, unless specifically directed by the Engineer. The Contractor shall provide and maintain protective barriers and whatever warning signs necessary to caution the public or as directed by the Engineer. The cost of providing and maintaining the protective barriers and warning signs shall be considered incidental to the cost of the project, and no extra compensation shall be made to the Contractor.

1.08 CLEAN UP OF PREMISES

- A. Clean up and remove all debris accumulated from project operations from time to time as directed. Upon completion of the construction work and before final acceptance of the contract work, remove all surplus materials, equipment, scaffolding, etc., and leave entire job clean and neat to the satisfaction of the Engineer.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

- A. Maintenance of Traffic: The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, passageways, etc. When necessary, the Contractor shall provide and erect barriers, etc., with special attention to protection of personnel.
- B. Protection: Throughout the progress of the work protection shall be provided for all property and equipment, and temporary barricades shall be provided as necessary. Work shall be done in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, and the State of Hawai'i's Occupational Safety and Health Standards, Rules and Regulations.
- C. Fires: No burning of debris of any kind will be allowed.
- D. Reference Points: Benchmarks, etc., shall be carefully maintained, but if disturbed or destroyed, shall be replaced as directed, at the Contractor's expense.
- E. Disposal: All materials resultant from operations under this Section shall become the property of the Contractor and shall be removed from the site. Loads of materials shall be trimmed to prevent droppings during transportation.

3.02 CLEARING AND GRUBBING

- A. The Contractor shall clear the premises of all obstacles and obstructions, the removal of which will be necessary for the proper reception, construction, execution and completion of other work included in this contract.
- B. The Contractor shall protect from injury and damage all surrounding trees, plants, etc., and shall leave all in as good as condition as at present. Any damage to existing improvement shall be repaired or replaced by the Contractor to the

satisfaction of the Engineer.

3.03 CLEAN UP OF PREMISES

- A. Clean up and remove all debris accumulated from building operations from time-to-time as directed. Upon completion of the construction work and before final acceptance of the contract work, remove all surplus materials, equipment, scaffoldings, etc., and leave entire job site raked clean and neat to the satisfaction of the Engineer.

END OF SECTION

SECTION 02210 – EARTHWORKS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish all labor, materials, tools, and equipment necessary for excavation, filling, backfilling, rough and finish grading, and related items necessary to complete all work shown on the Drawings and/or specified herein.

- B. Related Sections include the following:
 - 1. Preliminary Environmental Hazard Evaluation requirements refer to Section 01560 – Environmental Controls

 - 2. Procedure for verifying existing underground utility lines is specified in Section 01700 - EXECUTION REQUIREMENTS.

 - 3. Hazardous Materials Work Plan requirements refer to Section 01715 – Existing Conditions

 - 4. Section 02100 - SITE PREPARATION.

 - 6. Trenching and backfilling for interior utility lines up to a point 5 feet outside of building area are specified in DIVISION 15 - MECHANICAL.

 - 7. Concrete work, electrical work, and plumbing work are specified in their respective sections.

1.02 ORDINANCES AND PERMITS

- A. The Contractor shall comply with all applicable ordinances and regulations and obtain the required permits. All grading work shall comply with Chapter 14, Articles 13, 14, 15 and 16, of the Revised Ordinances of the City and County of Honolulu, 1990, as amended and as specified herein.

- B. The Contractor shall comply with the provisions of Chapter 11-55 Water Pollution Control and Chapter 11-54 Water Quality Standards of the Hawai'i Administrative Rules, Department of Health, State of Hawai'i.

1.03 SOIL BORINGS

- A. Soil borings have not been performed.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01300 - SUBMITTALS.

- B. Certificates: The Contractor shall furnish to the Contracting Officer affidavits and descriptive literature including installation instructions from the manufacturers of geotextiles furnished and installed under this section, together with certifications stating that such materials delivered to the project conform to the requirements of this specification.

- C. Soils Inspection and Testing and Special Certifications:
 - 1. Testing of the fill material for conformance to the project specifications and monitoring of all backfill, including testing for compaction, shall be the

responsibility of the Contractor. The subgrade preparation and the placement and compacting of yard and structural fill shall be tested by an independent licensed Soils Engineer or testing agency with a licensed Engineer under the supervision of the Contractor. The slab subgrade shall be tested prior to placement of the cushion material. All test results shall be submitted to the Contracting Officer for record purposes.

All costs for soils inspection and testing during construction shall be borne by the Contractor.

2. Testing shall be made throughout the area in accordance with these specifications and as recommended by the Contractor's Geotechnical Engineer for each compacted layer, including the subgrade and the backfill of trenches within the Work area. All test results must be approved by the Contractor's Soils Engineer or testing agency before the Contractor can proceed with placing of additional layers of fill or the placing of topsoil, cushion fill or base course.
 3. All footing excavations shall be observed by the Contractor's Geotechnical Engineer to verify that the actual subgrade soils material does not differ from the material identified in the Soils Report.
 4. Should imported fill be utilized on this project, the material shall be approved by the Contractor's Geotechnical Engineer as conforming to these specifications. A letter from the Contracting Officer's Soils Consultant approving the imported material shall be submitted to the Contracting Officer prior to delivery of the material to the job site.
 5. The Contractor's Geotechnical Engineer or testing agency shall prepare and submit to the Contracting Officer the post-grading report and certification required by the Department of Planning and Permitting for closure of the grading permit. Three (3) copies of the post-grading report and certification shall be provided to the Contracting Officer for record purposes.
 6. The Contractor's surveyor shall prepare and submit to the Contracting Officer the post-grading report and certification required by the Department of Planning and Permitting for closure of the grading permit. Three (3) copies of the surveyor's grading certification shall be provided to the Contracting Officer for record purposes.
- D. Field-Posted As-Built Drawings: Submit Field Posted as-built drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Yard Fill:

1. Imported yard fill materials shall be non-expansive soil, free from debris, hazardous, perishable or combustible materials, sod, and stones larger than 6 inches in maximum dimension and shall have a plasticity index not greater than 20. Any rock shall be well distributed in earth or other fine material with all voids filled and shall not be placed within 2 feet of the finished grade.
2. In the event that insufficient amount of yard fill is delivered from earthwork operations, the Contractor shall import the necessary materials without any additional cost to the Contracting Officer. Such imported materials shall be subject to approval of the Contracting Officer and shall meet the requirements as specified for the materials.
3. The onsite volcanic material may be reused as backfill and in compacted fills provided that the material shall be crushed to less than 3 inches in maximum dimension for reuse. The volcanic material shall be crushed to a well-graded condition meeting the following requirements:

SIEVE SIZE	PERCENT PASSING
3-INCH	1 00
No. 4	30 to 60
No. 200	1 0 to 30

- B. The processed material shall have a CBR value of greater than 20 and a CBR expansion value of 1.0 percent or less.
- C. Structural Fill:
 1. Structural fill material shall be non-expansive, granular, well-graded material with a 3-inch maximum particle size and between 10 and 30 percent by weight passing the No. 200 sieve. The fill material shall be free from clumps of soil, organic debris, adobe or other deleterious matter.
 2. The plasticity index for the fine portion of soil shall be less than 15. The CBR value shall not be less than 20 and CBR expansion value shall not be more than 1.0 percent when tested in accordance with ASTM D1883. Recycled asphalt pavement shall not be used for structural fill under the building.
- D. Cushion Fill Under Concrete Slabs: Cushion fill under concrete slabs shall be No. 67 aggregate. For interior slabs a vapor retarder shall be provided between the slab and cushion fill as described under Section 03300 - CAST-IN-PLACE CONCRETE.
- E. Cushion Material for Pipelines: Cushion material for water lines shall be S4C and for sewer lines shall be No. 67 aggregate.
- F. Topsoil: The Contractor shall deposit and spread a uniform 6-inch layer of screened topsoil around buildings and unpaved graded or grubbed areas. The topsoil shall pass a 1/2-inch screen and shall be lightly compacted to the finish elevations shown on the Drawings. All objectionable material shall be removed from the soil before placement. Approved existing soils may be used as topsoil.

The onsite material shall be excavated and stockpiled for use as topsoil. If there is insufficient onsite topsoil material, the Contractor shall import sufficient topsoil to meet the project requirements. Imported topsoil shall be friable soil of loamy character, free of refuse, weeds, nematodes or other deleterious extraneous matter. Imported topsoil must be approved by the Contracting Officer before delivery to the site.

G. Geotextile Fabrics:

1. General Requirements: Geotextile fabrics shall consist of long chain polymeric filaments composed of polypropylene, polyethylene or polyimide. The fabric may be woven or non-woven. The fabric shall be inert to chemicals found in the soil and shall meet the minimum physical property requirements listed below.

2. Geotextile fabrics for temporary silt fencing shall meet the following requirements:

Roll Width 3 feet

Tensile Strength (ASTM D-4632) 100 lb.

Mullen Burst Strength (ASTM D-3786) 275 psi.

Puncture Strength (ASTM D-4833) 60 lb.

Trapezoidal Tear (ASTM D-4533) 50 lb.

Permittivity (ASTM D-4491) 15 gal/min/sf

Grab Elongation (ASTM D-4632) 15%

Apparent Opening Size (ASTM D-4751) U.S. Sieve No. 20/30

3. Geotextile fabrics for weep holes material separation and subdrains shall meet the following requirements:

Tensile Strength (ASTM D-4632) 90 lb.

Mullen Burst Strength (ASTM D-3786) 185 psi.

Puncture Strength (ASTM D-3787) 55 lb.

Permittivity (ASTM D-4491) 150 gal/min/sf

Grab Elongation (ASTM D-4632) 50%

Apparent Opening Size (ASTM D-4751) U.S. Sieve No. 70

4. The geotextile shall be furnished in a protective wrapping which shall protect the fabric from damage during shipping, handling and exposure to sunlight. The geotextile fabric shall be stored in a dry condition.

PART 3 - EXECUTION

3.01 GENERAL

- A. No excavation or filling shall be undertaken until the area has been cleared and grubbed.
- B. Usable surface soil material shall be stripped from the site and stockpiled for use as topsoil.
- C. Install temporary silt fence and filter socks where shown on the drawing or ordered by the Contracting Officer. Remove silt fence and filter socks upon completion of grading.

- D. All excavation shall be protected and guarded against danger to life, limb and property.
- E. Shoring, cribbing and lagging, as required to safely preserve the excavations and earth banks from damages resulting from the work, shall be provided and installed by the Contractor.
- F. Precautions:
 - 1. The Contractor shall at all times control the grading around building areas so that the ground is adequately sloped to prevent any water from flowing into building areas and open trench excavations. All excavations shall be kept free from standing water.
 - 2. Lowering or raising of water table in areas where ground settlement or other detrimental effects may be induced is expressly prohibited. In such areas, the excavated spaces shall be sealed prior to the pumping of water or other approved means employed by the Contractor. The Contractor shall be responsible for disposal of the pumped liquids. Water from dewatering and other construction operations shall not be discharged directly into natural drainageways. The method of discharge shall comply with Department of Health Regulations.
 - 3. Water shall not be conducted onto adjacent building areas.
- G. Caution shall be exercised in all excavation work adjacent to existing trees which are to remain. All exposed fibrous and branch type roots shall be carefully pruned or saw-cut to the extent required for excavation work. Every effort shall be taken to preserve the existing trees and to minimize damage to said trees.
- H. Best Management Practice:
 - 1. The Contractor shall use the best management practices to reduce the amount of soil erosion resulting from the grading work.
 - 2. The work areas and haul roads, including roadways leading to the project site, shall be continuously watered to prevent the generation of dust. Granular materials shall be spread over all unpaved haul routes.
 - 3. All truck tires shall be free of mud before leaving the job site and entering a public roadway. The Contractor will clean all roads and the project's parking area of mud and dirt resulting from his operations at no additional cost to the Contracting Officer.
- I. Laying Out:
 - 1. The laying out of base lines, establishment of grades and staking out the entire work shall be done by a surveyor or a civil engineer licensed in the State of Hawai'i, at the Contractor's expense. The Contractor shall be solely responsible for their accuracy. The Contractor shall erect and maintain substantial batterboards showing construction of lines and levels.
 - 2. Should any discrepancies be discovered in the dimensions given in the plans, the Contractor shall immediately notify the Contracting Officer before proceeding any further with the work, otherwise he will be held responsible for

any costs involved in correction of construction placed due to such discrepancies. The Contractor shall be responsible for re- establishing property corners or survey control points which are destroyed by his operations.

3.02 EXCAVATION

A. General Requirements:

1. Excavation shall be done so as to obtain the elevations called for on the Drawings, allowing for fill, grading, topsoil and drainage away from buildings. Provide new swales as indicated.
2. The Contractor shall check plumbing, mechanical and electrical drawings for excavation of electrical trenches and plumbing lines.
3. Usable Materials as approved by the Contracting Officer shall be stockpiled (for later use as fill material) in a location designated by the Contracting Officer. The onsite clayey silt may be reused as backfill and in compacted fills provided all rock fragments larger than 3 inches in maximum dimension are removed.
4. Non-usable material such as mud, soft material, and expansive soils and excess materials shall become the property of the Contractor and shall be disposed of within the limits of the on-site disposal area or outside the project boundary limits at locations that have been approved by the City and County of Honolulu.
5. Blasting as a means of excavation shall not be permitted.
6. Unsuitable subgrade soil, as determined by the Contracting Officer, shall be excavated and removed by the Contractor.
7. Excavated, contaminated soils may be placed on site, within the designated disposal area as shown on the Drawings.
8. Excavated, surplus and materials that are unsuitable for re-use as backfill may be placed on site, within the designated disposal area, as shown on the Drawings. Surplus, and unsuitable excavated material, that exceeds the capacity of the disposal area shall be disposed off-site, at no additional cost to the Contracting Officer. Fill limits and final grading shall be as indicated on the Drawings.

B. Structural Excavation:

1. The excavation shall allow for at least 4 inches of cushion material under all concrete building slabs-on-grade. Where slabs will be subjected to machinery vibration, allow for a 6 inch layer of aggregate base course.
2. Excavation for footings and foundation shall have level beds, with stepped levels where necessary; localized soft spots shall be over- excavated and removed and the resulting void backfilled with approved structural fill properly compacted in accordance with these specifications.
3. Trenching for foundation footings and grade beams shall be made to the depth and dimensions called for on the Drawings. Bottom of trenches shall be level, solid and free from loose material. All foundations and footings must be carried to the depth shown on the plans. Over-excavation shall be corrected

as specified, for which no extra compensation will be allowed.

4. Any rock or hardpan encountered during excavation shall be broken out to a minimum depth of 4 inches below the bottom of the foundations.
 5. Subgrade soils under pavement areas shall be scarified to a minimum depth of 8 inches where possible, moisture conditioned to above optimum moisture, and compacted to at least 95 percent relative compaction. Where scarification of the subgrade is not practical, subgrade soils shall be proof-rolled with a minimum 15-ton vibratory drum roller for a minimum of eight passes.
 6. When suitable bearing for foundations is not encountered at the elevation indicated on Drawings, the Contractor shall immediately notify the Contracting Officer and shall not proceed any further until the necessary instructions for resumption of work have been received. The resulting increase or decrease in contract price through change order because of whatever change in quantity of excavated material for foundation shall be based on the net increase or decrease of the excavated material from the specified (or computed) original amount.
- C. Trench Excavation:
1. The Contractor shall do all necessary trench excavation to the depth required by the plans, including the excavation for pipe cushion. The excavation shall be unclassified and shall be performed regardless of the material encountered.
 2. The minimum width of the trench at the top of the pipe, when placed, shall be a width which will permit the proper construction of joints and compaction of backfill around the pipe. The sides of the trench shall be vertical, unless otherwise approved by the Contracting Officer. The maximum allowable width of the trench from the bottom of the excavation to a height of 12 inches above the pipe shall not exceed 12 inches on each side of the pipe when placed, unless otherwise approved by the Contracting Officer.
 3. When unsuitable material is encountered at the excavation, the Contractor shall be responsible for hauling and disposing of the material. The hauling and disposing shall be considered as incidental to the excavation work and no direct payment will be made. The Contracting Officer shall determine if the excavation material is unsuitable.
 4. The Contractor shall properly sheet and brace all trenches and excavations to render it safe and secure from possible slides. Trench excavations shall comply with the applicable OSHA requirements. Sheeting and bracing of trenches shall be considered as incidental to the excavation work and no direct payment will be made.
 5. All trenches shall be kept free from water during the installation, testing and backfilling of pipe. Discharge from dewatering operations shall not be drained directly onto any roadway or into any drainage system. The Contractor shall obtain the NOI (Notice of Intent) permit from the State Department of Health for any dewatering activities.

6. All open trenches shall be covered or barricaded during non-working hours. Traffic bearing covers shall be provided where applicable.
7. All excavated material shall be piled or stored so that it does not obstruct vehicular traffic or pedestrian walkways.

3.03 FILL AND BACKFILL

A. General Requirements:

1. Filling operations shall be performed so as to bring the entire project area to the finished grades shown on the Drawings, allowing for topsoil, concrete slab, or A.C. paving and base course.
2. At the time of compaction, the moisture content of fill and backfill material shall be such that the relative compactions specified can be obtained with the compacting equipment being used. At all times, it shall be the responsibility of the Contractor to employ such means as may be necessary to obtain a uniform optimum moisture content throughout the material being compacted.
3. Soft or loose soils that do not readily compact should be excavated and replaced with compacted structural fill.
4. Trenches within the building area shall be backfilled with structural fill and compacted to 95 percent of maximum density as determined by ASTM D1557.
5. In non-building areas with soil material, the exposed soil material should be scarified to a depth of 6 inches and recompact to a minimum of 90 percent compaction, as determined by ASTM D1557, prior to placement of the fill.

B. Yard Fill: Yard fill in areas where no concrete pavement or A.C. pavement is to be constructed shall be placed in layers, 8 inches or less in compacted thickness, and compacted to 95 percent of maximum density as determined by the ASTM D1557 procedure.

C. Structural Fill for Building and Pavement Areas: Granular structural fill shall be placed in 8 inch loose lifts and compacted to at least 95 percent compaction as determined by ASTM D1557.

D. Trench Backfill:

1. Bottom of Excavation to Midpoint of Pipe: All trenches and excavations shall be backfilled within a reasonable time after the pipes are installed. The backfill material from the bottom of the excavation to the midpoint of the pipe shall be pipe cushion material. The backfill shall be placed in loose layers not to exceed 6 inches in depth along each side of the pipe and shall be compacted. Special care shall be taken to secure thorough compaction under the haunches and at the sides of the pipe and to ensure that the backfill material is in continuous and uniform contact with the pipe. Backfilling shall be done in a manner which avoids causing any movement of the pipe sections.
2. Midpoint of Pipe to top of pipe cushion material (height varies - see plans):
 - a. The backfill material shall be pipe cushion material.

- b. The backfill shall be placed in loose layers not to exceed 6 inches in depth along each side of the pipe and compacted with hand or pneumatic tampers. The backfill shall be brought up evenly on each side of the pipe to an elevation of 6 inches over the top of the pipe, or such elevation as directed by the Contracting Officer. Backfilling shall be done in a manner that avoids causing any movement of the pipe sections.
3. From top of cushion material to Surface: Backfill from top of pipe cushion material to finished grade shall be select non-expansive material which contains less than 50 percent rock or hard lumps of earth. The greatest dimensions of rock or earth lumps permitted shall be 3 inches. Adobe, expansive soils or other unsuitable or deleterious materials shall not be used for backfill. For roadway areas, the upper 2 feet of the trench backfill shall be compacted to 95 percent of its maximum density and shall meet the requirements of the roadway pavement structure.

3.04 FINISH GRADING

- A. Outdoor areas not covered by buildings or pavement shall be graded to finish grade and contours, with an allowance for a 6-inch thick minimum layer of topsoil. Provide swales as shown on the plans.

3.05 TOPSOIL

- A. The Contractor shall deposit and spread a 6-inch layer of topsoil around buildings, including all areas other than A.C. paved or concrete slab areas, within the contract zone limits. The topsoil shall be lightly compacted to the finish elevations shown on the Drawings and grass planted as specified in Section 02920 - LAWNS AND GRASS.
- B. All slopes and swales for drainage shall be maintained in placing the topsoil.

END OF SECTION

SECTION 02444 - CHAIN LINK FENCE

PART 1 – GENERAL

1.01 SUMMARY

- A. The work to be performed under this section shall include the furnishing of materials, labor and equipment necessary to install all chain link fences and gates to the limits shown and as detailed on the plans and as specified herein.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All chain link fabric, posts, rails and accessories shall be hot dipped galvanized.
- B. Chain Link Fence Fabric shall be 9 GAGE, 2 inches unless otherwise shown or specified, be galvanized after fabrication and conform to ASTM A392, Class 1. The hot-dipped galvanized fabric shall contain not less than 1.2 ounces per sq. ft. of uncoated wire surface as determine by stripping test ASTM A90 and under the PREECE Test (ASTM A239), shall withstand 6 or more 1-minute dips before reaching the end point. All fabric shall be free from barbs, icicles or other hazardous projections resulting from galvanizing.
 - 1. The vinyl coating shall be thermally bonded to a thermoset bonding layer over the galvanized steel wire. Vinyl coating thickness shall be between 6 to 10 mils in accordance with ASTM F668, Class 2b.
- C. Tie Wire shall be 9- or 14-gauge soft annealed galvanized steel wire as called for on plans.
- D. Tension Bar shall be 1/4-inch thick by 3/4-inch wide mild steel bar for attachment of a fabric to a terminal post.
- E. Tension Band and Brace Band shall be formed from steel bands at least 1/8-inch thick by 3/4-inch wide.
- F. Tension Rod shall be 3/8-inch diameter mild steel rod threaded at one end and hooked 180 degrees at the other.
- G. Fittings:
 - 1. Post Cap and Eye Top shall be of one-piece construction and shall attach securely onto their respective posts.
 - 2. Coupling for top rails shall be outside sleeve type, at least 6 inches long and crimped at center.
 - 3. Rail Ends shall be snug, one-piece fittings for top and brace rails with holes to receive 5/16-inch bolts for securing to rail end bands.
 - 4. Double Rail Ends shall be similar to rail and except for an additional 1/2-inch hole to receive the hooked end of a tension rod.
- H. Composition and Finish of Metal Parts: All metal parts and fittings, including

tracks, gate hardware and frames, shall be of steel, malleable iron or wrought iron and shall be galvanized by the hot-dip process, after fabrication, in conformance with ASTM A153. The coating on all parts shall be continuous and smooth; that is, free from barbs, icicles or other projections. Bolts may be cadmium-plated in conformance with ASTM A165 instead.

- I. Gate Hardware:
 - 1. Hinges shall be heavy duty offset type permitting 180 degree swing using double clamping method of attachment and manufactured or forged malleable iron. All hinges shall be of appropriate size and capacity for the particular gate being supported and/or operated.
 - 2. Unless otherwise shown or specified, padlocking provisions for walk gate shall be a fork latch assembly, and that for a drive gate shall be an industrial drop rod guide and latch assembly as detailed in the plans.
- J. Post, Rails and Braces shall be the standard weight, hot-dipped galvanized, welded and seamless steel pipes conforming to ASTM A53. The zinc coating for all steel pipes shall conform to the requirements of ASTM A123.
- K. Tension Wire shall be of 7-gauge coiled spring or 6-gauge plain galvanized wire.
- L. Concrete for post footings shall be City and County Class B as specified in the DPW Standard Specifications.

PART 3 - EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

- A. General:
 - 1. Metal fencing and gates of the various types called for shall be erected in strict conformance with the plans and these specifications. The gates and hardware shall provide intended freedom of operation.
 - 2. Posts shall be plumb and in line. Welding shall be done in accordance with latest AWS standards. However, no splicing of posts, rails or braces shall be accepted. Where changes in line occur with an angle of deflection of 30 degrees or more, the change point will be considered a corner and a corner post shall be installed thereat. End, corner, and gate posts for fences with 5 feet and wider fabric shall be braced to the nearest line post with horizontal braces and tension rods. The horizontal braces shall be spaced midway between top rail and ground and securely fastened to posts as shown on plans. Where fencing is placed along a curve with radius of 50 feet, or less, horizontal braces (and tension rods) shall be installed between all posts in like manner. Pull posts, at maximum intervals of 300 feet, shall be braced and trussed in both directions as specified above.
 - 3. Field Touch-Ups: Field welds shall be cleaned of flux and spatter and all damaged galvanizing removed, all hazardous projections ground off, properly prepared, and then heavily coated with self-curing inorganic zinc coating. Manufactured coatings shall be applied in strict accordance with

manufacturer's printed specifications. Damage to existing painted surfaces shall be touched up.

- B. Fence Post, except as otherwise indicated or specified, shall be spaced not more than 10 feet apart. In curved fence sections having a radius of 50 feet or less, the posts shall be spaced as shown on the plans. Line posts shall be set so that top of the eye top shall be at the same height as the fence fabric.
- C. Top Rails shall pass through and bear firmly on base of eye tops, form a continuous brace from end to end of each stretch of fence, and be securely fastened to terminal posts with rail ends and brace bands. Couplings for the top rails shall be installed at intervals of 24 feet maximum.
- D. Chain Link Fabric:
 - 1. Chain link fabric shall be fastened on the side of the posts as designated and shall be mounted on the posts so that the bottom of the fabric will be no more above the finished grade than called for on the plans. High points of the ground shall be excavated as necessary. The fabric shall be stretched taut and securely fastened to the posts. Ends of wire ties shall be bent back so as not to be a hazard. Between posts the top edge of the fabric shall be fastened to the top rail and the lower edge to the tension wire with tie wire of size and at spacing as called for on the plans. Tension wire shall be stretched tight and shall be installed in a straight line between posts. Tension bars extending the full height of the fence and tension bar bands shall be used for fastening fabric to end, corner, pull and gate posts.
 - 2. Bolted tension bar bands shall be placed at top and bottom of tension bars and spaced at 12-inch intervals. Fastenings to line posts shall be made with tie wire of size and at spacing as called for on the plans.
- E. Gates shall be of size specified in plans. The corners of gate frames shall be fastened together and reinforced with malleable iron fittings or by welding as approved. Welds shall all be ground smooth. Where sizes permit, frames shall be galvanized after fabrication, otherwise all welds shall be finished as specified for touching up abrasions and field welds. All drive gate frames shall be cross-trussed with tension rods welded to frame at hooked end. Fabric specified for the fence shall be attached to the sides of the gate frame with full-height tension bars and tension bar bands at top, bottom and 12 inches + o.c. along tension bars with 9-gauge tie wires shall be placed along the top and bottom of the gate at corners and 6 inches + o.c. in between. For the drive gates, latches of the crop rod type shall be provided and shall be of the full gate height, arranged to engage the gate catch.

3.02 FINAL CLEAN-UP

- A. All exposed metal surfaces shall be clean and free of cement. All surplus earth resulting from metal fencing work that is not used in the grading work shall be cleaned up and disposed of off-site. All debris resulting from work of this section shall be removed from the site.

END OF SECTION

DIVISION 2 – SITE CONSTRUCTION

SECTION 02500 – WATER DISTRIBUTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Work includes all labor, materials, equipment, testing and inspection, and incidentals required to complete the work under this section as shown on the Drawings and as herein specified to construct the water system.
- B. The work includes, but is not limited to, the connection to the emergency water tank and the water distribution system including the building connection point located 5 feet from the structure.
- C. The water system shall be precisely laid out as indicated on the Drawings. Exercise care to avoid damage and impairment of existing utility lines. All damage resulting from the work shall be immediately corrected as directed by the Contracting Officer at no cost to the Contracting Officer.

1.02 REFERENCES

- A. The publications listed form a part of this specification to the extent referenced.
 - 1. Water System Standards, Board of Water Supply, City and County of Honolulu, State of Hawaii, 2002; hereinafter referred to as "Water System Standards." All references to measurement and payment do not apply to this project.
 - 2. Department of Health, State of Hawaii
 - a. Chapter 20 of Title II, Administrative Rules "Potable Water Systems," 1981.
 - b. Chapter 21 of Title II, Administrative Rules "Cross Connection and Backflow Control," 1981.
 - 3. American Water Works Association (AWWA):
 - a. AWWA C 601-68 Disinfecting Water Mains
 - b. AWWA C901 Standard for Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, ½-inch through 3-inch, for Water
 - 4. Safe Drinking Water Act, 40 CFR 141.
 - 5. American Society for Testing and Materials (ASTM) Publications:
 - a. ASTM B 32-89 Specifications for Solder Metal
 - b. ASTM B 88-89 Specifications for Seamless Copper Water Tube
 - c. ASTM D2737 Specification for Polyethylene Plastic Tubing

1.03 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.

- B. Product Data: Manufacturer's product data and installation instructions for each item to be incorporated into the water distribution system. All materials shall be provided with identification marks and data as required by the Water System Standards.
- C. Test Results: Test results as required in the Water System Standards for the water distribution system.
- D. Certificates:
 - 1. Before installation, furnish affidavits from the Manufacturers or supplier of pipe, fittings, etc., certifying that such materials delivered to the project conform to the requirements of these specifications.
 - 2. Certificate of Water System Chlorination.
 - 3. All other certificates as required by the Water System Standards.
- E. As-Built Drawings: Record drawings of the system, including elevations and material of construction.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall be in accordance with the Water System Standards Division 200-Materials. See also, BWS Section 402-Approved Materials List.
- B. Pipes and Fittings:
 - 1. Buried PVC mains (greater or equal to 4-inch inside pipe diameter) conforming to Water System Standard Section 204-Plastic Pipe (up to 12-inch mains).
 - 2. Water service laterals pipe and fittings shall be copper tubing, Type "K" conforming to ASTM B 88 or polyethylene tubing conforming to ASTM D2737, as noted on the plans. See Water System Standards Section 208.01 Copper Tubing. See Water System Standards Section 208.03 Plastic Tubing.
 - 3. Copper water service laterals solder shall conform to ASTM B 32, solder containing no more than 0.2 percent lead.
- C. Buried Warning and Identification Tape: Tape shall be polyethylene plastic or metallic core or metallic-faced, acid-and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3-inch minimum width, color coded as stated below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED POTABLE WATER LINE BELOW" or similar wording. Color and printing shall to be permanent, unaffected by moisture or soil. Warning tape color shall be "safety precaution blue".
- D. Valves: See Water System Standards Section 205 Valves and Appurtenances
- E. Valve Boxes: See Water System Standards Section 207 Cast Iron Manhole

Covers, Frames, Rungs, Eyebolts, Meter Box and Valve Box Covers and Frames, and Standpipe, and Section 403 Standard Details.

- F. All other materials not specified herein shall be as specified in the References.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work is to be performed. Should any condition be found unsuitable, no work shall be done until the unsatisfactory conditions have been corrected and are acceptable to the Contracting Officer. Proceeding with work will imply acceptance of the conditions by the Contracting Officer.

3.02 HANDLING AND STORAGE

- A. Handle and store products as per Manufacturer's instruction and the Water System Standards.

3.03 INSTALLATION

- A. Install water system in accordance with the Water System Standards and as indicated on the Drawings.
- B. Installation of Copper or Plastic Tubing and Fitting: Installation shall be in accordance with the Water System Standards, as modified to comply with the Safe Drinking Water Act.
- C. Installation of Buried Warning and Identification Tape: Install warning tape along the entire pipe alignment 18 inches below the finished grade.
- D. All other installations not specified herein shall be as specified in the References

3.04 TESTING AND INSPECTION

- A. After installation of the water system and prior to completion of the trench backfilling, test the system for leaks and flush under pressure to remove dirt, scale, or other objectionable materials.
- B. Conduct field tests in the presence of the Contracting Officer, provide three working days' notice prior to performing any testing.
- C. Test pipes and fittings in accordance with sections of Water System Standards Section 302 Water Mains and Appurtenances.

3.05 CHLORINATION

- A. Chlorinate the entire system in accordance with following:
 1. Chapter 20 of Title II, of the Department of Health, State of Hawaii.
 2. Water System Standards Section 302.29 Chlorination of Water Pipelines.
 3. C-601 of the AWWA.
- B. Make the tests and obtain the certificate as required by the authorities.

3.06 BACKFILLING

- A. Backfilling will not be permitted until the line has been tested and accepted by the Contracting Officer.

3.07 FINAL INSPECTION

- A. The water system relocation work shall be complete in every respect and operating as designed. Surplus materials shall have been removed from the site.

END OF SECTION

SECTION 02530 – SANITARY SEWERAGE

PART 1 – GENERAL

1.01 SUMMARY

- A. Work includes all labor, materials, testing and inspection, equipment, and incidentals required to complete the work under this section as shown on the Drawings and as herein specified, for the sanitary sewer system.

1.02 REFERENCES

- A. Department of Public Works, County of Kauai, City and County of Honolulu, County of Maui, County of Hawaii of the State of Hawaii:
 - 1. Standard Specifications for Public Works Construction, September 1986, as applicable to City and County of Honolulu, with the exception of paragraph "Measurement and payment"; referred to as "City Standard Specifications".
 - 2. Standard Details for Public Works Construction, September 1984, as applicable to City and County of Honolulu; referred to as "City Standards Details".
- B. Wastewater System Design Standards, Department of Environmental Services, City and County of Honolulu, July 2017.
- C. American Society for Testing and Materials (ASTM) Publications
 - 1. ASTM D 2729 - Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.03 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data: Manufacturer's product data with references to industry standards and installation instructions for each item to be incorporated into the system. Products shall be provided with identification marks and data as required by the City Standard Specifications. Submit manufacturer's catalog data for pipes and fittings.
- C. Test Reports: Test results for product tests performed in accordance with the City Standard Specifications.
- D. Certificates: Before installation, submit affidavits from the manufacturers or suppliers of pipe and fittings certifying that such materials delivered to the project conform to the requirements of these specifications.
- E. As-Built Drawings: Record drawings of the system, including elevations and material of construction shall be submitted in accordance with the requirements in SECTION 01300 - SUBMITTALS.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Materials shall be in accordance with the City Standard Specifications including but not limited to the following sections:
 - 1. Gravity Sewer Lines: Install polyvinyl chloride pipe (PVC).
 - a. PVC Sewer Pipe and Appurtenances Section 21
 - b. Sewer Manholes and Appurtenances Section 23
- B. Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape in rolls, 6 inches minimum width, color coded as stated below with warning and identification imprinted in bold black letters continuously and repeatedly over the entire tape length. Warning and identification to read, "CAUTION, BURIED SEWER PIPE LINE BELOW" or similar wording. Color of tape shall be green and printing shall be permanent, unaffected by moisture or soil.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which sewerage system is to be installed. Should any condition be found unsuitable, no work shall be done until the unsatisfactory conditions have been corrected and are acceptable to the Contractor. Proceeding with work will imply acceptance of the conditions by the Contractor.

3.02 INSTALLATION

- A. Gravity Sewer System:
- B. Handle and store materials as per manufacturer's instructions.
- C. Install the sanitary sewer system as per aforementioned sections of the City Standard Specifications and as noted on the Drawings.
- D. Once the mandrel test for deflection of the sewer line is completed as per the Standard Specifications, a golf ball shall be used to identify sags in the line. First the sewer line shall be flushed with a minimum of one pipe volume of clean, clear water. Upon flushing of the sewer lines, a golf ball or approved equal with a specific weight greater than that of water with a clearly marked line dividing the ball into two hemispheres shall be attached to a closed circuit television camera via a tether at a point along the hemisphere and pulled through the entire length of the gravity sewer. The closed circuit television camera shall be pulled facing backward with the golf ball and tether pulled behind so to view the golf ball with the camera. If the golf ball becomes submerged in water such that the marked line (or half or more of the golf ball) is below the water surface level, the section of pipe will not be considered acceptable. Any section of pipe found to be unacceptable will have to be repaired or replaced and retested. All material, equipment and labor required to perform the test and any replacement of pipe, including both labor and

materials, shall be provided by the Contractor at no cost to the Contracting Officer.

- E. Install buried warning identification tape in accordance with manufacturer's recommendations and as specified in Section 2.5.5 of the Wastewater System Design Standards.

3.03 FIELD QUALITY CONTROL

- A. The Contractor shall conduct field tests as required in the City Standard Specifications in the presence of the Contracting Officer. Provide a minimum of three (3) working days' notice prior to performance of the test. Soil material, bedding and backfill testing shall be performed by the Contractor's soils engineer.
- B. Provide test for leakage for the sewer pipes and appurtenances as per City Standard Specifications.

3.04 BACKFILLING

- A. Backfilling is not permitted until lines have been tested and accepted by the Contracting Officer.

3.05 FINAL INSPECTION

- A. The sewerage system shall be complete in every respect and operating as designed, including the cleaning and finishing of the lines. Surplus materials shall be removed. Lines and manholes shall be free from sand, silt, or other obstructions.
- B. Maintain the sewer system in a clear and operational condition until final acceptance by the Contracting Officer.

END OF SECTION

SECTION 02700 – BASE COURSES

PART 1 - GENERAL

1.01 SUMMARY

- A. Description: Furnish all labor, materials, testing and inspection, and equipment required for placing subbase, permeable separator, and base course on a prepared surface and furnishing and applying primer for untreated permeable base course.

- B. Related Sections:
 - 1. SECTION 02740 - FLEXIBLE PAVING

 - 2. SECTION 02780 - CONCRETE CURB AND GUTTERS

1.02 REFERENCES

- A. City and County of Honolulu, Department of Public Works, September 1986. Standard Specifications for Public Works Construction. All references to measurement and payment do not apply to this project.
 - 1. SECTION 29 SUBGRADE

 - 2. SECTION 30 SELECT BORROW FOR SUBBASE COURSE

 - 3. SECTION 31 AGGREGATE BASE COURSE

- B. ASTM International (ASTM)
 - 1. ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

 - 2. ASTM D6938 Standard Test Method for In-Place Density and Water Content of soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

 - 3. ASTM D6915 Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications

1.03 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.

- B. Provide samples, manufacturer's data, test reports, and materials' certifications, and delivery tags.

- C. Submit manufacturer's certificates of conformance for each type material base course.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aggregate base course shall be as specified in Section 31 Aggregate Base Course of the City Standard Specifications.

- B. Subbase material shall be as specified in Section 30 Select Borrow for Subbase Course of the City Standard Specifications.

PART 3 - EXECUTION

3.01 GENERAL

- A. Verify that all subgrades conform to Drawings and specifications. Any loose, soft or yielding areas shall be over-excavated to firm ground and replaced with air-dried borrow material and re-compacted to the specified density.

3.02 SUBGRADE PREPARATION

- A. City and County of Honolulu, Department of Public Works, September 1986. Standard Specifications for Public Works Construction. All references to measurement and payment do not apply to this project.

3.03 AGGREGATE BASE COURSE

- A. Construct the aggregate base course as indicated and in accordance with Section 31 of the City Standard Specifications.
- B. Submit field density test results from the Contractor's Geotechnical engineer for each 400 square yards of material placed in each lift or fraction thereof.

END OF SECTION

SECTION 02740 – FLEXIBLE PAVEMENT

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish all labor, materials, testing and inspection, and equipment required to complete the asphalt paving work as shown on the Drawings and as herein specified. Plans indicate 1.5" AC mill and 1.5" overlay. Surface preparation is required prior to milling due to the poor condition such as alligator cracks and weeds.

1.02 RELATED REQUIREMENTS

- A. SECTION 02700 - BASE COURSES

1.03 REFERENCE STANDARDS

- A. City and County of Honolulu, Department of Public Works, September 1986. Standard Specifications for Public Works Construction. All references to measurement and payment do not apply to this project.
 - 1. SECTION 33 - ASPHALT SURFACE TREATMENT
 - 2. SECTION 34 - ASPHALT CONCRETE PAVEMENT

1.04 SUBMITTALS

- A. See SECTION 01300 – SUBMITTALS.
- B. Provide samples, manufacturer's data, test reports, and materials' certifications, and delivery tags.
- C. Submit manufacturer's certificates of conformance for each type of bituminous material and for the job mix formula.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Asphalt concrete pavement shall be Mix #4 as specified in Section 34 of the City Standard Specifications.
- B. Prime coat and tack coat shall conform to Section 33 of the City Standard Specifications.
- C. AC crack joint sealant

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Remove dirt, loose aggregate, sediment and debris off AC pavement.
- B. Use a blower and/or power broom to remove dirt and sediment within AC cracks. Use a portable propane torch to burn weeds and kill exposed roots.

- C. Add a compatible AC pavement crack joint sealant to fill in open cracks. Follow manufacturer's recommendation.

3.02 ASPHALT CONCRETE PAVEMENTS

- A. If full-depth pavement repair is needed during construction, prepare the aggregate base course as specified in Section 33 of the City Standard Specifications. Apply the prime coat in quantities of not less than 0.20 gallon or more than 0.30 gallon per square yard. The prime coat shall be applied only when the aggregate base course contains moisture not in excess of the amount that will permit uniform distribution and penetration.
- B. A tack coat shall be applied to edges and surfaces of existing pavements, curbs, utility manhole frames, and concrete surfaces against which the bituminous wearing course is placed. Apply the tack coat at the rate in the manner as specified in Section 33 of the City Standard Specifications.
- C. Bituminous Wearing Course:
 - 1. Mixing of the wearing course shall be as specified in Section 34 of the Standard Specifications. During transport of the material, protect the mixture from the weather and prevent loss of heat. Do not haul over freshly placed material.
 - 2. Prior to placing the wearing course, prepare the surface as specified in Section 34 of the City Standard Specifications and herein.
 - 3. Spread, finish and compact the wearing course in accordance with Section 34 of the City Standard Specifications. Broadcasting or fining of the mixture over areas being compacted is not permitted.
 - 4. The same texture, density and smoothness are to be provided at joints as other sections of the course. Joints against existing pavement shall be as indicated. Clean or cut back contact surfaces if previously constructed pavements that have become coated with dust, sand or other objectionable material and apply tack coat as specified herein.
 - 5. Smoothness and surface tolerances for the compressed wearing course shall be as specified in Section 34 of the Standard Specifications. The Contract shall test for low areas in a manner acceptable to the Contracting Officer. Correct low or defective surface irregularities by cutting out faulty areas and replacing with fresh, hot mixture, and compacting the area to conform to the adjacent pavement.
 - 6. Compaction testing requirements shall be as specified in Section 34 of the City Standard Specifications.

3.03 CLEAN UP AND PROTECTION

- A. The Contractor shall be responsible for the paving and surfacing until acceptance by the Contracting Officer.
- B. Maintain the paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Repair all defective paving as directed by the Contracting Officer.

END OF SECTION

SECTION 02780 – CURBS AND GUTTERS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish all labor, materials, appliances, tools, equipment, facilities, testing and inspection, transportation, and services necessary for and incidental to performing all operations in connection with construction of cast-in-place concrete curbs and gutters as shown on the Drawings and specified herein.

1.02 RELATED REQUIREMENTS

- A. SECTION 02700 - BASE COURSES
- B. SECTION 02740 - FLEXIBLE PAVING
- C. SECTION 03300 - CAST-IN-PLACE CONCRETE

1.03 REFERENCE STANDARDS

- A. Standard Specifications for Public Works Construction, Department of Public Works, City and County of Honolulu, September 1986; hereinafter referred to as "Standard Specifications."
 - 1. SECTION 39 - PORTLAND CEMENT CONCRETE
 - 2. SECTION 41 - CONCRETE CURB AND GUTTER
 - 3. SECTION 48 - REINFORCING STEEL
- B. All references to measurement and payment do not apply to this project.
- C. ADA Standards for Accessible Design, Department of Justice, September 2010.
- D. American Society for Testing and Materials (ASTM) Publications:
 - 1. ASTM D 1752 Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

1.04 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Submit the name of the independent testing laboratory to be employed by the Contractor to perform concrete sampling and testing. The laboratory must be accepted by the Contracting Officer prior to commencing any concrete work.
- C. Submit manufacturer's certificates of compliance attesting that all aggregates, cement, reinforcing, joint materials and admixtures conform to the requirements herein specified.
- D. Submit three (3) compressive strength 28-day tests for each day's pour as sampled and tested by the accepted laboratory. The cost for all sampling, testing and resampling and testing shall be borne by the Contractor.

- E. Transit Mix Delivery Slips:
1. Keep records showing time and place of each pour of concrete, together with transit mix delivery slips certifying contents of the pour. The Contractor shall ensure that all stamps and log data are accurate, clear and legible, including the time stamp upon leaving the yard, the time of arrival at the job site, the time at the start of the unloading, the time unloading is finished, and the time of departure from the job site.
 2. Deliver the records and delivery slips to the Contracting Officer upon completion of the concrete placement work.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Forms:
1. Either steel or wood forms can be used at the option of the Contractor. Forms shall comply with Section 41 "Concrete Curb and Gutter" of the City Standards Specifications for concrete curbs and be of the size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use forms that are straight and free of distortion and defects, extending the full depth of concrete. Use flexible spring steel forms or laminated boards to form radius bends as required.
 2. Coat forms with form release agent which will not discolor or deface the surface of the concrete.
- B. Concrete materials shall conform to Section 41 "Concrete Curb and Gutter" of the City Standard Specifications. Concrete shall be Class B.
- C. Premolded Joint Filler: ASTM D 1752, Type I.
- D. Silicone Joint Sealer: Federal Specification TT-S-001543A and TT-S00230C.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which concrete curbs are to be installed. Notify the Contracting Officer, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Proof roll and prepare surface course and base courses in accordance with the requirements of Section 32 1100 "Base Courses." Do not begin concrete work until the Contractor's soils engineer has certified the areas are acceptable.
- C. Remove loose material from the compacted base course surface immediately before placing forms.

3.02 FORM CONSTRUCTION

- A. Set forms to the required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of the work, and so that

- forms can remain in place at least 24 hours after concrete placement.
- B. Check completed form work for grade and alignment to the following tolerances:
 - 1. Top of Form Units: Not more than 1/8-inch in 10 feet.
 - 2. Vertical Face: Longitudinal axis, not more than 1/8-inch in 20 feet.
 - 3. Construct the accessible route sidewalks and curb ramps as designated on the plans to meet Americans with Disabilities Act Accessibility Guidelines (ADAAG).
 - C. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

3.03 CURB AND GUTTER CONSTRUCTION

- A. All work shall be done in accordance with Section 41 Concrete Curb and Gutter of the City Standard Specifications for cast-in-place concrete curbs and gutter.
- B. Prepare subgrade and base courses in accordance with the requirements of Section 02700 Base Courses.
- C. Do not place concrete until base course has been certified by the Contractor's soils engineer and forms have been checked for line and grade. Moisten base course as required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around adjacent structures until these have been brought to the required grade and alignment.
- D. Place concrete using methods which prevent segregation of the mix, and with as little rehandling as possible. Consolidate concrete along the face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, and side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing and joint devices.
- E. Deposit and spread concrete in a continuous operation between transverse joints. If interrupted for more than ½ hour, place a construction joint in alignment with the score pattern.

3.04 JOINTS

- A. Construct transverse contraction joints for curbs at 12-foot intervals in accordance with Section 41 "Concrete Curb and Gutter" of the City Standard Specifications.
- B. Curb joints shall be constructed at right angles to the line of the curb.
- C. Any section of curbing with improper control joints or with saw cut joints not made within 24-hours of the concrete pour that develops cracks shall be removed proper control or expansion joints.

3.05 CURING

- A. Cure concrete by paper or curing compounds.

- B. Curing Compound:
 - 1. Apply immediately following completion of specified finishing.
 - 2. When applying compound, keep the surfaces damp but free from standing water.
 - 3. Cover surfaces with a uniform and even film of compound, as supplied. Apply in a single coat, using pressurized spray equipment, to achieve total coverage as recommended by manufacturer.
- C. Paper Curing: Paper cure concrete not otherwise permitted to be cured by curing compound as follows:
 - 1. Saturate curbs so that free moisture occurs over the entire area.
 - 2. After dampening, immediately cover curb with curing paper, lap 4 inches at joints and seal with adhesive tape or waterproof glue. Keep curing paper in place for not less than 10 calendar days. During curing period, scuffed or torn areas shall be promptly recovered with additional papers. Do not use any curing papers which contain a distinct tread design that may leave an impressed pattern on the curb.

3.06 PATCHING

- A. Within three days after stripping form work, fill and patch surface defects such as rock pockets, honeycombs, cracks, and holes. The Contracting Officer will distinguish between concrete which requires replacement or repair and surface defects which requires patching. Permission to patch any area will not construe as a waiver to the Contracting Officer's right to require complete removal of the defective work if the patching, in the opinion of the Contracting Officer, does not satisfactorily restore the quality and appearance of the surface.
- B. Chip away loose material from areas to be patched to a minimum depth of one inch and thoroughly wet for at least 6 inches surrounding the patch. Coat areas with thin brush coat of fine sand-cement grout followed by patching mortar. Prepare patching mortar of the same material and proportions as used for concrete, except remove coarse aggregate. Where exposed concrete is to remain unpainted, make trial patches using combinations of white cement and cement used in concrete mix and allow to set up in order to verify that the patching mortar matches the color of the adjacent concrete surface. Keep water in the mix to a minimum. Do not retemper mortar by adding water. Allow mortar to stand for one hour prior to use and mix to prevent setting. Compact mortar thoroughly into place and screed to leave patch slightly higher than surrounding surfaces. Leave area undisturbed for 1 to 2 hours to permit initial shrinkage. Then finish patch to match adjacent surfaces.

3.07 DEFECTIVE WORK, REPAIRS AND PROTECTION

- A. Finish which is not true to line and plane, (maximum 1/8 inch deviation in 10 feet), which is not in conformance with specified finish and appearance requirements, which exceeds specified tolerances, which does not properly connect to adjoining work, which does not slope to drain and which has been improperly cured, will be deemed as defective. Remove defective work and replace with proper work.

- B. Protect concrete from damage until acceptance of work. Exclude traffic and dead loads from the surface for at least 10 days after placement. When construction traffic is permitted, maintain concrete work as clean as possible by removing surface stains and spillage of materials as they occur.

3.08 CLEANING

- A. Wash curbs free of stains, discolorations, dirt and other foreign material just prior to final inspection. Conform to the requirements for cleaning and protection in Section 02740 "Flexible Pavement."

END OF SECTION

SECTION 02800 –PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Work includes all labor, materials, equipment, and incidentals required to complete the work under this section as shown on the Drawings and as herein specified for pavement markings.

1.02 REFERENCE STANDARDS

- A. Standard Specifications for State of Hawaii Department of Transportation, 2005.

1.03 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Certificate of Compliance: Submit for all materials.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Traffic paint shall conform to the requirements of HDOT Standard Specification Section 755.01 "White and Yellow Traffic Paint"

PART 3 - EXECUTION

- A. Install paint and pavement markers in roadways per HDOT Standard Specification Section 629 "Pavement Markings."

END OF SECTION

DIVISION 03 - CONCRETE

SECTION 03300 - CAST-IN-PLACE CONCRETE

Part 1 - GENERAL

1.01 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.02 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and silica fume.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Reinforcing steel - Certified mill test results or laboratory test results. Indicate bar size, yield strength, ultimate tensile strength, elongation, and bend test. Provide chemical composition for rebars that are to be welded.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mix water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1. Form materials and form-release agents.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 3. Curing materials.
 - 4. Floor and slab treatments.
 - 5. Bonding agents.
 - 6. Adhesives.
 - 7. Joint-filler strips.

8. Repair materials.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C94/94M requirements for production facilities and equipment.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 to conduct the testing indicated, as documented according to ASTM E548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- D. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- E. ACI Publications: Comply with the following unless more stringent provisions are indicated and maintain a copy at the field office.
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - 3. ACI 347R "Guide to Formwork for Concrete"

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Comply with ACI 347R. Provide new or good finish form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other ACI 347R approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1, or better.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Form oils or waxes shall not be used for concrete surfaces intended to be painted.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable, or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes not larger than 1 ½ inches in diameter in concrete surface.

2.02 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed, unless otherwise noted on the drawings.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- C. Steel Bar Mats: ASTM A184/A184M, assembled with clips.
 - 1. Steel Reinforcement: ASTM A615/A615M, Grade 60, deformed.
- D. Deformed-Steel Wire: ASTM A1064/A1064M.
- E. Deformed-Steel Welded Wire Fabric: ASTM A497/A497M, flat sheet.

2.03 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place that will not puncture the vapor retarder. Use plastic straps or brightly colored tie wires to secure reinforcing. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar support contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports. Refer to paragraph 3.06 for chair support spacing.
- B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

2.04 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I-II.
- B. Pozzolans
 - 1. Fly Ash: ASTM C618, Class C or F.
 - 2. Blended Hydraulic Cement: ASTM C595/C595M.
- C. Normal-Weight Aggregate: ASTM C33, uniformly graded, and as follows:

1. Class: Moderate weathering region, but not less than 3M.
 2. Aggregate Size: No. 67 (3/4 inch to No. 4).
- D. Size of Coarse Aggregate: Except when otherwise specified or permitted, maximum size of coarse aggregate shall not exceed three-fourths of the minimum clear spacing between reinforcing bars (or bundled bars), one-fifth of the narrowest dimension between the sides of forms, or one-third of the thickness of slabs or toppings.
- E. Water: Potable and complying with ASTM C94/C94M. Use only potable water for job site mixing.

2.05 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
- B. Air-Entraining Admixture: ASTM C260/C260M.
- C. Water-Reducing Admixture: ASTM C494/C494M, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C494/C494M , Type F.
- E. Water-Reducing and Accelerating Admixture: ASTM C494/C494M , Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C494/C494M , Type D.

2.06 FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete, complying with ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches long.

2.07 CURING MATERIALS AND EVAPORATION RETARDERS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B.

2.08 RELATED MATERIALS

- A. Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- B. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- C. Sleeves:
 - 1. Schedule 40 pipe, galvanized per ASTM A53/A53M.
 - 2. Schedule 40 PVC Pipe.

2.09 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
 - 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
- B. Pedestals and Footings:
 - 1. Compressive Strength (28 Days): 4,000 psi.
- C. Slab-on-Grade:
 - 1. Compressive Strength (28 Days): 4,000 psi.
- D. Equipment pads on grade:
 - 1. Compressive Strength (28 Days): 4,000 psi.
- E. Retaining Walls
 - 1. Compressive Strength (28 Days): 4,000 psi.
- F. Cementitious Materials: For concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.
- G. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
- H. Maximum Water-Cementitious Materials Ratio: 0.40 for corrosion protection of steel reinforcement in concrete exposed to chlorides from deicing chemicals, salt, saltwater, brackish water, seawater, or spray from these sources.
- I. Limit water-soluble, chloride-ion content in hardened concrete per ACI 318 Chapter 4 for corrosion protection of reinforcing steel.
- J. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate.
 - 1. Use synthetic fiber reinforcement for exterior concrete sidewalks on grade and in other areas identified in the contract documents.
- K. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixes where indicated.

2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, and ASTM C1116/C1116M and furnish batch ticket information. Batch ticket information shall include design mix reference, water that can be added at the jobsite, and admixtures. For transit mixing, complete not less than 70 revolutions of the drum at the manufacturer's rated mixing speed. Discharge concrete into its final position within 90 minutes after introduction of batch water to the cement. If a retarder admixture is used, the discharge time limit of 90 minutes may be increased by the time specified for retardation by the admixture manufacturer or the concrete supplier. Mix concrete a minimum of one minute at mixing speed immediately prior to discharge.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials according to ASTM C94/C94M . Mix concrete materials in appropriate drum-type batch machine mixer.
 1. For mixer capacity of 1 cu. yd. or less, continue mixing at least one and one-half minutes, but not more than five minutes after all ingredients are in mixer, before any part of batch is released.
 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of concrete placement in structure.
 4. Hand mixed concrete will not be allowed.

PART 3 - EXECUTION

3.01 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class C, 1/2 inch.
- D. Construct forms to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, recesses, and the like, for easy removal.
 - 1. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds. Maintain the integrity of the vapor retarder membrane.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor bolts, accurately located, to elevations required.
 - 2. Install inserts, hangers, metal ties, nailing strips, blocking, grounds and other fastening devices needed for attachment of other work.

- B. Locate electrical or mechanical conduits and fittings so that the strength of the concrete member is not impaired. "Conduits" include pipes, ducts, and electrical conduits. Unless required otherwise on the Drawings, conform to the following:
 - 1. Concrete Slabs on Grade: Do not embed conduits within the thickness of any concrete slab on grade. Place conduits in the subgrade below the concrete slabs.
- C. Obtain Contracting Officer approval to install conduit or pipe penetrations that may unduly impair the strength of the structural member (for example, multiple pipe penetrations near the face of a column).

3.03 REMOVING AND REUSING FORMS

- A. General: Formwork that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained. The 24 hour period may be reduced to 12 hours in compliance with ACI 347R with prior approval from the Contracting Officer.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Contracting Officer.

3.04 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Shop or field-weld reinforcement according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.05 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Contracting Officer.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 3. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.
1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.06 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed. Provide one day notification to Contracting Officer for each scheduled pour.
- B. Before placing concrete, water may be added at Project site, subject to limitations of ACI 301. Up to two gallons of water per cubic yard of concrete may be added at the jobsite provided the approved design mix accommodates the additional water.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.
- C. Convey concrete from mixer to the place of final deposit rapidly by methods that prevent segregation or loss of ingredients and will ensure the required quality of concrete. Use conveying equipment, conveyors, hoppers, baffles, chutes, pumps that are sized and designed to prevent cold joints from occurring and prevent segregation in discharged concrete. Clean conveying equipment before each placement.
- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- E. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used

to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.07 CONCRETE SLABS ON GRADE

- A. For exterior areas, unless specified elsewhere, place concrete floor slabs directly over granular fill or compacted fill] and reinforce slabs with synthetic fibers. Provide isolation and contraction joints where detailed and, at intersections, corners and at abutments. Place contraction joints not more than 40 feet apart, unless detailed otherwise.
 1. Finish concrete true to grade, section, and cross slope for sloped or crowned walks at 1.5% (1% minimum and 2% maximum). Round edges to 1/8" radius except saw-cut joints. Finish steps in connection with walks with same finish as walks.

3.08 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
 1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
 2. Do not apply rubbed finish to smooth-formed finish.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Contracting Officer before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.

- c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moist cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moist cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
3. Curing Compound: Apply uniformly in continuous operation by spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application where recommended by the manufacturer. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions. Defer joint filling as long as possible. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid epoxy joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas. Remove and replace concrete that cannot be repaired and patched to Contracting Officer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16(1.2-mm) sieve, using only enough water for handling and placing.

- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Contracting Officer.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4-inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 5. Repair defective areas, except random cracks and single holes 1-inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair random cracks and single holes 1-inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Contracting Officer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Contracting Officer's approval.

3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:
 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
 - a. When frequency of testing will provide fewer than five compressive strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C231/C231M, pressure method, for normal-weight concrete; ASTM C173/C173M, one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 4. Concrete Temperature: ASTM C1064/C1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
 - a. Cast and field cure one set of four standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C39/C39M; test two laboratory-cured specimens at 7 days and two at 28 days.
 - a. Test two field-cured specimens at 7 days and two at 28 days.

- b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.
- C. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Contracting Officer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.
- E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Contracting Officer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Contracting Officer.

END OF SECTION

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. SECTION 09250 - GYPSUM BOARD ASSEMBLIES: Sealing acoustical and sound-rated walls and ceilings.

1.03 REFERENCE STANDARDS

- A. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants 2018 (Reapproved 2022).
- B. ASTM C834 - Standard Specification for Latex Sealants 2017 (Reapproved 2023).
- C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2023.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016 (Reapproved 2023).
- G. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2023.
- H. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2022).

1.04 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.

5. Substrates for which use of primer is required.
 6. Sample product warranty.
 7. Certification by manufacturer indicating that product complies with specification requirements.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
 - D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
 - E. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
 - F. Field Quality Control Log: Submit filled-out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
 - G. Installer's qualification statement.
 - H. Executed warranty.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 1. Adhesion Testing: In accordance with ASTM C794.
 2. Compatibility Testing: In accordance with ASTM C1087.
 3. Allow sufficient time for testing to avoid delaying the work.
 4. Deliver sufficient samples to manufacturer for testing.
 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
- E. Field Quality Control Plan:
 1. Field testing agency's qualifications.

2. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

1.06 WARRANTY

- A. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Nonsag Sealants:
 1. Dow: www.dow.com/#sle.
 2. Pecora Corporation: www.pecora.com/#sle.
 3. Sika Corporation: www.usa.sika.com/#sle.
 4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle, or approved equal.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Do Not Seal:
 - a. Intentional weep holes in masonry.
 - b. Joints indicated to be covered with expansion joint cover assemblies.
 - c. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
 - d. Joints where sealant installation is specified in other sections.
 - e. Joints between suspended ceilings and walls.
- B. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
 1. Wall and Ceiling Joints in Nonwet Areas: Acrylic emulsion latex sealant.
 2. Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion.
 3. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
- C. Interior Wet Areas: Restrooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.
- D. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
- B. Colors: As indicated on drawings or match adjacent surface.

2.04 NONSAG JOINT SEALANTS

- A. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
 - 2. Color: Match adjacent finished surfaces.
 - 3. Products:
 - a. Dow; DOWSIL 999-A Building and Glazing Sealant: www.dow.com/#sle.
 - b. Pecora Corporation; Pecora 860: www.pecora.com/#sle.
 - c. Sika Corporation; Sikasil GP: www.usa.sika.com/#sle.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: White.
 - 2. Products:
 - a. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com/#sle.
 - b. Sika Corporation; Sikasil GP: www.usa.sika.com/#sle.
- C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
 - 1. Color: Standard colors matching finished surfaces, Type OP (opaque).
 - 2. Products:
 - a. Pecora Corporation; AC-20 +Silicone: www.pecora.com/#sle.
 - b. Tremco Commercial Sealants & Waterproofing; Tremflex 834: www.tremcosealants.com/#sle.

2.05 ACCESSORIES

- A. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- B. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- C. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

- D. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

- A. See SECTION 01400 - QUALITY REQUIREMENTS for additional requirements.

- B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

DIVISION 8 - DOORS AND WINDOWS

SECTION 08410 - ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront.

1.02 RELATED REQUIREMENTS

- A. SECTION 08810 - GLAZING: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- D. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- E. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.04 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Aluminum-Framed Storefronts:
 - 1. Arcadia, Inc: www.arcadiainc.com/#sle.
 - 2. Kawneer North America: www.kawneer.com/#sle.
 - 3. Oldcastle BuildingEnvelope: www.oldcastlebe.com/#sle, or approved equal.

2.02 BASIS OF DESIGN - FRAMING FOR MONOLITHIC GLAZING

- A. Center-Set Style:
 - 1. Basis of Design: Boyd Aluminum; Series B425, 2 by 4-1/2 inch Storefront Center-Set Style, Non-Thermally Broken: www.boydaluminum.com/#sle.
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another manufacturer.

2.03 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Finish: Class I natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - 2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 4. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 5. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 6. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.04 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections.
 - 1. Glazing Stops: Flush.
- B. Glazing: See SECTION 08810 - GLAZING.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).

- B. Fasteners: Stainless steel.
- C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.06 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.02 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.

3.03 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08810 - GLAZING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Glazing units, glass for interior storefront.
- B. Glazing compounds.

1.02 RELATED REQUIREMENTS

- A. SECTION 08410 - ALUMINUM-FRAMED STOREFRONTS.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015 (Reaffirmed 2020).
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- E. ASTM C1036 - Standard Specification for Flat Glass 2021.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016 (Reapproved 2023).
- H. GANA (SM) - GANA Sealant Manual 2008.

1.04 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data on Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

1.05 WARRANTY

- A. See SECTION 01300 - SUBMITTALS for additional warranty requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Float Glass Manufacturers:
 - 1. Guardian Glass, LLC: www.guardianglass.com/#sle.
 - 2. Pilkington North America Inc: www.pilkington.com/na/#sle.
 - 3. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle, or approved equal.

2.02 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Kind FT - Fully Tempered Type: Complies with ASTM C1048.

2.03 GLAZING UNITS

- A. Double-Glazed Sputter-Coated Insulating Glass Units:
 - 1. Outboard Lite: Sputter-coated Clear Float glass.
 - a. Clear Float Glass: ASTM C1036, Type 1, Class 1, Quality q3.
 - b. Coating on Surface No. 2: Guardian SunGuard SunGuard® SNX 51/23, or approved equal.
 - c. Glass Thickness: 1/4" (6mm).
 - d. Heat Treatment: Kind FT; CPSC 16CFR-1201; ANSI Z 97.1 as necessary to meet applicable codes and performance requirements.
 - 2. Air Space: 12.7mm wide, hermetically sealed, dehydrated 90% Argon space.
 - 3. Inboard Lite: Clear Float glass.
 - a. Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
 - b. Glass Thickness: 1/4" (6mm).
 - c. Coating on Surface No. 4: No coating
 - d. Heat-Treatment: Kind FT; CPSC 16CFR-1201; ANSI Z 97.1 as necessary to meet applicable codes and performance requirements.
 - 4. Glass Unit Performance Characteristics:
 - a. Visible Light Transmittance: 51 %
 - b. Visible Light Reflectance Outdoors: 14 %
 - c. Winter U-Value Nighttime: 0.238 Btu/hr·ft²·F
 - d. Summer U-Value Daytime: 0.209 Btu/hr·ft²·F
 - e. Solar Heat Gain Coefficient: 0.23
- B. Edge Seals: ASTM E 2188, with aluminum spacers, dual-sealed with a primary seal of polyisobutylene and a secondary seal of silicone sealant for glass-to-spacer seals.

2.04 GLAZING COMPOUNDS

- A. Polyurethane Sealant: Single component, chemical curing, nonstaining, nonbleeding; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.
- B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25 15 to 25; color as selected color as selected.

2.05 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.
- B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
 - 1. Width: As required for application.
 - 2. Thickness: As required for application.
 - 3. Spacer Rod Diameter: As required for application.
- C. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal.

PART 3 - EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 INSTALLATION, GENERAL

- A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

3.03 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

- A. Application - Interior Glazed: Set glazing infills from the interior of the building.
- B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.

- C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
- E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch (610 mm) intervals, 1/4 inch (6 mm) below sight line.
- F. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.
- G. Carefully trim protruding tape with knife.

3.04 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.05 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09110 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Metal partition framing.
- B. Framing accessories.

1.02 RELATED REQUIREMENTS

- A. SECTION 07920 - JOINT SEALANTS: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- B. SECTION 09250 - GYPSUM BOARD ASSEMBLIES: Execution requirements for anchors for attaching work of this section.

1.03 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members 2016, with Supplement (2020).
- B. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing 2020.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- E. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2022.

1.04 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing, Connectors, and Accessories:

1. CEMCO: www.cemcosteel.com/#sle.
2. ClarkDietrich: www.clarkdietrich.com/#sle.
3. MarinoWARE: www.marinoware.com/#sle.
4. SCAFCO Corporation: www.scafco.com/#sle.
5. The Steel Network, Inc: www.SteelNetwork.com/#sle, or approved equal.

2.02 FRAMING MATERIALS

- A. Fire-Resistance-Rated Assemblies: Comply with applicable code and as indicated on drawings.
- B. Non-Loadbearing Framing System Components: AISI S220; sheet steel, of size and properties necessary for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (L/240 at 240 Pa).
 1. Studs: C-shaped with flat faces.
 - a. Products:
 2. Runners: U-shaped, sized to match studs.
 3. Ceiling Channels: C-shaped.
 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).
- C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
- D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code when evaluated in accordance with AISI S100.
 2. Material: ASTM A653/A653M steel sheet, SS Grade 50.
 3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
- E. Non-Loadbearing Framing Accessories:
 1. Fasteners: ASTM C1002 self-piercing self-tapping screws.
 2. Anchorage Devices: Powder actuated.

2.03 FABRICATION

- A. Fabricate assemblies of framed sections to sizes and profiles required as shown on the Drawings.
- B. Fit, reinforce, and brace framing members to suit design requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that rough-in utilities are in proper location.

3.02 INSTALLATION OF STUD FRAMING

- A. Extend partition framing to structure..
- B. Align and secure top and bottom runners at 24 inches (600 mm) on center UON.
- C. Install studs vertically at spacing indicated on drawings.
- D. Align stud web openings horizontally.
- E. Secure studs to tracks using fastener method. Do not weld.
- F. Install double studs at wall openings, door and window jambs, not more than 2 inches (50 mm) from each side of openings.
- G. Coordinate erection of studs with requirements of door frames; install supports and attachments.
- H. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- I. Furring: Install at spacing and locations shown on drawings. Lap splices a minimum of 6 inches (150 mm).

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet (3 mm in 3 m).

END OF SECTION

SECTION 09250 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Gypsum wallboard.
- C. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. SECTION 09110 - NON-STRUCTURAL METAL FRAMING.
- B. SECTION 07920 - JOINT SEALANTS: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017 (Reapproved 2022).
- B. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board 2004 (Reapproved 2020).
- C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- D. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base 2019.
- E. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- G. ASTM E413 - Classification for Rating Sound Insulation 2022.
- H. GA-216 - Application and Finishing of Gypsum Panel Products 2021.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the installation of gypsum board assemblies with size, location, and installation of service utilities.

1.05 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data:
 - 1. Provide data on gypsum board, accessories, and joint finishing system.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.
- B. Store metal products to prevent corrosion.

PART 2 - PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.
- B. Interior Partitions: Provide completed assemblies as indicated on the drawings.

2.02 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company: www.americangypsum.com/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com/#sle.
 - 3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
 - 4. Gold Bond Building Products, LLC provided by National Gypsum Company : www.goldbondbuilding.com/#sle.
 - 5. PABCO Gypsum: www.pabco gypsum.com/#sle.
 - 6. USG Corporation: www.usg.com/#sle, or approved equal.
- B. Gypsum Wallboard (GYP BD-1): Type X paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut; tapered long edges.
 - 1. Application: Use for vertical surfaces, unless otherwise indicated.
 - 2. Thickness:
 - a. Vertical Surfaces: 5/8 inch (16 mm).
 - 3. Mold-Resistant, Paper-Faced Products (GYP BD-2):
 - a. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: www.certainteed.com/#sle.
 - b. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard: www.gpgypsum.com/#sle.
 - c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board: www.goldbondbuilding.com/#sle.

- d. USG Corporation; Sheetrock Brand Mold Tough Firecode SCX Panels 5/8 in. (15.9 mm): www.usg.com/#sle.

2.03 GYPSUM BOARD ACCESSORIES

- A. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant; see SECTION 07920 - JOINT SEALANTS.
- B. Finishing Accessories: ASTM C1047, extruded aluminum alloy (6063 T5) or galvanized steel sheet ASTM A924/A924M G90, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Products:
 - a. Phillips Manufacturing Co; Zinc Control Joint No. 093: www.phillipsmfg.com/#sle.
 - b. Trim-tex, Inc; Tear Away L-bead: www.trim-tex.com/#sle.
 - c. USG: Beadex Paper faced Trim B1XW corner reinforcement.
 - d. USG: Beadex Paper faced Trim B4
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- D. Nails for Attachment to Wood Members: ASTM C514.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For nonrated assemblies, install as follows:
 - 1. Single-Layer Applications: Screw attachment.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 - 1. Not more than 30 feet (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.
- B. Corner Beads: Install at external corners, using longest practical lengths.

- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.05 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 3: Walls to receive textured wall finish.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).

3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

3.07 PROTECTION

- A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

SECTION 09300 - TILING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Tile for wall applications.
- B. Cementitious backer board as tile substrate.
- C. Tile trim.
- D. Setting, grout, and accessory materials.

1.02 RELATED REQUIREMENTS

- A. SECTION 07920 - JOINT SEALANTS: Sealing joints between tile work and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

- A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017 (Reaffirmed 2022).
- B. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2017.
- C. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2021).
- D. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.
- E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2019.
- F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2021.
- G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 1999 (Reaffirmed 2019).
- H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2019).

- I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2019).
- J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).
- K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- L. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2019).
- M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2021).
- N. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.
- O. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.
- P. ANSI A118.1 - American National Standard Specifications for Dry-Set Cement Mortar; 2019.
- Q. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2019.
- R. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2019.
- S. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2014 (Reaffirmed 2019).
- T. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.
- U. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

- C. Shop Drawings: Indicate tile layout, perimeter conditions, junctions with dissimilar materials, control and expansion joints, ceramic accessories, and setting details.
- D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches (457 by 457 mm) in size illustrating pattern, color variations, and grout joint size variations.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Company specializing in performing tile installation, with minimum of five years of documented experience.

PART 2 - PRODUCTS

2.01 TILE

- A. Ceramic Wall Tile: ANSI A137.1 standard grade; product, size, and color to match existing.

2.02 TRIM AND ACCESSORIES

- A. Trim: Matching bullnose shapes in sizes coordinated with field tile as indicated on drawings.
 - 1. Applications:
 - a. Open Edges: Bullnose.
 - b. Floor to Wall Joints: Cove base.
 - 2. Manufacturers: Same as for tile.

2.03 SETTING MATERIALS

- A. Provide setting, grout materials, and accessory materials from same manufacturer.
- B. Manufacturers:
 - 1. Custom Building Products: www.custombuildingproducts.com/#sle.
 - 2. LATICRETE International, Inc: www.laticrete.com/#sle.
 - 3. Mapei Corporation, or approved equal.
- C. Dry-Set Portland Cement Mortar Bond Coat: ANSI A118.1.

2.04 GROUTS

- A. Provide setting and grout materials from same manufacturer.
- B. Standard Grout: ANSI A118.6 standard cement grout, match existing.
 - 1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
 - 2. Use sanded grout for joints 1/8 inch (3.2 mm) wide and larger; use unsanded grout for joints less than 1/8 inch (3.2 mm) wide.

2.05 MAINTENANCE MATERIALS

- A. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
 - 1. Composition: Water-based colorless silicone.
 - 2. Products: As recommended by grout manufacturer.

2.06 ACCESSORY MATERIALS

- A. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
 - 1. Fluid or Trowel Applied Type:
 - a. Material: Synthetic rubber or Acrylic.
 - b. Thickness: 25 mils (0.6 mm), minimum, dry film thickness.
- B. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/4 inch (6 mm) thick; 2 inch (51 mm) wide coated glass fiber tape for joints and corners.
 - 1. Products:
 - a. Custom Building Products; WonderBoard Lite Backerboard: www.custombuildingproducts.com/#sle.
 - b. PermaBASE Building Products, LLC provided by National Gypsum Company; PermaBase Cement Board: www.goldbondbuilding.com/#sle.
 - c. USG Corporation; Durock: www.usg.com/#sle, or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep control and expansion joints free of mortar, grout, and adhesive.
- H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- I. Grout tile joints unless otherwise indicated.
- J. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over wood substrate with backer board underlayment, install in accordance with TCNA (HB) Method F144, for cementitious backer boards, with standard grout.

3.05 INSTALLATION - WALL TILE

- A. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09911 - EXTERIOR PAINTING

PART 1 - GENERAL

1.02 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.03 RELATED REQUIREMENTS

- A. SECTION 09912 - INTERIOR PAINTING.

1.04 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

1.05 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
- B. Paints:
 - 1. Sherwin-Williams Company: www.sherwin-williams.com/#sle, or approved equal.
- C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including primed wood.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Exterior Alkyd Enamel.
 - a. Products:
 - 1) Sherwin Williams Pro Industrial Waterbased Alkyd Urethane B53 Series (Gloss or Semi-Gloss) or approved equal.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Latex Primer for Exterior Wood.
 - a. Products: Sherwin-Williams PrepRite ProBlock Primer B51 or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

3.02 APPLICATION

- A. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.

- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION

SECTION 09912 - INTERIOR PAINTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. SECTION 09911 - EXTERIOR PAINTING.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- E. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.04 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 2. Cross-reference to specified paint system products to be used in project; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Paint and Finish Materials: 1 gal (4 L) of each color; from the same product run, store where directed.
 2. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 fc (860 lux) measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: In compliance with requirements, provide Sherwin Williams, or approved equal.
- B. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of the State in which the Project is located.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: As indicated on drawings.

2.03 PAINT SYSTEMS - INTERIOR

- A. Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board and wood.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Institutional Low Odor/VOC Interior Latex.
 - a. Products: Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Low Sheen or approved equal.
- B. Interior Surfaces to be Painted: Shop primed steel.
 - 1. Top Coat(s): Urethane.
 - a. Products: Sherwin-Williams Pro Industrial B53 1150, Semi-Gloss.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Interior Institutional Low Odor/VOC Primer Sealer.
 - a. Products: SW ProMar 200 Zero VOC Primer or approved equal.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according

to SSPC-SP 6 Commercial Blast Cleaning. Protect from corrosion until coated.

- G. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. See SECTION 01450 - QUALITY CONTROL, for general requirements for field inspection.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finishes until completion of project.

END OF SECTION

DIVISION 12 - FURNISHINGS

SECTION 12490 - WINDOW SHADES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Manual roller shades and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.
- C. WCMA A100.1 - Standard for Safety of Window Covering Products; 2022.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work related to products of this section; require attendance of all affected installers.
- B. Sequencing:
 - 1. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.04 SUBMITTALS

- A. See SECTION 01300 - SUBMITTALS.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product to be used including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shop Drawings: Include shade schedule indicating size, location and keys to details.
- D. Selection Samples: Include fabric samples in full range of available colors and patterns.
- E. Verification Samples: Minimum size 6 inches (150 mm) square, representing actual materials, color and pattern.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

- B. Installer Qualifications: Company specializing in performing work of this type with minimum ten years of documented experience with shading systems of similar size, type, and complexity; manufacturer's authorized representative.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

1.07 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

- A. Provide manufacturer's standard, non-depreciating warranty, for interior shading only, covering the following:
 - 1. Shade Hardware: 10 years unless otherwise indicated.
 - 2. Shade Fabric: 10 years unless otherwise indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: MechoShade Systems LLC: www.mechoshade.com/#sle, or approved equal.

2.02 ROLLER SHADES

- A. General:
 - 1. Provide shade system components that are capable of being removed or adjusted without removing mounted shade brackets or cassette support channel.
 - 2. Provide shade system that operates smoothly when shades are raised or lowered.
- B. Basis of Design - Roller Shades: MechoShade Systems LLC; Mecho/5 System: www.mechoshade.com/#sle.
 - 1. Description: Single roller, manually operated fabric window shades.
 - a. Drop Position: Regular roll.
 - b. Mounting: Wall mounted.
 - c. Size: As indicated on drawings.
 - d. Fabric: As indicated under Shade Fabric article.
 - 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - 3. Roller Tubes:
 - a. Material: Extruded aluminum.

- b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
 - d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
4. Hembars: Designed to maintain bottom of shade straight and flat.
- a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
- a. Provide a permanently lubricated brake assembly mounted on a oil-impregnated hub with wrapped spring clutch.
 - b. Brake must withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.
 - c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
6. Accessories:
- a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; baked enamel finish.
 - 1) Provide single fascia to accommodate regular roll shades.
 - 2) Color: TBD.
 - 3) Profile: Square.
 - 4) Configuration: Captured, fascia stops at captured bracket end.

2.03 SHADE FABRIC

- A. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
 - 1. Products:
 - a. MechoShade Systems LLC Inc; Soho - 1900 series (5% open).
 - b. MechoShade Systems LLC Inc; Equinox Blackout - 0100 series; Opaque.
 - c. Color: Selected from manufacturer's standard colors.

2.04 ROLLER SHADE FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.

- B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch (13 mm) space between bottom bar and window stool.
 - 2. Horizontal Dimensions - Outside Mounting: Cover window frames, trim, and casings completely.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.02 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.03 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13200 - STORAGE TANKS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section describes requirements for cleaning and removal of underground storage tank (UST).
- B. Environmental protection shall consist of the prevention of environmental pollution as the result of UST removal.
- C. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or the environment or welfare, unfavorably alter ecological balances of importance to human life, affect other species, of importance to man, or degrade the utilization of the environment for aesthetic and recreational purposes.
- D. Contaminated materials shall be contained to prevent contaminants from blowing, leaching, or runoff to non-contaminated areas during windy and rainfall episodes.
- E. A problem can occur when storage tank is being removed or closed, and the process requires that the tanks be cleaned. Cleaning may be necessary to comply with shipping regulations, when the tank is to be removed, or closure regulations, when the tank is to be abandoned. In order to properly clean the tank, it may need to be ventilated or degassed prior to allowing the cleaning crew to begin work. Indiscriminate venting of fumes / vapors to the atmosphere have undesirable consequences when the project is close to an occupied area.
- F. Any costs incurred due to the Contractor's inability to control odors and hazards shall be paid for solely by the Contractor, including but not limited to: medical, legal, public and regulatory relations, investigation, testing, and reporting.

1.02 RELATED SECTIONS

- A. SECTION 02070 - SELECTIVE DEMOLITION.

1.03 REFERENCES

- A. Code of Federal Regulations:
 - 29 CFR 1910.1200 Hazard Communication (General Industry)
 - 29 CFR 1926.59 Hazard Communication (Construction Industry)
 - 29 CFR 1926.21 Safety Training and Education
 - 40 CFR 112 Spill Prevention, Control, and Countermeasure (SPCC)
 - 40 CFR 260-280 EPA SW 846 Test Methods for Evaluating Solid Wastes
- B. Hawaii Administrative Rules (HAR)":

HAR 11-58	Solid Waste Management Control
HAR 11-260	Hazardous Waste Management, General Provisions
HAR 11-261	Identification and Listing of Hazardous Waste
HAR 11-262	Standards Applicable to Generators of Hazardous Waste
HAR 11-263	Standards Applicable to Transporters of Hazardous Waste
HAR 11-264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
HAR 11-281	Underground Storage Tanks (UST)
HAR 11-451	Hawaii State Contingency Plan
HAR 14-149	Hazard Communication

C. Other References:

EM 385-1-1	(2014) Safety and Health Requirements Manual
API 1604	Removal and Disposal of Used Underground Petroleum Storage Tanks
HDOH	(2000) Technical Guidance Manual for underground Storage Tank Closure and Release Response

Underground Storage Tank Closure, One 6,000-gallon Diesel Tank, DOH Facility ID 9-101805, State Civil Defense, Diamond Head Facility, Honolulu, Oahu, Hawaii.

1.04 SUBMITTALS

- A. Notifications: The Contractor shall notify the DOH at each stage of the UST closure process, as outlined below:
1. Notify the State Department of Health (DOH) Solid and Hazardous Waste Branch in writing (Appendix 3-C for DOH forms "Notice of Intent to Close Underground Storage Tanks" at least 30 days prior to commencing permanent closure.
 2. Notify DOH again at least seven days prior to beginning a UST closure and provide the exact date that such activity will occur. Telephone or fax is acceptable for this 7 day notification.
 3. In an event fuel release is confirmed, per field measurement, observation, odors, or laboratory results, notify DOH within 24 hours and begin release response actions (I.e. release abatement, free product removal, release impact characterization, release investigation, cleanup, etc.). If the release is discovered on a weekend or holiday when the DOH office is closed, and the release presents an emergency, the contractor should contact the DOH's Office of Hazard Evaluation & Emergency Response.
 4. In cases, where contaminated soil is transported offsite, transporters are required to notify DOH Office of Solid Waste Management prior to transporting the contaminated soil offsite.

5. Once UST closure is completed, submit DOH Form No.1, "Notification for Underground Storage Tanks".
- B. UST Closure Work Plan: Submit a work plan for State's review. Work plan shall include all planning and procedures for the UST closure, environmental protection and Erosion and Sediment Control Plan (ESCP), certified ESCP Preparer, certified Water Pollution Plan Preparer, certified ESCP Coordinator, worker certifications, qualified Environmental Professional, and Best Management Practices (BMP) plan.
- C. Closure Report: Submit a UST closure report within 30 days upon completion of tank removal.
 1. If the UST closure investigation indicates no evidence of a petroleum release to soil or groundwater, then a UST closure report is not required to submit to DOH. However, information regarding UST closure activities should be available for inspection, or submittal, upon request by DOH for at least three years following UST Closure.
 2. If a closure report is submitted to DOH which documents no release occurred at the UST site, DOH will respond with the letter confirming that "no release occurred" at the site.
 3. In cases where a release has been confirmed during UST closure activities, the information in the UST Closure Report should be included as part of the Initial Release Response Report submitted to DOH within 90 days of discovery of a release.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TANK CLOSURE PLANNING

- A. Planning is critical to successful closure of UST.
- B. Closure planning shall include detailed plans on how to empty and clean the UST, excavate, and remove the UST, assess the excavation for releases and backfill the excavation. All closure activities planned shall comply with applicable health and safety requirements.
- C. The tank shall be vented according to a time schedule that will ensure that any areas within 200 yards of the vapors are not occupied during and for at least one hour after any venting.
- D. Monitor the work area and the vicinity and stop all work if odors cause operational problems for occupants of the facilities.

3.02 UST CONTENT REMOVAL

- A. Remaining contents or products in the UST should be pumped out prior to any excavation and removal of the UST. The UST is considered empty when the

tank contains no more than 2.5 centimeters (one inch) or 0.3% by weight of the UST's total capacity.

- B. The pumped-out material should be properly disposed of. Fuel may be reused by the facility.

3.03 REMOVAL AND DISPOSAL OF SLUDGE AND SEDIMENTS

- A. Sludge and sediments from petroleum USTs must be analyzed for hazardous waste characteristics.
- B. If the analytical results indicate hazardous, handle, and dispose of sludge and sediments as hazardous waste.

3.04 DECONTAMINATION

- A. Minimize the volume of waste and cleaning agents used to rinse the UST. Rinsate is subject to the toxicity characteristics leaching test.
- B. If the test results indicate not hazardous, treat the rinsate and dispose of in a similar manner as contaminated groundwater.
- C. In no cases may rinse water (treated or untreated) be discharged into the waters of the U.S. nor may they be disposed of in an underground injection well without proper permits. A permit or approval from the DOH Clean Water Branch and/or the Safe Drinking Water Branch are required for these types of discharge.

3.05 EXCAVATION AND REMOVAL OF UST

- A. Upon exposing the tank and piping, carefully inspect for evidence or indications of leaks and structural failures (e.g. corrosion, holes, and stress cracks). A qualified environmental consultant or engineer shall conduct the inspection.
- B. The tank and piping shall be adequately cleaned and decontaminated.
- C. Cleaned tank can be recycled as scrap metal, disposed of at a landfill, or repurposed.
- D. All applicable Federal and State health and safety requirements shall be complied with, to support the health and safety of the site workers, the occupants, the public, and the environment.

3.06 SAMPLING AND ANALYSIS

- A. The sides and floors of the tank excavation and the piping trenches should be screened for potential releases. If ground water is present in the excavation or trenches, the ground water should also be screened for potential releases.
- B. Absent of any indications of contamination, usually two soil samples for 6,000-gallon UST and samples at every 20 feet of the native soil beneath the piping in the trenches or at the native soil beneath every pipe joint, elbow, or other fittings are usually considered to be sufficient numbers of samples.
- C. If contamination is evident while excavating and removing the UST, removal of at least two additional feet of native soils from the sides and bottom of the excavation pit and one foot from the sides and bottom of the trenches is

recommended to ensure that all contaminated soils have been excavated before taking samples for verification.

- D. If release to the groundwater is confirmed, monitoring wells should be installed at the site to allow for the collection of a representative groundwater sample.
- E. Samples must be analyzed for chemical-specific constituents per Table 7.2 of the Hawaii UST Technical Guidance Manual (TGM) and the DOH Hazard Evaluation and Emergency Response (HEER) Office TGM.

3.07 WASTE HANDLING

- A. UST excavation and removal will generate various contaminated materials, such as contaminated soil under and around the UST, contaminated groundwater, and portions of concrete and asphalt pavement, and other debris.
- B. Segregate contaminated materials by the degree of contamination, i.e. heavily contaminated soil, moderately contaminated concrete, non-contaminated soil, etc.
- C. Contaminated materials should be placed on impervious surfaces to prevent the spread of contaminants onto non-contaminated areas. If the contaminated materials are to be stored either onsite or offsite overnight or for any length period of time, they should be fully covered by an impervious, durable tarpaulin to prevent dispersion due to wind, leaching, or runoff to non-contaminated areas during windy and rainy conditions.
- D. In cases where contaminated soil is transported offsite, transporters are required to notify DOH office of Solid Waste Management prior to transporting the contaminated soil offsite and may be required to obtain a transporter's permit. Petroleum contaminated soil may only be transported to a permitted solid waste management facility.

3.08 BACKFILL

- A. After completing all cleanup activities required for release response and sampling, backfill the excavation pit and piping trenches.
- B. Backfill material shall be uncontaminated, i.e. no contaminant levels exceeding the Hawaii Tier 1 Environmental Action Levels (EAL).
- C. In an event the excavation is to remain open for a period due to investigation or remediation, secure and excavation to prevent people or animal access to the site. Measures shall be taken to prevent or minimize rainwater from entering the excavation which may be contaminated.
- D. Temporary backfills may also be used in cases where the excavation is posing danger or logistical problems.
- E. Any costs incurred due to Contractor's inability to contain contaminants shall be paid for solely by Contractor, such as medical, legal, public and regulatory

relations, investigation, testing, and reporting.

END OF SECTION

SECTION 13283 - LEAD HAZARD CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. Contractor shall review the existing lead survey data provided as part of SECTION 01715 - EXISTING CONDITIONS - ASBESTOS/LEAD/HAZARDOUS MATERIAL SURVEY and verify the locations and quantities of lead paints.
- B. Lead-containing paints were identified in the project areas of Birkihmer EOC.
 - 1. For the purpose of this Section, all paints with measurable levels of lead are considered Lead-Containing Paint which shall be removed or disturbed in accordance with applicable rules and regulations.
 - 2. Total Lead-Based Paint abatement is not anticipated; however, any loose and flaky paints shall be removed to prevent exposures to the site workers, staff, the public, and the environment.
- C. Contractor must implement appropriate engineering controls and safety measures to prevent site workers, occupants, other trades, public, and environmental exposures to lead hazards.
- D. Contractor shall inform their employees, subcontractors, and other persons conducting work for this project, that interior and exterior surfaces of existing buildings associated with this project have lead-containing paints. Contractor, his/her employees, and subcontractors shall initiate and maintain applicable programs necessary to execute the work in accordance with the contract documents, Federal, State, and local rules and regulations.
- E. Contractor shall be responsible for ensuring that work generating lead containing debris conforms to the following applicable Federal, State and local rules and regulations.
 - 1. Occupational Safety and Health Administration (OSHA) and Hawaii Occupational Safety and Health (HIOSH) rules.
 - 2. Environmental Protection Agency (EPA) Toxic Substance Control Act (TSCA 40 CFR Part 745 Lead) Requirements for Lead-Based Paint Activities in Target Housing and Child Occupied Facilities, Lead Renovation, Repair and Painting Rule (RRP Rule), and National Emission Standards of Hazardous Air Pollutants (NESHAP).
 - 3. EPA Resource Conservation and Recovery Act (RCRA) of 1976, amended in 1980 and 1984.
- F. Contractor shall be responsible for initiating and maintaining safety precautions and programs necessary to keep the work place safe for his/her employees and subcontractors.
- G. For areas where paint is required to be removed from the substrate due to poor conditions, Contractor shall conduct a representative sampling of the paint chip waste for TCLP test. Contractor shall bid the project based on the assumption

that disposal of this paint chip waste as hazardous waste is required. For unforeseen lead-containing paint, Contractor may be given equitable adjustment for the disposal cost only (testing cost will be in basic bid), as determined by the Contracting Officer.

- H. Costs incurred due to Contractor's inability to control hazards shall be borne solely by Contractor, including but not limited to, medical, legal, public and regulatory relations, investigation, clean-up, monitoring, and reporting.

1.02 COORDINATION WITH OTHER SECTION

- A. Contractor shall refer to SECTION 13288 - TESTING/AIR MONITORING for requirements of work when disturbing hazardous materials.

1.03 LEAD-BASED PAINT FIELD TESTING

- A. Contractor reserves the right to conduct existing paint testing for lead, utilizing X-Ray Fluorescence (XRF) analysis or Atomic Absorption Spectrophotometry Analysis (AAS).
 - 1. Testing shall be conducted by an industrial hygienist, at the Contractor's expense.
 - 2. Test results shall be presented to the Contracting Officer for evaluation. Contractor's work practices, air monitoring and clearance requirements may be modified in accordance with paint test results.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Contractor shall submit a Lead Hazard Control Plan 20 calendar days prior to lead disturbance work, including but not limited to:
 - 1. A clear scope of work
 - 2. Description of methods to control lead hazards and dust
 - 3. A sketch of lead hazard control area and staging area for waste containers, equipment, and supplies
 - 4. Site Supervisor and/or Competent Person's name, contact number, and certifications
 - 5. Written Hazard Communication (HAZCOM) program, including worker training records
 - 6. Written Respiratory Protection Program
 - 7. Medical surveillance records
 - 8. Written Emergency Procedures Plan
 - 9. Product specifications and safety data sheets (SDS)
 - 10. Hazardous waste disposal plan

- C. Within 10 days of waste disposal, Contractor shall submit the following:
 - 1. A copy of the Hazardous Waste Disposal Log and the completed waste manifest
 - 2. Field records including daily field notes and photographs
 - 3. Sampling and analysis results

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Polyethylene Bags and Sheets: 6 mil minimum thickness in sizes required to accomplish the work.
- B. Other Materials: Provide materials, such as, but not limited to, rags, lumber, plywood, fasteners, duct tape, and sealant which may be required to properly prepare and complete the work.

2.02 TOOLS AND EQUIPMENT

- A. HEPA Vacuuming Equipment: Vacuuming equipment utilizing High Efficiency Particulate Air (HEPA) filters.

PART 3 - EXECUTION

3.01 PREPARATION PRIOR TO DISTURBANCE OF LEAD-CONTAINING PAINT

- A. Document existing paint chips or debris prior to work (indoors and outdoors), as applicable.
 - 1. If there are any paint chips or debris in the project area, Contractor shall pre-clean horizontal surfaces within the work area prior to disturbing existing LCP.
 - 2. Contractor shall treat paint chips or debris collected during pre-cleaning and during project related activities as lead-containing waste.
- B. Minimize lead-containing dust during work performance using wet methods and equipment with HEPA collection devices. If visual inspection, air monitoring, or clearance by Competent Person, IH, or Contracting Officer indicates that control measures are inadequate, Contractor shall stop work, clean up the affected area, and implement enhanced engineering controls at no additional cost to UHM.
- C. Establish a lead control area. Isolate and protect the portions of the area not within the scope of work using 6-mil polyethylene sheeting, or equivalent.
- D. Pre-work visual inspection: Inspect the immediate project and adjacent areas for the presence of paint chips or debris and document the physical conditions with photographs and narratives. This documentation will serve as baseline conditions to which final visual clearance will be compared.
- E. Demarcate the exterior lead control area using lead warning tape.

1. Lead warning tape shall be at least 20 feet away from the closest painted surface being disturbed.
2. Lead warning tape may be placed closer only if existing structural conditions prevent a 20-foot space between the lead warning tape and the working surface.
3. Place 6-mil polyethylene drop sheets around exterior surfaces.
4. Secure drop sheets so that wind, rain, or other forces will not dislodge the sheets.
5. Drop sheets shall extend horizontally, where applicable, at a distance sufficient to capture debris containing paint and substrates.
6. Drop sheets shall be periodically cleaned and kept free of debris. Any water captured by the drop sheet shall be contained and treated as lead-contaminated.

3.02 CONFORMANCE

- A. Work shall be executed in accordance with the following:
 1. Occupational Safety and Health Administration (OSHA) rules
 - a. Contractor shall ensure that work executed in this project is in accordance with the requirements of 29 CFR 1910.1025 and 29 CFR 1926.62.
 - b. Cost associated with the execution of work in accordance with these OSHA rules shall be the Contractor's responsibility.
 - c. Negative exposure assessment, air monitoring and testing cost shall be borne by the Contractor.
 2. EPA Toxic Substance Control Act (TSCA)
 - a. Contractor shall implement good housekeeping methods to confine the spread of airborne lead dust when conducting work on painted surfaces.
 - 1) Doors and windows shall be closed and temporary barriers, using 6 mil polyethylene sheeting, will be set up to minimize the spread of wind blown dust.
 - 2) Minimum 6 mil polyethylene shall be placed on the floors and walls, minimum 10-feet on each side of where disturbance is anticipated.
 - b. At the end of each work day, Contractor shall remove visible debris and dust, HEPA vacuum, and wet-wipe below and around existing horizontal and vertical surfaces where disturbance of hazardous material was conducted.
 - c. As applicable, carpeted areas shall be lined with 6 mil polyethylene sheeting prior to the start of work and HEPA vacuumed after completion.
 3. EPA Resource Conservation and Recovery Act (RCRA) of 1976, amended in 1980 and 1984.

- a. The project site may fall into the category of Conditionally Exempt Small Quantity Generator (CESQG) if the facility generates less than 100 kilograms/month or 220 pounds/month of hazardous waste. Contractor shall be responsible for the completion of the Hazardous Waste Disposal Log provided in Appendix A of this Section.
- b. Under the requirements for a CESQG, the generator:
 - 1) Must identify painted surfaces with LCP or assumed LCP, and the hazardous waste or acute hazardous waste generated at each site.
 - 2) Not store more than 1,000 kg or 2,200 pounds of hazardous waste, or assumed hazardous waste, at each site at any time.
 - 3) Can dispose of the waste in a municipal solid waste (MSW) landfill provided that Toxicity Characteristic Leaching Procedure (TCLP) results meet the landfill criteria, 5.0 milligrams per liter (mg/L) lead and 1.0 mg/L cadmium.
 - 4) Must dispose of the waste material at an EPA approved landfill off-island that accepts such waste if the TCLP results indicate that the material is hazardous waste (at or above 5.0 mg/L lead or 1.0 mg/L cadmium).
- c. Treatment of assumed to be Lead-Containing Debris:
 - 1) Debris resulting from Contractor's work, such as cutting, scrapping, drilling, coring, chipping, or sanding, of known or assumed LCP surfaces, shall be segregated from the rest of the construction debris.
 - 2) Hazardous waste and assumed to be hazardous waste amounts exceeding the CESQG limit shall follow RCRA regulations for Small Quantity Generator or Large Quantity Generator.
- d. Disposal of Lead-containing Paint Debris:
 - 1) LCP or assumed LCP debris generated by the Contractor must conform to the requirements of 3.02.A.3.b of this section.
 - a) Paint debris with TCLP lead concentration below 5.0 mg/L and TCLP cadmium below 1.0 mg/L may be disposed of at a municipal solid waste landfill that accepts such waste.
 - b) Disposal of this demolition debris on private land is prohibited, unless it is permitted by the State and the EPA.
 - c) Paint debris with TCLP lead and cadmium concentrations at or above 5.0 mg/L and 1.0 mg/L, respectively, must be disposed of as hazardous waste at an EPA-approved landfill off-island that accepts such waste.
 - 2) Accumulation and mixing of hazardous waste of one generator (facility) with that of another generator is prohibited.
 - 3) Disposal shall be in accordance with the permit requirements of the Municipal Solid Waste Landfill.

- 4) Contractor shall be responsible for costs related to the disposal of assumed LCP debris and hazardous paint chip waste.

3.03 ACTIVITIES DISTURBING LEAD-CONTAINING PAINT

- A. Conduct LCP surface preparation as required for this project, and minimize lead-containing dust using wet methods and HEPA equipment. If visual inspection indicates control measures are inadequate, the Competent Person must stop work, notify Contracting Officer, conduct clean-up, and implement enhanced engineering controls immediately at no additional cost to UHM.
- B. Do not execute dry removal or dry sweeping. Waste or paint debris generated during removal shall be promptly staged or packaged, and shall not accumulate uncontrolled at any time. Lead-containing waste shall be properly marked and stored in secure containers appropriate for storing lead-containing waste.
- C. Contractor shall not allow lead-containing waste to be stored outside of the lead control area, in a high traffic unsecured area, or where the waste could interact with rain or wind and create a secondary hazard or contamination.

3.04 LEAD CONCENTRATIONS IN THE WORK AREA

- A. Maximum permissible exposure to airborne concentrations of lead within the project area shall be 30 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) air. Stop work whenever this limit exceeded, and Competent Person shall remedy the condition prior to commencing work.
- B. Instruct and train each worker in proper respiratory use.
 1. Require that each worker always wear a respirator, properly fitted on the face, in the work area from the start of any operations which may cause airborne lead dust until the work area passes the required clearance.
 2. Use respiratory protection appropriate for the lead dust levels encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.
- C. Air Purifying Respirators: Provide half-face or full-face type respirators.
 1. Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with the National Institute for Occupational Safety and Health (NIOSH) Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with ANSI Z228.2. In addition, a chemical cartridge section may be added.
 2. Non-Permitted Respirators: Do not use single use, disposable or quarter-face respirators.
 3. Require that respiratory protection be used whenever there is any possibility of LCP disturbance, intentional or accidental.
 4. Require that a respirator be worn by anyone in a lead control area at all times when LCP is disturbed.

5. Regardless of Lead-Containing Dust Levels: Require that the minimum level of respiratory protection used be half-face air-purifying respirators with HEPA filters.

D. Fit Testing

1. Initial Fitting: Provide initial fitting of respirators during a respiratory protection training. Fit types of respirator to be actually worn by each individual. Allow an individual to use only those respirators for which training and fit testing have been provided.
2. On an Annual Basis: Check the fit of each worker's respirator using irritant smoke. Valid fit test certificates shall be included in the Lead Hazard Control Plan which shall be maintained onsite.
3. Upon Each Wearing: Require that each time an air purifying respirator is donned, it will be checked for proper fitting with a positive and negative pressure seal checks in accordance with the manufacturer's instructions or ANSI Z88.2 (2015).

E. Type of Respiratory Protection Required

1. Provide respiratory protection as appropriate. Higher levels of protection may be provided as determined by Competent Person or workers themselves. Determine the proper level of protection by dividing the expected or actual airborne lead dust levels in the work area by the "protection factors" given below.
2. Consider the following unless air monitoring results indicate greater protection is necessary. Refer to the Protection Factors table for choice of respirators.
 - a. Loose equipment cleaning prior to removal in uncontaminated area: Half-face dual cartridge-type respirator.
 - b. Plastic installation which does not disturb LCP: Half-face dual cartridge-type respirator.
 - c. Removing or cleaning items or plastic installation when such operation may disturb lead paints or lead dust: Half-face dual cartridge-type respirator.

- F. Areas: Contractor's Competent Person and IH shall frequently inspect the controlled areas and adjacent areas. Contractor activities shall not adversely impact the indoors or outdoors air and horizontal surfaces and ground of the project site.

3.05 STOP ACTION LEVELS

- A. Inside Work Area: Maintain airborne levels in the work area of less than the Stop Action Level given below for the type of respiratory protection in use.
1. If the lead dust levels rise above this figure for any sample taken, enhance work procedures to lower ambient dust levels.
 2. If lead dust levels for any work shift or 8-hour period exceeds the Stop Action Level, stop work except corrective action, and the Competent Person shall

notify Contracting Officer. After correcting the cause of lead dust levels, recommence work only after approval by the Competent Person. Competent Person shall document all decisions and follow-up actions and include them in the closeout report.

3.06 PROTECTIVE CLOTHING

- A. Furnish personnel exposed to lead-containing dust with disposable protective whole body clothing, head covering, gloves, and foot coverings. Furnish disposable plastic or rubber gloves to protect hands from lead.

PROTECTION FACTORS

RESPIRATOR TYPE	PROTECTION FACTOR
Air purifying: Negative pressure respirator HEPA filter Half facepiece	Up to 500 µg/m ³
Powered-air purifying respirator (PAPR): Negative pressure respirator HEPA filter Full facepiece	Up to 2,500 µg/m ³
PAPR Positive pressure respirator HEPA filter Half or full facepiece or Type C supplied air: Positive pressure respirator Continuous-flow half or full facepiece	Up to 5,000 µg/m ³

3.07 WARNING SIGNS AND LABELS

- A. Provide warning signs at approaches to the lead control areas.
- B. Locate signs at such a distance that personnel may read the sign and take necessary precautions before entering the area
- C. Provide and affix labels to impermeable bags, lead waste drums, and other containers containing lead materials, scrap, waste, or debris.
- D. Signs and labels shall comply with the requirements of 29 CFR 1910.1025.

3.08 TOOLS

- A. Filters on vacuums and exhaust equipment shall be absolute HEPA filters and UL 586 labeled.

3.09 AIR MONITORING

- A. Employee Monitoring: Contractor's Competent Person shall monitor employees' exposure to lead in accordance with OSHA requirements.
 1. Contractor shall collect air samples from employees' breathing zones during each shift, for the duration of the LCP-disturbing work.
 2. Contractor shall collect samples from at least 25% of workers conducting LCP-disturbing tasks, and not less than two workers.

- B. Environmental Sampling During Paint Removal Work. An independent Industrial Hygienist (IH) retained by UHM will conduct area air sampling daily, on each shift.
1. Sufficient area monitoring shall be conducted to verify unprotected personnel are not exposed at or above the action level, 30 micrograms per cubic meter air.
 2. If action level is reached, stop work and correct conditions causing the elevated airborne lead dust levels. Resume only after approval of the IH.
 3. Cost of retesting due to Contractor's inability to control lead dust shall be borne by Contractor.
 4. For outdoor operations, IH shall determine the location and number of samples to be taken.

Work area and Adjacent:

LEAD

STOP ACTION LEVEL ($\mu\text{g}/\text{m}^3$)	RESPIRATOR REQUIRED	PROTECTION FACTOR
50	Half-face APR	10
5,000	PAPR or Type C, Continuous flow	100
50,000	Type C, Pressure demand	1,000

- C. If the high lead air concentrations were the result of Contractor's failure of work area isolation measures, initiate the following actions:
1. Decontaminate the affected area(s).
 2. Require that respiratory protection be worn in affected area until the area is cleared.
- D. If the high reading was the result of other causes, initiate corrective action as determined by the IH.
- E. Effect on Contract Sum. Complete corrective work with no change in the Contract Sum if lead-containing dust levels exceeding $30 \mu\text{g}/\text{m}^3$ were caused by Contractor's activities. Costs involving delay, re-cleaning, additional lead air monitoring and quality control, investigation, and reporting shall be borne by Contractor.

3.10 ANALYTICAL METHODS

- A. NIOSH 7082 method shall be used in analyzing air samples. Filters used shall be in accordance with the referenced method.
- B. NIOSH 9100 method shall be used in analyzing lead wipe samples.

3.11 AIR SAMPLE MEDIA

- A. Lead Sample Cassettes. Air samples will be collected on 37 millimeter (mm) cassettes with 50 mm extension cowl with 0.8 micrometer cellulose ester membrane.

3.12 LABORATORY TESTING

- A. Services of a testing laboratory shall be employed by the IH. Lead air sample results will be made available within 48 hours upon receipt of laboratory analytical results.
- B. Contracting Officer will have access to air monitoring tests and clearance results.

3.13 CLEAN UP

- A. Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Prevent the spread of dust and debris; keep waste from being distributed over the general project area.
 - 1. Do not dry sweep the area.
 - 2. When the paint removal, demolition, or renovation is completed:
 - a. Clean visible lead paint contamination by vacuuming with a HEPA vacuum followed by wet mopping and wiping.
 - b. Contractor shall certify that the work was completed in accordance with OSHA 29 CFR 1910.1025, HUD 24 CFR 35, and EPA 40 CFR 745, and that there are no visible accumulations of lead-containing paint and dust in the project areas.
 - c. Competent Person and IH shall visually inspect the affected surfaces for residual lead paint chips and accumulated lead-containing dust after the work is completed.
 - d. Contractor shall re-clean areas showing lead-containing dust or residual lead paint chips to the Contracting Officer's satisfaction.
- B. Contractor is responsible for the restoration and cleaning of any areas outside the work area impacted by or contaminated by lead-containing dust or debris generated by the Contractor's work, such as removal, handling, or storage of lead-containing waste. Contractor shall perform remedial cleaning and restoration of these areas, if any, at no additional cost to UHM.

3.14 CLEARANCE

- A. Visual Clearance
 - 1. Pre-demolition inspection shall be conducted jointly by the Competent Person and the IH after painted surface treatment and prior to demolition of structures. Clearance will be granted when the Competent Person and IH agree that the subsequent demolition will generate no visible emission.
 - 2. Final visual inspection shall be conducted by the Competent Person and the IH after demolition is completed and all debris is removed offsite. No visible paint chips or debris with paints shall remain.
- B. Assess surface soil for lead after the demolition of the structures in four decision

units. The soil analytical results shall not exceed the baseline levels. Refer to the January 2017 hazardous material survey report for baseline surface soil conditions.

3.15 DISPOSAL

- A. Landfill may require characterization of the waste generated during the removal work, where a representative sample is analyzed for Toxicity Characteristic Leaching Procedure (TCLP) analysis.
 - 1. If analytical result indicates the TCLP level is below the EPA guideline or within the landfill acceptance criteria, the waste generated from the project can be disposed of as general construction and demolition (C&D) debris.
 - 2. If the TCLP test fails or the result exceeds the landfill acceptance criteria, the waste shall be treated as hazardous waste and be disposed of in a Resource Conservation Recovery Act (RCRA) permitted landfill. Contractor shall contact Contracting Officer for EPA ID number.
- B. Contracting Officer will review for equitable adjustment of contract amount upon evaluation and acceptance of the TCLP results to determine the hazard characteristics. If the waste is determined to be RCRA hazardous waste, the waste shall be disposed of at an off-island EPA-approved facility.
- C. Contractor shall submit a copy of the TCLP analytical results to Contracting Officer prior to request for EPA ID number. Hazardous Waste Manifest and Landfill Receipt shall be submitted prior to the final billing.

3.16 GENERAL

- A. Waste is to be hauled by a waste hauler with required licenses from State and local authority with jurisdiction.
- B. Protect interior of truck or dumpster with Critical and Primary Barriers.
- C. Carefully load containerized or bagged waste in fully enclosed dumpsters, trucks or other appropriate vehicles for transport. Exercise care before and during transport, to ensure that no unauthorized persons have access to the material. If required by DOT, vehicles shall be placarded with Department of Transportation labels.
- D. Do not store containerized or bagged waste outside of the work area. Take containers from the work area directly to a sealed truck or dumpster.
- E. Do not transport lead waste materials on open trucks. If waste material is to be transported in drums, label drums with the same warning labels as the bags.
- F. Coordinate with landfills in advance of transport and of the quantity of material to be delivered.
- G. After completion of hauling and disposal of demolition waste and paint waste, if separated, submit a copy of waste manifest, chain of custody form (if applicable), and waste storage facility receipt to Contracting Officer. Final contract payment shall not be made until completed disposal documents are submitted.

3.17 RECORDKEEPING

- A. Complete and submit a copy of the Project Hazardous Waste Log to the Contracting Officer. See Appendix B of this Section.
- B. Maintain accurate documentation of the site activities. Be prepared at all times to present real time information upon regulators' visits.
- C. Contractor's Competent Person shall be onsite at all times.

3.18 MEASUREMENT AND PAYMENT

- A. Except for the hazardous waste as indicated in Part 3.15, work performed under this Section shall not be measured or paid for separately, but shall be considered incidental to the lump sum price bid for the item of which it is a part in the Bid Schedule.

APPENDIX A

HAZARDOUS WASTE DISPOSAL LOG

(NAME OF PROJECT)

Street Address

City, State, Zip Code

YEAR	DESCRIPTION OF HAZARDOUS WASTE	APPROXIMATE WEIGHT IN POUNDS	SPECIAL HANDLING
JANUARY			
FEBRUARY			
MARCH			
APRIL			
MAY			
JUNE			
JULY			
AUGUST			
SEPTEMBER			
OCTOBER			
NOVEMBER			
DECEMBER			

By Signature

Print Name

APPENDIX B

PROJECT HAZARDOUS WASTE LOG
(Contractor to complete one per facility site)

PROJECT:

DAGS JOB NO.

START DATE: _____ COMPLETION DATE:

GENERAL CONTRACTOR:

ADDRESS:

TELEPHONE: _____ FAX NUMBER:

NAME OF SUPERINTENDENT FOR THIS PROJECT:

NAME OF GENERATOR (FACILITY):

ADDRESS:

TELEPHONE: _____ FAX NUMBER:

DESCRIPTION OF HAZARDOUS WASTE:

APPROXIMATE WEIGHT (IN POUNDS):

MONTHLY DISPOSAL LOG:	
MONTH: _____	WEIGHT IN POUNDS: _____
MONTH: _____	WEIGHT IN POUNDS: _____
MONTH: _____	WEIGHT IN POUNDS: _____

DISPOSAL SITE:

CONTRACTOR DISPOSING OF HAZARDOUS WASTE:

ADDRESS:

TELEPHONE: _____ FAX NUMBER:

FOLLOWING): DISPOSAL CONTRACTOR IS A (CHECK ONE OF THE

- CONDITIONALLY EXEMPT SMALL QUANTITY GENERATOR
- SMALL GENERATOR
- LARGE GENERATOR

APPROVAL:

STATE DESIGNATED COMPETENT PERSON:

COMPANY:

ADDRESS:

TELEPHONE NUMBER:

SIGNATURE

DATE

END OF SECTION

SECTION 13288 - TESTING/AIR MONITORING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section describes Contractor's responsibility for compliance while conducting work which disturbs lead-containing paint (LCP). Related sections are:
 - 1. SECTION 13283 - LEAD HAZARD CONTROL for requirements of work which disturbs lead-containing paint.
- B. Implement appropriate engineering controls and safety measures to prevent site workers, occupants, other trades, the public, and the environment from exposure to hazardous materials.
- C. Costs incurred due to Contractor inability to control hazards shall be borne by Contractor, including but not limited to, investigations, medical, legal, regulatory and public relations, clean-up, monitoring, and reporting.
- D. An independent industrial hygiene (IH) firm, retained by the State, will conduct the monitoring during the Contractor's work which disturbs LCP. IH firm shall have no affiliation with Abatement Contractor.

1.02 GENERAL REQUIREMENTS

- A. Testing and workers' breathing zone monitoring shall be conducted by the Contractor for the purpose of:
 - 1. Verifying compliance with the applicable codes, regulations and laws regarding LCP abatement.
 - 2. Ensuring that the legally-required documentation is collected in a timely manner.
 - 3. Providing engineering controls during project.

1.03 TESTING/ AIR MONITORING/ INDUSTRIAL HYGIENE SUPERVISION AND AIR MONITORING

- A. Industrial hygiene supervision and boundary air monitoring shall be performed by an independent IH firm retained by the State. The laboratory used for sample analysis shall be proficient in:
 - 1. The National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) program.
 - 2. The National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos or the Environmental Protection Agency (EPA) Research Triangle Institute (RTI) program for bulk asbestos analysis.
- B. Air monitoring and project supervision will be conducted under the direction of an Industrial Hygienist (IH) who has minimum 5 years of experience in hazard abatement project management. On-site monitoring may be conducted by a competent and qualified IH Technician with a minimum of 2 years of experience

in asbestos abatement and/or the relevant hazardous material abatement, provided activities are conducted under the supervision of the IH.

- C. Aforementioned air monitoring and project supervision shall not remove the Contractor's responsibility for his/her worker protection and required documentations.

1.04 COORDINATION WITH OTHER SECTIONS

- A. Testing and monitoring requirements included in the scope of work for any testing/air monitoring consultants or inspectors shall be coordinated with: SECTION 13283 - LEAD HAZARD CONTROL.

PART 2 - PRODUCTS

Not applicable to this section.

PART 3 - EXECUTION

3.01 COMPETENT PERSON RESPONSIBILITIES

- A. Contractor's Competent Person shall prepare a Lead Hazard Control Plan per SECTION 13283 - LEAD HAZARD CONTROL Paragraph 1.04 B. State and training certifications shall be valid and reflect the anticipated workers on site.
- B. If required by the landfill, Competent Person shall provide proof of waste characterization and disposal documents. In the event that the waste is determined to be hazardous, inform Contracting Officer, obtain EPA ID number, and request equitable adjustment to the contract.
- C. Refer to SECTION 13283 - LEAD HAZARD CONTROL and part 3.03, below, for additional responsibilities.

3.02 CONTRACTOR RESPONSIBILITIES

- A. Submit complete work plans for review and concurrence by the Contracting Officer. Refer to SECTION 13283 - LEAD HAZARD CONTROL for requirements of the work plan.
- B. Maintain worker monitoring and necessary records for the Contractor's employees as required by OSHA (29 CFR 1926.58), Hawaii Administrative Rules, and other applicable laws.
- C. Obtain legally required documentation for air monitoring and submit a written respiratory protection program as part of the contract.
- D. Costs involving investigations, air monitoring, legal, medical, regulatory and public relations, testing, and reporting due to Contractor inability to control hazards shall be borne by Contractor, and shall be deducted from the final contract payment.
- E. Accommodate additional testing performed by the IH; however, this shall not remove Contractor's responsibility of monitoring required by law and contract specifications.

- F. For final cleanup and decontamination following gross removal, remove the final polyethylene sheeting, or drop cloth, but leave the coverings for critical barriers, such as doors, windows, air ducts, etc., until successful clearance is obtained.
- G. Lead Clearance by Visual Inspection and Soil Testing
 - 1. IH retained by the State and the Contractor's Competent Person shall conduct visual inspection.
 - 2. No visible emissions of lead paint debris or dust.
 - 3. The IH will collect and analyze the surface soil samples in four decision units and compare the results against the baseline surface January 2017 soil data.

3.03 MONITORING AND INSPECTION BY COMPETENT PERSON

A. Duties of the Competent Person

- 1. Photographic Record of Project: Record work with representative photos. Photos shall become the property of the State and are to be accompanied by a detailed log.
- 2. Project Log: Competent Person shall be on site at all times and maintain daily field logs detailing key activities during LCP-related work and submit a summary of project activities to Contracting Officer within 10 days of completion for each campus. Incorporate daily field reports with other project data into a final closeout report.
- 3. Visual Inspection of Controlled Areas: Conduct inspections of controlled areas, during the actual work performance, to document the work practices employed. Verify that scheduled abatement or mitigation work is completed, and the area was properly and promptly cleaned and ready for other trades involved in the project.
- 4. Change Order: If changes are necessary once construction begins, review request for change and make a recommendation for approval. Per SECTION 13283 - LEAD HAZARD CONTROL Paragraph 3.18, removal activities and disposal of wastes will not be measured or paid separately, except for the hazardous waste determined by the waste characterization (SECTION 13283 - LEAD HAZARD CONTROL Paragraph 3.15).

B. Site Monitoring by Competent Person

- 1. Onsite personnel air monitoring as required by OSHA, and the project specifications.
- 2. Monitoring of decontamination procedures at control area entry/exit and of cleanup after each shift
- 3. Monitoring of controlled area maintenance and waste handling
- 4. Interface with IH, Designer of Records, representatives of regulatory agencies, and the Contracting Officer
- 5. Ensure workers are trained, engineering controls in place, and proper respiratory protection is utilized by personnel within control areas

6. Relay to Contracting Officer any discrepancies in Contractor's action with provisions of project specifications.

3.04 TESTING/AIR MONITORING

- A. IH retained by the State shall have authority to stop work or to exercise engineering controls during the project.
- B. IH may conduct additional testing and air monitoring at his/her discretion.
- C. Monitoring activities will be documented and submitted to Contracting Officer with test results, interpretations, follow-up actions, and final resolutions.

3.05 SAMPLE DESIGN

- A. The following is a typical sampling design per control area during the construction. Number of sample quantities and volume may vary.
 1. Background Samples: Background baseline samples shall be taken prior to LCP work to establish pre-removal airborne concentration levels. High volume continuous flow samples shall be taken for anticipated control area. Work area samples shall be analyzed by the NIOSH 7400 method for asbestos and NIOSH 7082 method for lead.
 2. Work Area Samples: Low volume samples of a maximum of 480 liters each shall be taken in the work area. Ambient air samples shall be taken outside of work area to assess and ensure that engineering controls are effective and that the persons entering the work area are properly protected from airborne hazards. If monitoring results inside and outside the controlled area indicate airborne concentrations is greater than 0.01 f/cc for asbestos and 30 $\mu\text{g}/\text{m}^3$ air for lead, Contractor shall correct the condition(s) causing the increase and ensure that Contractor maintains the ambient conditions to below the action levels.
 3. Barrier Samples: As applicable, two samples may be taken per barrier.
 4. Environmental Samples: Each removal area shall be controlled so that airborne dust cannot escape into trade, staff, and public access areas. Per the IH's discretion, high volume or low volume samples per controlled area will be taken.

3.06 MEASUREMENT AND PAYMENT

- A. Work involving worker monitoring, waste characterization, and OSHA and EPA compliance shall not be measured or paid for separately but shall be considered incidental to the lump sum price bid for the item of which it is a part in the Bid Schedule.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15000 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. The Contractor shall provide all labor, materials, tools and equipment and perform all work and services necessary for a complete and properly operating mechanical work, equipment and systems, as shown in drawings and as specified in accordance with provisions of the Contract Documents and completely coordinated with work of all other trades.
- B. The Contractor shall completely examine the Contract Documents and shall report to the State any error, inconsistency or omission he discovers prior to submitting a bid.
- C. Provide all supplementary or 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.
- D. Drawings and specifications shall be taken together. Provide work specified and not indicated or work indicated and not specified as though mentioned in both.
- 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.
- F. The Contractor shall maintain at the site one copy of all Drawings, Specifications, Addenda, approved 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 Contracting Officer at all times.
- G. The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the work, he shall remove all his waste materials and rubbish from and about the project as well as all his tools, construction equipment, machinery and surplus materials and shall clean all new equipment and accessories.
- H. The Contractor shall give the State timely notice of its readiness for testing any work including the data arranged so that the Contracting Officer may observe such testing. The Contractor shall bear all cost of such tests.
- I. New roofing material shall be compatible with existing which is elastomeric roof.

1.02 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Submit shop drawings, manufacturers' data and certificates for equipment, materials, finish and pertinent details for each system and have them approved

before procurement, fabrication or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. Partial submittal for long lead equipment shall be accepted prior to complete submittal. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable industry and technical society publication references and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.

1. Shop Drawings: Drawings shall be 24 inches by 36 inches in size, except as specified otherwise. Drawings shall include floor plans, sectional views, installation details of equipment; and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, accessories, piping and other items that must be shown to assure a coordinated installation. Drawings shall indicate adequate clearance for operation, maintenance and replacement of operating equipment devices. If equipment is disapproved, drawings shall be revised to show acceptable equipment and be resubmitted.

The Contractor shall review, stamp with his approval and submit, all Shop Drawings required by the Contract Documents or subsequently by the State as covered by modifications. At the time of submission, the Contractor shall inform the State in writing of any deviation in the Shop Drawings from the requirements of the Contract Documents. By approving and submitting Shop Drawings, the Contractor certifies that he has determined and verified all field measurements and obstructions, field construction criteria, materials, catalog numbers and similar data, that he has checked and coordinated each Shop Drawing with the requirements of the work and of the Contract Documents and that all equipment fits within designated spaces.

2. Manufacturers' Data: Submittals for each manufactured item shall be manufacturers' descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves and catalog cuts. Submittals shall include equipment certification terms and conditions, applicable self-diagnostic testing and start-up procedures. Equipment submittals shall specifically indicate the specified equipment assembly configurations with all specified standard and optional features, above and beyond general catalog products technical literature.
3. Standards Compliance: When materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA) and Underwriters Laboratories (UL), American Society of Heating, Refrigeration and Air-Conditioning Contracting Officers (ASHRAE) proof of such conformance shall be submitted to the State for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu of the label or listing, the Contractor shall submit a certificate from an independent testing organization, which is competent to perform acceptable test and is approved by the State. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard.

4. **Certified Test Reports:** Before delivery of materials and equipment, certified copies of all test reports specified in the individual section shall be submitted for approval. Furthermore, submit a written certificate, dated and signed by an authorized corporate officer of the Contractor who is either a full-time employee, principal, or a full-time partner delegated with the authority to bind the Contractor in all matters relating to its professional work of the Contractor, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Corporate credentials shall be furnished concurrently with applicable written certificates. Whenever a regulatory agency performs inspections or tests of any portion of the work, a written certificate shall be furnished by the Contractor to validate the results from the respective inspection test.
5. **Certificates of Conformance or Compliance:** Submit all certificates applicable to all specified equipment assemblies and parts for the Contracting Officer's approval prior to equipment delivery and commencement of equipment on-site installation. A certification from the manufacturer attesting that materials and equipment to be furnished for this project comply with the requirements of this specification and of the reference publications. Preprinted certifications will not be acceptable; certifications shall be in the original. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and result as materials formulated in accordance with the referenced publication," "equal or exceed the service and performance of the specified material." The certification shall simply state that the product conforms to the requirements specified. Furthermore, submit a written certificate, dated and signed by an authorized corporate officer of the Contractor who is either a full-time employee, principal, or a full-time partner delegated with the authority to bind the Contractor in all matters relating to its professional work of the Contractor, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Corporate credentials shall be furnished concurrently with applicable written certificates. Whenever a regulatory agency performs inspections or tests of any portion of the work, a written certificate shall be furnished by the Contractor to validate the results from the respective inspection test.
6. **Manufacturers' Certified Full Standard Product Warranty:** Submit the manufacturer's certified Full Standard Product Warranty terms and conditions applicable to all specified equipment assemblies and parts for the Contracting Officer's approval prior to equipment delivery and commencement of equipment on-site installation, as approved by the Contracting Officer. All manufacturers' Full Standard Product Warranty certificates are to be provided to the State at the time of equipment delivery and prior to the commencement of equipment on-site installation.

Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from project acceptance.

7. **Operation and Maintenance Manuals:** Submit manuals on all equipment and the overall system upon successful completion of equipment on-site

installation and start-up and prior to final inspection, as approved by the Contracting Officer. Evidence of the respective manufacturers' certification of all personnel responsible for installation, testing, and start-up of the equipment.

8. Hawaii Energy Rebate Application: Coordinate with design engineer to provide required information to complete Hawaii Energy Rebate Application for VFD HVAC fans and VRF systems. Application link: <https://hawaiienergy.com/for-business/rebates-for-business/hvac/>

1.05 LAWS, REGULATIONS AND CODES

- A. All work shall be in accordance with government laws, ordinances, rules and regulations and orders.
- B. The following shall govern where applicable; the Uniform Plumbing Code as adopted by the City and County of Honolulu, the International Building Code as adopted by the City and County of Honolulu, State of Hawaii Department of Health Regulations, 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 TRADE NAME

- A. Mentioning of a trade name in the plans and specifications indicates that the manufacturer is acceptable to the State. 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.

1.07 PERMITS AND INSPECTIONS

- A. Applications for permits will be done by the State. The Mechanical Contractor shall pay for all necessary permits and fees (note: all work shall be done as a part of a lump sum bid price).
- B. The Mechanical Contractor shall apply and pay for all necessary inspections required by any public authority having jurisdiction (note: all work shall be done as a part of a lump sum bid price).

1.08 DISCREPANCIES

- A. The Drawings and Specifications are intended to be cooperative. Any materials, equipment or system exhibited on the Drawings but not mentioned in the Specifications or vice versa 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 complementary 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 Contracting Officer at once. If the Contractor proceeds with the work affected without instructions from the State, he shall make good any resultant damage or defect. All interpretations of Drawings and specifications shall be clarified by the State.

1.09 WORKMANSHIP AND MATERIALS

- A. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades 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 accepted equivalent " 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 Contracting Officer that is referred to.
- D. The Contracting Officer 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 approved by the Contracting Officer. Damaged or defective items, in the opinion of the Contracting Officer, shall be replaced.
- F. Reference to standards are intended to be the latest revision of the standard specified.

1.10 MANUFACTURER'S RECOMMENDATIONS

- A. 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 Contracting Officer, prior to the installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can cause rejection of the material.

1.11 INSPECTION OF SITE

- A. This Contractor is required to attend a prebid meeting and site visit 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. If there are any questions or discrepancies in the design, the Contractor shall bring it to the attention of the Contracting Officer before submitting his proposal.

1.12 CONTINUITY OF SERVICES, PHASING

- A. Coordinate with Contracting Officer for relocation of office workers during each phase of construction. All work shall be performed to accommodate the phasing requirements noted in contract plans during normal working hours, night time, and/or weekends at contractor's discretion. Contractor is required to coordinate and reprogram the DDC system so that main HVAC equipment can operate during night and weekends during construction.
- B. Examine all Drawings and Specifications (i.e. work from other trades) 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.
- C. Investigate, determine and verify locations of any overhead utilities on or near the site. Determine such locations in conjunction with all public and private utility companies and with all authorities having jurisdiction.

1.13 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. Any drilling or cutting required for the performance of work under this Section shall be the responsibility of this Contractor and the cost shall be borne by him.
- C. Holes in Concrete: The Mechanical Contractor shall pay all costs for cutting holes (note: All work shall be done as a part of a lump sum bid price). All holes through existing concrete shall be either core drilled or saw cut. All holes required shall have the approval of the Contracting Officer prior to cutting and drilling.
- D. It shall be the responsibility of this Contractor to ascertain that all openings are properly located.

1.14 QUALITY ASSURANCE

- A. Suspended piping, ductwork and equipment shall be attached to the structure, supported by, and seismically braced per the most current revision of one of the following:
 - 1. Mason seismic Restraint Guidelines for suspended piping.
 - 2. Unistrut seismic bracing system.
 - 3. Tomarco ISAT Seismic Restraint system.
 - 4. SMACNA Seismic Restraint guidelines.
 - 5. NUSIG Seismic Restraint guidelines.
- B. Application of seismic bracing systems shall be as follows.
 - 1. Designed, engineered and built by the system contractor. The details and seismic bracing shop drawings shall be reviewed and approved by a licensed structural engineer, hired by the contractor.

2. Select components for strut, strut clamps, strut fittings, strut nuts, hangers, pipe clamps etc., in accordance with the pre-engineered seismic bracing systems designed for seismic zone 2A that have been reviewed and approved by a licensed structural engineer, hired by the contractor.
 3. Once a seismic bracing system is selected for the project and approved by the Structural Engineer of Record, the system shall be used for the entire project within a given mechanical system. Mixing of different seismic bracing systems is not permitted.
- C. Contractor shall submit, prior to installation, seismic load calculations for equipment, conduits, piping and ductwork, anchorage details, seismic brace detail(s), seismic brace connection to system detail(s), seismic brace connection to structure detail(s) and seismic brace spacing or lay-out details.
1. Calculations required for supports and bracing for:
 - a. Sizes and situations not covered by pre-engineered systems.
 2. Include horizontal and vertical reaction loads at connections to building structures for all seismic restraints, including those covered by referenced Guidelines. Coordinate reaction loads and attachment details with Contracting Officer.
 3. Calculations prepared and signed by a Structural Engineer knowledgeable in Seismic Design registered in Hawaii.
 - a. Hired by Contractor under this Section.
 - b. Cost of calculations borne under this Section.
- D. Contractor shall submit, prior to installation, data identifying the various supports to structure connections and seismic brace structure connections. Submittal data shall identify the following:
1. Location of connections.
 2. Numerical identification of maximum allowable design value of connecting method.
 3. Numerical value of applied load or reaction.
 4. Type of connection (vertical support, vertical support with seismic brace).
 5. Seismic brace reaction type (tension only, tension & compression).
 6. Detailed drawing (listing all related components) of method of connections.
- E. Submit letter signed by Structural Engineer performing seismic load calculations in conformance with item entitled "QUALITY ASSURANCE", confirming that:
1. Structural Engineer has performed calculations for each seismic restraint not covered by referenced Guidelines as part of this Contract.
 2. Structural Engineer has performed calculations for reaction loads to the building structure for all seismic restraints, including those covered by referenced Guidelines.

3. Structural Engineer has coordinated his bracing layout, reaction loads and details of structural attachments with Contracting Officer.
4. Structural Engineer has confirmed that proposed system of seismic bracing is fully compatible with building structure.
5. Copy of calculations and layout drawings for seismic bracing to be maintained on jobsite.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. As specified in all sections of DIVISION 15 - MECHANICAL.
- B. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be the manufacturer's latest design that complies with the specifications requirements. Materials and equipment shall be duplicate items that have been in satisfactory commercial or industrial use at least 2 years prior to bid opening. 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 items need not be the products of the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number and serial number on the nameplate.
- C. The mechanical contractor shall provide all necessary options and/or accessories to comply with the applicable equipment specification requirements. Installation of the options and/or accessories shall be in accordance with the manufacturer's requirements and the complete assembly shall be warranted by the respective equipment manufacturer.
- D. The Mechanical contractor shall provide certified manufacturer's representatives and/or service technicians for any field modification to mechanical equipment. The Contractor shall ensure that any modification to the equipment will not invalidate the manufacturer's warranty.

2.02 SUBSTITUTIONS

- A. The materials, products, and equipment described in these specifications establish a standard of required function, quality, dimension, capacity, performance and appearance to be met by any proposed substitution.
- B. Specific product listings in these specifications shall not preclude alternative product selections of equivalent or superior quality. Contractor may make reasonable substitutions, provided that these are submitted to the Contracting Officer for acceptance in accordance with the INTERIM GENERAL CONDITIONS. The Contractor shall be responsible for design changes to accommodate the substituted product, at no additional cost to the State.

2.03 SEISMIC RESTRAINTS

- A. General:
 1. Capable of safely accepting indicated external forces without failure.

2. Maintain equipment, piping, and ducts in a captive position.
- B. Criteria: Design for seismic forces herein before specified
- C. Bracing System: One of the following methods as most applicable for each brace.
1. Complete system of factory fabricated components.
 2. Complete system of job fabricated components.
 3. Miscellaneous metal structural shapes.

PART 3 - EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

- A. Provide competent and qualified manufacturer's factory trained and certified field service personnel on-site to be responsible for execution of all diagnostic testing in accordance with equipment manufacturer's installation and start-up certification requirements and warranty terms and conditions. Perform work using adequate numbers of personnel skilled in the appropriate trades, and provide adequate supervision and management of the work.
- B. All workmanship shall be of the highest standard. The piping systems shall be laid out to insure a neat, systematic and orderly arrangement of all work. Vertical piping lines shall be plumb and lines that are grouped shall be parallel and as direct as possible. Exposed pipe where indicated, shall be run parallel with walls.

3.02 PROTECTION OF MATERIALS AND EQUIPMENT

- A. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical injury. Upon completion of all work the fixtures, materials and equipment shall be thoroughly cleaned, repainted as required, adjusted and operated.

3.03 CUTTING AND PATCHING

- A. The Contractor shall arrange for all cutting, fitting and patching necessary to accommodate the plumbing work as the job progresses and such cutting and patching shall be done by that trade experienced in the particular type of work required.

3.04 PIPING IDENTIFICATION

- A. Identification of all new pipe lines shall be by means of colored, waterproof, all temperature, self-adhering labels and directional arrow.
- B. All exposed pipes, whether insulated or not shall be identified. Labels may be omitted from piping where the use is obvious, due to its connection to equipment and where the appearance would be objectionable in finished rooms, as approved by direction.
- C. 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.

3.05 EQUIPMENT IDENTIFICATION

- A. Identify all equipment with symbol and service conforming to that indicated on the drawings. Identification shall be on 1-1/4 inch by 3 inch laminated plastic nameplates securely fastened to the equipment. Leave manufacturer's nameplate clean, legible, and unpainted.

3.06 COORDINATION OF WORK AS SPECIFIED IN OTHER SECTIONS

- A. The Mechanical Contractor is responsible for coordination with the General Contractor to assure proper layout, size, and location of mechanical equipment. Mechanical Contractor shall ensure that power and control wiring are provided and installed.

3.07 INSPECTIONS

- A. All work and materials are subject to field observation at any and all times by the Contracting Officer.
- B. Contractor shall notify the Contracting Officer a minimum of two days prior to testing any piping which must be witnessed and approved before they are covered up or enclosed. Should the Contractor fail to notify the Contracting Officer at the times prescribed, it shall then be the Contractor's responsibility to make accessible any concealed lines, or demonstrate the acceptability of any part of the system. Any extra cost caused by the removal of such work shall be borne by the Contractor.
- C. If observer finds any material or work not conforming to these Specifications, Contractor within three days of being notified shall remove said materials from the premises and replace with approved material, at no cost to the State.

3.08 OPERATIONAL ACCEPTANCE TESTS

- A. 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 and shall complete the attached Operational Performance Tests form.

3.09 POSTED OPERATING INSTRUCTION

- A. Furnish approved operating instructions for each principal item of equipment for the use of the operation and maintenance personnel. Operating instruction shall be printed or engraved and shall be framed under glass or in approved laminated plastic and posted where directed by the Contracting Officer. 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 and weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

3.10 INSTRUCTION TO STATE PERSONNEL

- A. 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.

- B. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the State 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 time 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.

3.11 LOCAL TECHNICAL SUPPORT

- A. The mechanical equipment supplier shall have an Oahu office within 50 miles of the project site, staffed with factory trained engineers fully capable of providing instruction, routine maintenance and emergency maintenance service on all system components. The mechanical equipment supplier shall have locally stocked spare parts.

- B. The control system supplier shall have an Oahu office within 50 miles of the project site, staffed with factory trained engineers fully capable of providing instruction, routine maintenance and emergency maintenance service on all system components.

3.12 SAFETY REQUIREMENTS

- A. Belts, pulleys, 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.

- B. Items such as catwalks, ladders and guardrails shall be provided where required for safe operation and maintenance of equipment.

3.13 CLEANUP AND REPAIRS

- A. Debris shall not be allowed to accumulate as a result of this work. Upon completion of this work, remove all debris and excess materials, tools, etc. resulting from this work from the jobsite and leave the location of this work broom-clean in a manner acceptable to the Contracting Officer.

- B. This Contractor shall clean all fixtures and equipment set by him of oil, grease, stains, etc. All plates, trim, etc. shall be polished. Traps and drains shall be clean and unobstructed.
- C. All fixture piping and lines shall be thoroughly cleaned before leaving the work.

3.14 FINAL INSPECTION

- A. 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 done and the site cleaned up.

3.15 MAINTENANCE

- A. Refer to SECTION 15920 - MAINTENANCE SERVICE FOR AIR HANDLING AND VENTILATION SYSTEMS for maintenance.

3.16 SEALING AND PENETRATING

- A. Fire Rated: Provide UL tested assembly for all penetrations through fire rated walls and floor.
- B. Non-Rated: Provide mineral fiber sating (minimum of 3 lbs. density) at all non-rated walls and floors.

END OF SECTION

SECTION 15140 - SUPPORTS, ANCHORS, AND SEALS

PART 1- GENERAL

1.01 SUMMARY

- A. This Section includes supports, anchors and seals.
- B. This Section includes seismic bracing for seismic zone 2A.

1.02 QUALITY ASSURANCE

- A. Submit information as required by DIVISION 1 - GENERAL REQUIREMENTS for approval of seismic bracing, support and anchorage to the structure for equipment, conduits, piping and ductwork. System to be used for the project.
- B. Suspended piping, ductwork and equipment shall be attached to the structure, supported by, and seismically braced per the most current revision of one of the following:
 - 1. Mason seismic Restraint Guidelines for suspended piping.
 - 2. Unistrut seismic bracing system.
 - 3. Tomarco ISAT Seismic Restraint system
 - 4. SMACNA Seismic Restraint guidelines.
 - 5. NUSIG Seismic Restraint guidelines.
- C. Application of seismic bracing systems shall be as follows.
 - 1. Designed, engineered and built by the system contractor. The details and seismic bracing shop drawings shall be reviewed and approved by a licensed structural engineer, hired by the contractor.
 - 2. Select components for strut, strut clamps, strut fittings, strut nuts, hangers, pipe clamps etc., in accordance with the pre-engineered seismic bracing systems designed for seismic zone 2A that have been reviewed and approved by a licensed structural engineer, hired by the contractor.
 - 3. Once a seismic bracing system is selected for the project and approved by the Structural Engineer of Record, the system shall be used for the entire project within a given mechanical system. Mixing of different seismic bracing systems is not permitted.
- D. Do not mix seismic bracing designs within a given new system designs.
- E. All conditions which involve thermal and/or building expansion and contraction shall be taken in consideration and identified in the coordinated shop drawings.
- F. Seismic bracing, support and anchorage to the structure of all conditions which involve thermal and/or building expansion and contraction shall be engineered and built by the applicable system contractor. When applicable seismic bracing, support and anchorage details are used, review these details with Project

Structural Engineer and Mechanical Engineer.

- G. Contractor shall submit, prior to installation, seismic load calculations for equipment, conduits, piping and ductwork, anchorage details, seismic brace detail(s), seismic brace connection to system detail(s), seismic brace connection to structure detail(s) and seismic brace spacing or lay-out details.
 - 1. Calculations required for supports and bracing for:
 - a. Sizes and situations not covered by pre-engineered systems.
 - 2. Include horizontal and vertical reaction loads at connections to building structures for all seismic restraints, including those covered by referenced Guidelines. Coordinate reaction loads and attachment details with Contracting Officer.
 - 3. Calculations prepared and signed by a Structural Engineer knowledgeable in Seismic Design registered in Hawaii.
 - a. Hired by Contractor under this Section.
 - b. Cost of calculations borne under this Section.
- H. All connections to the structure shall be sized according to actual applied load plus any seismic vertical component increase. Do not size connection to the structure according to threaded hanger rod size.
- I. Contractor shall submit, prior to installation, data identifying the various supports to structure connections and seismic brace structure connections. Submittal data shall identify the following:
 - 1. Location of connections.
 - 2. Numerical identification of maximum allowable design value of connecting method.
 - 3. Numerical value of applied load or reaction.
 - 4. Type of connection (vertical support, vertical support with seismic brace).
 - 5. Seismic brace reaction type (tension only, tension & compression).
 - 6. Detailed drawing (listing all related components) of method of connections.
- J. Submit letter signed by Structural Engineer performing seismic load calculations in conformance with item entitled "QUALITY ASSURANCE", confirming that:
 - 1. Structural Engineer has performed calculations for each seismic restraint not covered by referenced Guidelines as part of this Contract.
 - 2. Structural Engineer has performed calculations for reaction loads to the building structure for all seismic restraints, including those covered by referenced Guidelines.
 - 3. Structural Engineer has coordinated his bracing layout, reaction loads and details of structural attachments with Contracting Officer.

4. Structural Engineer has confirmed that proposed system of seismic bracing is fully compatible with building structure.
 5. Copy of calculations and layout drawings for seismic bracing to be maintained on jobsite.
- K. Seismic bracing design force applications greater than those noted in the pre-engineered systems shall be engineered by the contractor and submitted prior to installation. These applications shall be reviewed and approved by the Project Structural Engineer of Record.
- L. When the pre-engineered system details are not usable for a given project condition, it shall be resolved through engineered adaptations or alteration. Whenever possible these adaptations or alterations shall use the specified pre-engineered seismic bracing system components to maintain compliance and uniformity. In all cases, and prior to installation, these adaptations or alterations shall be engineered in accordance with standard engineering practices by a qualified, registered Structural Engineer, and shall be submitted to the Project Structural Engineer and Mechanical Engineer of Record for their review and preliminary approval.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Hangers:
1. In accordance with the selected pre-engineered seismic bracing system.
- B. Strut - Channel Framing:
1. In accordance with the selected pre-engineered seismic bracing system.
- C. Anchors - Drill In:
1. Pre-approved with ICBO tested load rating. All expansion anchors used on the project shall be from one Manufacturer.

2.02 SEISMIC RESTRAINTS

- A. General:
1. Capable of safely accepting indicated external forces without failure.
 2. Maintain equipment, piping and ducts in a captive position.
- B. Criteria: Design for seismic forces herein before specified.
- C. Bracing System: One of the following methods as most applicable for each brace.
1. Complete system of factory fabricated components.
 2. Complete system of job fabricated components.
 3. Miscellaneous metal structural shapes.

2.03 ANCHORS, INSERTS AND FASTENERS

- A. All anchors and inserts shall be installed according to the ICBO standards.
- B. Do not use any anchor or insert in concrete which does not have a signed structural engineered design value based on its installed application.
- C. Do not use powder driven and power driven (Shoot-In) fasteners, expansion nails or friction spring clips for Mechanical seismic bracing application.
- D. An over-head concrete anchors or inserts shall be selected from listings within the specified pre-engineered seismic bracing systems and shall have maximum allowable design tension or shear values no greater than those listed within ICBO evaluation report.
- E. All anchors, inserts or connections to the structure shall be submitted to the Structural Engineer of Record for approval. Submittal review and/or acceptance by the Mechanical or Electrical Engineer of Record shall not constitute compliance or usability.
- F. Box type inserts which allow movements for horizontal adjustment shall not be allowed, unless engineered solution is provided to assure positive captive positioning and securing of load bearing attachment. Concrete inserts shall not be used for seismic bracing attachment unless specifically detailed in the Pre-Engineered Seismic Bracing Systems.
- G. All combined tension and sheer anchor or insert attachments shall be engineered.
- H. All unusable and/or non-compliance anchors or inserts, shall be cut-off flush with the concrete or removed at the contractors expense.
- I. Job site torque and/or load or pull testing shall not be allowed as justification for use of non-compliance anchors or inserts.
- J. Torque testing of anchors shall be allowed to verify compliance of anchor installation, however, torque testing shall not justify usability of anchor. Only load or pull testing shall be allowed to justify usability of anchors. Failure of torque shall constitute failure of anchor.
- K. 50 percent of anchors installed in concrete shall be tested in alternate groups, upon failure of an anchor, the next 20 consecutive anchors must pass, before 50 percent alternate group testing can resume.
- L. If anchor failures are due to contractor error, retesting of failed anchors as well as consecutive anchor testing to confirm contractors' ability to properly install anchors will be at the contractor's expense.
- M. All items attached to or support from structural or immediate steel, shall have a positive assembly and shall be through bolted, welded or clamped to the steel. All clamps shall be constructed of malleable iron or steel and shall include a retaining strap or J-hook.

2.04 PIPE HANGERS AND SUPPORTS FOR NON-SEISMIC BRACING APPLICATION

- A. Hangers for Uninsulated Steel or Copper Pipe, All Sizes: An adjustable wrought steel clevis plastic-coated for copper piping.
- B. Hangers for Cold Insulated Steel or Copper Pipe, All Sizes (Except Steam Pipe 2-1/2 Inches and Larger): An adjustable wrought steel clevis, sized to suit 360 degree high-density insulation insert.
- C. Hangers for Hot Insulated Steel or Copper Pipe, All Sizes, (except steam pipe 2-1/2 inches and larger): An adjustable wrought steel clevis, sized to suit a 180 degree, 20 gauge galvanized sheet metal insulation saddle, 12 inches long.
- D. Hangers for Insulated Steel Steam Pipe, Sizes 2-1/2 inches and Larger: Adjustable roller hanger with steel yoke and cast iron roller, with welded insulation protection saddle, size to accommodate insulation.
- E. High Density Insulation Inserts: For pipes 2-1/2 inches and larger use 360 degree calcium silicate (waterproofed for chilled water) inserts having a lap jointed 360 degree sheet metal protective sleeve. Thickness of insert shall match pipe covering (insulation) thickness. All inserts shall have an independent lab certified break, crack and/or crush strength equal to or greater than 5 times the applied load. Do not use inserts at seismic brace connection locations without prior written approval from the system design engineer. Do not connect seismic bracing to inserts without prior written approval from the system design engineer. Submit copies of insert manufacturers independent lab test reports. Replace all cracked, damaged and/or non-compliance inserts at no additional cost to Owner.
- F. Multiple or Trapeze Hangers: Steel channels or angles with welded spacers and hanger rods, sized to support load.
- G. Wall Support for Pipe Sizes to 3 inches: Cast iron hooks.
- H. Wall Support for Pipe, Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron rail for hot pipe, sizes 5 inches and larger.
- I. Vertical Support: Steel riser clamp.
- J. Floor Support for Hot Pipe, Sizes to 4 inches, and all Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- K. Beam Clamps for pipe hangers shall be complete with safety straps.
- L. Design hangers to impede disengagement by movement of supported pipe.
- M. Provide plastic-coated hangers and supports for copper piping or provide isolator between hanger or support and piping.
- N. Provide angles or channels to span joists and distribute load.

- O. Do not use wire for either temporary or permanent hanger or support purposes.

2.05 PIPE HANGERS AND SUPPORTS FOR SEISMIC BRACING APPLICATION

- A. Hangers for single hanger supported piping shall be steel clevis type.
- B. Hangers shall be designed and installed to allow for a minimum 1-1/2 inches of vertical adjustment.
- C. Hangers, supports and insulation for conditions which involve thermal and/or building expansion and contraction shall be engineered based on actual field conditions. Hangers shall be designed and installed to allow for vertical adjustment.
- D. Trapeze supported piping shall be attached to minimum 12 gauge, 1-5/8 inch by 1-5/8 inch (strut) channel framing or a structurally engineered trapeze hanger support.
- E. Items supported by trapeze hangers shall be properly attached at each trapeze location.
- F. Hangers and vertical support rods shall be sized and spaced according to the pre-engineered seismic bracing systems.
- G. Provide a protective barrier between non-compatible dissimilar metals.
- H. High Density Insulation Inserts: shall not be used at piping seismic attachment locations unless shown otherwise in the OSFIPD pre-approved seismic bracing systems.

2.06 HANGER RODS

- A. Provide steel hanger rods, appropriately threaded.

2.07 DUCT HANGERS AND SUPPORTS FOR NON-SEISMIC BRACING APPLICATIONS

- A. In accordance with CMC and SMACNA Standards.
- B. Provide galvanized steel angles, channels, straps, rods, etc., for duct support. Do not use raw steel.

2.08 DUCT HANGERS AND SUPPORTS FOR SEISMIC BRACING APPLICATION

- A. In accordance with one of the pre-engineered seismic bracing systems.

2.09 FLASHING

- A. Steel Flashing: 26 gauge galvanized steel.
- B. Lead Flashing: 4 pound per square foot sheet lead for waterproofing; 1 pound per square foot sheet lead for soundproofing.
- C. Safes: 5 pound per square foot sheet lead or 8 mil thick neoprene.
- D. Caps: Steel, 22 gauge minimum, 16 gauge at fire-resistant structures.

2.10 SLEEVES

- A. Sleeves for Pipes Passing Through Walls and Footings: Schedule 40 black steel pipe sleeve. For waterproof sleeves, use Thunderline Link-Seal or Calpico Sealing Linx.
- B. All pipes and ducts passing through fire-rated walls and floors shall be UL listed fire-rated assemblies. Refer to DIVISION 7 for fire-rated sealants. Pipe insulation carried through the penetration shall comply with the UL system requirement, but shall not be less than required in Specification SECTION 15650 - AIR CONDITIONING AND VENTILATION.
- C. Open voids and cavities occurring in pipe sleeves and ductwork passing through rated walls and floors shall be completely sealed with materials specified in the UL system listing.
- D. Size sleeves large enough to allow for movement due to expansion and to provide for continuous insulation.

PART 3 - EXECUTION

3.01 INSERTS AND DRILL-IN ANCHORS

- A. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.
- B. Set inserts in position in advance of concrete work. Provide reinforcement rod in concrete for inserts carrying pipe over 4 inches in diameter or ducts over 60 inches wide.
- C. Where concrete slabs form finished ceiling, finish inserts flush with slab surface.
- D. Locate expansion shields in concrete beams a minimum of 6 inches above bottom of beam.
- E. Do not use friction spring-type clips.
- F. Use hangers which are vertically adjustable after piping is erected.

3.02 PIPE HANGERS AND SUPPORTS

- A. Support horizontal steel and copper piping where pipes are not seismically braced per CMC.
- B. Support piping joined with grooved couplings per coupling manufacturer's installation guidelines.
- C. Where pipes are seismically braced, support and brace pipes in accordance with the specified pre-engineered seismic bracing systems.
- D. Install hangers to provide minimum 1/2-inch clear space between finished covering and adjacent work.
- E. Support piping within 12-inches at each change in direction, at ends of branches, at base and top of risers, pipes and drops, and wherever necessary to prevent

sag, bending, or vibration, in addition to the above listed hanger spacing.

- F. Use hangers which are vertically adjustable 1-1/2 inches minimum after piping is erected.
- G. Support horizontal soil pipe on both sides of each joint, with 5-0" maximum spacing between hangers.
- H. Support vertical piping at every other floor unless shown otherwise. Support vertical soil pipe at each floor at joint.
- I. Where several pipes can be installed in parallel and at same elevation, provide multiple individual hangers or trapeze hangers. Trapeze hangers shall not be used for supporting piping systems with different thermal expansion characteristics and/or slope requirements.
- J. Where practical, support riser piping independently of connected horizontal piping.
- K. Support nonmetallic piping with a sufficient number of hangers to prevent sagging and misalignment.
- L. Provide supports and miscellaneous metal such as steel plates, brackets, metal framing, bolts, nuts and etc. Where exposed to weather material shall be hot dipped galvanized.
- M. Vertical piping shall be supported top and bottom. Equipment shall not be used to support piping.
- N. Provide miscellaneous steel members, beam, brackets, etc. for support of work in this Division, unless specifically included in other Division.
- O. Use felt pad vibration isolators, Super Strut 716, Trisolators, in lieu of copper plating on steel hangers (copper piping).
- P. Hanger rod sizes shall be as shown below:

<u>Pipe Size</u>	<u>Rod Size</u>	<u>Pipe Size</u>	<u>Rod Size</u>
1/2 - 2"	3/8 "	8 - 12"	7/8"
2-1/2"- 3-1/2"	3/8"	14 - 16	1"
4"-5"	1/2"	18-30	1-1/4"
6"	1/2"		

- Q. Hanger Spacing Schedule: Maximum hanger and support spacing for horizontal piping, on centers, shall not exceed the spacing listed below. In all cases, avoid concentrating hangers. Evenly distribute the load off the structural framing system.

Type of Pipe	3/4" or Less	1 - 1-1/2"	2" or Larger
Steel Pipe	8'	10'	10'
Copper Tubing	8	10'	10'
Cast Iron Soil Pipe			10'

- R. Horizontal cast iron soil pipe shall have hangers on at least every other joint, but the distance between hangers shall not exceed 10-feet. Over 5-foot length section, hanger shall be provided at each side of joint. Hubless cast iron soil pipe shall be provided with additional hangers as required to prevent sagging. Additional hangers shall be used for seismic restraint.
- S. Install hanger on insulated piping in a manner that does not damage insulation. Provide steel pipe saddles as required to protect pipe covering. Pipe hangers on insulated piping shall be installed on the outside of the insulation and not in contact with the pipe (except at seismic pipe bracing when required). The insulation shall be protected by an 18-gauge galvanized steel shield.
- T. Miscellaneous hangers and supports, not detailed on or reference by contract document, shall be designed to support the combined weight of the pipe, fluid, and pipe insulation, and shall have a safety factor of at least five, based on the ultimate tensile strength of the material used. Calculation and sketches shall be submitted with signature and stamped by a licensed Hawaii Structural Engineer for submittal review.

3.03 DUCT HANGERS AND SUPPORTS

- A. Where ducts are not seismically braced, use duct hangers, supports, and installation per SMACNA Standards.
- B. Where ducts are seismically braced, use duct hangers, supports and installation in accordance with the selected pre-engineered seismic bracing systems.
- C. Specific details shown on Drawings take precedence over SMACNA requirements.

3.04 PRIMING

- A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipes shafts and suspended ceiling spaces are not considered exposed.

3.05 FLASHING

- A. Rash and counterflash where mechanical equipment passes through weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes with 24 inches x 24 inches sheet lead, minimum 8 inches above roof.
- C. Provide 12 inches minimum height curbs for roof-mounted mechanical equipment. Flash and counter flash with galvanized steel, soldered and waterproofed.

3.06 SLEEVES

- A. Set sleeves in position in advance of concrete work. Provide suitable reinforcing around sleeves.
- B. Where piping or ductwork passes through floor, ceiling or non fire-rated wall, close off space between pipe or duct and construction with noncombustible insulation. Provide tight-fitting metal caps on both sides and caulk.
- C. Provide pipe sleeves for all mechanical piping.
- D. Adequately sleeve pipe passing through concrete or masonry walls or concrete slabs to receive both pipe and insulation pertaining thereto.
- E. Waterproof sleeves shall be Thunderline Link-Seal or Calpico Sealing Linx.
- F. Install sleeves on pipes as they are being hung, ready for proper placement in wall as wall is being constructed.
- G. Where sleeves have been inadvertently omitted in concrete floors, provide requisite pipe opening by using properly sized diamond core drills after coordination with Structural Engineer. Areas located below drilling operations shall be protected from possible damage.

3.07 SEISMIC RESTRAINTS

- A. Install seismic restraints for pipes, flues, ducts and equipment in accordance with the above listed codes and guidelines.
- B. Design and install restraints to prevent permanent displacement in any direction caused by lateral motion, overturning, or uplift.
- C. Make no rigid connections between equipment, pipes and ducts and building structure that degrade noise and vibration isolation systems.
- D. Coordinate seismic bracing requirements with other sections to result in:
 - 1. Vertical pipe and duct restraints to coincide with and take place of required hangers.
 - 2. Longitudinal pipe bracing to coincide with required pipe anchors.

3.08 SEISMIC BRACING INSTALLATION

- A. Piping and Ductwork:
 - 1. Install all bracing and restraints per referenced "Guidelines".
 - 2. Coordinate seismic bracing and restraints so that required thermal expansion provisions are not restricted.
 - 3. Provide floor support and bracing of pipe connection risers to equipment.
 - 4. Where seismic bracing and restraints are not required refer to SECTION 15140 - SUPPORTS, ANCHORS AND SEALS.
- B. Flexibly Supported Piping and Ducts:

1. Install and locate restraints to allow normal operation of systems without transmitting vibrations to building structure.
 2. Location of restraints: Per referenced "Guidelines" as specified hereinbefore.
 3. Construction of Restraints: Steel cables, installed slack.
- C. Rigidly Mounted Equipment:
1. Secure to floor as required to prevent horizontal motion and overtuning.
 2. Secure to walls or other equipment to prevent overtuning.
 - a. Attach to elements capable of taking calculated loads.
 - b. Provide steel backing in walls as required to brace equipment and piping from wall.

3.09 FIELD QUALITY CONTROL

- A. Inspection of bracing devices by manufacturer's representative of bracing devices.
- B. Make all connections recommended by manufacturer's representative.

END OF SECTION

SECTION 15190 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes requirements for valve identification, equipment identification, piping and ductwork identification.

1.02 SUBMITTALS

- A. Comply with provisions of DIVISION 1 - GENERAL REQUIREMENTS.
- B. Submit valve tag chart, lists of pipe, duct and equipment to be labeled and color chart.
- C. Product Data: Manufacturer's latest published data for materials, equipment and installation, including samples of valve and damper tags, equipment identification and piping/ductwork identification.

1.03 QUALITY ASSURANCE

- A. American National Standards Institute (ANSI):
 - 1. A13.1 - 2007: Scheme for identification of piping systems.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Brady
- B. Seton
- C. All tagged components shall be in accordance with ANSI A13.1 - 2007.
- D. For valves and automatic dampers, use metal tags 2 inches minimum diameter, fabricated of brass or stainless steel.
- E. Attach tags with jack chain of same materials.
- F. For stamped tags, use 1/4 inch high letters.
- G. For labels, letters to be 2 inches high. Smaller letters may be used only when space does not permit 2-inch high lettering.
- H. Pressure sensitive tapes are acceptable.

PART 3 - EXECUTION

3.01 VALVES

- A. Tag valves with identifying number and system. Number valves by floor level. Do not tag equipment isolation valves.

- B. Tag all balancing valves with final accepted gpm per final balancing report.
- C. Prepare lists of tagged valves indicating location, floor level, tag number, system type (or number) and use. Prepare separate lists of each system. Include copies in each maintenance manual.
- D. Prepare a 48 x 36 flow diagram of each system indicating tag number. The flow diagram shall be framed with glass or laminated face and be mounted in the plant operation office.

3.02 DAMPERS, VOLUME

- A. Tag major volume dampers (more than 2,500 cfm) in exhaust air systems.
- B. Tag dampers with identifying number and system. Number dampers by floor level.
- C. Tag all balancing dampers with final accepted cfm per final balancing report.
- D. Prepare lists of tagged dampers indicating location, floor level, tag number, system type (or number) and use. Prepare separate lists of each system. Include copies in each maintenance manual.

3.03 DAMPERS, FIRE/SMOKE

- A. Tag dampers with identifying number and system. Number dampers by floor level.
- B. Tag all balancing dampers with final accepted cfm per final balancing report.
- C. Prepare lists of tagged dampers indicating location, floor level, tag number, system type (or number) and use. Prepare separate lists of each system. Include copies in each maintenance manual.
- D. Prepare a 48 x 36 floor plan of each system indicating tag number. The floor plan shall be framed with glass or laminated face and be mounted in the plant operation office.

3.04 CONSTANT VOLUME BOXES

- A. Tag boxes with identifying number and system as scheduled on drawings.
- B. Tag all boxes with final accepted cfm per final balancing report.
- C. Prepare lists of tagged boxes indicating location, floor level, tag number, system type (or number) use. Prepare separate lists of each system. Include copies in each maintenance manual.
- D. Prepare a 48 x 36 floor plan of each system indicating tag number. The floor plan shall be framed with glass or laminated face and be mounted in the plant operation office.

3.05 EQUIPMENT

- A. Identify equipment with identical letters and/or numbers as used on drawings. Where space is available use full name of equipment.

3.06 CONTROLS

- A. Controls identification shall be as specified IN SECTION 15650 - AIR CONDITIONING AND VENTILATION. Also identify controls such as float switches, alarms, remote pushbutton switches with 1-1/4 inch high lettering and laminated plastic plates glued or chained to equipment.

3.07 PIPING

- A. Provide piping systems with snap-on or self-adhesive color-coded banding markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, include generic name of system or its abbreviation, and include arrows to show direction of flow. Comply with ANSI A13.1 for color selection and band width standards. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls, or ceilings or otherwise pass into inaccessible spaces, and at 30-foot intervals along exposed portions of lines. Do not mark short and repetitive piping branches.

3.08 DUCTWORK

- A. Ductwork identification shall consist of stencil-painted identification on insulated or uninsulated ductwork and housings of the air handling systems; including arrows to show flow, system numbers and generic name of service. Mark primary runs at housing and main branches, and mark access doors to indicate equipment in housing or duct. Mark ductwork at 25 feet intervals. Where concealed behind removable ceilings, markings may be by plasticized tags in lieu of stencil-painted markers.

3.09 HAZARDOUS ITEMS

- A. Identify all hazardous ductwork, equipment, etc. by appropriate labeling with writing, for example: "Caution - Negative Pressure Isolation Room Exhaust," etc. Such labeling shall be affixed in a manner which is not readily removable and shall appear on the exhaust duct at intervals not more than 20 feet apart, and at least once near each room and each story traversed by the exhaust system.
- B. Provide warning signs of engraved plastic laminate or baked enamel signs at locations of major units of operational equipment. Provide warning signs where there is hazardous exposure or danger associated with the operation or maintenance of the equipment. Provide text of sufficient clarity and lettering of sufficient size to convey related data at each location. Mount permanently in an effective location. Comply with recognized industry standards for color and design.

END OF SECTION

SECTION 15400 - PLUMBING, GENERAL PURPOSE

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes the following for plumbing:
 - 1. Plumbing, piping, fittings, and accessories.
 - 2. Plumbing specialties.
 - 3. Pipe supports, anchors, and seals.
 - 4. Testing, adjusting, and balancing.
 - 5. Manufacturer's literature, shop drawings, and record drawings.
- B. Related Work Described Elsewhere:
 - 1. DIVISION 16 - ELECTRICAL.

1.02 DEFINITIONS

- A. AABC: Associated Air Balance Council
- B. AMCA: Air Movement and Control Association
- C. ASHRAE: American Society of Heating, Refrigerating, and Air-Conditioning Engineers
- D. ASME: American Society of Mechanical Engineers
- E. ASTM: American Society for Testing and Materials
- F. AWWA: American Water Works Association
- G. CISPI: Cast Iron Soil Pipe Institute
- H. MSS: Manufacturers Standardization Society
- I. NEBB: National Environmental Balancing Bureau

1.03 GENERAL REQUIREMENTS

- A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions or discrepancies in the plans and specifications, the Contractor shall call the attention of the Contracting Officer to such omissions and discrepancies in advance of the date of bid opening so that the necessary corrections can be made. Otherwise, the Contractor shall furnish and install the omissions or discrepancies as if the same were specified and provided for.

- B. Standards:
1. All work shall be done in accordance with the latest edition of the Uniform Plumbing Code and applicable ordinances of the City and County of Honolulu.
 2. All plumbing fixtures shall comply with the Board of Water Supply requirement for water conservation.
 3. Work shall comply with applicable regulations of the State of Hawaii Health Department.
 4. All plumbing fixtures and installation shall comply with the Americans with Disabilities Act Accessibility Guidelines.
 5. Contractor shall obtain all permits, licenses, and certificates and pay for all fees.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Shop Drawings and Diagrams: The Contractor shall submit 8 copies of shop drawings and brochures or catalog cuts of equipment for review and reply prior to start of work. Drawings shall show complete dimensioned installation, including all piping in building, equipment installation, elevation, invert, supports and foundations. The Contractor shall show the entire work with inverts, sleeves, and dimensions. Contractor shall check project drawings to avoid interferences with structural features and with work of other trades. No plumbing or piping work shall commence until plans have been reviewed by the Contracting Officer. Any deviations from the shop drawings shall require prior approval by the Contracting Officer.
- C. Product Data:
1. Approval of Materials, Fixtures and Equipment: As soon as practicable and within 30 days after award of contract and before commencement of installation of any materials and equipment, a complete schedule of the materials and equipment proposed for installation shall be submitted for the approval of the Contracting Officer. The schedule shall include catalogs, cuts, diagrams; drawings and such other descriptive data as may be required by the Contracting Officer. No consideration will be given to partial lists submitted from time to time. Any scheduled materials, fixtures and equipment not conforming to the specifications may be rejected.
- D. Operations and Maintenance Manual: Submit operations and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required as follows:
1. Operation Data:
 - a. Emergency instructions and procedures.
 - b. System, subsystem, and equipment descriptions, including operating standards.

- c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
 - d. Description of controls and sequence of operations.
 - e. Piping diagrams.
2. Maintenance Data:
- a. Manufacturer's information.
 - b. Name, address, and telephone number of installer or supplier.
 - c. Maintenance procedures.
 - d. Maintenance record forms.
 - e. Copies of maintenance service agreements.
- E. Maintenance and Service Schedules: Provide maintenance and service schedule for preventative and routine maintenance. Provide report indicating the maintenance performed on all new equipment installed as a part of this project.
- F. Material Safety Data Sheets: Provide properties of each material; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the material.
- G. Equipment or Fixture Listing: The materials and equipment or fixture schedule shall include catalogs, cuts, diagrams; drawings and such other descriptive data as may be required by the Contracting Officer. No consideration will be given to partial lists submitted from time to time. Any scheduled materials, fixtures and equipment not conforming to the specifications may be rejected.
- H. Field Posted As-Built Drawings: The Contractor shall keep at the job site a complete, neat, and accurate record of all approved deviations from the contract drawings, shop drawings and specifications, indicating the work as actually installed. These changes shall be recorded on prints of the drawings affected and the shop drawings. Record drawings and reproducible as-builts shall be submitted to the Contracting Officer after final acceptance.
- I. Warranty: Submit warranty as noted under item entitled "WARRANTY" hereinbelow.

1.05 WARRANTY

- A. Manufacturer's Warranty: Submit all manufacturer's certified full standard product warranty terms and conditions applicable to all specified equipment assemblies and parts for the Contracting Officer's approval prior to equipment delivery and commencement of equipment on-site installation. Warranty shall cover all costs for parts, labor, associated travel, and expenses from the project acceptance date. The above warranty shall not be interpreted as voiding, limiting, or reducing any equipment Manufacturer's Warranty permitted by law.

- B. Contractor's Warranty: The Contractor shall certify in writing the following items:
1. All equipment, accessories and material furnished for a period of 2 years from the project acceptance date against all defects in material and workmanship. The warranty period shall commence from the project acceptance date. If any equipment, piping, or material fails, does not operate satisfactorily, or shows undue wear, the Contractor will be notified, and shall be required to correct the defect and damage to other work caused by such defect immediately and at no additional cost to the State.
 2. All equipment and materials to provide the results specified or shown.
 3. All piping to be drip free and properly installed to be free of vibration, pounding or objectionable noise.
- C. The State shall have the right to require a written certificate, dated and signed by a responsible employee of this Contractor, evidencing the performance of any portion of the work, or any testing, as a condition precedent to the acceptance of any work or the result of any test. Whenever a regulatory agency performs inspections or tests of any portion of the work, a certificate shall be furnished by the Contractor that the inspection or test was satisfactorily passed.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All materials shall be new and of the best quality available in their respective kinds, free from all defects and shall be of the make and types specified or accepted equivalent.

2.02 FIXTURES

- A. Water Closet (WC): Top spud flushometer bowl.
1. White vitreous china, floor-mounted, floor outlet, 1-1/2 inch top spud, 2-1/8 inch fully glazed trapway, 12 inch rough-in, elongated bowl.
 2. Exposed Manual Water Closet Flushometer: Low consumption, 1.28 gpf, adjustable tailpiece, vandal-resistant stop cap, nickel-silver or polished chrome finish.
 3. Manufacturers: Kohler Co., American Standard, Sloan, or accepted equivalent.

2.03 SANITARY SEWER AND VENT PIPING

- A. Cast iron service weight hub and spigot pipe and fittings, ASTM A74, with ASTM C564 rubber compression fittings or caulked and leaded joints (above and below ground).
- B. Cast iron service weight hubless pipe and fittings, CISPI 301, with CISPI 310 coupling joints (above ground only).
- C. Cast iron service weight hubless pipe and fittings, CISPI 301, with cast iron couplings with neoprene gasket and stainless-steel nuts and bolts, MG Coupling Co or accepted equivalent (above and below ground). Nuts and bolts installed

underground shall be field coated with a bituminous coating, 4 mils minimum thickness.

2.04 WATER PIPING

- A. Copper Tubing: ASTM B88, hard drawn. Type L above grade, Type K with Polyethylene jacket below grade.
 - 1. Fittings: ASME B16.18, cast bronze, or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, solder, Grade 95TA or brazed.
- B. Insulation (Hot Water and Exposed Outdoor Cold Water) Pre-molded fiberglass pipe insulation, one inch thick, with all-service jacket, Owens-Corning 25 ASJ/SSL or accepted equivalent. Provide nested insulation segments on fittings, valves, and flanges. Seal ends with vapor barrier mastic. Provide 0.016 inch thick aluminum jacket on piping exposed to the weather.

2.05 PIPE HANGERS AND SUPPORTS

- A. Conform to MSS SP69.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
- C. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- F. Vertical Support: Steel riser clamp.
- G. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- H. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded, cadmium plated or galvanized.
- I. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.06 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches and Under:
 - 1. Ferrous Pipe: 150 psig malleable iron threaded unions.
 - 2. Copper Tube and Pipe: 150 psig bronze unions with soldered joints.
- B. Pipe Size Over 2 Inches:
 - 1. Ferrous Pipe: 150 psig forged steel slip-on flanges; 1/16 inch thick preformed neoprene gaskets.

2. Copper Tube and Pipe: 150 psig slip-on bronze flanges; 1/16 inch thick preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.07 BALL VALVES

- A. Up to and Including 3 Inches:
1. Manufacturers: NIBCO or accepted equivalent.
 2. Bronze 2-piece body, stainless steel ball, full port for 2 inches and less, conventional port above, Teflon seats and stuffing box ring, lever handle solder ends, extended neck for insulation.

2.08 CHECK VALVES

- A. Up to and Including 2 Inches:
1. Manufacturers: NIBCO or accepted equivalent.
 2. Bronze swing disk, screwed or solder ends, class 125.

2.09 PLUMBING SPECIALTIES

- A. Manufacturers: J.R. Smith, Josam, Zurn, or accepted equivalent.
- B. Floor Sink: See drawings.
- C. Cleanouts: See drawings.
- D. Water Hammer Arrestors and Shock Suppressors: PDI WH-201, normal air charge 50 psig, maximum operating temperature 225 degrees Fahrenheit and 100 psi. Polypropylene liner, butyl diaphragm, steel shell. Amtrol "Diatrol" shock suppressor or accepted equivalent.
- E. Balancing Valves:
1. Manufacturers: Armstrong CB, Bell & Gossett or accepted equivalent.
 2. Construction: Brass or bronze body with union on inlet or outlet, with memory stop. For flow measuring, flow balancing, positive shut-off and drain connection.
 3. Provide at hot water return line.
- F. Thermostatic Mixing Valve:
1. High low thermostatic water mixing valve with 1 GPM minimum flow capacity. 3/4" inlet and outlet sweat connections. Integral combination checkstops with wall support. 125 PSI maximum operating pressure. Copper encapsulated thermostatic assembly with stainless steel shuttle. Temperature adjustment range 90-140 degree F.

2.10 UNDERGROUND POTABLE WATER TANK SYSTEM

- A. Underground Water Tank: Factory-welded and coated carbon steel water tank, pressure tested for tightness to ensure quality and dependability of water supply. Interior liner shall comply with NSF/ANSI 61 Drinking Water System Components

- Health Effects for the safe storage of potable water. Exterior corrosion protection system for underground water tank shall comply with UL-1746. Underground water tank shall be provided with a factory hydrotest report.
- B. Water Filtration Skid: 304 Stainless Steel Cartridge construction. Max pleated filter rating of 10 µm. (2) filtration units in parallel operation.
1. Control Panel: Panel interface shall include features to includes monitoring of the underground water tank’s water level.
- C. Duplex Booster Pump: Variable speed control, speeds up and slows down based on demand of system, maintaining constant pressure. Lead-lag pump control to alternate pump starts, allowing equal run times on all pumps for longer life cycles.
1. Control Panel: The control panel shall be UL508A listed for industrial control panels and of the same manufacturer of the pump system. All programming shall be written and supported by the pump system manufacturer. The panel enclosure shall be powder coated steel, UL Type 4, and carry a NEMA 1 rating as an assembly. Single point of power connection and integral disconnect. The panel interface shall include features to include monitoring for pump suction pressure, system pressure, PID speed, estimated flow, pump status, pump alarm.
 2. Variable Speed Drive: The drives shall be a microprocessor controlled PWM output drive for variable torque duty and supplies for the maximum full load amps produced by the motor. The drive shall be in a NEMA 1 self-contained enclosure.
- D. Level Control: Radar sensor type with continuous level measurement of liquids. Double Chamber stainless steel housing.
- E. Control Valve: 2-way solenoid type control valve designed to provide open/close control of fluids in response to electrical signal. Control valve shall be able to be activated by level control sensor for filling the storage tank. Heavy-duty, nylon-reinforced diaphragm. Soft seat seal with drip tight Class VI enclosure. Control valve shall be easily maintained without removal from the water line.

2.12 ELECTRIC WATER HEATER

- A. Copper upper heating element and stainless steel lower heating element. Automatic temperature control. 21 GPH recovery at a 90 degree F rise. Enhanced-flow brass drain valve. Temperature and pressure relief valve.

2.13 HOT WATER RETURN PUMP

- A. Suction manifold and discharge manifold made of 316 stainless steel. Base frame made of 304 steel. Check valve and two isolating valves required. Pressure gauges on suction and discharge manifolds. Pressure transducer on discharge manifold.

2.14 EXPANSION TANKS

- A. Steel construction, pre-charge with heavy duty butyl bladder, 150 PSI working pressure, all wetted components shall be of approved materials, designed for potable water application. Tank shall have NPT system connections, charging valve and drain connections.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors. Install valves with stems upright or horizontal, not inverted.

3.03 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- C. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install ball valves for throttling, bypass, or manual flow control services.

3.04 INSTRUMENTS

- A. Instruments used in testing mechanical systems and equipment shall be as recommended by the AABC, NEBB, AMCA, or ASHRAE. Test instruments used shall be initially and periodically checked thereafter to verify their calibration accuracy as described in AABC or NEBB procedures. Provide calibration verification of each test instrument with each test report.
- B. Test equipment shall be furnished by the Contractor and shall remain his property.

3.05 TEST AND BALANCE

- A. Systems and equipment as listed in the Specifications shall be tested and balanced in accordance with qualified procedures from the AABC or NEBB Standards.
- B. Procedures for each system test and equipment test shall be maintained on file by the Contractor and shall be readily available to the Contracting Officer if requested.
- C. Procedures used in tests shall be included in the submitted report.
- D. Piping: Remove from systems, during testing, equipment which would be damaged by test pressure. Replace removed equipment after testing. Systems may be tested in sections as work progresses. However, any previously tested portion shall become part of any later test of composite system. Correct leaks by remaking joints with new material; makeshift remedies will not be permitted. Test time will be accrued only while full test pressure is on system. Do testing before backfilling or concealing.
- E. Test systems per following schedule. If not scheduled, minimum test pressures are 150 percent of indicated system working or static pressure. Unless indicated otherwise, "Tolerance" shall be no pressure drop, except that due to a temperature change, in a 24-hour period.

3.06 GENERAL TESTING PROCEDURES

- A. Valves:
 - 1. General Service Valves: Test bonnets for tightness. Test-operate from closed-to-open-to-closed position while under test pressure.
 - 2. Automatic Valves: Test solenoid valves, water-regulating valves, and pressure-reducing valves for proper operation at settings indicated.
 - 3. Water Safety Valves: Test relief valves, safety relief valves, safety valves, and temperature and pressure-relief valves 3 times.

3.07 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.
- G. Submit written verification that items listed above have been completed.

3.08 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed, and clean.
- B. Inject disinfectant, free chlorine in liquid, powder, table, or gas form, throughout system to obtain 50 to 80 mg/L residual.
- C. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- D. Maintain disinfectant in system for 24 hours.
- E. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- F. Flush disinfectant from system until residual equal to that of incoming water or 1 mg/L.
- G. No sooner than 24 hours after flushing, take samples from 10 percent of outlets and from water entry and analyze in accordance with AWWA C651.

3.09 TESTING AND INSPECTION

- A. Contractor shall furnish all equipment for tests and any required retests and pay for all cost of repairing any damage resulting from such tests. Contractor shall adjust systems until they are approved. Tests shall be performed in the presence of, and to the satisfaction of the State and inspector of the official agency involved.

3.10 CLEAN UP

- A. Debris shall not be allowed as a result of this work. Upon completion of this work, remove all debris and excess materials, tools, etc., resulting from this work from the job site and leave the location of this work broom-cleaned in an acceptable manner as approved by the State. All work including plumbing fixtures, traps and mechanical equipment shall be thoroughly cleaned and ready for use.

END OF SECTION

SECTION 15606 - POL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes all fuel oil piping and related auxiliary equipment for diesel generator. General requirements include those specified in SECTION 15000 - GENERAL MECHANICAL REQUIREMENTS.

1.02 SUBMITTALS

- A. Submittals shall be provided in accordance with SECTION 01300 - SUBMITTALS.
- B. Manufacturer's Data:
 - 1. Fuel Pipe and Fittings.
 - 2. Valves.
 - 3. Piping Accessories.
 - 4. Concrete Encased Aboveground Fuel Storage Tank
 - 5. Fuel Monitoring Accessories
 - 6. Manual Fuel Port Accessories
- C. Shop Drawings: Piping system and pipe supports.

1.03 WARRANTY

- A. All work in this Section shall be under warranty for a period of 2 years from the date of acceptance of the work as a whole by The State. Should any equipment or material fall 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 2 years after the final acceptance of the work as a whole.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Fuel Oil Piping and Accessories:
 - 1. All pipe and fittings shall be UL 971A listed flexible double wall piping system. Product shall be DoubleTrac by OmegaFlex. Inner layer shall be zero-permeation, corrugated stainless steel pipe with hand extruded polyethylene jacket used for diesel #2. At every bend, provide 45-deg or 90-deg bend fittings. A long radius turn installation without an elbow fitting is not allowed.
 - 2. Steel Piping: Steel piping 2-inches and smaller shall be threaded. Piping joints shall conform to ANSI B31.4.

3. Fuel Oil Piping and Accessories: Aboveground pipe shall conform to ASTM A-53, Schedule 40 black steel seamless pipe. Fittings shall be butt-welded type, ASME B16.3, Class 150. Backing rings shall conform to ASME B31.3 and be compatible with materials being welded. Flanges and flange fittings shall be ASME B16.5, steel flanges or convoluted steel flanges which meet the criteria of ASME BPVC VIII D1. Flange faces shall have integral grooves of rectangular cross section which afford containment for self-energizing gasket material.
- B. Valves: Ball valve, 150# class, socket weld, API 607 fire safe, Apollo 83-400 series, Jomar Model S-CS-2001N-SS-4B or approved equivalent.
- C. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.
- D. Fuel Oil Vent Piping and Accessories: ASTM A 53 standard weight, zinc coated steel with zinc-coated malleable iron fittings ASME B16.3.
- E. Air Vent and Low Point Drain Valves: 1/2" ball valve, Class 150, MSS SP-72 for flanged or butt-welded ends. Stockham or equal.
- F. Anti-Siphon Valves: Tank manufacturer shall provide UL listed bronze-bodied angle check valve with pressure relief, sized per tank manufacturer's recommendations. Provide with strainer upstream of anti-siphon valve.
- G. Dielectric Unions: Provide dielectric unions between ferrous and non-ferrous piping, Class 150.
 1. Check Valve: Swing check, 150# Class, threaded ends, OPW #821 or approved equivalent.
- H. Gaskets and Seals: All gaskets and seals in contact with fuel shall be non-asbestos material.
- I. Watertight Link Seal: Provide belt of linking rubber sections to form a mechanical seal between pipes and conduit penetrating retaining walls, floors, or tanks. Belt is to provide a watertight seal to withstand up to 20 PSIG. Proper size model and number of sections are to be chosen for application, and rubber to be made from EPDM or Nitrile. Metal hardware in galvanized carbon steel or 316 stainless steel.
- J. Piping Accessories:
 1. Flexible Fuel Hose: Flexible metal hose, corrugated type with braided wire sheath covering, close-pitch annular corrugations, rated for a working pressure of at least 125 psig, 8-inch minimum live length, flanged end connections, UL Listed for flammable liquid service. Metal for hose and braided wire sheath shall be stainless steel, any type of ASTM 300 Series.
 2. Unions: ANSI B16.39, 150 lb and 250 lb.

3. Hangers and Supports: MSS SP-58, types as required by MSS SP-69. Hanger rods shall be galvanized.
 4. Foot Valve: self-activating, double-poppet, shutoff type that prevents fuel flow from reversing. Valve shall conform to NFPA 30. Valve body shall be constructed of either cast steel or aluminum. Valve shall be provided with a minimum 20 mesh stainless steel screen on the intake. Valve seats shall be the replaceable type. Valve shall be capable of passing through a 75 mm 3 inches pipe or tank flange.
 5. Strainer - bottom clean-out Y-type line strainers with 304 SS gasket and 20 mesh screen.
- K. Overfill Prevention Valve:
1. Install at the fill port of AST-1
 2. Top fill set up.
 3. Coordinate with AST-1 supplier for fitting size.
 4. Morrison Bro. Company Model 9095A-AV
- L. Solenoid Valve:
1. Aluminum body with Viton diaphragm, Seals, and Disc, Stainless Steel springs, comparable with Diesel #2.
 2. POW 821 Solenoid Valve.
- M. Fuel Monitoring System:
1. Complete fuel monitoring system with configurable console without integral printer.
 2. Provide NEMA 4R Stainless steel enclosure.
 3. Provide Ethernet IP module.
 4. See drawings for sensors and fuel level management and alarm.
 5. Veeder-Root TLS-350 PLUS
- N. Manual Fuel Port System with Tank Alarm Panel:
1. Provide Fuel Port with flush wall-mounting flange.
 2. Provide with weatherproof, lockable box with spill containment.
 3. Provide with quick disconnect hose coupling with dust plug.
 4. Provide with hand pump for spill containment, with shutoff and check valve.
 5. Provide with Tank Alarm Panel in NEMA-4R, lockable enclosure with hinged door.

2.02 ABOVEGROUND PRIMARY CONTAINED STEEL TANK WITH INSULATED SECONDARY CONTAINMENT

- A. Primary Contained Steel Tank with Insulated Secondary Containment:
1. Provide a factory-assembled unit that includes a primary storage tank. Tank assembly shall be in accordance with NFPA 30 and NFPA 30A and be designed and manufactured for a rectangular installation. The concrete encased secondary fuel containment aboveground storage tank shall conform to UL 2085. The primary storage tank shall be factory-welded, steel that conforms to UL 142. Tank assembly shall be mounted on the tank manufacturer's standard UL listed support skid that elevates the tank assembly above the underlying concrete slab a minimum (4 inches). Clearance allows for lifting straps for tank relocation. Provide a minimal 19 L (5 gallon) overfill containment box on the tank fill line. The containment box shall be lockable and shall contain any spillage encountered at the tank during tank filling operations.
 2. The primary steel tank shall be pressure tested at 5 psig for 24 to 48 hours.
 3. The primary steel tank shall have "emergency vent" system as per NFPA 30 Code requirements.
 4. The protected and insulated AST systems shall have a thru-tank leak detector tube to allow for physical checkup and monitoring capability between the primary and the secondary containment.
 5. The primary steel tank shall be pressurized at 5 psig during concrete encasement.
 6. The outer surface of the primary steel tank shall be covered by a minimum of 1/4" thick (6.4 mm) Styrofoam insulation panels.
 7. The primary steel tank shall be encased in six inches of monolithic reinforced concrete, with minimum design strength of 4,000 and 5,000 psi at 28 days depending on the tank size. The concrete design shall include the following for long-term durability: air entrainment, water reducing admixture, and steel reinforcement. Concrete encasements with seams will not be approved.
 8. The protected and insulated AST systems shall be of concrete exterior and a continuous and visually verifiable monolithic (seamless) pour on top, bottom, ends, and sides and contain no cold joints or heat sinks (heat transfer points). The AST must be shop fabricated and tested in accordance with the UL listings. Designs that use two layers of steel with insulation material between them will not be approved.
 9. No steel or insulating material shall come in contact with the concrete or other corrosive material.
 10. All openings shall be from the top only. All exposed metal with the exception of stainless steel must be powder coated to inhibit corrosion.
 11. The protected and insulated AST systems shall include a 7 or 15-gallon powder coated or stainless steel, UL listed spill containment, and shall

include normally closed valve to release spilled product into the primary steel tank. Spill containment which route the spilled product into interstitial area will not be approved

12. The protected and insulated AST systems shall have a coated concrete exterior to resist weather and reflect sunlight. Models with steel exteriors will not be approved.
13. The protected and insulated AST systems shall have a warranty of 30 years for systems 2,000 gallon capacity and larger and 20 years for systems 1,000 gallon capacity and smaller with optional 30-year warranty.
14. The protected and insulated AST systems design shall have been in use for a minimum of 20 years. The manufacturer must stipulate no reportable AST containment system failure in 30,000 units produced.
15. The protected and insulated AST systems shall have 2 bolts for connecting grounding conductors for lightning protection in accordance with NFPA 780.
16. All fittings shall be of stainless steel.
17. Provide an additional layer of tank coating.
18. Provide with NFPA compliant Hazmat signage.
19. Provide prefabricated tank access ladder or steps.
20. Provide with a manufacturer provided exterior color finish of Prairie Dusk 9242-M with smooth texture (For AST on Birkhimer Building only).
21. Provide with a manufacturer provided exterior color finish of Alpine White 9100-P with smooth texture (For AST on Building 303 only).

2.03 FUEL TANK CONTROL AND MONITORING

- A. Control and Monitoring Digital Display Panel:
 1. UL508 listed. Type 3R Enclosure for outdoor usage.
 2. PLC based, 6-inch touch-panel operator interface.
 3. Network capable, IP address capable.
 4. Spare I/O for options, MODBUS and Ethernet network compatible 4-20 mA loop output.
 5. Relay dry contact outputs.
 6. Provide with digital fuel tank level gauge for AST-1.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General Installation Requirements for Piping:

1. Piping: Install piping in out-of-the way locations. Piping shall be free from traps and shall drain toward tank and equipment. Installation of oil piping and equipment in buildings shall conform to NFPA 31, except as indicated or specified herein. Feed line to equipment shall have a gate valve located near tank. Piping shall follow the general arrangement shown. Cut piping accurately to measurements established for the work. Work piping into place without springing or forcing, except where cold-springing is specified. Piping and equipment within buildings shall be entirely out of the way of lighting fixtures and doors, windows and other openings. Locate overhead piping in buildings in the most inconspicuous positions. Do not bury or conceal piping until it has been inspected, tested and approved. Where pipe passes through building structure, pipe joints shall not be concealed, but shall be located where they may be readily inspected and building structure shall not be weakened. Avoid interference with other piping, conduit or equipment. Except where specifically shown otherwise, vertical piping shall run plumb and straight and parallel to walls. Piping connected to equipment shall be installed to provide flexibility for vibration. Adequately support and anchor piping so that strain from weight of piping is not imposed on the equipment.
2. Fittings: Use long radius ells where appropriate to reduce pressure drops. Mitering of pipe to form elbows, notching straight runs to form full sized tees or any similar construction shall not be used.
3. Cleaning: Before jointing and erection of piping thoroughly clean interiors of pipe sections and components. In steel pipe, loosen scale and other foreign matter by rapping sharply and expel by wire brush and swab. Blow out both steel pipe and components with compressed air at 100 psig or more. Maintain cleanliness by closure of pipe openings with caps or plugs. Before making final terminal connections, blow out complete system with compressed air at 100 psig or more.
4. Changes in Pipe Size: Use reducing fittings for changes in pipe size. The use of bushings will not be permitted.
5. Pipe Sleeves: Provide pipe sleeves where pipes and tubing pass through masonry or concrete walls. Sleeves in outside walls above grade shall be steel pipe. Space between pipe, tubing, or insulation and the sleeve shall be not less than 5-inch. Hold sleeves securely in proper position and location before and during construction. Provide sleeves of sufficient length to pass through entire thickness of walls. Extend sleeves in floor slabs 1/2-inch above finished floor. Firmly pack space between the pipe or tubing and sleeve with oakum, and calk on both ends of sleeve with elastic cement.
6. Wall Plates: Secure plates to pipes at sleeves in buildings. All plates shall be painted cast-iron, malleable iron, or steel.
7. Steel Piping: Steel piping 2-inches and smaller shall be threaded. Piping joints shall conform to ANSI B31.4.

8. Screwed Joints in Piping: Use cylinder oil and graphite or graphite pipe-joint compound applied to male threads only for making up screwed joints. Red or white lead and zinc compound may be used. Lubricate threaded pipe joints, as well as bolts and studs used on high temperature pipe joints up to 1050°F, with anti-seize compound. Piping shall be free from fins and burrs. Ream or file out pipe ends to size of bore and remove chips.
9. Unions: Place unions where necessary to permit easy disconnection of piping and apparatus. Each connection having a screw end valve shall have a union. Unions shall be as specified.
10. Valves: Install valves in positions accessible for operation and repair.
11. Install Double Trac double wall pipe in accordance with manufacturer's instructions.

3.02 FIELD TESTS

- A. Tests: Prior to application of test pressure, install a currently calibrated test gage in the system and remove or valve off piping components which may be damaged by test. Maintain test pressure for at least one-hour. In the event of leakage, locate and repair leak and repeat test. Submit 3 copies of test reports to the Contracting Officer for all tests.
 1. Piping Test: Perform hydrostatic test of fuel oil piping with diesel fuel-oil at 1-1/2 times system pressure or 100 psig whichever is greater.

3.03 SHOP DRAWING

- A. Provide shop drawing for engineer's review and approval prior to commencing anyway work.
 1. Clearly indicate route of piping, fuel tank, and other equipment
 2. Include phasing, and sequence of work.

END OF SECTION

SECTION 15650 - AIR CONDITIONING AND VENTILATION

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

- A. The General Conditions, Special Conditions and General Requirements of the Specifications, apply to the work specified in this section.

1.02 SUMMARY

- A. Provide a complete and operating air conditioning system. "Provide" shall mean "Furnish and Install" when used herein. The air conditioning and ventilation systems shall include all equipment and all related items necessary to complete the work as shown on the drawings and herein specified. The work shall include the following:
 1. Removal of existing materials and equipment.
 2. Refrigeration Piping and Accessories.
 3. Louvers and Accessories.
 4. Ductwork and Accessories.
 5. Insulation and Jacketing for Piping and Ductwork.
 6. Air Handling Units (Direct Expansion)
 7. Air Cooled Condensing Units (Direct Expansion)
 8. Supply Fans
 9. External HEPA Filter Box
 10. Ceiling Cabinet Exhaust Fans
 11. VRF Heat Pumps.
 12. Variable Frequency Drives (VFD).
 13. Controls and control wiring.
 14. Corrosion protection.
 15. Adjusting, balancing and testing.
 16. Painting and finishing.
 17. Operating and maintenance instructions.
 18. Manufacturer's literature, shop drawings, record drawings.
 19. Maintenance Contract.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. SECTION 15950 - TESTING, ADJUSTING AND BALANCING.
- B. SECTION 15995 - MECHANICAL HVAC COMMISSIONING.
- C. Line voltage wiring and conduit is specified in DIVISION 16 - ELECTRICAL.

1.04 GENERAL REQUIREMENTS

- A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions or discrepancies in the plans and specifications, the Contractor shall call the attention of the State to such omissions and discrepancies in advance of the date of bid opening so that the necessary corrections can be made. Otherwise, the Contractor shall furnish and install the omissions or discrepancies as if the same were specified and provided for.

1.05 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. All work shall be done in accordance with applicable ordinances and codes of the County of Honolulu and in accordance with State Department of Health regulations.
- C. Work shall comply with applicable regulations of the State of Hawaii, National Fire Protection Association (NFPA) Pamphlet No. 90A, and American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 15-2016.
- D. Contractor shall obtain all permits, licenses and certificates and pay for all fees (note: all work shall be done as a part of a lump sum bid price).
- E. 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 shall 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, 6 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 sequences.

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 State with reproducible drawings of each installation showing the exact location of all items which are different from the original drawings.

1.06 WARRANTY

- A. All work in this Section shall be under warranty for a period of 2 years from the date of acceptance of the work as a whole by The State. Should any equipment or material fall 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 2 years after the final acceptance of the work as a whole.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. 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.
- B. Refrigeration Piping: Copper Tube and Fittings
 1. Copper tube: ASTM B280, Type ACR.
 2. Wrought-copper fittings and unions, ASME B16.22.
 3. Solder, ASTM B32, use AG-5, 15 percent silver brazing, 1100 degrees F.
 4. Flexible connections: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket. Socket ends. Factory tested at a minimum of 500 psig and maximum operating temperature of 250 F.
 5. 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.

6. 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.
7. Solenoid valves: Comply with ARI 760 and UL 429. Valves shall be of the 2 position, direct acting, or pilot operated types, opened or closed, electrically. Plated steel body, polytetrafluoroethylene seat, threaded end connection, stainless steel solenoid tube, plunger, closing spring and seat orifice.
8. Electronic expansion valves: The expansion valves shall be part of Variable Refrigerant Flow (VRF) equipment.
9. 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.
10. Moisture/liquid 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 R410A 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 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.
12. Liquid Refrigerant Sight Glass: The sight glass shall be of the double-port see-through type with 2 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.
13. 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 2 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 refrigerant piping.
- D. Louver and Accessories:
1. Louver: Louvers shall be aluminum, drainable, wind driven rain resistant, with stationary blades. AMCA500-L tested and water resistance effectiveness shall meet AMCA Class A. Color to match existing. Ruskin Company model ELF375DX or accepted equivalent.
 2. Insect Screens: 16x18 mesh, 0.011 inch diameter aluminum wire or 0.009 inch diameter stainless steel wire, with frame.
 3. Sound panels: Provide acoustical panels with steel rack. Media shall be incombustible, acoustical quality, shot-free fiberglass with long, resilient fibers bonded with a thermosetting resin. Media shall be bacteria and fungus resistant and conform to irregular surfaces. Media shall not cause or accelerate corrosion of aluminum or steel. Mineral wool will not be permitted as a substitute for fiberglass. Density shall be as required to achieve acoustic performance on drawings.
- E. 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. Supports: Galvanized steel straps or hanger rods in accordance with SMACNA Duct Construction Standards.
 3. Rectangular Dampers:
 - a. With Height Dimensions Less Than 12 Inches: SMACNA Figure 2-12 shall be followed for dampers up to 12 inches in height.
 - b. With Height Dimension Between 12 and 24 Inches:
 - 1) Butterfly type dampers with 18 gauge galvanized steel or duct casing angle reinforced as required.
 - 2) Provide single thickness 16 gauge minimum, galvanized steel blades, welded or bolted to 1/2 inches minimum diameter through shaft. Permanently mark end of shaft to indicate blade position and fit with a locking quadrant mounted on outside of frame. Bearings shall be pressed into frame and designed for dynamic requirements.
 - c. With Height Dimension Greater Than 24 Inches:
 - 1) Frame, 5 inches by 1 inch, 16 gauge galvanized steel channel. Blades, 8 inches maximum width, 18 gauge galvanized steel, opposed blade, having shafts/bearings designed to meet dynamic requirements, positively locked to shafts.

- 2) Control shaft shall be 3/8 inch square, plated steel, permanently marked to indicate blade position, and fitted with locking quadrant mounted on outside of frame.
 - 3) Dampers shall be Ruskin MD15 or accepted equivalent.
- F. 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. 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.
 - b. Vapor Barrier Material: Fed. Spec. HH-B-100, Type I.
 2. Refrigerant and Condensate Drain Piping:
 - a. Flexible Unicellular: 3/4" thick on pipes up to 2 inches and 1" thick on pipes over 2 inches.
 - b. Polystyrene: 1-1/2" thick on pipes up to 2 inches and 2" thick on pipes over 2 inches.
 3. Duct Insulation Finishes:
 - a. Outdoor Jacket: Aluminum, 0.02 inch thick
 4. Duct Insulation:
 - a. Flexible Glass Fiber: ANSI/ASTM C612, commercial grade, 'k' value of 0.29 at 75 degrees F. 0.002-inch foil scrim facing for air conditioning ducts. 1-1/2" thick, 3/4 pcf for indoor supply/return ducts.
- G. Diffusers:
1. Square, Rectangular, or Round Neck Ceiling Diffusers:
 - a. Ceiling diffusers shall have fixed, horizontal discharge pattern. These diffusers shall consist of an outer frame assembly of the sizes and mounting types shown on the plans and outlet schedule. A square or rectangular inlet shall be an integral part of the frame assembly and a transition piece shall be available to facilitate attachment of round duct. An inner core assembly consisting of fixed deflection louvers shall be available in one-, two-, three- or four-way horizontal discharge patterns. The inner core assembly must be removable in the field without tools for easy installation, cleaning or damper adjustment.
 - b. The finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315 degrees F for 30 minutes. The pencil hardness must be HB to H.
 - c. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering, or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

- d. Optional damper shall be constructed of heavy gauge steel (aluminum also available). Damper must be operable from the face of the diffuser by removing the spring loaded inner core assembly. Optional Throw Reducing Vanes (TRV) must be available to deflect a horizontal discharge airstream from each side of the TDC diffuser into diverging airstreams.
- e. The manufacturer shall provide published performance data for the diffuser. The diffuser shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

2.02 EQUIPMENT

A. Air Handling Units (Direct Expansion):

- 1. General: Unit shall be a factory-assembled, single-piece central station air handler. Unit shall consist of a fan and coil section with factory-installed direct expansion coil, filter section, or access section as indicated on the equipment schedules.
- 2. Unit Cabinet: Unit panels shall be constructed of 20 gage galvanized steel. Casing panels shall be removable for easy access to the unit. All panels shall be gasketed to ensure a tight seal. Hinged access doors shall be double wall with 1.5 lb dual-density fiberglass between galvanized steel panels. Insulation for casing panels on unit shall be 1-in. minimum thickness dual-density fiberglass insulation with a nominal density of not less than 1.5 lb per cubic foot.
- 3. Fans: Fan sections shall be constructed of galvanized steel and shall have a formed channel base for integral mounting of fan, motor, and casing panels. Each unit shall have a single fan wheel and scroll. Fans shall be double width, double inlet type, with forward-curved blades. Provide VFD controller or ECM on units where shown on the equipment schedule.
- 4. Coils: Copper tube with copper or aluminum plate fins bonded by mechanical expansion and designed and tested in accordance with ANSI/ASHRAE 15.
- 5. Filter: Flat filter section with 2 inch pleated MERV 13 filter kits with hinged door access.

B. Air Cooled Condensing Units (Direct Expansion):

- 1. General: Factory assembled, single-piece, air-cooled condensing unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressors, nitrogen holding charge, and special features required prior to field start-up.
- 2. Unit Cabinet: Cabinet shall be galvanized steel casing with a baked enamel powder or pre-painted finish. Control box access panels shall be hinged for service access.
- 3. Fans: Condenser fans shall be direct-drive propeller type, discharging air vertically upward. Shafts shall have inherent corrosion resistance.

Condenser-fan openings shall be equipped with PVC-coated steel wire safety guards.

4. Compressors: Staging of compressors shall provide unloading capability. 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.
- C. Supply Fans:
1. General: Belt drive, centrifugal, inline fan.
 2. Construction: Continuously welded steel housing and supports with inlet and outlet collars for slip fit duct connections. Stainless steel shaft and fasteners.
 3. Fan and Motor: Fan statically and dynamically balanced. Motor shall be heavy duty with permanently lubricated sealed ball bearings. Belt guard in accordance with OSHA requirements. Fan shall bear the AMCA Seal for sound and fan performance.
- D. External HEPA Filter Box:
1. Double wall aluminum construction with duct adapters on each end. Provide with access panel for accessing the filters. Filter box shall include one MERV11 pre-filter and one high quality H13 HEPA (99.95 percent) filter.
- E. Exhaust Fans:
1. Ceiling Cabinet Exhaust Fans:
 - a. Corrosion resistant galvanized steel scroll and hosing. Sound absorbing insulation. Rectangular outlet duct collar with integral spring loaded backdraft damper. Double inlet forward curved wheel. Plug type disconnect. Adjustable mounting brackets.
 2. Wall-Mounted Exhaust Fans:
 - a. Direct drive, axial type sidewall fans shall be provided as follows:
 - b. Propellers shall be constructed with cast aluminum blades and hubs. A standard square key and set screw or tapered bushing shall lock the propeller to the motor shaft. All propellers shall be statically and dynamically balanced.
 - c. Motors shall be permanently lubricated, heavy duty type, carefully matched to the fan load and furnished at the specified RPM, voltage, phase, and enclosure.
 - d. Motor drive frame assemblies and fan panels shall be galvanized steel. Drive frame assemblies shall be formed steel and fan panels shall have prepunched mounting holes, formed flanges, and an insertable drop-in venturi. Drive frames and panels shall be bolted construction.
- F. VRF Heat Pumps:
1. Outdoor Unit:

- a. General: outdoor unit modules shall be air-cooled, direct expansion (DX), multi-zone units. The outdoor unit modules shall be equipped with a single compressor which is inverter-driven and multiple circuit boards—all of which must be manufactured by the branded DX manufacturer. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.
- b. Casing/Frame:
 - 1) Outdoor units are constructed with galvanized steel, bonderized and finished with powder coat baked enamel paint. Each frame has a removable inspection panel to allow access to service tool connection, dip switches, auto addressing and error codes. Outdoor unit frames are completely factory assembled, piped and wired. Dual and triple frame outdoor units need to be field piped with factory designed and supplied Y-branch kits to manifold them together into a single refrigerant circuit.
 - 2) Provide locally applied aftermarket coating on the inside and outside of all outdoor installed AC equipment rated for minimum 4000 hours salt spray test in accordance with ASTM B117.
- c. Refrigerant System:
 - 1) The refrigeration system consists of a single refrigeration circuit and uses R410A refrigerant. The outdoor unit is provided with factory installed components, including a refrigerant strainer, check valves, oil separator, accumulator, four-way reversing valve, electronic controlled expansion valve (EEV), high and low side charging ports, high pressure safety switch, service valves, and interconnecting piping.
- d. Compressors:
 - 1) Each outdoor unit module shall be equipped with only inverter driven scroll hermetic compressors. Non inverter-driven compressors, which may cause inrush current (demand charges) and require larger generators for temporary power shall not be allowed.
 - 2) Each compressor shall be equipped with a multi-port discharge mechanism to eliminate over compression at part load. Manufacturer's that rely on a single compressor discharge port and provide no means of eliminating over compression and energy waste at part load shall not be allowed.
 - 3) Crankcase heat shall be provided via induction-type heater utilizing eddy currents from motor windings. Energy-wasting "belly-band" type crankcase heaters are not allowed. Manufacturers that utilize belly-band crankcase heaters will be considered as alternate only.
 - 4) Compressor shall have an inverter to modulate capacity. The capacity for each compressor shall be variable with a minimum turndown not greater than 15 percent.
 - 5) The compressor shall be equipped with an internal thermal overload.

- 6) Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.
 - 7) Manufacturers that utilize a compressor sump oil sensor to equalize compressor oil volume within a single module shall not be allowed unless they actively shut down the system to protect from compressor failure.
- e. Outdoor Unit Coil:
- 1) The outdoor heat exchanger shall be of zinc coated aluminum construction with turbulating flat tube construction. The coil fins shall have a factory applied corrosion resistant finish. Uncoated aluminum coils/fins are not allowed.
 - 2) Provide locally applied aftermarket coating on all coils for all equipment rated for minimum 4000 hours salt spray test in accordance with ASTM B117.
- f. Fans and Motors:
- 1) All outdoor unit frames <80MBh include one direct drive, variable speed propeller type fan.
- g. Electrical:
- 1) The outdoor unit electrical power shall be as indicated on the drawing's equipment schedules.
 - 2) The outdoor unit shall be controlled by integral microprocessors.
 - 3) The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.
- h. Controls:
- 1) Outdoor unit shall include Variable Evaporator Temperature or comparable method of varying system evaporator (refrigerant) temperature in order to reduce compression ratio and power consumption during light load or mild ambient temperatures. Multiple evaporator refrigerant temperature settings shall be required in order to optimize efficiency within required system-specific performance and installation constraints. System shall reduce compression ratio only when/if all indoor units are within 1.8F of setpoint; reducing compression ratio based solely on ambient temperature risks discomfort and is not allowed. Variable Evaporator Temperature or comparable method shall incorporate override or disable capability based on external signal to allow for space humidity control or load demand.
2. Wall-Mounted Indoor Unit:
- a. General: The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping,

electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. The unit shall have an auto-swing function for the horizontal vane. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

- b. Unit Cabinet:
 - 1) The casing shall have a white finish.
- c. Fan:
 - 1) The indoor unit fan shall be an assembly with 2, 3, or 4 fan(s) direct driven by a single motor.
 - 2) The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.
 - 3) The indoor fan shall consist of 4 speeds, Low, Mid, and High, and Auto fan function.
- d. Filter:
 - 1) Return air shall be filtered by means of an easily removable, washable filter.
- e. Coil:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phosphor copper or silver alloy.
 - 2) The coils shall be pressure tested at the factory.
- f. Electrical:
 - 1) The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
 - 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).
- g. Controls:
 - 1) Units shall have the ability to control supplemental heat via connector CN24 and a 12 VDC output.
 - 2) Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8 degrees F - 9.0 degrees F adjustable deadband from set point.
 - 3) Indoor unit shall include no less than 4 digital inputs capable of being used for customizable control strategies.
 - 4) Indoor unit shall include no less than 3 digital outputs capable of being used for customizable control strategies.

- 5) Manufacturer to provide drain pan level sensor powered by a 20-year life lithium battery. Sensor shall require no external power for operation and shall have an audible indication of low battery condition.
 - 6) The drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.
3. Indoor Units: Ceiling-recessed cassette
- a. General: The ceiling-recessed indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function, a test run switch, and the ability to adjust airflow patterns for different ceiling heights. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.
 - b. Unit Cabinet:
 - 1) The cabinet panel shall have provisions for a field installed filtered outside air intake.
 - 2) Branch ducting shall be allowed from cabinet.
 - 3) Four-way grille shall be fixed to bottom of cabinet allowing 2, 3 or 4-way blow.
 - 4) The grille vane angles shall be individually adjustable from a wired remote controller to customize the airflow pattern for the conditioned space.
 - c. Fan:
 - 1) The indoor fan shall be an assembly with a statically and dynamically balanced turbo fan direct driven by a single motor with permanently lubricated bearings.
 - 2) The indoor unit shall include an AUTO fan setting capable of maximizing energy efficiency by adjusting the fan speed based on the difference between controller set-point and space temperature. The indoor fan shall be capable of 4 speed settings, Low, Mid, High and Auto.
 - 3) The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.
 - 4) The indoor unit fan logic must include multiple setting that can be changed to provide optimum airflow based on ceiling height and number of outlets used.

- 5) The indoor unit vanes shall have 5 fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.
 - 6) Grille shall include a factory-installed “i-see” sensor, or accepted equivalent, to work in conjunction with indoor unit control sequence to prevent unnecessary cooling or heating in unoccupied areas of the zone without decreasing comfort levels. Sensor must detect occupancy (not simply motion) and location of occupants by measuring size & temperature of objects within a 39’ detecting diameter (based on 8.8ft mounting height) with 1,856 or more measuring points.
- d. Filter:
- 1) Return air shall be filtered by means of a removable 2” pleated MERV 13 filter. Tested in accordance with ANSI/ASHRAE 52.2 Standard. Rated class 2 under UL Standard 900.
- e. Coil:
- 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phosphor-copper or silver alloy.
 - 2) The coils shall be pressure tested at the factory.
 - 3) The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 33 inches above the condensate pan.
- f. Electrical:
- 1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
 - 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).
- g. Controls:
- 1) Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8 degrees F - 9.0 degrees F adjustable deadband from set point.
 - 2) Indoor unit shall include no less than 4 digital inputs capable of being used for customizable control strategies.
 - 3) Indoor unit shall include no less than 3 digital outputs capable of being used for customizable control strategies.
4. Floor-Standing Indoor Units:
- a. General: The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and

fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

- b. Unit Cabinet:
 - 1) The casing shall have a beige Acrylic paint finish.
- c. Fan:
 - 1) The indoor unit fan shall be an assembly with one or two statically and dynamically balanced Sirocco fan(s) direct driven by a single motor with permanently lubricated bearings.
 - 2) The indoor fan shall consist of 2 speeds, High and Low.
- d. Filter:
 - 1) Return air shall be filtered by means of an easily removable washable filter.
- e. Coil:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phosphor copper or silver alloy.
 - 2) The coils shall be pressure tested at the factory.
- f. Electrical:
 - 1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
 - 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).
- g. Controls:
 - 1) Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8 degrees F - 9.0 degrees F adjustable deadband from set point.
 - 2) Indoor unit shall include no less than 4 digital inputs capable of being used for customizable control strategies.
 - 3) Indoor unit shall include no less than 3 digital outputs capable of being used for customizable control strategies.

G. Variable Frequency Drives:

- 1. General:
 - a. Provide manufacturer's published product and technical data, recommended installation and operating instructions, physical characteristics, including weights, UL Listing, standard diagnostic and testing procedures for field operation and trouble-shooting, and maintenance and repair data per DIVISION 1.

- b. Components shall be UL listed and labeled.
 - c. Materials and equipment shall be new and in perfect condition. Except as otherwise specified, materials shall be in accordance with standard specifications of American Society of Testing Material, National Electrical Code, or other agency or code-enforcing authority having jurisdiction.
 - d. Equipment design, internal supports, testing, etc., shall comply with industry standards, inspecting or testing agencies, and NFPA regulations.
 - e. Provide VFD matched to equipment size with BACnet card and combination starter.
2. System Description:
- a. Variable frequency drive controller shall consist of full-wave converter, DC link, and power transistorized inverter section to control single motor or multiple as indicated on plans. Silicon controlled rectifiers are not acceptable; motor overload protection shall be inherent in unit.
 - b. VFD shall be self-protecting against any malfunction of driven load, its wiring, or inadvertent operation, such as, but not limited to:
 - 1) Motor disconnected while operating.
 - 2) Motor closed-in on energized drive, whether motor is coasting (in either direction) or standing still.
 - 3) Motor single-phasing.
 - 4) Short-circuited open or ground wiring in or to motor.
3. Construction:
- a. General: Controller shall be totally enclosed, dead front, wall mounted or free standing assembly.
 - b. Variable frequency drive controller (or VFC) shall be of sufficient capacity and provide quality of output waveform so as to achieve full rated output on motors.
 - 1) Minimum efficiency 96 percent at 100 percent speed, and 90 percent at 20 percent speed.
 - 2) Rated Input Voltage: 460 volts “10 percent, 60 Hz “2 Hz, without use of step-up/down transformers.
 - 3) Ambient Temperature Range: Minus 10 degrees C. Provide, closed loop air conditioner if required.
 - 4) Altitude Rating: Up to 3,000 ft above sea level without derating.
 - 5) Service Factor: 1.0, at drive’s rated line voltage.
 - 6) Power Unit Rating Basis: Continuous rated current at rated speed and voltage.

- c. The entire VFD shall have a withstand short circuit rating of 65,000 rms symmetrical amperes minimum, and higher rating as indicated on the electrical drawing. Breaker shall be mechanically interlocked with power unit enclosure door, padlockable, with defeat capability. Except for incoming line terminals on circuit disconnect device, there shall be no live power within unit with circuit disconnect opened.
- d. Worst case RMS motor line current measured at rated speed, torque, and voltage shall not exceed 1.05 RMS current for pure sine wave operation. Pulse train frequency from inverter shall be field adjustable from 3 kHz to 16 kHz.
- e. Pulse train (carrier) frequency shall be field adjustable from 3 kHz to 12 kHz.
- f. Input signals shall have optically coupled isolators. Output shall be sinusoidal pulse width modulated voltage waveform. System shall include necessary control circuits, synchronizing equipment, and protective devices. System protection shall provide following:
 - 1) Current limit.
 - 2) Overcurrent: 170 percent instantaneous electric trip; with trip indication.
 - 3) Short Circuit: Phase-to-phase and phase-to-ground trip without damage to unit; provide trip identification.
 - 4) Overvoltage: High DC bus voltage trips fault, with trip indication.
 - 5) Undervoltage: 20 percent below line voltage causes trip; provide trip indication.
 - 6) Automatic Restart: After power interruption, unit shall reset and restart, per input control signal, and pick up coasting or stopped motor without additional delay.
 - 7) Burn-Out: DC bus fuse protection or 3-phase input fusing.
 - 8) Power unit over-temperature protection.
 - 9) Digital Indication: Overvoltage, undervoltage, overcurrent, overheating, LED indication to indicate capacitor charge.
- g. VFD shall include responsive action to motor winding temperature detectors or thermostatic switches, where indicated or required.
- h. Provide timed linear acceleration and deceleration function adjustable from 6 to 60 seconds.
- i. Units shall be enclosed in a sheet metal or high-density plastic housing of NEMA 1 (or as indicated or required) construction. Door shall include:

- 1) Input circuit breaker handle.
 - 2) Manual speed control potentiometer.
 - 3) HAND-OFF-AUTO selector switch.
 - 4) Speed/frequency indicating meter, 0-100 percent/0-60 Hz.
 - 5) Elapsed time meter, reading to tenths of hours.
 - 6) Meter to directly read volts and amperes.
 - 7) RUN, STOP, FAULT pilot lights.
 - 8) KW output.
- j. Input signal shall be coordinated with control requirements as shown and specified. Provide signal isolators, etc., as required to accept control signal.
- k. Following conditions shall cause orderly shutdown:
- 1) Loss of input power.
 - 2) Undervoltage.
 - 3) Sustained overload.
 - 4) In by-pass only, sustained overload by means of manually resettable thermal-overload relay.
- l. Diagnostic and Testing Procedure: Submit manufacturer's standard diagnostic and testing procedure for diagnosing and troubleshooting.
- m. Provide ramp to stop.
- n. Maximum starting current shall not exceed 150 percent of motor full load current.
- o. Isolation between drives shall not be required to maintain proper operation of drives.
- p. Provide control power transformer, size as required, with primary and secondary fuse protection.
- q. Provide 3-element motor overload relay with thermal elements sized for motor running protection in both normal and in by-pass operation.
- r. Contractor shall furnish necessary additional equipment as required if unit is supplied with closed-loop air-conditioner to maintain ambient temperature range.
- s. Provide surge suppressor on electromagnetic contactors.

- t. Provide coated, printed circuit boards.
- u. Minimum and maximum speed control set points, internal field-adjustable.
- v. Provide DDC communication card compatible with Bacnet protocol.
- w. Microprocessor based Bypass Controller manual or automatic (selectable) transfer to line power via contactors. A keypad to control the bypass controller is to be mounted on the enclosure door. The bypass keypad shall include a one line to be mounted on the enclosure door. The bypass keypad shall include a one-line diagram and status LED's to indicate mode of operation, drive and bypass status and ready and enable conditions. When in the "Drive" mode, the bypass contactor is open, and the drive output contactor is closed. In the "Bypass" position, the drive output contactor is open, and the bypass contactor is closed via Start/Stop command. Start/Stop via customer supplied maintained contact shall be 24 V or 115 V compatible and shall function in both the "Drive" and "Bypass" modes. The voltage tolerance of the bypass power supply shall be +30/-35 percent to eliminate the problem of contactor coil burnout. The design shall include single-phase protection in both the AFD and bypass modes.
 - 1) Customer Interlock Terminal Strip: Provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in Hand, Auto, Drive or Bypass modes.
 - 2) Automatic/manual bypass operation shall be selectable in the standard microprocessor-based bypass design.
 - 3) Door/cover interlocked disconnect switch which will disconnect all input power from the drive, bypass and all internally mounted options. The disconnect handle shall be through the door and be padlockable in the "OFF" position.
 - 4) Fast acting semi-conductor fuses exclusive to the AFD - fast acting semi-conductor fuses allow the API) to disconnect from the line prior to clearing upstream branch circuit protection, maintaining bypass capability. Bypass designs which have no such fuses, or diagram and status LEDs to indicate the mode of operation, drive and bypass status and ready and enable conditions. When in the "Drive" mode, the bypass contactor is open and the drive output contactor is closed. In the "Bypass" position, the drive output contactor is closed.
- x. Each VFD shall be provided with filter/reactor to reduce the harmonics to the power line.

H. Condensate Pumps:

- 1. General: The condensate drain pump shall be designed for automatic collection and removal of condensate from air conditioning equipment. Vertical centrifugal pump design. Stainless steel motor shaft. Automatic start-

stop operation. Overflow detection switch. Thermally protected fan cooled motor.

I. Controls Devices:

1. General: The control system shall be as indicated on the drawings and described in the specifications. Controls shall be DDC 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.
2. Automatic Valves: Sized by manufacturer for indicated flow and pressure drop, 150 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.
3. Valve 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.
4. Control Relays: General purpose type, with plug in socket screw terminal connections, with 2 normally open and 2 normally closed sets of contacts unless otherwise indicated, and coil voltage as indicated.
5. Wiring and Accessories: Provide all required interconnecting wiring to complete the system. Provide transformers as required. Electrical work shall comply with local codes and the electrical section of this specification.
6. Motor Starters: Horsepower rated manual starters shall be provided, as indicated. Starters shall conform to NEMA ICS and shall have thermal overload protection and other appurtenances necessary and as indicated. Shall be new and as specified for variable speed drives.
7. Hydrogen Sensors:
 - a. The hydrogen detection system shall have visible and audible alarms and 1 percent and 2 percent hydrogen relays.
 - b. The system shall come with the main control, a highly accurate gas sensor and a 25 ft. cable.
 - c. The system shall include relays for remote connections to alarm/monitoring systems and for control of external relays or an exhaust fan.
 - d. Features:
 - 1) Universal power inputs: 110/220 Vac and/or 12 - 48 Vdc input.
 - 2) Strobe light for visual alerts.
 - 3) Sensor status indicator LEDs on the main control.
 - 4) NRTL/C Certified: UL Std. No. 61010-1.

8. Programmable Controllers:
 - a. The Control System shall be composed of one or more independent, stand-alone, microprocessor based Programmable Controllers to manage the local strategies. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
 - b. Controller hardware shall be suitable for the anticipated ambient conditions.
 - 1) Controller used in conditioned ambient shall be mounted in NEMA 1 type enclosures, and shall be rated for operation at 32 degrees F to 120 degrees F.
 - c. The Controller shall have sufficient memory to support its operating system, database, and programming requirements.
 - d. Controllers that perform scheduling shall have a real time clock.
 - e. The Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
 - 1) Assume a predetermined failure mode.
 - 2) Generate an alarm notification.
9. Temperature Sensors:
 - a. Temperature sensors shall be Resistance Temperature Device (RTD) or Thermistor.
 - b. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.
 - c. Provide matched temperature sensors for differential temperature measurement. Differential accuracy shall be within 0.2 F.
 - d. Flow liquids not harmful to the specified materials and shall prove liquid flow. Provide with NEMA1 enclosures.

PART 3 - EXECUTION

3.01 COOPERATION WITH OTHER TRADES AND CONFLICT IN WORK

- A. Contractor shall examine all drawings of proposed work and coordinate his work with other trades. Work conflicts shall be brought to attention of Contracting Officer and work rearranged or modified in accordance with his decision.
- B. If changes in indicated locations or arrangements of work are required, they shall be made by Contractor without additional charge to the State provided that these changes were ordered before work is installed and no extra material or labor is required.

- C. Should the Contractor determine that extra material and labor will be required to accommodate any rearrangement, he shall first submit detailed estimates of cost for required changes and proceed with work only upon written approval by the State.

3.02 EQUIPMENT INSTALLATION

- A. Equipment shall be installed as indicated and in accordance with all manufacturer's recommendations and instructions.

- B. Provide controls as indicated for proper operation of the equipment. Provide all necessary relays, contactors, enclosures and transformers to ensure proper system operation.

3.03 INSTALLATION REQUIREMENTS

- A. Necessary supports and vibration isolators shall be provided for equipment and appurtenances as required. Equipment shall be installed in accordance with manufacturer's instructions.

3.04 DUCTWORK INSTALLATION

- A. Ductwork installation shall be in accordance with SMACNA Duct Construction Standards, 1985 Edition. Ducts shall be installed leaktight so that no leakage of air can be detected. Adjust dampers, diffusers, registers, and accessories to deliver air quantities indicated and so that draft and objectionable noise are eliminated. Provide turning vanes at all elbows and tees and extractors at all branch connections.
 - 1. Install ductwork in adherence to heights permitted by the structure and consult with other trades, and in conjunction with them, establish necessary space requirements for each trade.
 - 2. Sizes, runs, and connections of ducts shall be as indicated. Adhere to drawings as closely as possible. Install ductwork in adherence to heights permitted by the structure and consult with other trades, and in conjunction with them, establish necessary space requirements for each trade. Duct sizes shown on drawings are net size.
 - 3. Details of construction, metal gauges, reinforcement and materials not specified herein shall be in accordance with SMACNA Low Velocity Duct Construction Standards, NFPA 90A or as approved. Fabricate ductwork in first class manner with airtight joints, presenting smooth surface on the inside, neatly finished on the outside.
 - 4. Where square elbows are used, provide fixed double radius turning vanes. Construct, brace and support ducts in such a manner that they will not sag or vibrate when fans are operating.
 - 5. All duct openings to exterior shall be weatherproofed with sheet metal blocking. Thoroughly seal all exterior duct openings and joints with silicone sealant.
 - 6. Provide externally adjustable splitter dampers at all tees.

7. During construction, keep openings in ductwork closed with sheet metal to prevent injury and take all possible precautions to keep interior of ducts, air intake chambers and fan housings free from dirt or dust.
8. Cleaning of Duct System: After completing installation of ductwork, entire system shall be cleaned of rubbish, plaster, dirt, and any other debris. After installation of equipment and connection are made on fan, and before any grilles, outlets or registers are installed, entire system shall be blown out with dampers and outlets wide open.

3.05 INSULATION

- A. Insulation shall be installed by an experienced licensed insulation contractor in accordance with best trade practices. Insulation shall be continuous through hangers and penetrations. Insulation shall be sealed to maintain integrity of vapor barrier. Insulate fittings, flanges, valves, etc., with premolded or precut insulation segments, same thickness as adjoining pipe.
 1. Pipe Insulation: Insulate all chilled water piping.
 - a. Provide protective galvanized shields on pipes passing through hangers, MSS SP-69, Type 40.
 - b. Thickness of pipe insulation shall be as follows:
 - 1) Chilled Water Piping:
 - a) Cellular Glass and Polystyrene: 1-1/2" thick on pipes up to 3 inches; 2" thick on pipes over 3 inches. K-factor 0.75 or better.
 2. Vapor Barrier Jacket: Insulation shall be covered with vapor barrier jackets.
 3. Pipe: Insulation shall be applied with joints tightly butted and ends sealed with vapor barrier coating. Jackets shall overlap and be sealed. Factory self-sealing lap systems may be used. All breaks and punctures in jackets shall be sealed. Fittings, Flanges, Valves: Insulation of the same thickness and type shall be placed around the item, either premolded or segmented. Voids shall be filled with loose insulation or cement. Insulation shall be coated with glass tape embedded in 2 coats of vapor barrier coating or with premolded PVC fitting covers applied over a layer of vapor barrier coating. Equipment Insulation: Insulate pumps by forming a box around the pump housing. The box shall be constructed by forming the bottom and sides using joints that do not leave raw ends of insulation exposed. Joints between sides and between sides and bottom shall be joined by adhesive with lap strips for rigid mineral fiber and contact adhesive for flexible elastomeric cellular insulation. The box shall conform to the requirements of MICA Insulation Stds plate No. 49 when using flexible elastomeric cellular insulation. Joints between top cover and sides shall fit tightly forming a female shiplap joint on the side pieces and a male joint on the top cover, thus making the top cover removable.

Exposed insulation corners shall be protected with corner angles.

Upon completion of installation of the insulation, including removable sections, 2 coats of vapor retarder coating shall be applied with a layer of glass cloth embedded between the coats. The total dry thickness of the finish shall be 1/16 inch. A parting line shall be provided between the box and the removable sections allowing the removable sections to be removed without

disturbing the insulation coating. Flashing sealant shall be applied to parting line, between equipment and removable section insulation, and at all penetrations.

4. Refrigerant Piping and Condensate Drain Piping:
 - a. Flexible Unicellular: 3/4" thick on pipes up to 2 inches and 1" thick on pipes over 2 inches.
 - b. Polystyrene: 1-1/2" thick on pipes up to 2 inches and 2" thick on pipes over 2 inches.

3.06 LOUVERS

- A. Clean opening thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Install louvers at locations indicated on the drawings and in accordance with manufacturer's instructions.
- C. Install louvers plumb, level, in plane of wall.
- D. Install joint sealants.

3.07 REFRIGERATION PIPING AND INSTALLATION

- A. Install refrigerant piping according to ASHRAE 15.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Drawings, schematics and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss and other design considerations.
- D. Install piping indicated to be exposed at right angles or parallel to building walls.
- E. Install piping above accessible ceiling to allow sufficient space for ceiling access.
- F. Install piping adjacent to equipment to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install refrigerant piping in protective conduit where installed belowground. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

3.08 VARIABLE FREQUENCY DRIVE CONTROL

- A. Install variable frequency drive controllers for motors as indicated.
- B. Mount sensors rigidly and adequate for the environment within which the sensor operates.
- C. VFD manufacturer shall verify motor nameplate data to ensure compatibility of VFD and motor being used.

- D. Verify properly sized overload elements, fuses, circuit breakers, etc., to protect controller, motor, and circuit components.
- E. Provide required interlocking wiring between controller and motor disconnecting means, if required or indicated.
- F. Manufacturer's local authorized representative shall inspect installation and assist in initial start-up, testing, and adjusting drive. Cooperate with automatic control system Contractor in adjusting and setting control.
- G. Manufacturer's local authorized representative and installing contractor shall conduct manufacturer's recommended field tests to demonstrate operation, interlocking, and control of units.
- H. Manufacturer's representative shall submit letter to Engineer stating tests conducted, results obtained, and certify installation meets requirements of manufacturer, that equipment warranties and guarantees are in full effect, and installation meets intent of Contract Documents.

3.09 INSTALLATION OF SENSORS

- A. Install sensors in accordance with the manufacturer's recommendations.
- B. Mount sensors rigidly and adequate for the environment within which the sensor operates.
- C. All wires attached to sensors shall be air sealed in their conduits or in the wall to stop air transmitted from other areas affecting sensor readings.
- D. All pipe mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat conducting fluid in thermal wells.
- E. Mechanical contractor shall coordinate with DDC contractor prior to pipe installation to make sure that all pipe wells are pre-arranged, and coordinated.

3.10 IDENTIFICATION OF HARDWARE AND WIRING

- A. All wiring and cabling, including that within factory fabricated panels, shall be labeled at each end within 2 inches of termination with a cable identifier and other descriptive information.
- B. Permanently label or code each point of field terminal strips to show the instrument or item served.
- C. Identify control panels with minimum 1-cm letters on laminated plastic nameplates.
- D. Identify all other control components with permanent labels. Identifiers shall match record documents. All plug-in components shall be labeled such that removal of the component does not remove the label.

3.11 TESTING, ADJUSTING, AND BALANCING

- A. Cleaning and Adjusting: Pipes, strainers, valves and pumps shall be cleaned free of scale and thoroughly flushed of all foreign matter. Temporary bypass shall be provided for all water coils to prevent flushing water from passing through coils. Strainers and valves shall be thoroughly cleaned. Equipment shall be wiped clean with all traces of oil, dust, dirt, or paint spots removed. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Control valves and other miscellaneous equipment requiring adjustment shall be adjusted to setting indicated or directed.

- B. Tests:
 - 1. Water Piping: After cleaning, water piping shall be hydrostatically tested at a pressure equal to 1-1/2 times the total system operating pressure for a period of time sufficient for inspection of every joint in the system and in no case less than 2 hours. No loss of pressure will be allowed. Leaks found during tests shall be repaired by tightening, rewelding joints, or replacing pipe or fittings. Concealed piping shall be tested in place before concealing.

- C. Performance Tests: Testing and balancing of the systems shall be performed by an independent testing agency, by personnel who are not employees of the installing contractor. After cleaning and testing are completed as specified, each system shall be tested as a whole to see that all items perform as integral parts of the system. Corrections and adjustments shall be made as necessary.

- D. Balancing: Water piping systems shall be balanced to produce water quantities as indicated with all manual and automatic control valves open.

- E. Test Reports:
 - 1. Typewritten schedules of readings taken during the balancing and testing operations indicating the required or specified reading, and the final balanced reading shall be provided in a certified report.

3.12 ELECTRICAL WORK

- A. Electric motor driven equipment specified herein shall be provided complete with motors, motor starters, control wiring and controls. Electrical equipment and wiring shall be in accordance with electrical section. Motor starters shall be provided by Mechanical Contractor complete with properly sized thermal overload protection and other appurtenances necessary for the motor control specified. Manual or automatic control and protective devices required for the operation herein specified and any control wiring required for controls and devices but not shown on the electrical plan shall be provided. Electrical work shall conform to NFPA 70.

3.13 PAINTING AND FINISHING

- A. Provide touch-up painting on equipment whose factory finish has been damaged and on all walls, ceilings and other finished surfaces affected by this work. Touch up painting shall match adjacent surfaces.

- B. Clean up all areas around the work installed under this section and remove all debris, dust, and dirt caused by the work.

- C. Paint all exposed black steel piping for most protection.

3.14 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Bound Instructions: 8 complete sets of instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment shall be furnished. Flysheet shall be placed before instructions covering 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:
 - 1. Wiring and control diagrams, with data to explain the detailed operation and control of each component.
 - 2. A control sequence describing startup, operation and shutdown.
 - 3. Operating and maintenance instructions for each piece of equipment, including lubrication instructions.
 - 4. Manufacturer's bulletins, cuts and descriptive data.
 - 5. Parts lists and recommended spare parts.
- B. Field Instructions: Upon completion of the work and at a time designated, the services of one or more project engineers shall be provided by the contractor for 2 four-hour sessions to instruct the State in the operation and maintenance of the system. These field instructions shall cover all the items contained in the bound instructions.

3.15 COMMISSIONING

- A. Commissioning is a comprehensive and systematic process to verify that the building's energy related systems are installed, calibrated and perform according to The State's project requirements, basis of design, and construction documents.
- B. Commissioning is a part of this project and all contractors performing work governed by this division of the specification shall refer to specification SECTION 15995 - MECHANICAL HVAC COMMISSIONING for complete commissioning requirements that apply to all of the work within this division.

3.16 CALIBRATION AND ADJUSTMENTS

- A. After completion of the installation, perform final calibrations and adjustments of the equipment provided under this contract and supply services incidental to the proper performance of the unit control panels under warranty.

3.17 ACCEPTANCE PROCEDURE

- A. Provide operational acceptance tests. The tests shall be performed during a normal day of operation after the air conditioning system has been completely installed and made operable. Results of the tests shall be indicated on the attached Operational Performance Test form and shall be part of the submittal for the testing and balancing report.

3.18 FIELD INSTRUCTION

- A. Upon completion of the work and at a time designated, the services of one or more qualified personnel shall be provided by the Contractor for a period of not

less than 8 hours to train and provide technical assistance to no more than 4 representatives of the State in the operation, maintenance and programming of the new control system. These field instructions shall cover all the items contained in the bound instructions. Submit course outline, instructor's name and an on-site training schedule. The training shall be a combination of classroom and hands on field training. The Contractor shall submit course outline and schedule for approval.

END OF SECTION

SECTION 15920 - MAINTENANCE SERVICE FOR AIR HANDLING AND VENTILATION SYSTEMS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

- A. The General Conditions, Special Conditions and General Requirements of the Specifications, apply to the work specified in this section.

1.02 SUMMARY

- A. Contractor shall furnish all labor, materials, parts, tools, lubricants, refrigerant, equipment, transportation and supervision necessary for the complete inspection, maintenance and repairs to the air conditioning, POL, and plumbing systems installed in this contract. The Contractor shall completely guarantee the satisfactory operation of all systems within the scope of this contract for 2 years after the acceptance of the project.

1.03 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
 1. For billable repairs over \$1,000, including any work performed by a subcontractor, a written proposal with a cost estimate shall be submitted to the Contracting Officer for approval prior to performing the repairs.
 2. A written report of the test results shall be submitted to the Contracting Officer.
 3. Megger chiller motor and submit written report of readings.
 4. Within 7 calendar days after the award of this contract, the Contractor shall submit to the Contracting Officer a proposed monthly maintenance schedule for all air conditioning and ventilation systems, a proposed Maintenance Logbook for each facility, a proposed Chemical Treatment Logbook, and a Service Report Form.
 5. The Contractor shall submit the service reports to the Contracting Officer at the end of each month.
 6. Provide a proposed maintenance schedule per equipment, including required parts replacements per manufacturer's recommendation, and cost break down by each quarter.

1.04 DESCRIPTION OF WORK

- A. The Contractor shall perform complete maintenance service, repairs, and trouble calls for all the air conditioning and ventilation systems included in this contract. The Contractor is responsible to maintain and repair all mechanical, electrical, and control components of each unit including the circuit breaker in the electric panel. The Contractor shall be responsible for all costs necessary to maintain and repair all air conditioning and ventilation systems for complete satisfactory operation and operational reliability.

- B. The Contractor is not responsible for the repair of damages due to vandalism, fire, severe weather, or unusual events beyond the Contractors' control, the Contractor shall immediately notify the Contracting Officer, or their designated representative of the situation, document the cause, and recommend repairs. The Contractor shall substantiate all instances due to utility power supply outages, surges and other power fluctuations. These repairs shall be considered billable and shall follow the requirements of subparagraph entitled "Billable Repairs and Authorized Extra Work".
- C. The Contractor is not responsible for the computer and signal portion of the Energy Monitoring and Control System (EMCS). The Contractor is also not responsible for any proprietary sensor or device used to control the air conditioning and ventilating systems through an EMCS controller. The Contractor shall be responsible for all mechanical and electrical portions of the EMCS, including any wiring connected to the EMCS, and all non-proprietary devices.
- D. The satisfactory performance of maintenance service, repairs, and trouble calls, including the satisfactory operation of all equipment and systems, shall be determined by the Contracting Officer. All maintenance services and repairs shall be subject to inspection and approval by the Contracting Officer. This condition does not relieve the Contractor from performing any of the specified scheduled maintenance services.
- E. The Contracting Officer reserves the right to have any work performed on the weekends or after normal operating hours as specified in item entitled "SERVICE AND WORK SCHEDULE". Should the Contracting Officer exercises this right, the Contractor shall be compensated in accordance with item entitled "AFTERHOURS COMPENSATION AND MARK-UPS".
- F. The Contractor shall be fully responsible for all damages caused by the Contractor or the Contractor's failure to properly maintain, repair, close, secure or leave the air conditioning and ventilation systems in proper operating condition.
 - 1. Maintenance Service: The maintenance service shall consist of thorough maintenance work in accordance with item entitled "ITEMIZED MAINTENANCE SERVICE TASKS" and with the best commercial practices governing the maintenance of air conditioning systems. The Contractor shall be responsible for all costs necessary to maintain the air conditioning and ventilation systems listed herein.
 - 2. Repairs: During routine maintenance service and trouble calls, the Contractor shall replace all worn, failed, or doubtful components as necessary to ensure complete satisfactory operation and operational reliability of the air conditioning and ventilation systems. Repairs shall commence upon discovery of the fault or failure. The Contractor shall be responsible for all repair costs including labor, materials, and subcontractors necessary to restore and return the systems to service.
 - 3. Replacement parts and materials shall be in accordance with item entitled "PARTS AND MATERIAL".

4. Billable Repairs and Authorized Extra Work: Billable repairs that will incur less \$1,000 in total expenses shall be performed upon discovery. For billable repairs over \$1,000, including any work performed by a subcontractor, a written proposal with a cost estimate shall be submitted to the Contracting Officer for approval prior to performing the repairs, except when authorized by the Contracting Officer to perform the work prior to receiving the cost estimate. The Contractor shall commence the repairs within 24 hours after the proposal has been approved by the Contracting Officer. Written proposals and cost estimates shall be inclusive of all costs necessary to perform the repair and shall include:
 - a. Description and nature of the repair;
 - b. Reason why the repair is not contractual work;
 - c. Documentation to substantiate the cause of the damage;
 - d. Parts and materials list with pricing including freight;
 - e. Estimated labor;
 - f. Estimated subcontractor costs;
 - g. Contractor mark-ups; and
 - h. Start and completion dates

The Contracting Officer may request the Contractor to perform extra work at any of the facilities covered by this Contract. Upon request by the Contracting Officer, the Contractor shall provide written quotations for any proposed extra work. Written quotations shall be inclusive of all cost necessary to perform the proposed extra work.

Hourly labor rates listed in Offer Form B, Part C shall be used for all billable repairs and authorized extra work. Should the Contracting Officer require the billable repairs and authorized extra work be performed afterhours, the labor rates shall be adjusted pursuant to item entitled "AFTERHOURS COMPENSATION AND MARK-UPS".

Parts, materials, and subcontractor charges for billable repairs and authorized extra work shall be pursuant to item entitled "AFTERHOURS COMPENSATION AND MARK-UPS".

5. Trouble Calls: The Contractor shall respond to all trouble calls within 2 hours after the Contractor is notified by Central Services Division (CSD). Upon arrival at the facility, the Contractor shall immediately investigate and determine the cause of the trouble call. Should it be determined that the cause of the trouble call is beyond the scope of this Contract, the Contractor shall notify the Contracting Officer immediately upon making that determination.

The Contractor shall provide updates to the Contracting Officer at the end of the working day on the status of all outstanding trouble calls. This notification shall identify the trouble call tracking number, date and time notification received, facility, unit, date and time of response at the site, problems found, actions taken, actions the contractor is intending to take and an estimated completion date.

The CSD is the only State of Hawaii representatives authorized to initiate a trouble call unless authorized by the Contracting Officer. Any billable work performed by the Contractor that was not initiated by the CSD or authorized by the Contracting Officer may not be paid.

1.05 ITEMIZED MAINTENANCE SERVICE TASKS

- A. The Contractor shall perform all maintenance services listed in this section. Any industry-standard maintenance requirement that is not listed, but necessary to ensure the complete satisfactory operation and operational reliability of the air conditioning and ventilation systems shall be performed and immediately brought to the attention of the Contracting Officer.

- B. Ventilating Fans (Exhaust and Supply):
 - 1. Quarterly Service:
 - a. Check motor-controlled and back-draft dampers for proper operation. Lubricate linkage to ensure free movement.

 - b. Lubricate fan motors and bearings.

 - c. Check belt wear and tension. Adjust and replace as needed.

 - d. Check sheaves for wear. Replace as needed.

 - e. Check fan collar, bearings and shaft for wear. Repair or replace as needed.

 - f. Replace air filters.

 - g. Certify performance of quarterly fan maintenance service and correct and report all discrepancies.

 - 2. Annual Service:
 - a. Clean fan wheels and housings of dust, dirt, and grease.

 - b. Remove and wash all intake and exhaust grilles, registers, louvers and dampers. Repair/replace deteriorated bird/insect screens.

 - c. Certify performance of annual fan maintenance service and correct and report all discrepancies.

- C. Pumps:
 - 1. Quarterly Service:

- a. Lubricate and check pump and motor bearings for abnormal temperature and unusual noise or vibration and repair/replace as needed.
 - b. Check packing glands and seals for excessive leakage. Adjust, tighten or replace as required.
 - c. Certify performance of quarterly service and correct and report all discrepancies.
2. Semi-Annual Service:
- a. Check and blow down strainer to domestic water pumps. Remove and clean strainer.
 - b. Check condition of all insulation. Upon discovery or after being notified, repair/replace damaged insulation properly and immediately, including all instances when the insulation is disturbed during any service or repair work.
 - c. Log suction and discharge pressures for all pumps.
 - d. Clean and remove all dust and foreign matter. Clean all rust spots and scratches and immediately touch up with a durable paint of matching color.
 - e. Check motor coupling for alignment and ensure mounting bolts are secure.
 - f. Certify performance of semi-annual service and correct and report all discrepancies.
- D. Controls:
1. Monthly Service:
- a. Adjust thermostat to maintain 75 degrees F room temperature.
 - b. Check all VAV boxes, sensors and operators. Repair/replace broken parts.
 - c. Certify performance of monthly controls maintenance service. Correct and report all discrepancies.
2. Quarterly Service:
- a. Check sequencing, circuits and operation of all chiller plant controls.
 - b. Check time clock interface and set points.
 - c. Check all control valves for proper operation. Repair/replace broken valves.
 - d. Check control devices for proper operation, sticking stems, and calibration. Repair/replace weak or broken springs and all other parts.
 - e. VAV Boxes: Clean flow sensors, align actuator and shaft to confirm 0%

corresponds with no flow.

- f. Check automatic dampers for tightness in closing, bent blades and defective linkage; lubricate connections for free movement and repair as required.
- g. Inspect and test surge and transient voltage protection equipment for all controls, pumps and equipment.
- h. Calibrate air and water temperature sensors.
- i. Certify performance of quarterly controls maintenance service. Correct and report all discrepancies.

3. Annual Service:

- a. Verify duct mounted smoke detectors operate properly and shutdown the corresponding air handling unit upon detection of smoke.
- b. Certify performance of annual controls maintenance service. Correct and report all discrepancies. Submit maintenance report in writing.

E. Variable Frequency Drive (V.F.D.):

1. Quarterly Service:

- a. Service variable frequency drive per manufacturer's recommendations.
- b. Certify performance of quarterly variable frequency drive unit maintenance service. Correct and report all discrepancies.

2. Annual Service:

- a. Submit maintenance report in writing.

F. Fan Coil Unit:

1. Monthly Service:

- a. Clean and clear all drip pans and flush all related condensate drain lines with nitrogen. Install pan tablets if necessary to control algae. (Contractor may be liable for water damage due to clogged drains)
- b. Wash permanent type filters with an approved detergent and spray coat with an approved filter treatment solution. Replace deteriorated permanent type filters that cannot be cleaned.
- c. Check refrigerant charge, suction and discharge pressures.
- d. Check controls for proper operation.
- e. Operate equipment to check for proper operation, unusual noise and vibration; adjust or repair all equipment and controls as required, cleanup all equipment.

- f. Certify performance of monthly fan coil unit maintenance service. Correct and report all discrepancies.
2. Semi-Annual Service:
- a. Tighten electrical connections.
 - b. Certify performance of semi-annual fan coil unit maintenance service. Correct and report all discrepancies.
3. Annual Service:
- a. Clean cooling coils of dirt accumulation using water, steam or surfactant chemical coil cleaner solution (Acidic or alkaline type not allowed) per manufacturer's recommendations. Straighten any bent coil fins with a fin comb.
 - b. Check temperature differential across cooling coils and log readings.
 - c. Clean the fan wheel, fan shaft and interior and exterior of equipment housings.
 - d. Secure all loose housing components, seal leaks, and touch-up paint after cleaning all rust.
 - e. Check and calibrate all electric and/or electronic temperature controls.
 - f. Inspect the control and power box wiring for secure connections and insulation.
 - g. Check condition of gasketing and insulation around unit, door and dampers. Repair or replace as necessary.
 - h. Certify performance of annual fan coil unit maintenance service. Correct and report all discrepancies. Submit maintenance report in writing.
- G. Air Handling Unit:
1. Monthly Service:
- a. Inspect, clean, and clear all floor sinks and drip pans and flush all related condensate drain lines with nitrogen. Install pan tablets if necessary to control algae. (Contractor may be liable for water damage due to clogged drains). Record condition of drip pans and floor sinks.
 - b. Change all disposable air filters at least once a month; use 2-inch thick pleated filters with a minimum efficiency reporting value (MERV) of 13 (Camfil AP-Eleven or equal).
 - c. Lubricate and oil all fan and motor bearings, connections of dampers and vanes. Check controls for proper operation.

- d. Check drives for wear; adjust belt tension. Replace belt(s) as required.
 - e. Operate equipment to check for proper operation, unusual noise and vibration; adjust or repair all equipment and controls as required, cleanup all equipment.
 - f. Check DDC schedule for proper operation and time settings.
 - g. Check ultraviolet light elements, fixtures, and connections.
 - h. Certify performance of monthly air handling unit maintenance service. Correct and report all discrepancies.
2. Quarterly Service:
- a. Check motor-controlled and back-draft dampers for proper operation; lubricate linkage for free movement.
 - b. Certify performance of quarterly air handling unit maintenance service. Correct and report all discrepancies.
3. Semi-Annual Service:
- a. Adjust alignment of bearings and sheaves; lubricate fan and motor bearings. Replace worn or noisy bearings and sheaves.
 - b. Clean chilled water strainer.
 - c. Tighten electrical connections.
 - d. Certify performance of semi-annual air handling unit maintenance service. Correct and report all discrepancies.
4. Annual Service:
- a. Clean cooling coils of dirt accumulation using water, steam or surfactant chemical coil cleaner solution (Acidic or alkaline type not allowed) per manufacturer's recommendations. Straighten any bent coil fins with a fin comb.
 - b. Check pressure and temperature differential across cooling coils and log readings. Clean strainer, check vents and drains on chilled water coils.
 - c. Remove and wash supply and return air grilles, registers and diffusers and fresh air intake grilles and dampers and repair or replace deteriorated bird screens.
 - d. Clean the fan wheel, fan shaft and interior and exterior of equipment housings.
 - e. Clean and adjust chilled water valve and clean strainer.

- f. Secure all loose housing components, seal leaks, and touch-up paint after cleaning all rust.
- g. Check and calibrate all electric and/or electronic temperature controls.
- h. Inspect the control and power box wiring for secure connections and insulation.
- i. Replace all UVC light elements with new elements.
- j. Check condition of gasketing and insulation around unit, door and dampers. Repair or replace as necessary.
- k. Examine flex connections for cracks or leaks. Repair or replace damaged material.
- l. Replace belt(s).
- m. Certify performance of annual air handling unit maintenance service. Correct and report all discrepancies. Submit maintenance report in writing.

H. Packaged Air-Cooled Condenser:

1. Monthly Service:

- a. Measure and record refrigerant compressor suction and discharge and oil pressures.
- b. Check for water, refrigerant and oil leakage. Correct or repair as required.
- c. Check vibration isolator mounts.
- d. Check compressor, fan, and motor bearings for abnormal temperature and unusual noise. Lubricate and/or replace as required.
- e. Check refrigerant sight glass. Change filter/drier if moisture indicated. Check compressor oil level and add oil as required.
- f. Check air-cooled condenser fans, sheaves, and belts. Verify belt tension. Replace components as required.
- g. Adjust alignment of bearings and sheaves for fans, motors, and compressors. Replace worn or noisy bearings or sheaves.
- h. Run system operation through a complete operating cycle and adjust for proper operation.
- i. Certify performance of monthly maintenance service and correct and report all discrepancies.

2. Quarterly Service:
 - a. Wash condenser coils and clean all dirt accumulation, using water or steam and a surfactant chemical coil cleaner (alkaline or acidic cleaners not allowed).
 - b. Certify performance of quarterly maintenance service and correct and report all discrepancies.
3. Annual Service:
 - a. Test and analyze compressor oil. A written report of the test results shall be submitted to the Contracting Officer.
 - b. Replace strainer and oil filter. Change oil as recommended by the analysis and manufacturer's recommendations. Properly dispose of all oil.
 - c. Check refrigerant; replace filter-drier.
 - d. Test control switches, compressor unloading, and safeties. Calibrate and record settings. Adjust as required.
 - e. Check and clean all unit housings. Permanently seal any leaks. Remove all rust from exterior components and immediately touch-up with a durable paint of matching color.
 - f. Check condition of all insulation. Upon discovery or after being notified, repair/replace damaged insulation properly and immediately, including all instances when the insulation is disturbed during any service or repair work.
 - g. Certify performance of annual maintenance service and correct and report all discrepancies.
- I. Standby and Lead-Lag Equipment (Pumps, Etc.) Control Switches and Time Clocks:
 1. Monthly Service:
 - a. The Contractor shall be responsible for the manual operational change over and rotation of all standby and lead-lag equipment not controlled by a computer.
 - b. Clean contacts, replace if necessary. Check and adjust time settings as directed or required. Check back-up battery and replace as necessary.
 - c. Replace non-functional and broken time clocks with electronic, capacitance back-up time clocks. Battery back-up time clocks shall not be used.
 - d. Replace non-functional and broken bypass timer switches with adjustable electronic, 4-hour programmable timer switch with electronic selector switches or buttons.

2. Semi-Annual Service:
 - a. Thoroughly clean out all dust and dirt from inside of housing.
 - b. Check and tighten loose fasteners and adjust spring tensions as required.
 - c. Check and operate all release mechanisms to ensure proper working order.
 - d. Clean out all dust and dirt from inside of all electrical panels by using dry compressed nitrogen to blow out dust and foreign matters.

- J. Valves, Equipment and Supports:
 1. The Contractor shall exercise all equipment shut-off valves quarterly for proper operation and tightness. Repair or place all leaking or non-operational upon discovery or notification.
 2. Remove rust from piping, equipment and support surfaces. Apply rust treatment/inhibitor, prime and paint with corrosion protection coating. Paint color shall match existing. Work shall be done immediately upon discovery or notification.

- K. Cleaning of Mechanical Equipment Rooms or Enclosures:
 1. Monthly Service:
 - a. Vacuum or wipe clean all equipment surfaces and all related appurtenances.
 - b. Vacuum clean or sweep complete floor and platform areas.
 - c. Wet wash complete floor area with tap water where allowed by the Contracting Officer.
 - d. Remove all trash, scrap, used parts, lubricants and other items not being used.
 - e. Notify the Contracting Officer of any vandalism, dangerous or hazardous conditions and improper storage of items that impacts the work space within the rooms and enclosures.

- L. Fuel System:
 1. Monthly Service:
 - a. Check for any alarm message from the fuel level, and leak monitoring panel.
 - b. Visibly check for possible fuel leak
 - c. Attend monthly emergency generator testing to ensure that the tank and its fuel supply piping system is operating properly.
 - d. Exercise valves per part J. Valves, Equipment and Support

- e. Certify performance of annual maintenance service and correct and report all discrepancies.

1.06 RECORDS AND REPORTS

- A. All documents and records shall be made available to the Contracting Officer upon request.

- B. Logbooks and Service Reports:
 - 1. Within 7 calendar days after the award of this contract, the Contractor shall submit to the Contracting Officer a proposed monthly maintenance schedule for all air conditioning and ventilation systems, a proposed Maintenance Logbook for each facility, a proposed Chemical Treatment Logbook, and a Service Report Form for use with every maintenance service. The submittals should contain enough detail to adequately demonstrate that the terms and conditions of this contract will be met. Contractor shall include any other forms to be used in the performance of the contract requirements. The Contracting Officer may reject any submittal and reserves the right to provide the Contractor with preprinted maintenance forms or worksheets to be completed by the Contractor.

 - 2. Maintenance Logbooks, Chemical Treatment Logbooks and Service Reports shall be filled out properly and completely at the time of service. At a minimum, the following information shall be recorded: date, start and end time, service and work performed, materials and parts used, technician(s) name, and any recommendations. Chemical Treatment Logbooks shall also include monthly water analysis, water treatment equipment maintenance and repair, chemical feed set points and adjustments made, and the amount of each chemical used from the previous maintenance period.

 - 3. Service Reports shall be signed by a representative of the building. The Maintenance Logbook and Chemical Treatment Logbook shall be posted in the mechanical room or equipment cabinet at the facility.

 - 4. At the end of the contract period, the Contractor shall submit the Maintenance and Chemical Treatment Logbooks for each air conditioning and ventilating system of all facilities. Final payment shall not be made until all Maintenance and Chemical Treatment Logbooks are received.

- C. Monthly Summary Report:
 - 1. The Contractor shall submit the service reports to the Contracting Officer at the end of each month.

- D. Annual Equipment Inventory Schedule:
 - 1. The annual equipment inventory schedule shall list an up-to-date inventory of all air conditioning and ventilation equipment at each facility. The schedule shall list make, model, serial number, capacity, equipment location, area served, and installation date.

- E. Annual Equipment Replacement Report:
 - 1. The Contractor shall submit a written annual equipment replacement report to the Contracting Officer for review and approval. The annual report shall identify the unit, justification for replacement, and projected life expectancy of the unit. The projected life shall be a minimum of 2 years to allow the State to secure funding, design and construct.
 - 2. The Contracting Officer may accept, reject, or modify the projected life of each unit listed in the annual equipment replacement report. For equipment replacements accepted by the Contracting Officer, the Contractor shall remain fully responsible for the maintenance and repair of the unit through the expected life expectancy period.

1.07 SERVICE AND WORK SCHEDULE

- A. All maintenance service and repair work shall be performed during normal operating hours between 7:30 A.M. to 4:00 P.M. on Monday through Friday, excluding State holidays, or as approved by the Contracting Officer and HI-EMA. The Contractor shall schedule all maintenance service and repair work to minimize disruption of the building operations. The Contractor may be required to reschedule at no additional cost to the State. The State reserves the right to have maintenance services and repair work performed on the weekends or after normal operating hours. Should the Contracting Officer exercise this right, the Contractor shall be compensated for adjusted hourly labor rates pursuant to Section 7.0. AFTERHOURS COMPENSATION AND MARK-UPS.
- B. Monthly Service: Monthly service tasks shall be not less than 3 weeks nor more than 5 weeks from the last service, unless the scheduled service is delayed or approved by the Contracting Officer. There shall be a minimum of 12 monthly maintenance services completed in any 12-month period.
- C. Quarterly Service: Quarterly service tasks shall be performed during regular monthly service and shall be not less than 12 weeks nor more than 14 weeks from the last quarterly service, unless the scheduled quarterly service is delayed or approved by the Contracting Officer. There shall be a minimum of 4 quarterly maintenance services completed in any 12-month period.
- D. Semi-Annual Service: Semi-annual service tasks shall be performed during regular monthly service and shall be not less than 25 weeks nor more than 27 weeks from the last semi-annual service, unless the scheduled semi-annual service is delayed or approved by the Contracting Officer. There shall be a minimum of 2 semi-annual maintenance services completed in any 12-month period.
- E. Annual Service: Annual service tasks shall be performed during regular monthly service and shall be not less than 51 weeks nor more than 53 weeks from the last annual service, unless the scheduled annual service is delayed or approved by the Contracting Officer. There shall be a minimum of one annual maintenance service completed in any 12-month period.

PART 2 - PRODUCTS

2.01 PARTS AND MATERIALS

- A. All parts and materials, including refrigerants, required for the Itemized Maintenance Service Tasks and all repairs shall be provided at no additional cost to the State.
- B. The Contractor shall maintain a supply of parts and materials required for the Itemized Maintenance Service Tasks and routine repairs of all air conditioning and ventilation systems. All replacement parts used for maintenance service, repairs, and authorized extra work shall be new original equipment manufacturer (OEM) parts or new aftermarket parts that meet or exceed the OEM specifications. At the discretion and approval of the Contracting Officer, parts may be rebuilt provided the rebuilt part will provide complete satisfactory operation and not compromise operational reliability. The Contractor shall submit a written proposal with a cost estimate to the Contracting Officer for approval prior to rebuilding any part.
- C. Obsolescence, discontinuance, or any other circumstance that affect the availability of replacement parts does not relieve the Contractor of any of its' responsibilities to ensure complete satisfactory operation and operational reliability of the air conditioning and ventilation systems. The State shall not provide any compensation.
- D. The Contractor shall notify the Contracting Officer whenever parts are not locally available to accomplish any repair. The Contracting Officer may request the part to be shipped by air freight at the expense of the State. The State shall be responsible only for the additional costs to use air freight in lieu of typical freight. The Contractor shall not mark-up the additional air freight charges.
- E. The Contractor shall provide and maintain a supply of refrigerants for the life of the contract. The Contractor shall maintain records of refrigerant usage for each location and shall comply with all government regulations. The Contractor shall support and protect the State legally and financially with regard to these regulations. Recovery and storage of refrigerants shall be included at no additional cost to the State.
- F. The State, its employees, or any of building occupants, shall not be responsible for nor accept any deliveries made to the facilities. The Contractor shall be present to receive any parts, material, or equipment deliveries.

2.02 AFTERHOURS COMPENSATION AND MARK-UPS

- A. Should the Contracting Officer require the Contractor to perform any work on the weekends or after normal works hours, the State shall compensate the Contractor as follows:
 - 1. Maintenance Services: Maintenance services performed on the weekends or afterhours shall be compensated at 0.5 times the hourly rate provided by Contractor on Offer Form B, Part C. No further compensation shall be provided.

2. Repairs, Trouble Calls, Authorized Extra Work: Repairs, trouble calls, and authorized extra work performed on the weekends or afterhours shall be compensated at 1.5 times the hourly rate provided by Contractor on Offer Form B, Part C. Except for parts, materials, and subcontractors, no further compensation shall be provided.
- B. The Contractor shall be compensated for parts and materials required for billable repair work and authorized extra work. Parts and materials for billable repair work and authorized extra work may be marked up, up to 20 percent above the Contractors' total cost. Work performed by Subcontractors and equipment rentals may be marked up, up to 10 percent above the Contractors' total cost. The mark-ups shall include shipping, overhead, profit, taxes, and any other incidental expenses. No further compensation greater than the listed mark-ups shall be provided. The Contractor shall substantiate all costs by submitting copies of all invoices with their payment request to the State.
 - C. The labor rate listed on Offer Form B, Part C. shall be used for all billable repairs and authorized extra work. Invoices for these services shall be submitted per instance and separately from the monthly invoice.

PART 3 - EXECUTION

3.01 CLEANUP AND WORK PRACTICES

- A. The Contractor shall keep the jobsite free of debris, litter, refuse, etc. and shall clean up all spills. The Contractor shall remove all trash, used parts, fluids, lubricants, and equipment from the service area upon completion of the work. The Contractor shall dispose of all used parts, fluids, and lubricants off-site and in accordance with all applicable regulations. All written records required by any regulation shall be submitted to the Contracting Officer. The Contractor shall support and protect the State legally and financially with regard to these regulations.
- B. The Contractor shall exercise caution during the progress of all maintenance service and repair work to prevent damage to any of the buildings. The Contractor shall be responsible to repair all damages caused by the Contractor's negligence or failure to properly maintain the air conditioning and ventilation systems.
- C. The Contractor shall not store parts or materials at the facilities except while performing work tasks.

3.02 CONTRACT COMMENCEMENT AND COMPLETION

- A. Upon commencement of this Contract, the Contractor may submit to the Contracting Officer an itemized list of units that are not operating satisfactorily, require repair, or have not been routinely maintained and serviced. The list shall include a description of the equipment, the nature and severity of the deficiency, and the impacts of the deficiency. The list shall be submitted within 30 days after this Contract is executed.

- B. The Contracting Officer shall determine which of the listed units are the responsibility of the previous Contractor and shall provide the revised list to the Contractor. Units on the revised list are not the Contractor's responsibility until notified by the Contracting Officer. The Contracting Officer shall solely determine if and when the deficiencies have been resolved and remedied.

- C. Within 45 days after the completion of this Contract, the Contracting Officer may notify and submit to the Contractor an itemized list of units that were determined to be deficient at the time this Contract ended. The Contractor shall resolve and remedy all items on the list within 30 days of notification. Until the Contracting Officer determines that the deficiencies have been resolved and remedied, the Contractor shall be responsible for all maintenance services, repairs and trouble calls, as detailed in this Contract, for the units listed. The Contracting Officer shall solely determine if and when the deficiencies have been resolved and remedied. All corrective work and extended services shall be provided by the Contractor at no additional cost to the State. Final payment shall not be made until all deficiencies have been resolved and remedied.

3.03 SAFETY PRECAUTIONS

- A. The Contractor shall not perform any maintenance service and repair work until all safety barricades are in place. The Contractor shall comply with all applicable safety regulations promulgated by HIOSH, USEPA, and other governmental agencies.

END OF SECTION

SECTION 15950 - TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes the following for testing, adjusting, and balancing:
 - 1. Balancing Air Distribution Systems:
 - a. Variable air volume systems.
 - b. All supply, return, and exhaust air devices served by the new HVAC systems.
 - c. DX system
 - d. Variable Refrigerant Flow DX system.
 - e. Emergency Water Storage system including booster pump.

1.02 GENERAL REQUIREMENTS

- A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions or discrepancies in the plans and specifications such as dampers, gauges, and sensors that will inhibit the proper Testing, Adjusting and Balancing (TAB) process, the Contractor shall call the attention of the Engineer to such omissions and discrepancies in advance of the date of bid opening so that the necessary corrections can be made. Otherwise the Contractor shall furnish and install the omissions or discrepancies as if the same were specified and provided for.
- B. Standards: Applicable standard published by the National Environmental Balancing Bureau (NEBB) and/or the Associated Air Balance Council (AABC).

1.03 QUALITY ASSURANCE

- A. Independent TAB Agency and Personnel Qualifications: To secure approval for the proposed agency, submit information certifying that the TAB agency is a first tier subcontractor who is not affiliated with any other company participating in work on this contract, including design, furnishing equipment, or construction. Further, submit the following, for the agency to the Engineer.
- B. Independent AABC or NEBB or TABB TAB agency:
 - 1. TAB Agency: AABC registration number and expiration date of current certification; or NEBB certification number and expiration date of current certification; or Testing, Adjusting and Balancing Bureau (TABB) certification number and expiration date of current certification.
 - 2. TAB Team Supervisor: Employee of the TAB contractor and certified by AABC or NEBB or TABB. Name and copy of the supervisor's certificate and expiration date of current certification.
 - 3. TAB Technician: Name and documented evidence that each field technician has satisfactorily assisted a TAB team field for not less than one year immediately preceding this contract's bid opening date.

- C. TAB Standard: Perform TAB in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, unless otherwise specified herein. All recommended and suggested practices contained in the TAB Standard are considered mandatory. Use the provisions of the TAB standard including checklists, report forms, etc., as nearly as practical, to satisfy the Contract requirements. Use the TAB standard for all aspects of TAB, including qualifications for the TAB firm and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB standard, adhere to the manufacturer's recommendations.
- D. Instrumentation: List all test equipment to be used, including its manufacturer, model number, calibration date and serial number, as described in ASHRAE 111, Section 5, "Instrumentation".
- E. Certified TAB Report:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB report.
 - 2. Certify that the TAB team complied with the TAB standard and the procedures specified and referenced in this specification.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Independent TAB Agency and Personnel Qualifications: Within 30 days of contractor's notice to proceed, submit documentation that the TAB contractor and this project's TAB team members meet the qualifications specified in "Quality Assurance" article.
- C. Certified TAB Reports: Within 30 days of contractor's notice to proceed.
- D. Instrumentation: Within 30 days of contractor's notice to proceed, submit documentation in accordance with the "Quality Assurance" article.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PRE-TAB FIELD WORK

- A. Examine the contract documents and become familiar with project requirements. Report deficiencies discovered before and during performance of TAB procedures.
- B. Ensure the systems are ready and operational. Verify the following:
 - 1. Automatic temperature control systems are operational.
 - 2. Windows and doors are closed.

3. Equipment doors are closed.
4. Electrical wiring is complete.
5. All mechanical equipment is operational.

3.02 TAB FIELD WORK - GENERAL

- A. Comply with the requirements of AABC National Standards for Total System Balance, latest edition, NEBB Procedural Standards, latest edition, ASHRAE 111, latest edition or SMACNA HVAC Systems - Testing, Adjusting and Balancing, latest edition. Comply with ASHRAE 62.1, latest edition, Section 7.2.2, "Air Balancing".
- B. Cut insulation, ducts, pipes and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 2. Install and join new insulation that matches removed materials. Restore insulation coverings, vapor barrier and finish according to Insulation specifications.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed control levers and similar controls and devices with paint or other suitable permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP).

3.03 PROCEDURES FOR MOTORS

- A. Test at final balanced conditions and record the following:
 1. Manufacturer's name, model number and serial number.
 2. Motor HP rating, RPM and efficiency rating.
 3. Nameplate and measured voltage/ampereage each phase.
 4. Starter thermal protection element rating.
- B. If the motor is driven by a variable frequency drive, test for proper operation at speeds from minimum to maximum. Test the manual bypass. Record observations including the manufacturer, model number, serial number and nameplate data.

3.04 CERTIFIED TAB REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems. Include a certification sheet, signed and sealed by the certified testing and balancing engineer.
- B. General Data:
 1. Title page.

2. Name and address of the TAB contractor.
 3. Project name, location.
 4. Architect, Engineer and Contractor's name and address.
 5. Report date.
 6. Notes to explain why final data in the body of reports vary from indicated values.
 7. Water System Diagrams: Include schematic layouts of the chilled water and condenser water systems with the following information:
 - a. Quantity of water flow (gpm).
 - b. Water flow setpoint.
- C. Test Reports: Typewritten schedules of readings taken during the balancing and testing operations indicating the required or specified reading, and the final balanced reading shall be provided for the following items: Complete standard AABC, NEBB, SMACNA equipment test reports for the following equipment:
1. Motors
 2. FCU/AHUs:
 - a. Fan Flow
 - b. Pressure differential in "wg".
 - c. Motor RPM
 - d. Discharge and section pressure
 - e. Motor BHP
 - f. Air flow balance of each and every air devices.
 3. Air Cooled Condensing Unit:
 - a. Refrigerant liquid/suction temperature
 - b. Calculated tonnage
 4. Exhaust Fan
 5. Booster Fan
 6. VAV Terminal
 7. Booster Pump

END OF SECTION

SECTION 15995 - MECHANICAL HVAC COMMISSIONING

PART 1 - GENERAL

1.01 SUMMARY

- A. As specified in SECTION 01190 - GENERAL REQUIREMENTS FOR COMMISSIONING.
- B. Related sections include DIVISION 1 - GENERAL REQUIREMENTS and DIVISION 15 - MECHANICAL.

1.02 SCOPE

- A. The contractor shall hire an independent commissioning authority (CxA). The certified commissioning authority acting as The State's representative is designated as the commissioning authority. The Contractor shall provide a Commissioning Authority (CxA) to perform commissioning services for the project. The CxA shall be a certified commissioning authority in good standing by ASHRAE, NEBB or ACG and conforming to all rules and regulations with their respective organizations. The CxA shall become familiar with the State DOD project requirements and execute the required commissioning activities. The CxA shall also be tasked with additional duties as detailed in these specifications. The contractor shall provide labor and services to the CxA to accomplish the work specified herein as they apply to the commissioning of the building systems. The CxA may be an independent third party or can be associated with the design engineering firm provided that The State signs an appropriate waiver.
- B. Scope of work associated with commissioning.
 - 1. Building B303:
 - a. Replace existing DX FCU/ACCU, ductwork, with new energy efficient HVAC equipment.
 - b. Provide Standalone electronic controls to the new HVAC equipment.
 - c. Provide a new fuel tank for a
 - d. Test and Balance of the installed system.
 - 2. Building PSB:
 - a. Replace existing DX FCU/ACCU, ductwork, with new energy efficient HVAC equipment.
 - b. Provide Standalone electronic controls to the new HVAC equipment.
 - c. Provide a new exhaust fan.
 - d. Test and Balance of the installed system.
 - 3. Building Birkhimer:
 - a. Replace existing DX FCU/ACCU, ductwork, with new energy-efficient HVAC equipment.

- b. Provide Standalone electronic controls to the new HVAC equipment.
- c. Provide a new emergency potable water system including water tanks, pumps, water quality monitoring system, and control systems.
- d. Replace an existing underground diesel fuel tank with a new aboveground tank as indicated.
- e. Test and Balance of the HVAC systems.
- f. Duct smoke detectors, and their monitoring and alarm capability to the building's FA system.

1.03 SUBMITTALS

- A. Submit in accordance with DIVISION 1 - GENERAL REQUIREMENTS and SECTION 01190 - GENERAL REQUIREMENTS FOR COMMISSIONING.

1.04 GENERAL REQUIREMENTS

- A. It is the intent to provide a complete installation. Should there be omissions or discrepancies in the plans and specifications such as dampers, gauges, and sensors that will inhibit the proper commissioning process, the Contractor shall call the attention of the Engineer to such omissions and discrepancies so that the necessary corrections can be made.

1. Standards:

- a. All work shall be done in accordance with applicable ordinances and codes of State of Hawaii and in accordance with authorities having jurisdictions.
- b. Work shall comply with applicable regulations of State of Hawaii, National Fire Protection Association (NFPA), American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 202-2013, Guideline 0-2005 and Guideline 1.1-2007.

- 2. 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 shall not relieve the Contractor from providing such labor or material. Drawings do not attempt to show exact details of piping and ductwork.

- a. Contract Drawings: Mechanical are essentially diagrammatic, showing locations of ducts, pipes and equipment. Where locations are not dimensioned, they are approximate; Contractor shall study existing conditions and plan his work in the most logical manner.
- b. Shop Drawings: As soon as practical, the contractor shall provide the commissioning agent with a set of shop drawings and data submittals including the automatic control diagrams that have been reviewed by the Engineers. Coordinate with the commissioning agent to provide all pertinent information on the building systems.

1.05 COMMISSIONING PROCEDURES

- A. Overview: This section of the specification describes the process for commissioning building systems, defines the responsibilities of the

commissioning authority and contractor, and outlines the duties of other members of the commissioning team.

The commissioning process shall be applied to all equipment, components, and systems, including specified interfaces to and from equipment and systems provided under other divisions.

- B. Subcontractors: The contractor confirms that the appropriate subcontractors include the commissioning work in their respective scope of work. The appropriate subcontractors shall be responsible for cooperating and coordinating their work with the commissioning agent as indicated. They shall also be responsible for carrying out all the physical activities required for physical installation of components and systems, and for operating them during the commissioning process, and including providing and operating measuring devices as required.
- C. Commissioning Authority: The designated commissioning authority acting as The State's representative shall observe any or all of the systems functional performance tests as an important element in the operator familiarization and instruction process. If outside air temperature, lack of full occupancy, or other factors prevent full performance testing of some functions, then testing, verifying and documenting the performance of these functions shall be carried out at an appropriate, and mutually agreed upon, time during the 12 months after substantial completion.
- D. Appropriate checklist from the SMACNA HVAC Commissioning Manual or the approved equivalent, designated by the mechanical engineer who is the commissioning authority, shall be used for this project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 THE COMMISSIONING PROCESS

- A. The commissioning team shall consist of:
 - 1. The State's representative(s).
 - 2. The Architect and Designer engineer(s).
 - 3. The commissioning authority.
 - 4. The construction manager's representative(s).
 - 5. The quality control manager or representative(s).
 - 6. The contractor's representative(s).
 - 7. The controls subcontractor's representative(s).
 - 8. The mechanical contractor's representative.

9. The TAB contractor's representative.
10. The electrical contractor's representative(s).
11. The manufacturer's representative(s).

3.02 COMMISSIONING RESPONSIBILITIES

- A. The commissioning authority (CA) or his representative shall:
 1. Plan, organize, and implement the commissioning process as specified herein.
 2. Prepare the commissioning plan and ensure its distribution for review and comment.
 3. Revise the commissioning plan as required during construction.
 4. Chair commissioning meetings and prepare and distribute minutes to all commissioning team members, whether or not they attended the meeting.
 5. Coordinate commissioning activities among all contractors, sub-trades, and suppliers.
 6. Carry out all required system readiness checks and document the results as the checks are done.
 7. In cooperation with the controls contractor, ensure all control point checkouts are carried out and the results documented as the checks are done.
 8. Observe or verify all start-ups and initial system operations tests and checks, which shall encompass all specified functional performance tests, ensuring the results are documented as the tests and checks are done.
 9. At the direction of the mechanical design engineer, ensure equipment and systems are operated for functional performance verification purposes.
 10. Ensure all required instruction and demonstrations are provided to The State's designated operating staff.
- B. Contractor: The general contractor (GC), and all his sub-trades (SUBS) and manufacturers (MFR), shall cooperate with the commissioning authority in carrying out the commissioning process. In this context, the contractor shall:
 1. Provide equipment and systems start-up as required.
 2. Operate equipment and systems as required for both initial systems operations and final functional performance tests.
 3. Attend commissioning meetings, and attend to action items arising from them, as required to allow the commissioning process to proceed on schedule.
 4. Provide instruction and demonstrations for The State's designated operating staff, in conjunction with the commissioning authority, in order to meet all specified requirements in this regard.

- C. The State (OR): The State will ensure the availability of operating staff for all scheduled instruction and demonstration sessions.
- D. Construction Manager (CM) and Quality Control Manager (QC): The Construction Manager and Quality Control Manager are the primary communication contact for all commissioning work, and shall:
1. Provide communication between The State, commissioning authority, architect and design engineer, contractors, sub-contractors and suppliers.
 2. Schedule and holds commissioning and coordination meetings.
 3. Coordinate all commissioning schedules from the commissioning authority to the contractors doing the start-up and commissioning tasks.
 4. Coordinate and tracks all corrective work required to complete the commissioning.
 5. Provide all required drawings, submittals, O&M manuals and test records to commissioning authority.
- E. Architect (A/E): The Architect is the primary communication contact for all design professions and shall:
1. Provide communication and operational assistance with commissioning issues, conflicts and design questions with the design professions.
 2. Attend periodic commissioning meetings and performance tests.
 3. Review contractor's submittal in cooperation the Commissioning Authority to conformance to the design intent.
 4. Provide training and training assistance concerning the design intent and the basis of design.
- F. Control subcontractor (CC): The control subcontractor is the Commissioning Team's primary authority on the materials and methods used to implement the controls project scope of work.
1. Attends commissioning meetings and provides commissioning coordination for all controls systems commissioning activities.
 2. Provides all required submittal information required for the design of commissioning tests by the commissioning authority. They shall include:
 - a. Sequences of Operation submittals: The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. They shall include:
 - 1) An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.
 - 2) All interactions and interlocks with other systems.
 - 3) Detailed delineation of control between any packaged controls and the energy management control system and direct digital control system, listing what points the EMCS and DDC monitor only and what points are control points and are adjustable.

- 4) Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included, but will generally require additional narrative).
 - 5) Start-up sequences.
 - 6) Warm-up mode sequences.
 - 7) Normal operating mode sequences.
 - 8) Unoccupied mode sequences.
 - 9) Shutdown sequences.
 - 10) Capacity control sequences and equipment staging.
 - 11) Temperature and pressure control: setbacks, setups, resets, etc.
 - 12) Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
 - 13) Effects of power or equipment failure with all standby component functions.
 - 14) Sequences for all alarms and emergency shut downs.
 - 15) Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
 - 16) Schedules, if known.
 - 17) To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections, unless the sections are numbered.
- b. Control Drawings submittal:
- 1) The control drawings shall have a key to all abbreviations.
 - 2) The control drawings shall contain graphic schematic depictions of the systems and each component.
 - 3) The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
 - 4) Provide a full points list with at least the following included for each point:
 - a) Controlled system
 - b) Point abbreviation

- c) Point description
 - d) Display unit
 - e) Control point or setpoint (Yes / No)
 - f) Monitoring point (Yes / No)
 - g) Intermediate point (Yes / No)
 - h) Calculated point (Yes / No)
- 5) Key:
- a) Point Description: DB temp, airflow, etc.
 - b) Control or Setpoint: Point that controls equipment and can have its setpoint changed (OSA, SAT, etc.)
 - c) Intermediate Point: Point whose value is used to make a calculation which then controls equipment (space temperatures that are averaged to a virtual point to control reset).
 - d) Monitoring Point: Point that does not control or contribute to the control of equipment, but is used for operation, maintenance, or performance verification.
 - e) Calculated Point: "Virtual" point generated from calculations of other point values.
 - f) The Controls Contractor shall keep the CA informed of all changes to this list during programming and setup.
- c. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.
 - d. Assist and cooperate with the TC in the following manner:
 - 1) Meet with the TC prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB. Provide the TC any needed unique instruments for setting terminal unit boxes and instruct TC in their use (handheld control system interface for use around the building during TAB, etc.).
 - 2) For a given area, have all required pre-functional checklists, calibrations, startup and selected functional tests of the system completed and approved by the CA prior to TAB.
 - 3) Provide a qualified technician to operate the controls to assist the TC in performing TAB, or provide sufficient training for TC to operate the system without assistance.
 - e. Assist and cooperate with the CA in the following manner:
 - 1) Using a skilled technician who is familiar with this building, execute the functional testing of the controls system. Assist in the functional

testing of all equipment. Provide means of communication during the testing (e.g. 2 ways radio).

- 2) Execute all control system trend logs specified.
- f. The controls contractor shall prepare a written plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional performance testing. At minimum, the plan shall include for each type of equipment controlled by the automatic controls:
- 1) System name.
 - 2) List of devices.
 - 3) Step-by-step procedures for testing each controller after installation, including:
 - a) Process of verifying proper hardware and wiring installation.
 - b) Process of downloading programs to local controllers and verifying that they are addressed correctly.
 - c) Process of performing operational checks of each controlled component.
 - d) Plan and process for calibrating valve and damper actuators and all sensors.
 - e) A description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.
 - 4) A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor or controller has "passed" and is operating within the contract parameters.
 - 5) A description of the instrumentation required for testing.
 - 6) Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work.
- g. Provide a signed and dated certification of Performance to the CA and CM upon completion of the checkout of each controlled device, equipment and system prior to functional testing for each piece of equipment or system, that all system programming is complete as to all respects of the Contract Documents, except functional testing requirements.
- h. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as specified.

- i. List and clearly identify on the as-built duct and piping drawings the locations of all static and differential pressure sensors (air, water and building pressure).
 3. Assists the CA in reviewing and modifying commissioning check lists for controls systems, for consistency with the materials and methods used in the construction of the controls systems.
 4. Provides technicians, tools and instrumentation for controls commissioning activities and tests.
 5. Assists CA in developing commissioning schedules for all controls commissioning activities and complete all controls commissioning activities to those schedules.
 6. Completes all corrective action, on a timely basis as required to complete all controls commissioning activities.
 7. Prepares all operating and maintenance manuals and all required as built documents in accordance with the specifications prior to The State's training activities as dictated by the commissioning schedule.
 8. Provides The State's training in accordance with The State's training agenda and schedule provided by the CA.
- B. Testing, Adjusting and Balancing Contractor (TC): The TC is the Commissioning Team's primary authority on the instruments and methods used to implement TAB project scope of work.
1. Attends commissioning meetings and provides commissioning coordination for all TAB systems commissioning activities.
 2. Provides all required submittal information required for the design of commissioning tests by the commissioning authority.
 3. Submit the outline of the TAB plan and approach for each system and component to the CA, CM and the controls contractor 6 weeks prior to starting the TAB. This plan will be developed after the TAB has some familiarity with the control system. The submitted plan will include:
 - a) Certification that the TC has reviewed the construction documents and the systems with the design engineers and contractors to sufficiently understand the design intent for each system.
 - b) An explanation of the intended use of the building control system. The controls contractor will comment on feasibility of the plan.
 - c) All field checkout sheets and logs to be used that list each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - d) Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - e) Final test report forms to be used.

- f) Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch / sub-main proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using air flow straighteners or relocating flow stations and sensors will be discussed. Provide the analogous explanations for the water side.
- g) List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
- h) Details of how total flow will be determined (Air: sum of terminal flows via DDC calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations. Water: pump curves, circuit setter, flow station, ultrasonic, etc.).
- i) The identification and types of measurement instruments to be used and their most recent calibration date.
- j) Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and provide methods to verify this.
- k) Confirmation that TAB plan verify the outside air ventilation and indoor air ventilation criteria under all conditions.
- l) Details of whether and how minimum outside air cfm will be verified and set, and for what level (total building, zone, etc.).
- m) Details of how building static and exhaust fan / relief damper capacity will be checked.
- n) Proposed selection points for sound measurements and sound measurement methods.
- o) Details of methods for making any specified coil or other system plant capacity measurements.
- p) Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.
- q) Details regarding specified deferred or seasonal TAB work.
- r) Details of any specified false loading of systems to complete TAB work.
- s) Details of all exhaust fan balancing and capacity verifications, including any required room pressure differentials.
- t) Plan for hand-written field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
- u) Plan for formal progress reports (scope and frequency).

- v) Plan for formal deficiency reports (scope, frequency and distribution).
- 4. A running log of events and issues shall be kept by the TAB field technicians. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the CA and CM at least twice a week.
- 5. Communicate in writing to the controls contractor all setpoint and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.
- 6. Provide a draft TAB report within 2 weeks of completion. A copy will be provided to the CA. The report will contain a full explanation of the methodology, assumptions and the results in a clear format with designations of all uncommon abbreviations and column headings. The report should follow the latest and most rigorous reporting recommendations by AABC, NEBB or ASHRAE Standard 111.
- 7. Provide the CA with any requested data, gathered, but not shown on the draft reports.
- 8. Provide a final TAB report for the CA with details, as in the draft.
- 9. Conduct functional performance tests and checks on the original TAB.
- 10. Assists the CA in reviewing and modifying commissioning check lists for TAB systems, for consistency with the methods used in the construction and TAB of mechanical systems.
- 11. Provides technicians, tools and instrumentation for TAB commissioning activities and tests.
- 12. Assists CA in developing commissioning schedules for all TAB commissioning activities and complete all TAB commissioning activities to those schedules. Completes all corrective action, on a timely basis as required to complete all TAB commissioning activities.
- 13. Prepares all TAB reports and all required as built documents in accordance with the specifications prior to The State's training activities as dictated by the commissioning schedule.

3.03 COMMISSIONING PLAN

- A. Commissioning Phases: The on-site commissioning process shall be organized and carried out in 4 phases, as follows:
 - 1. Phase 1 - system readiness and start-up.
 - 2. Phase 2 - initial operation.
 - 3. Phase 3 - functional performance verification.
 - 4. Phase 4 - demonstration and instruction.

Each phase is applicable to each separate system and its components, including all related controls and specified interfaces to other divisions.

3.04 PHASE 1 - SYSTEMS READINESS AND START-UP

- A. Before starting any equipment or systems, complete the system readiness or pre-start checks. Deficiencies or incomplete work shall be corrected, and the checks repeated until the installation is ready for operation. The following conditions and items shall be completed as applicable:
 - 1. Piping systems have been pressure tested as specified, found to be tight, with reports submitted.
 - 2. Piping systems have been flushed and cleaned as specified, any required reports submitted, and then filled or charged as applicable.
 - 3. Equipment has been lubricated to specification.
 - 4. Air system cleaning is complete, and particulate filters have been installed.
 - 5. Vibration isolation and seismic restraints have been installed to specification and adjusted.
 - 6. Equipment drives have been aligned.
 - 7. Electrical services have been installed and checked.
 - 8. Control point checkouts have been completed.
 - 9. Safety controls have been installed and operation checked.
 - 10. Major equipment start-up has been carried out by manufacturers representatives (when specified), and required startup reports completed and submitted.

3.05 PHASE 2 - INITIAL OPERATION

- A. The contractor completes the testing, balancing, and calibration of all components and systems. They also operate all systems through all specified modes of operation, and test system responses to specified abnormal or emergency conditions.
- B. All checks shall be documented. Deficiencies or incomplete work shall be corrected, and the checks repeated until the installation is ready for operation.
- C. Work carried out during this phase of commissioning shall include the following, as applicable:
 - 1. Mechanical Contractor:
 - a) Air systems balancing, including positioning of all balance dampers, adjustments to diffusers, registers, and grilles.
 - b) Hydronic systems balancing, including positioning of all balance valves.
 - c) Correction of problems revealed during balancing, including changes to fan speeds or blade pitch as necessary.

- d) The balancing contractor, or subcontractor to the Mechanical Contractor, and controls contractor working together, setting up air flows and controls calibrations for variable volume terminal units and air valves where applicable.
 - e) Ensuring final adjustments to vibration isolation and seismic restraints are carried out as necessary.
2. Controls Contractor:
- a. Setting up and calibrating all automatic temperature controls devices, including adjustments to control valves and damper actuators.
 - b. Setting up or programming controls for accurate response and precise sequencing to meet specified performance.
 - c. Checking operation of all fire dampers.

3.06 PHASE 3 - FUNCTIONAL PERFORMANCE VERIFICATION

- A. All equipment and systems shall be operated through the entire sequence of operations, as directed by the engineer for witnessing and verifying acceptable operation.
- B. During this phase of commissioning, the following checks and tests may be required by the commissioning authority and shall be allowed for:
 - 1. Mechanical Contractor:
 - a. Checking the location and accessibility of all access panels.
 - b. Demonstration of acceptable noise and vibration levels from any equipment under its full range of operational conditions.
 - c. Operation of equipment and systems under every specified mode of operation and sequence of control.
 - d. Operation of equipment and systems under normal, abnormal, and emergency conditions.
 - e. Once acceptable performance of the building systems has been verified, then operation under specified interfaces to/from equipment and systems provided under other divisions.
 - 2. Controls Contractor:
 - a. Operation of all controls system devices, both sensors and actuators.
 - b. Proper physical response of all controlled devices and components to setpoint changes or other relevant adjustments.
 - c. Operation of randomly selected fire or smoke dampers.

3.07 DEMONSTRATION AND INSTRUCTION

- A. The formal demonstration and instruction for operating staff shall commence once the Phase 3 commissioning is complete and substantial completion achieved. Demonstration and instruction shall cover all equipment and systems, and their controls.

3.08 EXECUTION

- A. The following building systems and their accessories and connecting equipment shall be commissioned:
1. Controls: Installation and operation of all devices; complete operation of all controls sequences in coordination with commissioning of all controlled systems.
 2. Ductwork: Installation checks (including supports and alignment); air balancing verification.
 3. Piping and Valves: Installation checks (including supports and alignment); flow balancing verification; leak testing as applicable.
 4. Variable Volume Fan Coil Unit/Air Handling Unit: air flow balancing, starter controls, outside air motorized damper interlock.
 5. Air Cooled Condensing Unit.
 6. Exhaust fan.
 7. Booster Fan: interlock with VRF Fan Coil Unit.
- B. Commissioning Team and Checklists: The Contractor shall designate team members to participate in the pre-functional checklist and the functional performance testing specified. The team members are:
1. Symbol Function:
 - QC Quality Control Manager Representative
 - S Specialist Quality Control Representative (e.g. Radon)
 - M Contractor's Mechanical Representative
 - E Contractor's Electrical Representative
 - T Contractor's Testing, Adjusting, and Balancing Representative
 - C Contractor's Controls Representative
 - F Contractor's Manufacturer Representative
 - CA Commissioning Authority
 - OR The State's Representative
- C. The commissioning team shall complete each checklist in appendices located at the end of this section. Each commissioning team member shall accept each pre-functional checklist item, by initials and date. Items noted with an "X" (or blacked out) indicates that participation by that individual is not required. Also, each commissioning team member shall accept each functional performance test checklist by signature and date.
- D. The pre-functional checklist and functional performance tests shall be performed in a manner which essentially duplicates the checking, testing, and inspection methods established in the related Sections. Where checking, testing, and inspection methods are not specified in other Sections, methods shall be established which will provide the information required. Testing and verification required by this Section shall be performed during the Commissioning phase. Requirements in related Sections are independent from the requirements of this Section and shall not be used to satisfy any of the requirements specified in this Section. The Contractor shall provide all materials, services, and labor required to perform the pre-functional checklist and functional performance tests. A pre-

functional checklist or functional performance test shall be aborted if any system deficiency prevents the successful completion of the test. The Contractor shall reimburse the expenses and costs associated with effort lost due to tests that are aborted. These costs shall include salary, travel costs and per diem (where applicable) for commissioning team members.

- E. Pre-functional checklist: Perform for the items indicated on the checklists in Appendix A. Deficiencies discovered during these checks shall be corrected and retested in accordance with the applicable contract requirements.
- F. Functional Performance Tests: Perform for the items indicated on the checklists in Appendix B. Functional performance tests shall begin only after all pre-functional checklists have been successfully completed. Tests shall prove all modes of the sequences of operation, and shall verify all other relevant contract requirements. Tests shall begin with equipment or components and shall progress through subsystems to complete systems. Upon failure of any functional performance test checklist item, the Contractor shall correct all deficiencies in accordance with the applicable contract requirements. The checklist shall then be repeated until it has been completed with no errors.
- G. Commissioned Equipment and Systems:

Commissioned Equipment/System	Pre-Functional Checklist & Functional Performance Test Checklist
DDC System	Required
Exhaust Fans	Required
Fan Coil Unit	Required
AHU with VFD	Required
VAV Boxes	Required
Ductwork	Required
DX outdoor and fan coil unit (cooling only inverter heat pump type)	Required
Emergency Generator, fuel storage tanks and its distribution and monitoring system	Required
Emergency Water Storage system	Required
Smoke detector connections to the building FA system	Required

3.09 COMMISSIONING REPORT

- A. Submit a completed commissioning report with all completed startup reports, PVT, PFT and FPT forms. The report shall also include a complete systems manual with all initial setpoints and control points of all the equipment that makes up the mechanical system.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16011 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section specifies the general electrical requirements for all labor, materials, equipment, and services provided under DIVISION 16 - ELECTRICAL.
- B. Work specified in this Division shall include, but not be limited to the following
 1. Distribution system, including metering equipment, dry-type transformers, panelboards, overcurrent protection devices, and feeders.
 2. Complete electrical system wiring including branch circuits, luminaires, switches, receptacles, outlets and control devices.
 3. Complete lighting and control systems, including time switches, lighting contactors, control stations, and lighting control panels.
 4. Power wiring for electrically-operated equipment and appliances.
 5. Standby generator, automatic transfer, and control system.
 6. Include in the bid and pay for the permits, plan review fees, inspection fees and deliver the certificate of final inspection to Contracting Officer.
 7. Testing.
 8. Record drawings.

1.02 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 system and equipment. All systems shall be properly adjusted and in working order at the time of final acceptance.
- C. Electrical equipment and wiring system shall have sufficient capacity to accommodate all equipment, appliances and other electrical loads as specified herein and shown on the drawings and as required per National Electrical Code and other applicable codes, standards and requirements plus spare capacity to accommodate any planned future facilities and additions and minimum 20 percent spare capacity for future growth.

- D. 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.
- E. It is the intent of these Specifications and other Contract Documents to require an installation complete in every detail. Consequently, the Contractor will 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.

1.03 REFERENCES

- A. The publications listed herein form a part of this specification to the extent referenced. The publications may be referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication with current revisions and amendments will be enforced.
- B. Comply with the applicable State Code Rules and the ordinances of the County having jurisdiction over this project.
- C. Comply with requirements and regulations of the electric utilities.
- D. In the event of conflict between pertinent codes and regulations, and the requirements of the referenced standards, or those indicated in Specifications and on drawings, the provisions of the more stringent shall govern.

1.04 RELATED WORK

- A. DIVISION 1 - GENERAL REQUIREMENTS.
- B. DIVISION 3 - CONCRETE.
- C. SECTION 09911 - EXTERIOR PAINTING.
- D. SECTION 09912 - INTERIOR PAINTING.

1.05 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.

1.06 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Certificates:

1. Submit written certification that electrical systems are complete and operational as stipulated in item entitled "DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS" hereinbelow.
 2. Submit certificate of final inspection and acceptance as stipulated in item entitled "INSPECTION" hereinbelow.
- C. Warranty: Submit warranty as stipulated in item entitled "WARRANTY" hereinbelow.
- D. Record Drawings: After the work is complete, Contractor shall provide record drawings showing the as-built conditions.
- E. Submittals required in the sections which refer to this section shall conform to the following additional requirements. Submittals 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 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 approval. Transmittal letter shall include a listing of all items by manufacturer and catalog number which are included in the submittal package and shall clearly identify the submittal with this project.
- F. 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. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data may result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for certificates of compliance.
- G. Submittal drawings shall be a minimum of 11 inches by 17 inches in size using a minimum scale of 1/8 inch per foot, except as specified otherwise. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, 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.
- H. Where installation procedures or part of the installation procedures are required to be in accordance with manufacturer's instructions, submit printed copies of those instructions prior to installation. Installation of the item shall not proceed until manufacturer's instructions are received. Failure to submit manufacturer's instructions shall be cause for rejection of the equipment or material.
- I. Submit manufacturer's certifications as required for products, materials, finishes, and equipment as specified in the technical sections. Certificates from material suppliers are not acceptable. Preprinted certifications and copies of previously

submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material". Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.

- J. Where equipment or materials are specified to conform to industry and technical society reference standards of organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.
- K. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.
- L. Submit text of posted operating instructions for each system and principal item of equipment as specified in the technical sections.
- M. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. **Incomplete submittals and those without summary sheets will be returned without review.**

1.07 QUALITY ASSURANCE

- A. 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 Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
- B. 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 2 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.

- C. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
- D. Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.
- E. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70.

1.08 COORDINATION

- A. Refer to all project Drawings and to all Sections of the project Specifications. Coordinate and fit all work accordingly so that all electrical outlets and equipment will be properly located and readily accessible. The Drawings indicate the relation of wiring and connections and must not be scaled for exact locations. Verify all construction dimensions at the project and make changes necessary to conform to the building as constructed. Work improperly installed due to lack of construction verification shall be corrected at the Contractor's expense.
- B. Work shall be scheduled to avoid delays, interferences, and unnecessary work. If any conflicts occur, necessitating departures from the Drawings and Specifications, details of departures and reasons therefore shall be submitted immediately for consideration by the Contracting Officer.

1.09 DELIVERY, HANDLING AND STORAGE

- A. Deliver all materials of this Division in manufacturer's original unopened packages or containers with label intact and legible.
- B. Use means necessary to protect the materials of this section before, during and after installation; to protect the installed work and materials of all other trades; and to protect the original structure, work and materials of the State.
- C. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Contracting Officer and at no additional cost to the State.

1.10 DRAWINGS AND SPECIFICATIONS

- A. Electrical system drawings are diagrammatic and symbolic. Locations of outlets, devices, raceways, apparatus, etc., shown are approximate and shall be installed with the required maintenance and code clearances and to avoid conflict with other systems and trades. Visit site and verify lineal footages required and check scales and dimensions shown on architectural drawings prior to bidding to verify locations, routing and lineal footages of electrical work required for inclusion into bid. Study the project drawings and specifications, and make installation in most logical manner for eye appeal and coordination with other systems and trades. Unless dimensioned or noted otherwise, orderly configuration and visual composition are fully intended.
- B. Include additional components and wiring which are not shown or specified herein but are required for proper control and operation to provide for a complete and operable system within intent indicated on the drawings and specifications.

- C. Study the project drawings and specifications prior to bidding and provide additional wiring including apparatus and devices for equipment furnished by others without additional cost.
- D. Relocate devices, fixtures, apparatus and associated wiring including raceways, within 10 feet of the original location, without additional cost, for code compliance and to avoid conflict with other systems or trades, structures, utilities and when directed before installation.
- E. Equipment ratings or wire sizes that are missing or shown in error shall be provided to have adequate capacity to serve the required and future loads plus minimum 20 percent spare capacity, and be in compliance with NEC.
- F. Verify voltages and other ratings of energy conversion, transformation and electrical utilization equipment prior to placing order with factory. Input voltages of equipment shall match serving utility or system voltage available.

1.11 POSTED OPERATING INSTRUCTIONS

- A. Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:
 - 1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - 2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - 3. Safety precautions.
 - 4. The procedure in the event of equipment failure.
 - 5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.
- B. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.12 MANUFACTURER'S NAMEPLATE

- A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.13 FIELD FABRICATED NAMEPLATES

- A. ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white, with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum

size of nameplates shall be one inch by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.14 WARNING SIGNS

- A. Provide warning signs/labels for arc flash protection in accordance with NFPA 70E and NEMA Z535.4 for panelboards that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized. Provide field installed signs/labels to warn qualified persons of potential electric arc flash hazards when warning signs/labels are not provided by the manufacturer. The marking shall be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.
 - 1. When the enclosure integrity of such equipment is specified to be in accordance with IEEE C57.12.28 or IEEE C57.12.29, such as for pad-mounted transformers and pad-mounted switches, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 inches by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in 2 lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPSO710D72 or approved equal.
 - 2. When such equipment is guarded by a fence, mount signs on the fence. Provide metal signs having nominal dimensions of 14 inches by 10 inches with the legend "DANGER HIGH VOLTAGE KEEP OUT" printed in 3 lines of nominal 3 inch high white letters on a red and black field.

1.15 ELECTRICAL REQUIREMENTS

- A. Electrical installation shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.16 INSTRUCTION TO GOVERNMENT PERSONNEL

- A. Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors 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 work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section.

1.17 WARRANTY

- A. Contractor's Warranty: Installation shall be complete in every detail as specified and ready for use. Unless otherwise indicated, any items supplied by Contractor developing defects of design, construction, or quality within ONE year of final acceptance by Contracting Officer 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 State. Lamps shall be warranted for fifty percent of rated lamp life.

- B. The Contractor's Warranty shall be countersigned by the General Contractor.
- C. The Surety shall not be held liable beyond two years from the project acceptance date.

PART 2 - PRODUCTS

2.01 FACTORY APPLIED FINISH

- A. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test and the additional requirements specified in the technical sections.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install all electrical materials and equipment in accordance with manufacturer's recommendations and as accepted by the Contracting Officer for the seismic zone classification at the project site in accordance with the applicable Building Code.
- B. Cut, break, drill and patch as required, to install electrical system. Repair any surface damaged or marred by notching, drilling or any other process necessary for installation of electrical work. Patch any damaged surfaces to match the existing surface.
- C. 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 cost to the State. The Contractor shall submit the proposed revisions to the electrical design to the Contracting Officer for acceptance.
- D. The Electrical Contractor shall coordinate his work with other trades to avoid conflicts with civil, mechanical, structural, and architectural elements of this project.

3.02 JOBSITE CONDITIONS

- A. These specifications are accompanied by construction drawings including building and site plans of all trades showing locations of all service runs, feeder runs, outlets, switches, devices, and other electrical equipment. The locations are approximate and before installing, study adjacent architectural details and make installation in most logical manner. Any device may be relocated within 10 feet before installation at the direction of the Contracting Officer without additional cost to the State.
- B. Before installing, verify all dimensions 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 Contracting Officer. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.03 CONNECTIONS TO EQUIPMENT PROVIDED BY OTHER TRADES

- A. Electrical Contractor shall provide conduit, wiring and all electrical connections from building wiring to motors for ventilation, air conditioning, and other equipment, including all switches, motor protection devices, and controllers/starters as specified by other trades.
- B. Electrical Contractor shall ascertain from other trades furnishing electrically-operated equipment, the exact size and type of all motors and other loads, the exact locations of such equipment and the proper point where electrical connections should be brought through the floors, ceiling or walls, as the case may be. Locations shown are diagrammatic only; coordination of the correct locations shall be the full responsibility of the Electrical Contractor.
- C. Examine Civil, Mechanical, Architectural, Structural and other Drawings and Specifications for information concerning electrically-operated equipment and control apparatus and diagrams.
- D. Install individually mounted controllers/starters furnished for motors under other Divisions. Provide and install safety switches as necessary for each such motor in accordance with the NEC.
- E. All control devices and control wiring shall be provided as described in the installation manuals of equipment and/or the Drawings and Specifications of other trades and disciplines.

3.04 FIELD APPLIED PAINTING

- A. Prime and paint all exposed raceways, boxes, fittings, support channels, mounting hardware, and accessories to match finish of adjacent surfaces. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in the section specifying the associated electrical equipment.

3.05 FIELD FABRICATED NAMEPLATE MOUNTING

- A. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of 2 sheet-metal screws or 2 rivets.

3.06 DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS

- A. Submit written certification that electrical systems are complete and operational. Submit certification with Contractor's request for final review.
- B. At the time of final review of electrical work, demonstrate the operation of electrical systems. Provide labor, apparatus and equipment for systems'

demonstration. The various tests shall be under the direction and supervision of the Contracting Officer.

- C. The Contractor shall provide all test equipment, materials, labor, and temporary power hook-ups to perform start-up and all tests as required, to obtain final field acceptance from the State. All tests shall be conducted in the presence of the Contracting Officer or his representative. All test procedures shall conform to this specification and applicable standards. (ANSI, IEEE, NEMA, OSHA, NFPA, NETA, etc.)
- D. The Contractor shall be responsible for all tests and test record. Testing shall be performed by and under the immediate supervision of the Contractor. Test record shall be kept for each piece of equipment. Copies shall be furnished to the Contracting Officer for his review and/or acceptance.
- E. A visual inspection of all electrical equipment, to check for foreign material, tightness or wiring and connection, proper grounding, matching nameplate charts with specification, etc., shall be made prior to actual testing.
- F. After demonstration of systems, submit to the Contracting Officer 6 sets of keys for electrical equipment locks.

3.07 INSPECTION

- A. Arrange for periodic inspection by the local authorities and deliver the certificate of final inspection to the Contracting Officer.

END OF SECTION

SECTION 16100 - ELECTRICAL WORK

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes, but is not limited to, electrical systems as indicated in the drawings.

1.02 REFERENCES

- A. The publications listed herein form a part of this specification to the extent referenced. The publications may be referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication with current revisions and amendments will be enforced.

1.03 RELATED WORK

- A. SECTION 16011 - GENERAL ELECTRICAL REQUIREMENTS applies to this section with additions and modifications specified herein.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Submit shop drawings and catalog cuts of the following equipment for approval. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. **Incomplete submittals and those without summary sheets will be returned without review.**
- C. Manufacturer's Catalog Data:
 - 1. Panelboards.
 - 2. Overcurrent protection devices.
 - 3. Safety switches.
 - 4. Metering equipment.
 - 5. Wiring Devices and associated Device Plates.
- D. Shop Drawings:
 - 1. Panelboards.
- E. Reports: Submit test results for approval in report form:
 - 1. 600 volt wiring test.
 - 2. Grounding system test.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "must" 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 Contracting Officer. Provide equipment, materials,

installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

- B. 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 2 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 this section.
- C. Alternative Qualifications: Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
- D. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Materials shall be new and those items listed by the Underwriters' Laboratories shall bear "UL" label of approval.
- B. Brand names, manufacturer's names and catalog numbers indicate the standard of design and quality required. Acceptable manufacturers for electrical apparatus include General Electric, Square D, Siemens-ITE, 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 prior to bidding by the Contracting Officer.
- C. Electrical equipment and luminaires shall be supplied through the manufacturer's designated representative by a local distributor.
- D. Proof of compliance shall be furnished when shop drawings are submitted.
- E. Where 2 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.
- F. Where electrical apparatus is to be installed outdoors, NEMA 4X stainless steel housings shall be provided, unless noted otherwise.

2.02 RACEWAYS

- A. Rigid Steel Conduit: Rigid steel, zinc-coated inside and outside, for use with threaded fittings. ANSI C80.1, UL 6.
- B. Intermediate Metal Conduit (IMC): Rigid steel, zinc- and chromate-coated inside and outside, for use with threaded fittings. UL 1242.
- C. Plastic-Coated Rigid Steel and IMC Conduit: NEMA RN1, Type 40 (40 mils thick).
- D. Electrical Metal Tubing (EMT): Thin-walled steel tubing, zinc-coated. UL 797, ANSI C80.3.
- E. Flexible Metal Conduit: Flexible steel conduit; zinc-coated inside and outside, smooth inside walls, liquid-tight with factory fittings for liquid-tight installation. Provide bushings with bonding jumper lugs for flexible conduit in excess of 6 feet in length. UL 1, UL 360.
- F. Rigid Nonmetallic Conduit: Polyvinyl chloride, Schedule 40. NEMA TC 2, UL 651.
- 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.
- H. Fittings for Rigid Metal Conduit and IMC: Threaded-type. Split couplings unacceptable.
- I. Fittings for EMT: Steel compression type.
- J. Fittings for Rigid Nonmetallic Conduit: NEMA TC 3 for PVC and UL 514B.

2.03 OUTLET BOXES AND COVERS

- A. Outlet and Small Junction Boxes: UL 514A, galvanized, if ferrous metal. UL 514C, if nonmetallic.
 - 1. Nominal 4 inches square, 2-1/8 inches deep exclusive of plaster ring, pressed steel.
 - 2. Surface mounted boxes and boxes exposed to the weather shall be cast steel, type FD, prime painted and enamel finished with neoprene gasketed covers, threaded hubs for conduit connections and stainless steel screws.

2.04 CABINETS, JUNCTION BOXES, AND PULL BOXES

- A. Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel. Where exposed to wet, damp, or corrosive environments, NEMA Type 4X stainless steel.

2.05 WIRES AND CABLES

- A. 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.

- B. Conductors:
1. Conductors No. 8 AWG and larger diameter shall be stranded.
 2. Conductors No. 10 AWG and smaller diameter shall be solid.
 3. Conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated otherwise.
 4. Conductor sizes and capacities shown are based on copper, unless indicated otherwise. All conductors shall be copper.
 5. Equipment Manufacturer Requirements: When manufacturer's equipment requires copper conductors at the terminations or requires copper conductors to be provided between components of equipment, provide copper conductors or splices, splice boxes, and other work required to satisfy manufacturer's requirements.
 6. Minimum Conductor Sizes:
 - a. Minimum size for branch circuits shall be No. 12 AWG.
 - b. Class 1 remote-control and signal circuits: No. 14 AWG.
 - c. Class 2 low-energy, remote-control and signal circuits: No. 16 AWG.
 - d. Class 3 low-energy, remote-control, alarm and signal circuits: No. 22 AWG.
 - e. Digital low voltage lighting control (DLVLC) system at 24 Volts or less: Category 5 UTP cables in EMT conduit.
- C. Color Coding: Provide for service, feeder, branch, control, and signaling circuit conductors.
1. Color of ground and neutral conductors shall be as follows:
 - a. Grounding Conductors: Green.
 - b. Neutral Conductors: White.
 - c. Exception, where neutrals of more than one system are installed in same raceway or box, other neutrals shall be white with a different colored (not green) stripe for each.
 2. Color of ungrounded conductors in different voltage systems shall be as follows:
 - a. 208/120 Volt, 3-phase:
 - 1) Phase A - black.
 - 2) Phase B - red.
 - 3) Phase C - blue.
 - b. 120/240 Volt, Single Phase: Black and red.

- D. Insulation: Unless specified or indicated otherwise or required by NFPA 70, power and lighting wires shall be 600-volt, Type THWN/THHN conforming to UL 83 or Type XHHW or RHW conforming to UL 44, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits shall be Type TW or TF, conforming to UL 83. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.
- E. Bonding Conductors: ASTM B1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

2.06 SPLICES AND TERMINATION COMPONENTS

- A. UL 486A-486B 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-486B or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.07 DEVICE PLATES

- A. Provide UL listed, one-piece device plates for outlets to suit the devices installed.
 - 1. For metal outlet boxes, plates on unfinished walls shall be of zinc-coated sheet steel or cast metal having round or beveled edges.
 - 2. For nonmetallic boxes and fittings, other suitable plates may be provided.
 - 3. Screws shall be machine-type with countersunk heads in color to match finish of plate.
 - 4. Sectional type device plates will not be permitted.
 - 5. Plates installed in wet locations shall be gasketed and UL listed for "wet locations".

2.08 SWITCHES

- A. Toggle Switches: NEMA WD 1, UL 20, single pole, totally enclosed with bodies of thermoplastic or thermoset plastic and mounting strap with grounding screw.
 - 1. Handles shall be white thermoplastic.
 - 2. Wiring terminals shall be screw-type, side-wired or of the solderless pressure type having suitable conductor-release arrangement.
 - 3. Contacts shall be silver-cadmium and contact arm shall be one-piece copper alloy.
 - 4. Switches shall be rated quiet-type ac only, 120/277 volts, with current rating and number of poles indicated.
- B. Disconnect (Safety) Switches: NEMA KS 1. Provide heavy duty-type switches. Switches serving as motor-disconnect means shall be horsepower rated. Provide switches in NEMA 4X stainless steel, enclosure as indicated per NEMA ICS 6.

2.09 RECEPTACLES

- A. General: UL 498, general purpose specification grade, grounding-type.
 - 1. Ratings and configurations shall be as indicated.
 - 2. Bodies shall be of white as per NEMA WD 1.
 - 3. Face and body shall be thermoplastic supported on a metal mounting strap.
 - 4. Dimensional requirements shall be per NEMA WD 6.
 - 5. Provide screw-type, side-wired wiring terminals or of the solderless pressure type having suitable conductor-release arrangement.
 - 6. Connect grounding pole to mounting strap.
 - 7. The receptacle shall contain triple-wipe power contacts and double or triple-wipe ground contacts.
- B. Weatherproof Receptacles: Provide weather-resistant type, UL listed for use in wet locations with integral GFCI protection. Include cast metal box with gasketed, hinged, lockable and weatherproof while-in-use, polycarbonate, UV resistant/stabilized cover plate.
- C. Ground-Fault Circuit Interrupter 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. Provide screw-type, side-wired wiring terminals or pre-wired (pigtail) leads.
- D. Special Purpose Receptacles: Provide in ratings indicated.

2.10 PANELBOARDS

- A. Provide panelboards in accordance with the following:
 - 1. UL 67 and UL 50 having a short-circuit current rating as indicated.
 - 2. Panelboards for use as service disconnecting means: additionally conform to UL 869A.
 - 3. Panelboards: circuit breaker-equipped.
 - 4. Designed such that individual breakers can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as means of obtaining clearances as required by UL.
 - 5. "Specific breaker placement" is required in panelboards to match the breaker placement indicated in the panelboard schedule on the drawings.
 - 6. Where "space only" or "PFB" is indicated, make provisions for future installation of breakers.
 - 7. Directories: Indicate load served by each circuit in panelboard.

8. Directories: Indicate source of service to panelboard (e.g., Panel PA served from Panel MDP).
 9. Provide new directories for existing panels modified by this project as indicated.
 10. Type directories and mount in holder behind transparent protective covering.
 11. Panelboards: Listed and labeled for their intended use.
 12. Panelboard nameplates: provided in accordance with paragraph FIELD FABRICATED NAMEPLATES hereinbelow.
- B. Enclosure: Provide panelboard enclosure in accordance with the following:
1. UL 50.
 2. Cabinets mounted outdoors or flush-mounted: hot-dipped galvanized after fabrication.
 3. Cabinets: Painted in accordance with paragraph PAINTING.
 4. Front Edges of Cabinets: Form-flanged or fitted with structural shapes welded or riveted to the sheet steel, for supporting the panelboard front.
 5. All Cabinets: Fabricated such that no part of any surface on the finished cabinet deviates from a true plane by more than 1/8 inch.
 6. Holes: Provided in the back of indoor surface-mounted cabinets, with outside spacers and inside stiffeners, for mounting the cabinets with a 1/2 inch clear space between the back of the cabinet and the wall surface.
 7. Flush Doors: Mounted on hinges that expose only the hinge roll to view when the door is closed.
 8. Each Door: Fitted with a combined catch and lock, except that doors over 24 inches long provided with a 3-point latch having a knob with a T-handle, and a cylinder lock.
 9. Keys: 2 provided with each lock, with all locks keyed alike.
 10. Finished-head Cap Screws: Provided for mounting the panelboard fronts on the cabinets.
 - a) Panelboard Buses: Provide copper buses. Support bus bars on bases independent of circuit breakers. Main buses and back pans shall be designed so that breakers may be changed without machining, drilling, or tapping. Provide isolated neutral bus in each panel for connection of circuit neutral conductors. Provide separate ground bus identified as equipment grounding bus per UL 67 for connecting grounding conductors; bond to steel cabinet.

- C. Circuit Breakers: UL 489, thermal magnetic-type and solid state-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.
 - 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. Maintain phase sequence throughout each panel so that any 3 adjacent breaker poles are connected to Phases A, B, and C, respectively.
 - 2. Circuit Breaker with GFCI: UL 943 and NFPA 70. Provide with "push-to-test" button, visible indication of tripped condition, and ability to detect and trip on current imbalance of 6 milliamperes or greater per requirements of UL 943 for Class A GFCI devices, for personnel protection

2.11 ENCLOSED CIRCUIT BREAKERS

- A. 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.

2.12 MOTORS

- A. Provide motors in accordance with the following:
 - 1. NEMA MG 1.
 - 2. Hermetic-type sealed motor compressors shall also comply with UL 984.
 - 3. Provide the size in terms of HP or kVA, or full-load current, or a combination of these characteristics, and other characteristics, of each motor as indicated or specified.
 - 4. Determine specific motor characteristics to ensure provision of correctly sized starters and overload heaters.
 - 5. Motors for operation on 208-volt, 3-phase circuits shall have terminal voltage rating of 200 volts, and those for operation on 480-volt, 3-phase circuits shall have terminal voltage rating of 460 volts.
 - 6. Motors shall be designed to operate at full capacity with voltage variation of plus or minus 10 percent of motor voltage rating.
 - 7. Unless otherwise indicated, motors rated 1 HP and above shall be continuous duty type.
 - 8. Where fuse protection is specifically recommended by the equipment manufacturer, provide fused switches in lieu of non-fused switches indicated.
- B. High Efficiency Single-Phase Motors: Single-phase fractional-horsepower alternating-current motors shall be high efficiency types corresponding to the applications listed in NEMA MG 11. In exception, for motor-driven equipment with a minimum seasonal or overall efficiency rating, such as a SEER rating, provide equipment with motor to meet the overall system rating indicated.

- C. Premium Efficiency Polyphase Motors and Single-Phase Motors: Select polyphase and continuous-duty single phase motors based on high efficiency characteristics relative to typical characteristics and applications as listed in NEMA MG 10 and NEMA MG 11. In addition, continuous rated, polyphase squirrel-cage medium induction motors must meet the requirements for premium efficiency electric motors in accordance with NEMA MG 1, including the NEMA full load efficiency ratings. In exception, for motor-driven equipment with a minimum seasonal or overall efficiency rating, such as a SEER rating, provide equipment with motor to meet the overall system rating indicated.
- D. Motor Sizes: Provide size for duty to be performed, not exceeding the full-load nameplate current rating when driven equipment is operated at specified capacity under most severe conditions likely to be encountered. When motor size provided differs from size indicated or specified, make adjustments to wiring, disconnect devices, and branch circuit protection to accommodate equipment actually provided. Provide controllers for motors rated 1 HP and above with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage. Provide protection for motors from immediate restart by a time adjustable restart relay.
- E. 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 as specified herein. Power wiring and conduit shall conform to the requirements specified herein. Control wiring shall be provided under and conform to the requirements of the section specifying the associated equipment.

2.13 MOTOR CONTROLLERS

- A. Provide motor controllers in accordance with the following:
 - 1. UL 508, NEMA ICS 1, and NEMA ICS 2
 - 2. Controllers shall have thermal overload protection in each phase and shall have one spare normally open and one spare normally closed auxiliary contact.
 - 3. Provide controllers for motors rated 1HP and above with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage.
 - 4. Provide protection for motors from immediate restart by a time adjustable restart relay.
 - 5. When used with pressure, float, or similar automatic-type or maintained-contact switch, controller shall have hand/off/automatic selector switch.
 - 6. Connections to selector switch shall be such that only normal automatic regulatory control devices are bypassed when switch is in "hand" position.
 - 7. Safety control devices, such as low and high pressure cutouts, high temperature cutouts, and motor overload protective devices, shall be connected in motor control circuit in "hand" and "automatic" positions.

8. Control circuit connections to hand/off/automatic selector switch or to more than one automatic regulatory control device shall be made in accordance with indicated or manufacturer's approved wiring diagram.
 9. Provide a disconnecting means, capable of being locked in the open position, for the motor that is located in sight from the motor location and the driven machinery location. As an alternative, provide a motor controller disconnect, capable of being locked in the open position, to serve as the disconnecting means for the motor if it is in sight from the motor location and the driven machinery location.
 10. Overload protective devices shall provide adequate protection to motor windings; be thermal inverse-time-limit type; and include manual reset-type pushbutton on outside of motor controller case.
 11. Cover of combination motor controller and manual switch or circuit breaker shall be interlocked with operating handle of switch or circuit breaker so that cover cannot be opened unless handle of switch or circuit breaker is in "off" position.
- B. Control Wiring:
1. Provide control wiring in accordance with the following:
 - a. All control wire shall be stranded tinned copper switchboard wire with 600-volt flame-retardant insulation Type SIS meeting UL 44, or Type MTW meeting UL 1063, and shall pass the VW-1 flame tests included in those standards.
 - b. Hinge wire shall have Class K stranding.
 - c. Current transformer secondary leads shall be not smaller than No. 10 AWG.
 - d. The minimum size of control wire shall be No. 14 AWG.
 - e. Power wiring for 480-volt circuits and below shall be of the same type as control wiring and the minimum size shall be No. 12 AWG.
 - f. Special attention shall be given to wiring and terminal arrangement on the terminal blocks to permit the individual conductors of each external cable to be terminated on adjacent terminal points.
- C. Control Circuits:
1. Control circuits shall have maximum voltage of 120 volts derived from control transformer in same enclosure. Transformers shall conform to UL 506, as applicable. Transformers, other than transformers in bridge circuits, shall have primaries wound for voltage available and secondaries wound for correct control circuit voltage. Size transformers so that 80 percent of rated capacity equals connected load. Provide disconnect switch on primary side. Provide fuses in each ungrounded primary feeder. One secondary lead shall be fused; other shall be grounded. For designated systems, as indicated, provide backup power supply, including transformers connected to

emergency power source. Provide for automatic switchover and alarm upon failure of primary control circuit.

- D. Enclosures for Motor Controllers: NEMA ICS 6.
- E. Pushbutton Stations: Provide with “start/stop” momentary contacts having one normally open and one normally closed set of contacts, and red lights to indicate when motor is running. Stations shall be heavy duty, oil-tight design.
- F. Pilot and Indicating Lights: Provide LED cluster lamps
- G. Reduced-Voltage Controllers: Provide for polyphase motors 5 horsepower and larger. Reduced-voltage starters shall be single-step, closed transition autotransformer, reactor, primary resistor-type, solid state-type, or as indicated, and shall have adjustable time interval between application of reduced and full voltages to motors.

2.14 MANUAL MOTOR STARTERS (MOTOR RATED SWITCHES)

- A. Single pole designed for surface mounting with overload protection.

2.15 POWER METERS

- A. Capable of monitoring for network management, energy cost management, energy allocation, and operational efficiency.
- B. Construction:
 - 1. Form Factor: 1/4 DIN with cut-out of 3.6 by 3.6 inches (92 by 92 mm) and panel-mount integrated display of 3.8 by 3.8 inches (96 by 96 mm).
 - 2. Capable of mounting in enclosure panel/door without tools.
 - 3. Provide removable connectors for voltage inputs, control power, communications, and auxiliary inputs/outputs.
- C. Voltage and Current Inputs:
 - 1. Support direct connection of low-voltage circuits up to 600 VAC without requiring voltage (potential) transformers.
 - 2. Provide four metered 5 A nominal current inputs for 3-phase measurement plus neutral.
- D. Control Power: 100-480 VAC.
- E. Measured and Calculated Metering Parameters: Support full range of 3-phase voltage, current, power, and energy measurements, power factor, frequency, total harmonic distortion (THD), and individual power harmonics readings (up to 63rd order).
- F. Measurement Accuracy:
 - 1. Provide four-quadrant metering and sample current/voltage simultaneously without gaps with 64 samples per cycle (zero blind).
 - 2. ANSI C12.20; Class 0.2.

3. IEC 61557-12; Class 0.2.
- G. Display:
1. Provide backlit dot-matrix LCD, anti-glare and scratch resistant with minimum of 128 by 128 pixels.
 2. Capable of displaying four values per screen.
 3. Provide summary screen to view snapshot of system.
 4. Support integrated or remote display.
- H. Input/Outputs:
1. Support four digital inputs for demand sync pulse, time sync input, and conditional energy control.
 2. Provide 2 digital outputs that operate by user command sent over communication link or in response to user-defined alarm/event.
 3. Provide four digital inputs configurable for input metering with on-board pulse weight calculation and conversion to standard units for external water, air, gas, electrical, or steam (WAGES) meters.
- I. Communications:
1. Support serial RS485 Modbus, Ethernet Modbus TCP, Ethernet BACnet IP (BTL listed), DNP over Ethernet, and Ethernet IP.
 2. Provide 2 Ethernet ports for daisy-chain wiring from meter to meter.
 3. Support serving data over Ethernet network accessible through web browser with default pages from factory.
 4. Support upgradeable firmware to enhance functionality through Ethernet or serial communication connection for upgrades of individual meters or groups.
 5. Provide integrated gateway functionality to enable connection via Ethernet to downstream, serially connected devices.
- J. Onboard Logging:
1. Provide capability to log data, alarms, and events, including data logs, minimum/maximum log files of selected parameter values, and alarm logs for each user-defined alarm/event.
 2. Nonvolatile Memory: Support 14 parameters every 15 minutes for 90 days.
- K. Alarming:
1. Support 29 setpoint-driven alarms, 4 digital alarms, 4 unary alarms, 10 Boolean alarms and 5 custom alarms.
 2. Support user-definable alarm events.

3. Support setpoint-driven alarms for voltage/current parameters, input status, and end-of-interval status.
4. Support generation of email/text message notifications upon alarm condition via simple mail transfer protocol (SMTP).
5. Support management and monitoring of devices on IP network via simple network management protocol (SNMP) with delivery of alarm condition by SNMP traps.

2.16 LOCKOUT REQUIREMENTS

- A. Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147. Mechanical isolation of machines and other equipment shall be in accordance with requirements of DIVISION 15 - MECHANICAL.

2.17 GROUNDING AND BONDING EQUIPMENT

- A. Ground Rods: UL 467. Ground rods shall be copper-clad steel, with minimum diameter of 3/4 inch and minimum length of 10 feet .

2.18 MANUFACTURER'S NAMEPLATE

- A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.19 FIELD FABRICATED NAMEPLATES

- A. Provide field fabricated nameplates in accordance with the following:
 1. ASTM D709.
 2. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings.
 3. Each nameplate inscription shall identify the function and, when applicable, the position.
 4. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core.
 5. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core.
 6. Minimum size of nameplates shall be one inch by 2.5 inches.
 7. Lettering shall be a minimum of 0.25 inch high normal block style.

2.20 WARNING SIGNS

- A. Provide warning signs for flash protection in accordance with NFPA 70E and NEMA Z535.4 for panelboards, and industrial control panels that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized. Provide field installed signs to warn qualified persons of potential electric arc flash hazards when warning signs are

not provided by the manufacturer. The marking shall be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

2.21 FIRESTOPPING MATERIALS

- A. Provide firestopping around electrical penetrations. Utilize UL-listed firestopping systems or assemblies suitable for the penetration being sealed.

2.22 FACTORY APPLIED FINISH

- A. Provide factory-applied finish on electrical equipment in accordance with the following:
 1. NEMA 250 corrosion-resistance test and the additional requirements as specified herein.
 2. Interior and exterior steel surfaces of equipment enclosures shall be thoroughly cleaned and then receive a rust-inhibitive phosphatizing or equivalent treatment prior to painting.
 3. Exterior surfaces shall be free from holes, seams, dents, weld marks, loose scale or other imperfections.
 4. Interior surfaces shall receive not less than one coat of corrosion-resisting paint in accordance with the manufacturer's standard practice.
 5. Exterior surfaces shall be primed, filled where necessary, and given not less than 2 coats baked enamel with semi-gloss finish.
 6. Equipment located indoors shall be ANSI Light Gray, and equipment located outdoors shall be ANSI Dark Gray.
 7. Provide manufacturer's coatings for touch-up work and as specified in item entitled "FIELD APPLIED PAINTING" hereinbelow.

2.23 HARDWARE, SUPPORTS, BACKING, ETC.

- A. Provide all hardware, supports, backing and other accessories necessary to install electrical equipment. Wood materials shall be treated against termites, iron or steel materials shall be galvanized for corrosion protection, and non-ferrous materials shall be brass or bronze. Provide other specialty materials where indicated.
- B. Bolts, nuts, washers, and screws used for exterior use shall be high quality stainless steel or brass.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces, shall conform to requirements of NFPA 70 and IEEE C2 and to requirements specified herein.

- B. Wiring Methods: Provide insulated conductors installed in rigid steel conduit, IMC, rigid nonmetallic conduit, or EMT, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Utilize non-wax type lubricants for pulling, chemically neutral to insulation and sheath. Mechanical means for pulling to be tongue-limiting type and not be used for #2 AWG wires and smaller. 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. Conduit which penetrates fire-rated walls, fire-rated partitions, or fire-rated floors shall be firestopped.
1. Pull Wire: Install pull wires in empty conduits. Pull wire shall be plastic having minimum 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.
- C. 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.
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, including under open-sided covered lanais, patios, walkways or other similar locations.
 2. Restrictions Applicable to Flexible Conduit: Use only as specified in subparagraph entitled "Flexible Connections" hereinbelow.
 3. Stub-Ups: Provide conduits stubbed up through concrete floor for connection to free-standing equipment with adjustable top or coupling threaded inside for plugs, set flush with finished floor. Extend conductors to equipment in rigid steel conduit, except that flexible metal conduit may be used 6 inches above floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.
 4. Conduit Support: Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Plastic tie-wraps are not allowed for securing or supporting of electrical conduit. Load applied to fasteners shall not exceed 1/4 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. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Conduit and box systems shall 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. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Where conduit crosses building expansion joints, provide suitable expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. For conduits greater than 2-1/2 inches inside diameter, provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

5. 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.
 6. Locknuts and Bushings: Fasten conduits to sheet metal boxes and cabinets with 2 locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. 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. Provide threaded, weatherproof hubs for raceway connections to the top and sides of boxes and enclosures exposed to the weather. Utilize 2 weather-tight, sealing locknuts for penetrations to the bottom of such boxes.
 7. Flexible Connections: Provide flexible steel conduit between 3 feet and 6 feet in length for recessed and semi-recessed 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.
- D. 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, when surface mounted on interior walls exposed up to 8 feet above floors and walkways, and when specifically indicated. Boxes in other locations shall be sheet steel, except that nonmetallic boxes may be used with nonmetallic conduit system. 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. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. Threaded studs driven in by powder charge and provided with lockwashers and nuts may be used in lieu of wood screws, expansion shields, or machine screws. 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. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

1. Boxes: For use with raceway systems shall be a minimum 1-1/2 inches deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets: minimum 4 inches square, except that 4 by 2 inch boxes may be used where only one raceway enters outlet.
 2. Pull Boxes: Construct of at least minimum size required by NFPA 70 of code-gauge galvanized sheet steel 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.
- E. Mounting Heights: Mount panelboards, enclosed circuit breakers, motor controllers and disconnecting switches so height of any operating handle at its highest position is a maximum 78 inches above finished floor. Mount lighting switches so height of the operating handle at its highest position is a maximum of 48 inches above finished floor. Mount receptacles 18 inches above finished floor, unless otherwise indicated. Mount other devices as indicated. Measure mounting heights of wiring devices and outlets to center of device or outlet, unless otherwise indicated.
- F. Conductor Identification: Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, color coding shall be by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, color coding shall be by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves. Identify control circuit terminations in accordance with manufacturer's recommendations.
1. Marking Strips: Provide marking strips in accordance with the following:
 - a. White or other light-colored plastic marking strips, fastened by screws to each terminal block, shall be provided for wire designations.

- b. The wire numbers shall be made with permanent ink.
 - c. The marking strips shall be reversible to permit marking both sides, or 2 marking strips shall be furnished with each block.
 - d. Marking strips shall accommodate the 2 sets of wire numbers.
 - e. Each device to which a connection is made shall be assigned a device designation in accordance with NEMA ICS 1 and each device terminal to which a connection is made shall be marked with a distinct terminal marking corresponding to the wire designation used on the Contractor's schematic and connection diagrams.
 - f. The wire (terminal point) designations used on the Contractor's wiring diagrams and printed on terminal block marking strips may be according to the Contractor's standard practice; however, additional wire and cable designations for identification of remote (external) circuits shall be provided for the Government's wire designations.
 - g. Prints of the marking strips drawings submitted for approval will be so marked and returned to the Contractor for addition of the designations to the terminal strips and tracings, along with any rearrangement of points required.
- G. 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.
- 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. Use of sectional-type device plates are not permitted. Provide gasket for plates installed in wet locations.
- I. Electrical Penetrations: Openings around electrical penetrations (such as conduit penetrations or flush mounted equipment enclosures or junctions boxes) through fire resistance-rated walls, partitions, floors, or ceilings shall be sealed to maintain fire resistive integrity. Use 3M CP25, Type MPP moldable putty or equivalent material or assemblies to maintain fire resistive integrity for conduit penetration and flush mounted outlet boxes. Use other approved construction methods for larger enclosures.
- J. Grounding and Bonding: Provide in accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic raceways, and neutral conductor of wiring systems. Make ground connection at main service equipment and extend grounding conductor to point of entrance of metallic water service. Make connection to water pipe by suitable ground clamp or lug connection to plugged tee. If flanged pipes are encountered, make connection with lug bolted to street side of flanged connection. Supplement metallic water

service grounding system with additional made electrode in compliance with NFPA 70. Make ground connection to driven ground rods on exterior of building. Interconnect all grounding media in or on the structure to provide a common ground potential. This shall include lightning protection, electrical service, telecommunications system grounds, as well as underground metallic piping systems. Interconnection to the gas line shall be made on the customer's side of the meter. Use main size lightning conductors for interconnecting these grounding systems to the lightning protection system. In addition to the requirements specified herein, provide telecommunications grounding in accordance with TIA-607. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

1. Ground Rods: Provide cone pointed ground rods. The resistance to ground shall be measured using the fall-of-potential method described in IEEE 81. The maximum resistance of a driven ground shall not exceed 25 ohms under normally dry conditions. If this resistance cannot be obtained with a single rod, additional rods shall be provided in accordance with the requirements of NFPA 70 (not less than 6 feet on centers). If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, notify the Contracting Officer who will decide on the number of ground rods to add.
 2. Grounding Connections: Make grounding connections which are buried or otherwise normally inaccessible, by exothermic weld or compression connector.
 - a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.
 - b. Make compression connections using a hydraulic compression tool to provide the correct circumferential pressure. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.
 3. Resistance: Maximum resistance-to-ground of grounding system shall not exceed 25 ohms under dry conditions. Where resistance obtained exceeds 25 ohms, contact Contracting Officer for further instructions.
- 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.
- L. Seismic Bracing: Contractor shall provide seismic bracing for all electrical equipment, apparatus, and raceways. Bracing shall, as a minimum, comply with the County Building Code.
- M. Repair of Existing Work: Repair of existing work, demolition, and modification of existing electrical distribution systems shall be performed as follows:

1. 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.
2. Removal of Existing Electrical Distribution System: Removal of existing electrical distribution system equipment shall include equipment's associated wiring, including conductors, cables, exposed conduit, surface metal raceways, boxes, and fittings, back to equipment's power source as indicated.
3. Continuation of Service: Maintain continuity of existing circuits of equipment to remain. Existing circuits of equipment shall remain energized. Circuits which are to remain but were disturbed during demolition shall have circuits wiring and power restored back to original condition.

3.02 FIELD FABRICATED NAMEPLATE MOUNTING

- A. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of 2 sheet-metal screws or 2 rivets.

3.03 WARNING SIGN MOUNTING

- A. Provide the number of signs required to be readable from each accessible side. Space the signs in accordance with NFPA 70E.

3.04 FIELD APPLIED PAINTING

- A. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Where field painting of enclosures for panelboards, load centers or the like is specified to match adjacent surfaces, to correct damage to the manufacturer's factory applied coatings, or to meet the indicated or specified safety criteria, provide manufacturer's recommended coatings and apply in accordance to manufacturer's instructions.

3.05 FIELD QUALITY CONTROL

- A. Furnish test equipment and personnel and submit written copies of test results. Give Contracting Officer 5 working days' notice prior to each test.
 1. Devices Subject to Manual Operation: Each device subject to manual operation shall be operated at least 5 times, demonstrating satisfactory operation each time.
 2. 600-Volt Wiring Test: Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 500 volts to provide direct reading of resistance. Minimum resistance shall be 250,000 ohms. Submit results to the Contracting Officer.
 3. Ground-Fault Receptacle Test: Test ground-fault receptacles with a "load" (such as a plug in light) to verify that the "line" and "load" leads are not reversed. Press the TEST button and then the RESET button to verify by LED status that the device is a self-test model as specified in UL 943.

4. Grounding System Test: Test grounding system to ensure continuity and that resistance to ground is not excessive. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Submit written results of each test to Contracting Officer and indicate location of rods as well as resistance and soil conditions at time measurements were made.
- B. Manufacturer Services: Provide services of manufacturer's field representative to perform functional testing, commissioning, and first parameter adjusting.
1. Test and adjust controls and safeties.
 2. Replace damaged or malfunctioning equipment and report discrepancies or installation issues.

END OF SECTION

SECTION 16208 - ENGINE GENERATOR SET

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide engine generator set, with all necessary accessories, for the standby power distribution system.

1.02 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise indicated, most recent edition of the publication with current revisions and amendments will be enforced.

1.03 RELATED WORK

- A. SECTION 16011 - GENERAL ELECTRICAL REQUIREMENTS applies to this section with additions and modifications specified herein.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Manufacturer's Catalog Data: Engine generator set with all necessary accessories complete, and corresponding catalog cuts.
- C. Shop Drawings: Shop drawings shall be submitted for review to the Contracting Officer. Submitted shop drawings shall have sufficient information so that they may be considered for approval without reference to un-submitted detail drawings. No shop drawings will be considered for approval which, in the opinion of the Contracting Officer, is contingent upon approval of other features for approval if such features are not incorporated into the shop drawings. If changes or corrections are necessary, resubmit the corrected shop drawings using the same procedures as the original submission. It is understood that the approval of the Contractor's shop drawings, whether general or detailed, is a general approval relating only to their sufficiency and compliance with the intention of the design and shall not excuse or constitute an acceptance of errors, discrepancies, or omissions, or waiver of detailed requirements. The shop drawings shall include, but not be limited to, the following:
 - 1. Submit detailed drawings showing the following:
 - a. Base-mounted equipment, complete with base and attachments, including anchor bolt template and recommended clearances for maintenance and operation.
 - b. Starting system.
 - c. Fuel system.
 - d. Cooling system.
 - e. Exhaust system.

- f. Electric wiring of relays, breakers, programmable controllers, and switches including single line and wiring diagrams section.
 - g. Location, type, and description of vibration isolation devices for all applications.
 - h. The safety system, including wiring schematics.
 - i. One-line schematic and wiring diagrams of the generator, exciter, regulator, governor, and instrumentation.
 - j. Panel layouts.
 - k. Mounting and support for each panel and major piece of electrical equipment.
 - l. Engine-generator set rigging points and lifting instructions.
2. Submit drawings pertaining to the engine-generator set and auxiliary equipment, including but not limited to the following:
- a. Certified outline, general arrangement (setting plan), and anchor bolt details. Show total weight and center of gravity of assembled equipment on the steel sub-base.
 - b. Detailed elementary, schematic wiring, and interconnection diagrams of the engine starting system, jacket coolant heating system, engine protective devices, engine alarm devices, engine speed governor system, generator and excitation system, and other integral devices.
 - c. Detailed elementary, schematic wiring; and interconnection diagrams of the fuel system, starting battery system, engine-generator control panel, generator circuit breaker.
 - d. Dimensional drawings or catalog cuts of exhaust silencers, radiator, fuel day tanks, fuel oil cooler, valves and pumps, intake filters, vibration isolators, and other auxiliary equipment not integral with the engine-generator set.
3. Submit drawings showing floor plan arrangement of exhaust, air intake, fuel oil cooler, and jacket coolant water systems including arrangement of piping and pipe sizes.
- D. Operations and Maintenance (O&M) Manual: Submit operating instructions as stipulated in the item entitled "OPERATIONS AND MAINTENANCE MANUAL" hereinbelow.
- E. Two Year Warranty: Submit two year warranty as stipulated in the item entitled "EXTENDED WARRANTY - TWO YEAR" hereinbelow.

1.05 OPERATIONS AND MAINTENANCE MANUAL

- A. 6 sets of Operations and Maintenance Manuals shall be submitted by the Contractor at his earliest convenience after approval of shop drawings. The manuals shall include the following:
 - 1. Operating instructions and maintenance procedures for all components and overall system.
 - 2. Recommended spare parts list containing information of components, manufacturer's name and catalog number and price.
 - 3. Approved and certified shop drawings.
 - 4. Certified test report.
- B. 4 sets of Operations and Maintenance Manuals shall accompany the equipment and 2 sets shall be submitted to the Contracting Officer.

1.06 QUALITY ASSURANCE

- A. Regulatory Requirements: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "must" 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 Contracting Officer. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
- B. 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 2 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 this section.
- C. Alternative Qualifications: Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
- D. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.07 PARTS AND SERVICE

- A. The diesel electric generator set shall be such that it can be properly maintained and serviced without the necessity of the User carrying expensive part stocks or

being subjected to the inconvenience of long periods of interrupted services due to lack of available parts.

- B. The vendor shall specify the nearest location of permanent parts depots in the State of Hawaii from which the parts may be obtained in necessary quantities at any time during the day or night. The engine supplier shall have complete parts and service facilities in the State of Hawaii. The supplier shall have factory trained technicians and be factory authorized to repair both engine and generator.

PART 2 - PRODUCTS

2.01 DIESEL ENGINE-GENERATOR SET

- A. Provide and install each engine-generator set complete and totally functional, with all necessary ancillary equipment to include: Air filtration; starting system; generator controls, protection, and isolation; instrumentation; lubrication; fuel system; cooling system; and engine exhaust system. Submit certification that the engine-generator set and cooling system function properly in the ambient temperatures specified.
- B. Provide each engine-generator set consisting of one engine, one generator, and one exciter mounted, assembled, and aligned on one base; and all other necessary ancillary equipment which may be mounted separately. Assemble sets having a capacity of 750 kW or smaller and attach to the base prior to shipping. Provide set components that are environmentally suitable for the locations shown and that are the manufacturer's standard product offered in catalogs for commercial or industrial use. Provide a generator strip heater for moisture control when the generator is not operating. Identify any nonstandard products or components and the reason for their use.
- C. Equipment and materials shall be the manufacturer's standard products offered in catalogs for commercial or industrial use.
- D. Each engine-generator set shall have a power rating as indicated in the contract drawings and shall be suitable for standby applications. The power of the engine-generator set is defined as the power output available at the generator terminals excluding the electrical power absorbed by the essential independent auxiliaries. Essential independent auxiliaries are items of equipment which are essential for the continued or repeated operation of the engine which uses power supplied from a source other than the engine.
- E. Engine shall be capable of starting as a fully compression-ignition engine on No. 2 diesel fuel at any condition within 0 degrees F to 120 degrees F at sea level. The engine shall accelerate to rated speed and accept full load within 10 seconds maximum. Diesel engines requiring premium fuel will not be considered.
- F. Critical Speeds: Complete engine-generator set shall be free of critical speeds of either a major or minor order which would endanger or impair satisfactory operation of the sets.

- G. The engine generator system shall meet all local, State, and Federal NSPS emissions regulations for stationary emergency applications.
- H. Performance:
1. Frequency: Upon completion or removal of full-rated load in one step, unless otherwise indicated, engine-generator set shall recover to stabilized speed within 12 seconds after full rated load is applied in one step and the frequency shall vary by not more than 20 percent. Under steady-state conditions, the maximum frequency minus the minimum frequency shall not exceed 0.25 hertz.
 2. Voltage: Under steady-state conditions, the voltage regulation shall not exceed 0.5 percent for any load between no load and full load, at any constant ambient temperature between minus 20 degrees F and 120 degrees F. Upon completion of the addition of the full rated load in one step, the voltage shall vary by not more than 30 percent and shall recover to within steady-state modulation band within 12 seconds.
 3. Load Characteristics: The generator set shall be capable of supporting non-linear loads and uninterruptible power supplies connected to the emergency power bus. The generator set shall be capable of supporting the following loads while meeting the stated voltage and frequency performance requirements.

Provide a minimum generator set sKVA of 370 sKVA at 30 instantaneous voltage dip when applying the above load steps. Instantaneous voltage dip shall be as defined per NEMA MG 1. Sustained voltage dip is not acceptable.

- I. Control Characteristics:
1. Engine-generator set shall be capable of manual or automatic operation. The engine control circuits shall be designed for 12 or 24 volts DC. Selector switch or control buttons (manual-off-auto) shall be provided for the system.
 2. Manual Operation: Placing of the selector switch of set from the "OFF" to the "MANUAL" position shall cause the set to start and accelerate to governed speed. Upon reaching rated speed, the set shall be capable of accepting full-rated load. Moving the selector switch of the set to the "OFF" position shall cause the starting circuits to open, the set to shut down.
 3. Automatic Operation: With the selector switches in the "AUTO" position, set shall start upon the removal of electrical continuity between a pair of electrical contacts provided for that purpose. The set shall be actuated through such contacts and will have load transferred to it by an automatic transfer control switching scheme. Upon re-energization of the normal source, load will be removed from the set by the automatic transfer control switching scheme. Engine shall be stopped automatically after a 5-minute cool-down unloaded running time.
 4. Operation of the engine-generator set for manual testing shall be as follows:
 - a. The engine shall be started manually by means of the operation selector switch on its control panel to "manual" position.

- b. Building load shall be used for testing unless otherwise indicated.

2.02 DIESEL ENGINE AND ACCESSORIES

- A. ISO 3046. Diesel engine shall be 4-cycle naturally aspirated, or turbocharged, or turbocharged and intercooled; vertical in-line or vertical Vee type; designed for stationary service. Engine shall be capable of immediate acceleration from rest to normal speed without intermediate idle/warm up period or pre-lubrication to provide essential electrical power. Two-cycle engines are not acceptable.
- B. Subbase Mounting: Mount each engine-generator set on a structural steel subbase sized to support the engine, generator, and necessary accessories, auxiliaries and control equipment to produce a complete self-contained unit as standard with the manufacturer. Design the structural subbase to properly support the equipment and maintain proper alignment of the engine-generator set in the specified seismic zone. In addition, provide subbase with both lifting rings and jacking pads properly located to facilitate shipping and installation of the unit. Factory-align engine and generator on the subbase and securely bolt into place in accordance with the manufacturer's standard practice. Crankshaft shall have rigid coupling for connection to the generator.
- C. Assembly: Completely shop-assemble each engine-generator set on its structural steel subbase. Paint entire unit with manufacturer's standard paints and colors. After factory tests and before shipping, thoroughly clean and retouch painting as necessary to provide complete protection.
- D. Turbocharger: If required by the manufacturer to meet the engine-generator set rating, provide turbine type driven by exhaust gas from engine cylinders, and direct connected to the blower supplying air to the engine intake manifold.
- E. Intercooler: Provide manufacturer's standard intercooler for engine size specified.
- F. Crankcase Protection: Provide manufacturer's standard method of preventing crankcase explosions and standard method of crankcase ventilation.
- G. Engine Lubricating Oil System: Provide each engine with the manufacturer's standard full pressure lubricating oil system arranged to cool the pistons and to distribute oil to moving parts of the engine. Provide oil type and oil filters as recommended by the engine manufacturer.
- H. Engine Cooling System: Provide each engine with the manufacturer's standard jacket water pump. Provide a thermostatic control valve in the jacket coolant system for each engine-generator set to maintain a constant jacket coolant temperature to the engine.
- I. Engine Fuel System: Provide each engine with the manufacturer's standard fuel system integral with the engine, complete with necessary piping, fittings, and valves for connecting items of equipment which are a part of the system. Provide engine manufacturer's standard hand priming pump. Provide manufacturer's standard filter for each engine, of the throwaway filter element type, consisting of shell filter elements, drains, and necessary connections and fittings.

- J. Engine Intake Filter: Provide intake filter assemblies for each engine of the oil bath or dry type, as standard with the manufacturer. Filters shall be capable of removing a minimum of 92 percent of dirt and abrasive 3 microns and larger from intake air. Size filters to suit engine requirements at 100 percent of rated full load. Design unit for field access for maintenance purposes.
- K. Engine Starting System: Starting shall be accomplished using an adequately sized dc starter system with a positive shift solenoid to engage the starter motor and to crank the engine continuously for 60 seconds without overheating.
- L. Jacket Coolant Heating System: Provide a factory-installed, 120 volts ac, jacket coolant heating system to ensure rapid starting. Thermostatically control heater at the temperature recommended by engine manufacturer. Include necessary equipment, piping, controls, wiring, and accessories.
- M. Engine Protective (Shutdown) Devices: Equip each engine with devices to shut down the engine by shutting off the fuel supply to the engine via a fuel shutoff solenoid. Auxiliary contacts shall be suitable for activating a remote alarm system. Shutdown shall open the associated generator circuit breaker. Provide the following shutdown devices:
 - 1. Overspeed device which operates when engine speed exceeds normal synchronous speed by 18 percent or as recommended by manufacturer. Device shall require manual reset.
 - 2. Pressure switch which operates when lubricating oil pressure to engine drops below a preset value.
 - 3. Temperature switch which operates when jacket coolant temperature exceeds a preset value.
 - 4. Device which operates when the coolant level in the radiator drops below a preset level.
 - 5. Other shutdown devices as recommended by the engine manufacturer.
- N. Engine Alarm Devices: Equip each engine with alarm devices. Auxiliary contacts shall be suitable for activating a remote alarm system. Alarm devices shall have factory-fixed set points. Provide the following alarm contact devices:
 - 1. Pressure switch which operates when lubricating oil pressure drops below a preset value.
 - 2. Temperature switch which operates when jacket coolant temperature exceeds a preset value.
 - 3. Temperature switch which operates when jacket coolant temperature is too low.
 - 4. Other alarm devices as recommended by the engine manufacturer.
- O. Miscellaneous Engine Accessories: Provide the following engine accessories where the manufacturer's standard design permits:

1. Piping on engine to inlet and outlet connections, including nonstandard companion flanges.
 2. Structural steel subbase and vibration isolators, foundation bolts, nuts, and pipe sleeves.
 3. Level jack screws or shims, as required.
 4. Rails, chocks, and shims for installation of subbase on the foundation.
 5. Removable guard, around fan. Support guard, on engine subbase, to suit manufacturer's standard.
- P. Engine Speed Governor System: Engine shall have isochronous (solid state) speed-sensing governor. The governor shall be capable of maintaining a constant speed within plus or minus 1/3 percent of rated frequency under a steady-state- conditions (including no load).

2.03 GENERATOR AND EXCITATION SYSTEM

- A. Generator: Provide salient-pole type, ac, brushless-excited, revolving field, air-cooled, self-ventilated, coupled type, synchronous generator conforming to NEMA MG 1, Part 22, NEMA C50.10, and IEEE C50.12. Generator shall be rated for standby duty at 100 percent of the power rating of the engine-generator set. Temperature rise of each of the various parts of the generator shall not exceed 130 degrees C as measured by resistance, based on a maximum ambient temperature of 40 degrees C. Winding insulation shall be Class H.
1. Rotor: The rotor shall have connected amortiser windings.
 2. Generator Space Heater: Provide 120 volt ac heaters. Heater capacity shall be as recommended by the generator manufacturer to aid in keeping the generator insulation dry.
 3. Grounding: Provide non-corrosive steel grounding pads located at 2 opposite mounting legs.
 4. Filters: Provide manufacturer's standard generator cooling air filter assembly.
 5. Design generator to protect against mechanical, electrical and thermal damage due to vibration, 25 percent overspeeds, or voltages and temperatures at a rated output capacity of 110 percent for prime applications and 100 percent for standby applications.
 6. Provide generator ancillary equipment meeting the short circuit requirements of NEMA MG 1. Select drip-proof guarded option for generators without weatherproof enclosures.
- B. Excitation System: Provide a brushless excitation system consisting of an exciter and rotating rectifier assembly integral with the generator and a voltage regulator. Insulation class for parts integral with the generator shall be as specified in paragraph entitled "Generator".
1. Exciter and Rotating Rectifier Assembly: Rectifiers shall be provided with surge voltage protection.

2. Voltage Regulator: Voltage regulator shall be solid state or digital, automatic, 3-phase sensing, volts per hertz type regulator. Voltage variation for any 40 degree C change over the operating temperature range shall be less than plus or minus one percent. Operating temperature shall be minus 40 degree C to plus 70 degree C. Voltage adjust range shall be plus to minus 5.0 percent of nominal. Inherent regulator features shall include overexcitation shutdown.

2.04 ENGINE-GENERATOR SET AUXILIARY SYSTEMS AND EQUIPMENT

- A. Provide auxiliary systems and equipment designed for continuous duty at 100 percent of the power rating of the engine-generator set.
 1. Vibration Isolation System: Install the subbase on vibration isolators that are secured to a suitable concrete foundation. Provide isolators as recommended by the engine-generator set and isolator manufacturers and provide integral or external lateral support to limit lateral movement and overturning moments. The isolation system shall reduce the vibration transmitted to the adjacent floor slab to a maximum of 0.0085 inch total amplitude throughout the frequency range down to 65 Hz.
 2. Exhaust System: Provide exhaust systems for each engine.
 - a. Exhaust Silencers: A critical class silencer shall be provided for each engine which will reduce the exhaust sound spectrum by the following listed values at a 75 foot radius from the outlet, with generator set loaded to rated capacity and clear weather. Inlet and outlet connections shall be flanged.

Octave Band Center Frequency (Hertz)								
Minimum Silencer Attenuation Decibels	63	125	250	500	1000	2000	4000	8000
Critical Class	15	32	37	36	30	36	37	37

- b. Field Installed Exhaust Piping System: Field installed exhaust piping shall conform to the following:
 - 1) Exhaust Piping: Provide flanges for connections to diesel engines, exhaust mufflers, and flexible connections. Provide steel pipe conforming to ASTM A53/A53M for each engine complete with necessary fittings, flanges, gaskets, bolts, and nuts. Exhaust piping shall be Schedule 40 pipe for 12 inches and smaller, standard weight for sizes 14 inches through 24 inches, and 0.25 inch wall thickness for sizes larger than 24 inches. Flanges shall be Class 150 slip-on forged steel welding flanges in accordance with ASME B16.5, with material in accordance with ASTM A181/A181M, Grade I. Fittings shall be buttwelding conforming to ASTM A234/A234M, with wall thickness same as adjoining piping. Fittings shall be of same material and wall thickness as pipe. Built-up miter welded fittings may be used. Miter angles of each individual section shall not exceed 22.5 degrees total and not more than 11.25 degrees relative to the axis of the pipe at any

one cut. Gaskets for exhaust piping shall be of high temperature asbestos-free material suitable for the service and shall be ASME B16.21, composition ring, 0.0625 inch thick. Bolting material for exhaust flanges shall be alloy-steel bolt-studs conforming to ASTM A193/A193M, Grade B7 bolts and alloy-steel nuts conforming to ASTM A194/A194M, Grade 7. Bolts shall be of sufficient length to obtain full bearing on the nuts and shall project not more than 2 full threads beyond the nut. Provide stainless steel counterbalance type rain caps at termination of each exhaust pipe.

- 2) Expansion (Flexible) Joints: Provide sections of multiple corrugated stainless steel expansion joints in the engine exhaust piping for each engine to absorb expansion strains and vibration transmitted to the piping. Flexible joints shall be suitable for operation at 200 degrees F above normal exhaust gas temperature at 100 percent load, 10,000 cycles, minimum. Joints shall be flanged and located between engine exhaust manifold and exhaust piping, shall be the same size as exhaust piping size, and shall be designed and constructed for diesel engine exhaust service.
 - 3) Hangers and Supports: MSS SP-58 and MSS SP-69.
 - 4) Piping Sleeves: Provide where piping passes through masonry or concrete walls, floors, roofs, and partitions. Sleeves shall be placed during construction. Unless indicated otherwise, pipe sleeves shall comply with following requirements: sleeves in outside walls below and above grade, in floor, or in roof slabs, shall be standard weight zinc coated steel pipe. Sleeves in partitions shall be zinc coated sheet steel having a nominal weight of not less than 0.90 pound per square foot. Space between piping insulation and the sleeve shall not be less than 0.25 inch. Sleeves shall be held securely in proper position and location during construction. Sleeves shall be sufficient length to pass through entire thickness of walls, partitions, or slabs. Sleeves in floor slabs shall extend 2 inches above the finished floor. Space between the pipe and the sleeve shall be firmly packed with insulation and caulked at both ends of the sleeve with plastic waterproof cement.
 - 5) Piping Insulation: Provide exhaust piping insulation.
3. Cooling system: Provide the specified cooling water system. Properly size equipment to handle the flow rate and pressure losses of the coolant mixture for the specified engine and site conditions.
 - a. Radiators: Provide for each engine-generator set, as standard with the manufacturer.
 - 1) Design Conditions: Each radiator unit shall have ample capacity to remove not less than the total kW Btu per hour of heat rejected by its respective engine at 100 percent full-rated load to the jacket water, fuel oil, and lubricating oil system, and intercooler. Radiator capacity shall be rated at optimum temperature of coolant leaving the engine and intercooler as recommended by the engine manufacturer with an ambient dry bulb air temperature outside the enclosure of 95 degrees

F maximum, and 55 degrees F minimum at the site elevation, and with the coolant mixture of water and ethylene glycol, 50 percent by volume of each.

- 2) Engine Mounted Radiator Construction: Radiator fan shall direct airflow from the engine outward through the radiator. Fan shall be V-belt driven directly from the engine crankshaft. Radiator fan shall have sufficient capacity to meet design conditions against a static restriction of 0.5 inches of water. Fan static capacity shall be adjusted to suit the ductwork furnished. Cooling section shall have a tube and fin-type core consisting of copper or copper base alloy tubes with nonferrous fins. Select engine-driven fans for quiet vibration-free operation. Make provision for coolant expansion either by self-contained expansion tanks or separately mounted expansion tanks, as standard with the manufacturer. Provide suitable guards for each fan and drive.
4. Diesel Fuel System: NFPA 30 and NFPA 37 and the requirements herein.
 - a. Diesel Fuel Piping System: Factory installed piping shall conform to the engine manufacturer's standard. Provide flange connections in accordance with ASME B16.1 Class 125 flanges. Piping between the engine and the diesel fuel tank shall comply with SECTION 15606 - POL SYSTEMS.
 - b. Diesel Fuel Tank System: See SECTION 15606 - POL SYSTEMS for aboveground fuel tank and accessory requirements.
5. Starting Battery System: Provide a 12-volt dc starting battery installation for starting of each engine-generator set utilizing an electric cranking system.
 - a. Engine Starting Battery: Provide lead-acid, SAE Type D diesel engine starting batteries. Batteries shall have sufficient capacity to provide 60 seconds of continuous cranking of the engine in an ambient temperature of 55 degrees F.
 - b. Starting Battery Charger: UL 1236. Provide 120 volt ac, enclosed, automatic equalizing, dual-rate, solid-state, constant voltage type battery charger with automatic ac line compensation. Dc output shall be voltage regulated and current limited. Charger shall have 2 ranges, float and equalize, and shall provide continuous taper charging. The charger shall have a continuous output rating of not less than 10 amperes and shall be sized to recharge the engine starting batteries in a minimum of 24 hours while providing the control power needs of the engine-generator set. Enclosure shall be NEMA ICS 6, Type 1. The following accessories shall be included:
 - 1) Dc ammeter.
 - 2) Dc voltmeter.
 - 3) Ac on light.
 - 4) Low voltage light.

- 5) High voltage light.
 - 6) Low dc voltage alarm relay.
 - 7) High dc voltage alarm relay.
 - 8) Ac power failure relay.
6. Engine-Generator Control Panel: Provide NEMA ICS 6, Type 1 enclosed control panel mounted on the engine-generator set with vibration isolators. Provide the following control panel mounted devices and control features.
- a. Control Panel Mounted Devices:
 - 1) Engine Control Switch (ECS): Provide a 3 position control switch with "MANUAL START" - "OFF/RESET" - "AUTO START" positions.
 - 2) Emergency Stop Push Button (ESPB): Provide a red, mushroom head, twist-to-reset, maintained contact type push button.
 - 3) Generator Metering: Provide ac metering package that displays ac voltage, current, and frequency of one phase of the generator output simultaneously. Metering package shall include a voltmeter/ammeter phase selector switch to allow viewing of each phase.
 - 4) Generator Voltage Adjust Potentiometer (VAP): Provide a potentiometer or other means via control panel to adjust generator voltage.
 - 5) Engine Instrumentation: Provide instrumentation package that displays the following engine information:
 - a) Engine oil pressure.
 - b) Engine coolant temperature.
 - c) Engine speed (rpm)
 - d) Engine running hours.
 - 6) Indicating Lamps: Provide LED type indicating lamps and a lamp test switch. Lamps shall indicate the following alarm and shutdown conditions.
 - a) Low engine lubricating oil pressure alarm.
 - b) Low engine lubricating oil pressure shutdown.
 - c) High engine coolant temperature alarm.
 - d) High engine coolant temperature shutdown.
 - e) Engine overcrank shutdown.

- f) Engine overspeed shutdown.
 - g) Emergency stop shutdown.
 - h) Starting battery system trouble alarm.
 - i) Tank low fuel shutdown.
 - j) Low engine coolant temperature alarm.
 - k) Low coolant level shutdown.
 - l) Alarm Horn: Provide an alarm horn and a horn silence switch.
 - m) Panel Lamp: Provide a panel lamp and lamp "ON-OFF" switch.
- b. Crank Cycle/Terminate Relay: Provide crank cycle/terminate relay with adjustable crank/rest periods of one to 60 seconds (initially set for 15 seconds) and adjustable total crank time of 30 seconds to 10 minutes (initially set for 75 seconds).
- c. Engine Cooldown Relay: Provide cooldown relay with adjustable cool down time of 0 to 30 minutes (initially set at engine manufacturer's recommended time).
7. Generator Circuit Breaker: UL 489, molded case, adjustable thermal magnetic trip type circuit breaker. The circuit breaker continuous current rating shall be adequate for the power rating of the engine-generator set and the circuit breaker shall be rated to withstand the short circuit current provided by the generator set. Provide circuit breaker in a NEMA ICS 6, Type 1 enclosure mounted on the engine-generator set.
8. Remote Alarm Annunciator:
- a. Provide NEMA ICS 6, Type 1, enclosed remote alarm annunciator powered by the engine starting battery system. The annunciator shall have a lamp test switch and LED type indicating lamps. The annunciator shall give visual and audible warnings for the following operating and alarm conditions:
 - 1) Provide lamps for the following operating conditions:
 - a) Operating on emergency.
 - b) Starting battery system trouble.
 - 2) Provide lamps and an audible signal for the following alarm conditions:
 - a) Low engine lubricating oil pressure.
 - b) Low engine coolant temperature.
 - c) High engine coolant temperature.

- d) Low fuel.
 - e) Engine overcrank shutdown.
 - f) Engine overspeed shutdown.
9. Electrical Support Equipment: Furnish with respective pieces of equipment. Motors, controllers, contractors, and disconnect switches shall conform to SECTION 16100 - ELECTRICAL WORK. Provide electrical connections under SECTION 16100 - ELECTRICAL WORK. Provide controllers and contractors with maximum of 120 volt control circuits, and auxiliary contacts for use with controls furnished.
10. Weatherproof Enclosure: Provide for each engine-generator set and fabricate from shop primed 16 gage minimum sheet steel in accordance with the manufacturer's standard design. Provide a complete, weatherproof enclosure for the engine, generator, and auxiliary systems and equipment. Support exhaust piping and silencer so that the turbocharger is not subjected to exhaust system weight or lateral forces generated in connecting piping that exceed the engine manufacturer's maximum allowed forces and moments. The housing shall have sufficient louvered openings to allow entrance of outside air for engine and generator cooling at full load. Design louvered openings to exclude driving rain and snow. Provide properly arranged and sized, hinged panels in the enclosure to allow convenient access to the engine, generator, and control equipment for maintenance and operational procedures. Brace the housing internally to prevent excessive vibration when the set is in operation.

2.05 IDENTIFICATION OF EQUIPMENT

- A. Provide plates and tags sized so that inscription is readily legible to operating or maintenance personnel and securely mounted to or attached in proximity of their identified controls or equipment. Lettering shall be normal block lettering, a minimum of 0.25 inch high.
- B. Materials: Construct ID plates and tags of 16 gage minimum thickness bronze or stainless steel sheet metal engraved or stamped with inscription. Construct plates and tags not exposed to the weather or high operational temperature of the diesel engine of laminated plastic, 0.125 inch thick, matte white finish with black center core, with lettering accurately aligned and engraved into the core.
- C. Control Devices and Operation Indicators: Provide ID plates or tags for control devices and operation indicators, including valves, off-on switches, visual alarm annunciators, gages and thermometers, that are required for operation and maintenance of provided mechanical systems. Plates or tags shall be minimum of 0.5 inch high and 2 inches long and shall indicate component system and component function.
- D. Equipment: Provide ID plates of a minimum size of 3 inches high and 5 inches long on provided equipment indicating the following information:
 - 1. Manufacturer's name, address, type and model number, and serial number;
 - 2. Contract number and accepted date;

3. Capacity or size;
4. System in which installed; and
5. System which it controls.

2.06 SUPPORTS AND MISCELLANEOUS

- A. The complete assembled engine-generator set will be field installed on a concrete equipment pad. Disassembly of generator, engine, skid base, and radiator will not be permitted to facilitate installation.
- B. The isolation system shall reduce the vibration transmitted to the adjacent floor slab by 95 percent or better. The manufacturer shall certify that the vibration isolation system will reduce the vibration to the limits specified.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall conform to the applicable requirements of IEEE C2, NFPA 30, NFPA 37, and NFPA 70.

3.02 GROUNDING

- A. NFPA 70 and IEEE C2, except that grounding systems shall have a resistance to solid earth ground not exceeding 25 ohms.
- B. Grounding Electrodes: Provide driven ground rods as specified in SECTION 16100 - ELECTRICAL WORK. Connect ground conductors to the upper end of ground rods by exothermic weld or compression connector. Provide compression connectors at equipment end of ground conductors.
- C. Engine-Generator Set Grounding: Provide separate copper grounding conductors and connect them to the ground system in accordance with NFPA 70.
- D. Connections: Make joints in grounding conductors by exothermic weld or compression connector. Exothermic welds and compression connectors shall be installed as specified in SECTION 16100 - ELECTRICAL WORK.
- E. Grounding and Bonding Equipment: UL 467, except as indicated or specified otherwise.

3.03 START-UP SERVICE

- A. Contractor shall include in his bid the service of the vendor's system/service engineer who fully understands the entire assembly/integration of the system, to assist in final piping/wiring checkout and to perform load and operational tests.
- B. The bid shall include 3 complete days of service plus all out-of-pocket expenses. In the case of an unsatisfactory test result, vendor shall provide all parts and labor to repair the system and to continue the start-up and test procedure until the systems operation proved meeting the specification at no extra cost to the

project. Resistive and reactive load banks shall be used to provide testing at the rated 0.8 power factor.

3.04 PREREQUISITES FOR FUNCTIONAL ACCEPTANCE TESTING

- A. Completion of the following requirements is mandatory prior to scheduling functional acceptance tests for the engine-generator set and auxiliary equipment.
- B. Piping Tests: Complete as specified in SECTION 15606 - POL SYSTEMS.
- C. Performance of Acceptance Checks and Tests:
 - 1. Generator Sets: Complete as specified in the paragraph entitled "Acceptance Checks and Tests" hereinbelow.
 - 2. Automatic Transfer Switch: See "Automatic Transfer Switch: Acceptance Checks and Tests"
- D. Automatic Transfer Switch: Acceptance Checks and Tests:
 - 1. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with drawing specifications.
 - b. Inspect physical and mechanical condition.
 - c. Confirm correct application of manufacturer's recommended lubricants.
 - d. Verify that manual transfer warnings are attached and visible.
 - e. Verify tightness of all control connections.
 - f. Verify tightness of accessible bolted connections by calibrated torque-wrench method. Thermographic survey is not required.
 - g. Perform manual transfer operation.
 - h. Verify positive mechanical interlocking between normal and alternate sources.
 - 2. Electrical Tests:
 - a. Measure contact-resistance.
 - b. Perform insulation-resistance on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole for one minute. Perform tests in both source positions.
 - c. Verify settings and operations of control devices.
 - d. Calibrate and set all relays and timers.
- E. Automatic Transfer Switch: Functional Acceptance Tests: Functional Acceptance Tests shall be coordinated with the on-site generator set and shall include simulating power failure and demonstrating the following operations for each automatic transfer switch. Contractor shall show by demonstration in

service that the automatic transfer switches are in good operating condition, and function not less than 5 times.

1. Perform Automatic Transfer Tests:
 - a. Simulate loss of normal/preferred power.
 - b. Return to normal/preferred power.
 - c. Simulate loss of emergency power.
 - d. Simulate all forms of single-phase conditions.
 2. Verify correct operational and timing of the following functions:
 - a. Normal source voltage-sensing relays.
 - b. Engine start sequence.
 - c. Time delay upon transfer.
 - d. Alternate source voltage-sensing relays.
 - e. Automatic transfer operation.
 - f. Interlocks and limit switch function.
 - g. Time delay and retransfer upon normal power restoration.
 - h. By-pass/isolation functional modes and related automatic transfer switch operations.
- F. Preliminary Operations: The vendor's system/service engineer shall conduct manufacturer recommended start-up procedures and tests to verify that the engine-generator set and auxiliary equipment are ready for functional acceptance tests. Give the Contracting Officer 15 days' advance notice that preliminary operations will be conducted. After preliminary operation has been successfully conducted, the vendor's system/service engineer will notify the Contracting Officer in writing stating the engine-generator set and auxiliary equipment are ready for functional acceptance tests.
- G. Functional Acceptance Test Procedure: Test procedure shall be prepared by the vendor's system/service engineer specifically for the engine-generator set and auxiliary equipment. The test agenda shall cover the requirements specified in the paragraph entitled "Functional Acceptance Tests" hereinbelow. The test procedure shall indicate in detail how tests are to be conducted. A statement of the tests that are to be performed without indicating how the tests are to be performed is not acceptable. Indicate what work is planned on each workday and identify the calendar dates of the planned workdays. Specify what additional technical support personnel is needed, such as factory representatives for major equipment. Specify on which testing workday each technical support personnel is needed. Data recording forms to be used to document test results are to be submitted with the proposed test procedure. A list of test equipment and instruments shall also be included in the test procedure.

- H. Test Equipment: Test equipment and instruments shall be on hand prior to scheduling field tests or, subject to Contracting Officer approval, evidence shall be provided to show that arrangements have been made to have the necessary equipment and instruments on site prior to field testing.

3.05 FIELD QUALITY CONTROL

- A. Give Contracting Officer 15 days notice of dates and times scheduled for tests which require the presence of the Contracting Officer. The Contractor shall be responsible for costs associated with conducting tests outside of normal working hours and with incorporating special arrangements and procedures, including temporary power conditions. The Contractor shall provide labor, equipment, diesel fuel, test load, and consumables required for the specified tests. Perform the following field tests.

- B. Acceptance Checks and Tests: Perform in accordance with the manufacturer's recommendations, and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.
 - 1. Circuit Breakers - Low Voltage Insulated Case/Molded Case:
 - a. Visual and Mechanical Inspection:
 - 1) Compare nameplate data with specifications and approved shop drawings.
 - 2) Inspect circuit breaker for correct mounting.
 - 3) Operate circuit breaker to ensure smooth operation.
 - 4) Inspect case for cracks or other defects.
 - 5) Verify tightness of accessible bolted connections and cable connections by calibrated torque-wrench method.
Thermographic survey is not required.
 - 6) Inspect mechanism contacts and arc chutes in unsealed units.
 - b. Electrical Tests:
 - 1) Perform contact-resistance tests.
 - 2) Perform insulation-resistance tests.
 - 3) Adjust Breaker(s) for final settings in accordance with engine-generator set manufacturer's requirements.
 - 2. Current Transformers:
 - a. Visual and Mechanical Inspection:
 - 1) Compare equipment nameplate data with specifications and approved shop drawings.
 - 2) Inspect physical and mechanical condition.
 - 3) Verify correct connection.

- 4) Verify that adequate clearances exist between primary and secondary circuit.
 - 5) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method. Thermographic survey is not required.
 - 6) Verify that all required grounding and shorting connections provide good contact.
3. Metering and Instrumentation:
- a. Visual and Mechanical Inspection:
 - 1) Compare equipment nameplate data with specifications and approved shop drawings.
 - 2) Inspect physical and mechanical condition.
 - 3) Verify tightness of electrical connections.
 - b. Electrical Tests:
 - 1) Determine accuracy of meters at 25, 50, 75, and 100 percent of full scale.
 - 2) Calibrate watt-hour meters according to manufacturer's published data.
 - 3) Verify all instrument multipliers.
 - 4) Electrically confirm that current transformer secondary circuits are intact.
4. Battery Systems:
- a. Visual and Mechanical Inspection
 - 1) Compare equipment nameplate data with specifications and approved shop drawings.
 - 2) Inspect physical and mechanical condition.
 - 3) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method. Thermographic survey is not required.
 - 4) Measure electrolyte specific gravity and temperature and visually check fill level.
 - 5) Verify adequacy of battery support racks, mounting, anchorage, and clearances.
 - b. Electrical Tests:
 - 1) Set charger float and equalizing voltage levels.

- 2) Verify all charger functions and alarms.
 - 3) Measure each cell voltage and total battery voltage with charger energized and in float mode of operation.
 - 4) Perform a capacity load test.
5. Engine-Generator Set:
- a. Visual and Mechanical Inspection:
 - 1) Compare equipment nameplate data with specifications and approved shop drawings.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect for correct anchorage and grounding.
 - b. Electrical and Mechanical Tests:
 - 1) Perform an insulation-resistance test on generator winding with respect to ground. Calculate polarization index.
 - 2) Perform phase rotation test to determine compatibility with load requirements.
6. Grounding System:
- a. Visual and Mechanical Inspection: Inspect ground system for compliance with contract plans and specifications.
 - b. Electrical Tests: Perform ground-impedance measurements utilizing the fall-of-potential method. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.
- C. Functional Acceptance Tests: The tests shall be performed by the vendor's system/service engineer. Upon successful test completion, the start-up engineer shall provide the Contracting Officer with a written test report within 15 calendar days showing the tests performed and the results of each test. The report shall include the completed approved test data forms and certification from the vendor's system/service engineer that the test results fall within the manufacturer's recommended limits and meet the specified requirements performance. The report shall be dated and signed by the start-up engineer and submitted for approval by the Contracting Officer. The Contracting Officer will witness final acceptance tests. Testing shall include but not be limited to:
1. Verify proper functioning of each engine protective shutdown device and pre-shutdown alarm device. Testing of the devices shall be accomplished by adjusting shutdown set points and observing proper alarm and engine shutdown operation.

2. Verify proper functioning of the engine overspeed trip device. Testing of the overspeed trip device shall be accomplished by adjusting overspeed set point to rated speed until an overspeed trip is experienced.
3. Verify proper functioning of the crank cycle/terminate relay. Testing of the relay shall be accomplished by engaging the starter motor with the engine being prevented from running. Observe the complete crank/rest cycle as described in the paragraph entitled "Crank Cycle/Terminate Relay".
4. Verify proper functioning of the following automatic and manual operations. Testing shall include but not be limited to:
 - a. Loss of Utility: Initiate a normal power failure. Record time delay on start, cranking time until engine starts and runs, time to come up to operating speed, voltage and frequency overshoot, and time to achieve steady state conditions with all switches transferred to emergency position. Emergency power shall be supplied within 10 seconds from loss of normal power.
 - b. Return of Utility: Return normal power and record time delay on retransfer for each automatic transfer switch, and time delay on engine cooldown and shutdown.
 - c. Manual starting.
 - d. Emergency stop.
5. Operate the engine-generator set with connected test load of rated kW at 0.8 power factor until the jacket water temperature stabilizes. Stabilization will be considered to have occurred when 3 consecutive temperature readings remain unchanged. Continue to operate the generator set for an additional 2 hours. Record instrument readings for terminal voltage, line current, frequency (Hz), engine speed rpm, lubricating oil pressure, jacket water temperature, and ambient temperature at 5 minute intervals for first 15 minutes and at 15 minute intervals thereafter.
6. Upon successful Functional Acceptance Testing and approval of said tests, all fuel tanks shall be filled to their appropriate maximum fill capacity.

3.06 TRAINING

- A. Upon completion of the work and at a time approved by the Contracting Officer, the Contractor shall provide instructions by a qualified instructor to the State maintenance personnel in the proper operation and maintenance of the equipment. State maintenance personnel shall receive training comparable to the equipment manufacturer's factory training. The duration of the instruction shall be approximately 4 hours. Actual duration shall be dependent on the complexity of the specific engine-generator set system supplied for the project and the actual project installation details.
- B. Instructor's Qualification Resume: Instructors shall be regular employees of the engine-generator set manufacturer. The instruction personnel provided to satisfy the requirements above shall be factory certified by the related equipment

manufacturer to provide instruction services. Submit the name and qualification resume of instructor to the Contracting Officer for approval.

3.07 EXTENDED WARRANTY - TWO YEAR

- A. Two year warranty and maintenance shall be provided by the Contractor for a 2 year period from project acceptance.
- B. The Contractor shall include all material, equipment and labor costs for performing maintenance work in his Bid.
- C. The Contractor shall include the service of the vendor's authorized field service engineer and/or mechanic to provide quarterly, one-year, and 2-year maintenance interval work as outlined below. Service work performed shall include the listed items in addition to any recommended work identified in the operations and maintenance manual for the equipment.
- D. Quarterly Service Requirements:
 - 1. Before Starting the Engine:
 - a. Perform all "Weekly Before Starting the Engine Maintenance" procedures per Operations and Maintenance Manual first.
 - b. Walk-Around Inspection: Inspect engine, radiator and generator for debris, loose or broken fittings, hoses or wires and guards. Repair as necessary.
 - c. Cooling System: Check coolant level. Maintain level within 1/2 inch to bottom of filler neck or proper level on sight gauge (if equipped). Replace coolant element (if equipped) or add liquid coolant conditioner.
 - d. Fuel System: Drain water and sediment from tank.
 - e. Air Cleaner Element: Inspect and clean or replace element.
 - f. Governor: Check and maintain oil level (if required).
 - g. Engine Crankcase: Check oil level. Maintain oil level between the ADD and FULL marks on the "Engine Stopped" side of the dipstick.
 - h. Crankcase Breather: Clean.
 - i. Linkages: Check and adjust all linkages, if necessary. Lubricate all linkage fittings with MPGM grease.
 - j. Engine Protective Devices: Check; test for proper operation.
 - k. Batteries: Clean top of batteries. Check electrolyte level (unless maintenance free). Check for loose connections.
 - l. Engine: Wipe down; clean as needed.
 - m. Generator: Check for moisture, dust, oils, greases and debris on main stator windings, exciter and PMG. Clean as needed. Check generator windings with megohmmeter and record readings for reference.

- n. Generator Bearing: Inspect generator bearing and bracket. Lubricate generator bearing.
- 2. With Engine Running:
 - a. Perform all “Weekly with Engine Running Maintenance” procedures per Operation and Maintenance Manual first.
 - b. Start the Engine: Operate the engine and check all gauges, oil pressure, fuel pressure, rpm (frequency), generated voltage and engine jacket water temperature, for correct readings.
 - c. Engine Crankcase: Check the oil level. Maintain the oil level between the ADD and FULL marks on the “Engine Running” side of the dipstick.
 - d. Generator Louvers: Check for proper operation (able to open and close freely).
 - e. Engine Mounts: Inspect for proper installation and loose fasteners. Check for proper torque.
 - f. Leaks and Noises: Check for leaks and unusual noises. NOTE: Engine must be stopped before making necessary repairs.
 - 3. After Stopping the Engine:
 - a. Perform all “Weekly After Stopping the Engine Maintenance” procedures per Operation and Maintenance Manual first.
 - b. Walk-Around Inspection: Repair or adjust. Make repairs or adjustments to the engine and generator set as necessary. Report any malfunction and make necessary repairs.
 - c. Scheduled Oil Sampling (SOS): Obtain sample for analysis.
 - d. Fuel Tank: Check the fuel level; advise the State to refill if below 3/4 full.
 - e. Battery Charger: Record charging amperage and voltage readings.
 - f. Automatic Switches (If Equipped): Check that all switches are in proper position for automatic start.
- E. One-Year Service Requirements:
- 1. Before Starting the Engine:
 - a. Perform all Quarterly Maintenance Procedures described above.
 - b. Valve Lash: Check, adjust if necessary. Refer to the engine Service Manual for proper procedure and settings.
 - 2. With Engine Running:
 - a. Perform all Quarterly Maintenance Procedures described above.

- b. Load Test: Load the engine to minimum of 30 percent of rated load using building load. Operate at this level for minimum of 2 hours. After approximately one hour, record the readings of all gauges: oil pressure, fuel pressure, oil level rpm (frequency), generated voltage, service meter and engine jacket water temperature.
 - 3. After Stopping the Engine:
 - a. Perform all Quarterly Maintenance Procedures described above.
 - b. Engine Oil and Filter(s): Change oil. Replace filter(s), cut old filter open and inspect for foreign material.
- F. Two Year Service Requirements:
- 1. Before Starting the Engine:
 - a. Perform all Quarterly and One-Year Before Starting the Engine Maintenance procedures described above.
 - b. Space Heaters: Check for proper operation.
 - c. Generator: Check for moisture, dust, oils, greases, and debris on main stator windings, exciter, and PMG. Clean as needed.
 - d. Turbocharger: Inspect/check; inspect for proper operation. Check the end play and radial clearance on the turbine wheel and shaft.
 - e. Engine: Perform a complete engine adjustment and tune-up.
 - f. Generator Bearing: Inspect generator bearing and bracket. Lubricate generator bearing; refer to Generator Service Manual.
 - 2. With Engine Running:
 - a. Perform all Quarterly and One-Year with Engine Running Maintenance procedures described above.
 - b. Start the Engine: Operate the engine and check all gauges, oil pressure, fuel pressure, rpm (frequency), generated voltage and engine jacket water temperature, for correct readings.
 - c. Engine Crankcase: Check the oil level. Maintain the oil level between the ADD and FULL marks on the "Engine Running" side of the dipstick.
 - d. Generator Louvers: Check for proper operation (able to open and close freely).
 - e. Exhaust System: Check for leaks. Repair or replace defective components with engine stopped.
 - f. Leaks and Noises: Check the leaks and unusual noises. NOTE: Engine must be stopped before making necessary repairs.
 - g. Load Test: Load the engine to minimum 30 percent of rated load using building load. Operate at this level for minimum of 2 hours. After

approximately one hour, record the readings of all gauges: oil pressure, fuel pressure, oil level, rpm (frequency), generated voltage, service meter, engine jacket water temperature, exhaust temperature (if equipped) and manifold vacuum (if equipped).

3. After Stopping the Engine:
 - a. Perform all Quarterly and One-Year After Stopping the Engine Maintenance procedures described above.
 - b. Walk-Around Inspection: Repair or adjust. Make repairs or adjustments to the engine and generator set as necessary. Report any malfunction and make necessary repairs.
 - c. Scheduled Oil Sampling (SOS): Obtain sample for analysis. Provide report of findings and recommendations.
 - d. Engine Oil and Filter(s): Change oil, Replace filter(s), cut old filter open and inspect for foreign material.
 - e. Coolant Analysis: Obtain sample for analysis.
 - f. Fuel Tank Level: Check the fuel level; advise the State to refill if below 3/4 full.
 - g. Battery Charger: Read charging amperage reading.
 - h. Automatic Switches (If Equipped): Check that all switches are in proper position for automatic start.
- G. Fuel Testing - Obtain fuel sample and test for contamination. Advise State if fuel should be cleaned or replaced.

END OF SECTION

SECTION 16301 - UNDERGROUND ELECTRICAL WORK

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes, but is not limited to, the underground electrical infrastructure system. The underground infrastructure system includes the provision for electrical underground maintenance structures, ductlines, and conductors.

1.02 REFERENCES

- A. The publications listed herein form a part of this specification to the extent referenced. The publications may be referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication with current revisions and amendments will be enforced.

1.03 RELATED WORK

- A. SECTION 16011 - GENERAL ELECTRICAL REQUIREMENTS applies to this section with additions and modifications specified herein.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Submit shop drawings and catalog cuts of the following equipment for approval. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. **Incomplete submittals and those without summary sheets will be returned without review.**
- C. Manufacturer's Catalog Data:
 - 1. Sealing material.
 - 2. Composite polymer concrete/fiberglass handholes.
 - 3. Cover hold down bolts.
- D. Shop Drawings:
 - 1. Composite polymer concrete/fiberglass handholes.
- E. Reports: Test reports as required in the item entitled "FIELD QUALITY CONTROL" hereinbelow.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "must" 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 Contracting Officer. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

- B. 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 2 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 this section.
- C. Alternative Qualifications: Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
- D. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall conform to the respective specifications and standards and to the specifications herein. Electrical ratings shall be as indicated.

2.02 CONDUIT, DUCTS, AND FITTINGS

- A. Rigid Metal Conduit: UL 6.
- B. Rigid Metallic Conduit, PVC Coated: NEMA RN 1, Type A40.
- C. Intermediate Metal Conduit: UL 1242.
- D. Intermediate Metal Conduit, PVC Coated: NEMA RN 1, Type A40.
- E. Plastic Conduit for Direct Burial: UL 651, Schedule 40 or Schedule 80 or as otherwise indicated.
- F. Duct Sealant:
 - 1. Conduit Sealing Compound: Compounds for sealing ducts and conduit shall have a putty-like consistency workable with the hands at temperatures as low as 35 degrees Fahrenheit, shall neither slump at a temperature of 300 degrees Fahrenheit, nor harden materially when exposed to the air. Compounds shall adhere to clean surfaces of fiber or plastic ducts; metallic conduits or conduit coatings; concrete, masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds shall form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds shall have no injurious effect upon the hands of workmen or upon materials.

2. UL 94, Class HBF: Provide high-expansion urethane foam duct sealant that expands and hardens to form a closed, chemically and water resistant, rigid structure. Sealant must be compatible with common cable and wire jackets and capable of adhering to metals, plastics and concrete. Sealant must be capable of curing in temperature ranges of 35 degrees Fahrenheit to 95 degrees Fahrenheit. Cured sealant must withstand temperature ranges of -20 degrees Fahrenheit to 200 degrees Fahrenheit without loss of function.

G. Fittings:

1. Metal Fittings: UL 514B.
2. PVC Conduit Fittings: UL 514B, UL 651.
3. Outlet Boxes for Steel Conduit: Outlet boxes for use with rigid steel conduit shall be cast-metal cadmium or zinc-coated if of ferrous metal with gasketed closures and shall conform to UL 514A.

2.03 LOW VOLTAGE INSULATED CONDUCTORS AND CABLES

- A. Insulated conductors shall be rated 600 volts and conform to the requirements of NFPA 70, including listing requirements. Wires and cables manufactured more than 24 months prior to date of delivery to the site shall not be accepted. Service entrance conductors shall conform to UL 854, Type USE.
- B. Conductor Types: Cable and duct sizes indicated are for copper conductors and THHN/THWN unless otherwise noted. Conductors No. 10 AWG and smaller must be solid. Conductors No. 8 AWG and larger must be stranded. All conductors shall be copper.
- C. Conductor Material: Unless specified or indicated otherwise or required by NFPA 70, wires in conduit, other than service entrance, shall be 600-volt, Type THWN/THHN conforming to UL 83 or Type XHHW or RHW conforming to UL 44. Copper conductors shall be annealed copper complying with ASTM B3 and ASTM B8.
- D. Cable Marking:
 1. Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout the cable length.
 2. Each cable shall be identified by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, in each electric manhole, telecommunications maintenance hole, handhole, junction box, and each terminal. Each tag shall contain the following information; cable type, conductor size, circuit number, circuit voltage, cable destination and phase identification.
 3. Conductors shall be color coded. Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Conductor identification shall be by color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, heat shrink type sleeves, or colored electrical tape. Control circuit terminations shall be

properly identified. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one system are installed in same raceway or box, other neutrals shall be white with a different colored (not green) stripe for each. Color of ungrounded conductors in different voltage systems shall be as follows:

a. 208/120 Volt, 3-phase:

- 1) Phase A - black.
- 2) Phase B - red.
- 3) Phase C - blue.

2.04 LOW VOLTAGE WIRE CONNECTORS AND TERMINALS

- A. UL 486A-486B. Shall provide a uniform compression over the entire conductor contact surface. Use solderless terminal lugs on stranded conductors.

2.05 LOW VOLTAGE SPLICES

- A. Provide splices in conductors with a compression connector on the conductor and by insulating and waterproofing using one of the following methods which are suitable for continuous submersion in water and comply with ANSI C119.1.
- B. Heat Shrinkable Splice: Provide heat shrinkable splice insulation by means of a thermoplastic adhesive sealant material which shall be applied in accordance with the manufacturer's written instructions.
- C. Cold Shrink Rubber Splice: Provide a cold-shrink rubber splice which consists of EPDM rubber tube which has been factory stretched onto a spiraled core which is removed during splice installation. The installation shall not require heat or flame, or any additional materials such as covering or adhesive. It shall be designed for use with inline compression type connectors, or indoor, outdoor, direct-burial or submerged locations.

2.06 TAPE

- A. Insulating Tape: UL 510, plastic insulating tape, capable of performing in a continuous temperature environment of 80 degrees Celsius.

2.07 PULL STRING/ROPE

- A. Shall be plastic or flat pull line (bull line) having a minimum tensile strength of 200 pounds. For empty ducts intended for telephone or cable television utility cabling, provide mule tape in conformance with the utility company standards.

2.08 GROUNDING AND BONDING

- A. Driven Ground Rods: Provide solid stainless steel ground rods not less than 3/4-inch in diameter by 10 feet in length. Sectional type rods may be used for rods 20 feet or longer.
- B. Grounding Conductors: Stranded-bare copper conductors shall conform to ASTM B8, Class B, soft-drawn unless otherwise indicated. Solid-bare copper conductors shall conform to ASTM B1 for sizes No. 8 and smaller. Insulated conductors shall be of the same material as phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Aluminum is not acceptable.

- C. Composite/Fiberglass Handholes and Covers: ANSI/SCTE 77. Provide handholes and covers of polymer concrete, reinforced with heavy weave fiberglass with a design load (Tier rating) appropriate for or greater than the intended use. All covers are required to have the Tier level rating embossed on the surface and this rating must not exceed the design load of the box. Provide stainless steel hold-down bolts and nuts for handhole covers 2 feet by 4 feet or larger. Bolts shall be unique, requiring a specially-furnished tool such as a hex-head or center-reject nut.

2.09 CABLE TAGS IN HANDHOLES

- A. Provide tags for each cable located handholes. The tags shall be polyethylene. Do not provide handwritten letters. The first position on the power cable tag shall denote the voltage. The second through sixth positions on the tag shall identify the circuit. The next to last position shall denote the phase of the circuit and shall include the Greek "phi" symbol. The last position shall denote the cable size. As an example, a tag could have the following designation: "11.5 NAS 1-8(Phase A)500", denoting that the tagged cable is on the 11.5kV system circuit number NAS 1-8, underground, Phase A, sized at 500 kcmil.
- B. Polyethylene Cable Tags: Provide tags of polyethylene that have an average tensile strength of 3250 pounds per square inch; and that are 0.08-inch thick (minimum), non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 170 degrees Fahrenheit. Provide 0.05-inch (minimum) thick black polyethylene tag holder. Provide a one-piece nylon, self-locking tie at each end of the cable tag. Ties shall have a minimum loop tensile strength of 175 pounds. The cable tags shall have black block letters, numbers, and symbols one inch high on a yellow background. Letters, numbers, and symbols shall not fall off or change positions regardless of the cable tags' orientation.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment and devices in accordance with the manufacturer's published instructions and with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable. In addition to these requirements, install telecommunications in accordance with TIA-758 and RUS Bull 1751F-644.

3.02 CABLE INSPECTION

- A. Prior to installation, each cable reel shall be inspected for correct storage positions, signs of physical damage, and broken end seals. If end seal is broken, moisture shall be removed from cable prior to installation in accordance with the cable manufacturer's recommendations.

3.03 UNDERGROUND STRUCTURE CONSTRUCTION

- A. Provide standard precast/prefabricated construction as specified herein. Underground structure locations, as indicated, are approximate. Coordinate exact underground structure locations with other utilities and finished grading and paving.

- B. Prefabricated Structure Construction: Set commercial prefabricated structures on 6-inches of level, 90 percent compacted, granular fill, 3/4-inch to one inch size, extending 12-inches beyond the structure on each side. Compact granular fill by a minimum of 4 passes with a plate type vibrator. Installation shall additionally conform to the manufacturer's instructions.

3.04 UNDERGROUND CONDUIT AND DUCT SYSTEMS

- A. Depths to top of the conduit shall be in accordance with NFPA 70. Run conduit in straight lines except where a change of direction is necessary. Numbers and sizes of ducts shall be as indicated. Ducts shall have a continuous slope downward toward underground structures and away from buildings, laid with a minimum slope of 3-inches per 100 feet. Depending on the contour of the finished grade, the high-point may be at a terminal a handhole, or between handholes. Terminate all PVC conduit end points in handholes with end bells. The bell end of the conduits that enter handholes must be flush with the wall.

Perform changes in ductbank direction as follows:

1. Short-radius 90-degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable.
 2. The minimum manufactured bend radius shall be 18-inches for ducts of less than 3-inches diameter, and 36-inches for ducts 3-inches or greater in diameter.
 3. As an exception to the bend radius required above, provide field manufactured long sweep bends having a minimum radius of 25 feet for a change of direction of more than 5 degrees, either horizontally or vertically. Both curved and straight sections may be used to form long sweep bends, but the maximum curve used shall be 30 degrees and manufactured bends shall be used.
- B. Treatment: Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made with proper tools and match factory tapers. A coupling recommended by the duct manufacturer shall be used whenever an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid. Plastic ducts shall be stored on a flat surface and protected from the direct rays of the sun.
 - C. Conduit Cleaning: As each conduit run is completed, for conduit sizes 3-inches and larger, draw a flexible testing mandrel approximately 12-inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. For conduit sizes less than 3-inches, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs.
 - D. Multiple Conduits: Stagger the joints of the conduits by rows (horizontally) and layers (vertically) to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, ties, and locking device on top to provide

- a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions but provide a minimum of 2 spacer assemblies per 10 feet of conduit assembly.
- E. Conduit Plugs and Pull Rope: New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weep hole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.
 - F. Conduit and Duct Without Concrete Encasement: Unless otherwise indicated, depths to the top surface of the direct buried conduit or duct must be not less than 18-inches below finished grade, except under roads and pavement, where depth must be not less than 24-inches below finished grade. Provide not less than 3-inches clearance from the conduit to each side of the trench. Separate multiple conduits by a minimum distance of 2-inches, except that light and power conduits shall be separated from control, signal, and telephone conduits by a minimum distance of 12-inches. Grade bottom of trench smooth; where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3-inches, fill and tamp level with original bottom with sand or earth free from particles that would be retained on a 1/4-inch sieve. The first 6-inches layer of backfill cover shall be sand compacted as previously specified. The rest of the excavation shall be backfilled and compacted in 3-inches to 6-inches layers. Provide color, type and depth of warning tape as indicated in the drawings.
 - 1. Encasement Under Roads and Structures: Under roads and paved areas, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3-inches concrete cover around ducts. Concrete encasement shall extend at least 5 feet beyond the edges of paved areas and roads.

3.05 CABLE PULLING

- A. Test duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables. Pull cables down grade with the feed-in point at the handhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through handhole opening and into duct runs. Do not exceed the specified cable bending radii when installing cable under any conditions, including turn-ups into enclosures. Cable with tape shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.
- B. Cable Lubricants: Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables.

3.06 CABLES IN UNDERGROUND STRUCTURES

- A. Do not install cables utilizing the shortest path between penetrations, but route along those walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls, not to interfere with duct entrances.
- B. Cable Tag Installation: Install cable tags in each handhole as specified, including each splice. Tag wire and cable provided by this contract. Install cable tags over the fireproofing, if any, and locate the tags so that they are clearly visible without disturbing any cabling or wiring in the handholes.

3.07 LOW VOLTAGE CABLE SPLICING AND TERMINATING

- A. Make terminations and splices with materials and methods as indicated or specified herein and as designated by the written instructions of the manufacturer. Do not allow the cables to be moved until after the splicing material has completely set. Make splices in underground distribution systems only in accessible locations such as handholes.

3.08 GROUNDING SYSTEMS

- A. Provide grounding system as indicated, in accordance with NFPA 70 and IEEE C2, and as specified herein. Provide grounding systems with a resistance to solid earth not exceeding 25 ohms.
- B. Grounding Electrodes: Provide cone pointed driven ground rods driven full depth plus 6-inches, installed to provide an earth ground of the appropriate value for the particular equipment being grounded. If the specified ground resistance is not met, an additional ground rod shall be provided in accordance with the requirements of NFPA 70 (placed not less than 6 feet from the first rod). Should the resultant (combined) resistance exceed the specified resistance, measured not less than 48 hours after rainfall, the Contracting Officer shall be notified immediately.
- C. Grounding Connections: Make grounding connections which are buried or otherwise normally inaccessible, by exothermic weld or compression connector.
 - 1. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.
 - 2. Make compression connections using a hydraulic compression tool to provide the correct circumferential pressure. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.

3.09 EXCAVATING, BACKFILLING, AND COMPACTING

- A. Provide in accordance with NFPA 70
- B. General Excavation and Trenching: Keep excavations free from water while construction is in progress. Notify the Contracting Officer immediately in writing if it becomes necessary to remove rock or hard, unstable, or otherwise unsatisfactory material to a depth greater than indicated. Make trench sides as nearly vertical as practicable except where sloping of sides is allowed. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the conduit. Excavate ledge rock, boulders, and other unyielding material to an overdepth at least 6-inches below the bottom of the conduit unless otherwise indicated or specified. Blasting will not be permitted. Use gravel placed in 6-inches maximum layers to refill overdepths to the proper grade. At Contractor's option, the excavations may be cut to an overdepth of not less than 4-inches and refilled to required grade as specified. Grade bottom of trenches accurately to provide uniform bearing and support for each section of conduit on

undisturbed soil at every point along its entire length. Trench dimensions shall be as indicated.

- C. Backfilling: Construct backfill in 2 operations (initial and final) as indicated and specified in this section. Place initial backfill in 6-inches maximum loose lifts to one foot above conduit unless otherwise specified. Ensure that initially placed material is tamped firmly under pipe haunches. Bring up evenly on each side and along the full length of conduit. Ensure that no damage is done to the conduit or its protective coating. Place the remainder of the backfill (final backfill) in 9-inches maximum loose lifts unless otherwise specified. Compact each loose lift as specified in paragraph entitled "Compaction" before placing the next lift. Where settlements greater than the tolerance typically allowed for grading occur in trenches due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation. Coordinate backfilling with testing of conduits. Provide buried warning and identification tape installed in accordance with the manufacturer's recommendation.
- D. Compaction: Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging conduits and protective conduit coatings. Compact material in accordance with the following unless otherwise specified. If necessary, alter, change, or modify selected equipment or compaction methods to meet specified compaction requirements.
1. Compaction of Conduit and Initial Backfill: Compact each lift to a dense consistency as evidenced by little to no settlement of the gravel under repeated passes with the compaction equipment but not less than a minimum of 5 passes of a hand operated type vibratory compactor with the vibrator turned on.
 2. Compaction of Final Backfill: Moisture condition the final backfill to between optimum and 3 percent wet of the optimum content and compact to at least 90 percent ASTM D 1557 maximum dry unit weight. Under areas to be seeded or sodded, compact succeeding layers of final backfill to 85 percent of ASTM D 1557 maximum dry unit weight. For conduits under structures and pavements, the top 24-inches of backfill below the finish subgrade level shall consist of controlled backfill placed in not more than 8-inches thick loose horizontal lifts, moisture conditioned to within 2 percent of optimum moisture content, and compacted to at least 95 percent of ASTM D 1557 maximum dry unit weight.
- E. Reconditioning of Surfaces:
1. Unpaved Surfaces: Restore to their original elevation and condition unpaved surfaces disturbed during installation of duct. Preserve sod and topsoil removed during excavation and reinstall after backfilling is completed. Replace sod that is damaged by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, re-seed the restored surface with the same quantity and formula of seed as that used in the original seeding, and provide top-soiling, fertilizing, liming, seeding, sodding, sprigging, or mulching.

2. Paving Repairs: Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists, restore such surface treatment or pavement the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces.

3.10 FIELD QUALITY CONTROL

- A. Performance of Field Acceptance Checks and Tests: Perform in accordance with the manufacturer's recommendations and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.
 1. Low Voltage Cables, 600-Volt: Perform tests after installation of cable, splices and terminations and before terminating to equipment or splicing to existing circuits.
 - a. Visual and Mechanical Inspection:
 - 1) Inspect exposed cable sections for physical damage.
 - 2) Verify that cable is supplied and connected in accordance with contract plans and specifications.
 - 3) Verify tightness of accessible bolted electrical connections.
 - 4) Inspect compression-applied connectors for correct cable match and indentation.
 - 5) Visually inspect jacket and insulation condition.
 - 6) Inspect for proper phase identification and arrangement.
 - b. Electrical Tests:
 - 1) Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 1000 volts dc for one minute.
 - 2) Perform continuity tests to insure correct cable connection.
 2. Grounding System:
 - a. Visual and Mechanical Inspection: Inspect ground system for compliance with contract plans and specifications.
 - b. Electrical Tests: Perform ground-impedance measurements utilizing the fall-of-potential method in accordance with IEEE 81. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable megohmmeter tester in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.

- B. Follow-Up Verification: Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the Contracting Officer shall be given 5 working days advance notice of the dates and times of checking and testing.

END OF SECTION

SECTION 16510 - INTERIOR LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes providing luminaires, lamps, drivers, switches, time switches and other control devices, contactors, emergency lighting accessories and battery-powered units and systems for interior use, including luminaires and accessories mounted on the exterior surfaces of buildings. Materials not normally furnished by manufacturers of these devices are specified in SECTION 16100 - ELECTRICAL WORK.

1.02 REFERENCES

- A. The publications listed herein form a part of this specification to the extent referenced. The publications may be referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication with current revisions and amendments will be enforced.

1.03 RELATED WORK

- A. SECTION 16011 - GENERAL ELECTRICAL REQUIREMENTS applies to this section, with the additions and modifications specified herein.
- B. SECTION 16100 - ELECTRICAL WORK applies to this section, with additions and modifications specified herein.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Data, shop drawings, and reports shall employ the terminology, classifications, and methods prescribed by the Illuminating Engineering Society of North America, as applicable, for the lighting system specified.
- C. Submit shop drawings and catalog cuts of the following equipment for approval. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. Incomplete submittals and those without summary sheets will be returned without review.
- D. Manufacturer's Catalog Data:
 - 1. Luminaires, including light sources and LED drivers.
 - 2. Electronic dimming driver
 - 3. Wall-box dimmer switch
 - 4. Wall-box occupancy sensor/switch
 - 5. Lighting contactor
 - 6. Photocell switch
 - 7. Exit light
 - 8. Local Area Controller

9. Low-voltage wall switches
 10. Occupancy/vacancy sensors
- E. Certificates:
1. LED Driver and Dimming Switch/Control Station Compatibility Certificate.
 2. Occupancy/Vacancy Sensor Verification Test Results.
- F. Operations and Maintenance (O&M) Manual: Submit Operations and Maintenance Manual as stipulated in item entitled "OPERATIONS AND MAINTENANCE MANUAL" hereinbelow.
- G. Manufacturer's Warranty: Submit manufacturer's warranty as stipulated in item entitled "MANUFACTURER'S WARRANTY" hereinbelow.

1.05 OPERATIONS AND MAINTENANCE MANUAL

- A. Submit operation and maintenance data showing all light fixtures and drivers, control modules, control zones, occupancy/vacancy sensors, ambient light level sensors, power packs, dimming drivers, schematic diagrams and all interconnecting control wire, conduit, and associated hardware. Submit documentation that includes contact information, summary of procedures, and the limitations and conditions applicable to the project.

1.06 QUALITY ASSURANCE

- A. Regulatory Requirements: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "must" 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 Contracting Officer. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
- B. 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 2 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 this section.
- C. Alternative Qualifications: Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
- D. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.07 MANUFACTURER'S WARRANTY

- A. Manufacturer's warranties and guarantees furnished for materials used in the work and instruction sheets and parts lists supplied with materials shall be delivered to the Contracting Officer prior to acceptance of the project.
- B. Manufacturer's LED Luminaire Warranty:
 - 1. Provide a written 5 year minimum replacement warranty for material, fixture finish, and workmanship. Provide written warranty document that contains all warranty processing information needed, including but not limited to, lighting distributor's purchase order number and/or manufacturer's sales order number, manufacturer's toll-free warranty telephone number, customer service point of contact, whether or not a return authorization number is required, return shipping information, and closest return location to the project location.
 - a. Finish warranty must include failure and substantial deterioration such as blistering, cracking, peeling, chalking, or fading.
 - b. Material warranty must include:
 - 1) All LED drivers and integral control equipment.
 - 2) Replacement when more than 15 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.
- C. Warranty period must begin in accordance with the manufacturer's standard warranty starting date.

PART 2 - PRODUCTS

2.01 PROJECT COORDINATION

- A. Products and materials not considered to be luminaires, luminaire controls, or associated equipment are specified in SECTION 16100 - ELECTRICAL WORK. Luminaires, luminaire controls, and associated equipment for exterior applications are specified in SECTION 16530 - EXTERIOR LIGHTING.

2.02 LUMINAIRES

- A. UL 1598, NEMA C82.77, and UL 8750. Provide luminaires as indicated in luminaire schedule or details on project plans. Provide luminaires complete with light sources of quantity, type, and wattage indicated. Provide all luminaires of the same type by the same manufacturer. Luminaires must be specifically designed for use with the driver and light source provided.
- B. LED Luminaires: Provide luminaires complete with power supplies (drivers) and light sources. Provide design information including lumen output and design life in luminaire schedule on project plans for LED luminaires. LED luminaires must also meet the following minimum requirements:
 - 1. Luminaires must have a minimum 5 year manufacturer's warranty.
 - 2. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.

3. Luminaire drive current value must be identical to that provided by test data for luminaire in question.
4. Luminaires must be tested to IES LM-79 and IES LM-80 standards.

2.03 DRIVERS

- A. LED Drivers: NEMA SSL 1, UL 8750. LED drivers must be electronic, UL Class 1, constant-current type and comply with the following requirements:
 1. Output power (watts) and luminous flux (lumens) as shown in luminaire schedule for each luminaire type.
 2. Power Factor (PF) greater than or equal to 0.9 over the full dimming range when provided.
 3. Current draw Total Harmonic Distortion (THD) of less than 20 percent.
 4. Class A sound rating.
 5. Operable at input voltage of 120-277 volts at 60 hertz.
 6. Minimum 5 year manufacturer's warranty.
 7. RoHS compliant.
 8. Integral thermal protection that reduces or eliminates the output power if case temperature exceeds a value detrimental to the driver.
 9. UL listed for dry or damp locations typical of interior installations.
 10. Provide dimming capability as indicated in the luminaire schedule on project plans. Dimmable drivers must dim down to 10 percent. Dimmable drivers must be controlled by a Class 2 low voltage 0-10VDC controller dimming signal protocol unless otherwise specified. LED drivers of the same family/series must track evenly across multiple luminaires at all light levels.

2.04 LIGHT SOURCES

- A. NEMA ANSLG C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.
- B. LED Light Sources:
 1. Correlated Color Temperature (CCT) of 3500 degrees K.
 2. Minimum Color Rendering Index (CRI) R9 value of 80.
 3. High power, white light output utilizing phosphor conversion (PC) process.
 4. RoHS compliant.
 5. Provide light source color consistency by utilizing a binning tolerance within a 3-step McAdam ellipse.

2.05 LIGHTING CONTROLS

- A. ASHRAE 90.1 - IP ASHRAE 189.1. Provide lighting control systems that do not switch off battery-operated or emergency backup luminaires or exit signs. Provide system with override of lighting controls devices controlling luminaires in

path of egress with activation of fire alarm system. Provide lighting control system that operates the lighting system as described in the project plans. Submit Sequence of Operation for Lighting Control System describing the operation of the proposed lighting control system and devices.

- B. Localized Control Systems: Provide room or area-wide lighting control system capable of manual control, time-based control, or receiving input from photosensors and occupancy/vacancy sensors.
 - 1. Local Area Lighting Controller: CEC Title 24 and ASHRAE 90.1 - IP compliant. Provide controller designed for single area or room with the following requirements:
 - a. 120-277 volt input, designed for LED lighting loads.
 - b. 2 zone, with 2 relay(s) rated 20 amps each with one manual switch per zone.
 - c. Provide inputs for occupancy/vacancy sensors, photosensors, and low-voltage wall switches.
 - d. Capable of 0-10V dimming.
 - e. Provide override 'ON' function with input from Fire Alarm Control Panel for all emergency lighting. Controller must not turn off power to emergency batteries or exit signs.
- C. Devices:
 - 1. Toggle Switches: Provide line-voltage toggle switches as specified in SECTION 16100 - ELECTRICAL WORK. When used for non-digital loads, devices must be rated at 20 Amps inductive load, and be compatible with the lighting control systems.
 - 2. Wall-Box Dimmers: UL 1472, UL 20, IEEE C62.41, NEMA 77, NEMA SSL 7A. Dimmers must provide flicker-free, continuously variable light output throughout the dimming range of 10 percent to 100 percent. Devices must be capable of operating at their full rated capacity regardless of being single or gang-mounted, and be compatible with three-way and four-way switching scenarios. Provide wall-box dimmers that meet the following requirements:
 - a. Device operates as [part of a lighting control system.
 - b. Device operates with the use of a vertical slider, paddle, rotary, button, or toggle with adjacent vertical slider.
 - c. Finish of device matches switches and outlets in the same area.
 - d. Back box in wall has sufficient depth to accommodate body of switch and wiring.
 - e. Dimmer is capable of controlling 0-10 volt LED drivers. Dimmers and the drivers they control must be provided from the same manufacturer or tested and certified as compatible for use together.
 - f. Radio frequency interference suppression is integral to device.

3. Scene Wallstations: Provide scene wallstations that are compatible with the other components of the lighting control system and capable of Class 1 or 2 wiring methods in accordance with the NEC and local codes. Provide devices that contain on/off group, preset scene functions, or dim up/dim down interface through front panel. Programming of new scenes or zone assignments must be accomplished by authorized personnel from the space being controlled. Provide labeling for each button, including laminated sheet with scene descriptions to be posted near each scene controller.
- D. Sensors for Lighting Control: IEEE C62.41, NEMA WD 1, UL 94, UL 916, UL 508, ASTM D4674 REV A, NEMA WD 7.
1. Occupancy/Vacancy Sensors: Provide occupancy/vacancy sensors with coverage patterns as indicated on manufacturer's shop drawings. Provide no less quantity of sensors as shown on plans, but add additional sensors when required to fulfill coverage requirement for the specific model of sensor provided. Provide sensor types as described in the sequence of operations. Sensor locations and quantities are shown in shop drawings provided by the lighting control system manufacturer. Provide occupancy sensor operation that requires movement to activate luminaires controlled and turns luminaires off after a set time of inactivity. Provide ceiling or wall-mounted occupancy/vacancy sensors that meet the following requirements:
 - a. Operating voltage to suit the intended overall control system.
 - b. Time delay of 30 seconds to 30 minutes with at least four intermediate time delay settings.
 - c. Sensors are ceiling mounted, wall-box mounted or integral to luminaire.
 - d. Does not exceed a maximum load requirement of 20mA at 24VDC. No minimum load requirement and be capable of switching from zero to 800 W at 120 VAC, 50/60 Hz and from zero to 1200 W at 277 VAC, 50/60 Hz.
 - e. Shielded or controlled by internal logic to adjust sensitivity to avoid false triggering due to ambient temperature, air temperature variations or HVAC air movement.
 - f. Sensor is equipped to automatically energize the connected load upon loss of normal power when located in a means of egress.
 - g. Occupancy and vacancy operation is field-adjustable and programmable with push-button or dip switch on the sensor device.
 - h. No leakage current to load when in the off mode.
 - i. Utilize zero-crossing circuitry to prevent damage from high inrush current and to promote long life operation.
 - j. Allow the adding or deleting of specific luminaires or zones to the assigned sensor without the use of ladders.
 - k. Passive Infrared (PIR) Sensors: Provide Passive Infrared Sensors (PIR) sensors that detect occupancy by sensing heat and movement in the area

of coverage. Provide sensors are constructed of a housing of high-impact, injection-molded thermoplastic. Provide PIR sensors that are temperature compensated, with a dual element sensor and a multi-element fresnel lens of POLY IR4 material.

- I. Ultrasonic Sensors: Provide ultrasonic sensors that detect occupancy by sensing a change in pattern of reflected ultrasonic waves in the area of coverage. Provide sensors that are constructed of a housing of high-impact, injection-molded thermoplastic. Provide ultrasonic sensors that operate at 40 kHz.
- m. Dual Technology Sensors: Provide dual technology sensors that meet the requirements for PIR sensors and ultrasonic sensors indicated above. If either the passive infrared or ultrasonic sensing registers occupancy, the luminaires must remain on.
- n. Integrated Sensors: Provide integrated occupancy/vacancy sensors that mount directly to the luminaires as indicated in project plans.
- o. Power Packs: UL 2043. Power packs used to provide power to lighting control sensors in accordance with the manufacturer's specifications. Provide power packs that meet the following requirements:
 - 1) Operate at an input voltage of 120-277 VAC, with an output voltage 24 VDC at 225 mA.
 - 2) Constructed of plenum-rated, high-impact thermoplastic enclosure.
 - 3) Utilizes zero-crossing circuitry to prevent damage from inrush current.
 - 4) Maximum load rating of 16 amps for electronic lighting loads.
 - 5) Directive 2011/65/EU. Restriction of Hazardous Substances (RoHS) compliant.

2.06 EXIT LIGHTS

- A. UL 924, NFPA 70, and NFPA 101. Provide wattage as indicated in the luminaire schedule on the project plans. Provide LED Exit Signs that meet the following criteria:
 - 1. Housing constructed of UV-stable, thermo-plastic.
 - 2. UL listed for damp location.
 - 3. Configured for universal ceiling or wall mounting.
 - 4. 6 inch high, 3/4 inch stroke red lettering on face of sign with chevrons on either side of lettering to indicate direction.
 - 5. Single or double face as indicated in project plans and luminaire schedule.
- B. Exit Signs with Battery Backup: Equip with automatic power failure device, test switch, and pilot light, and fully automatic high/low trickle charger in a self-contained power pack. Battery must be sealed, maintenance free nickel-cadmium type, and must operate unattended for a period of not less than five

years. Emergency run time must be a minimum of 1-1/2 hours. LEDs must have a minimum rated life of 10 years. Provide self-diagnostic circuitry integral to emergency LED driver. In lieu of battery, can use a nonradioactive photoluminescent plate.

2.07 EMERGENCY LIGHTING EQUIPMENT

- A. UL 924, NFPA 101. Provide lamps in wattage indicated.
 - 1. LED Emergency Driver: UL 924, NFPA 101. Provide LED emergency driver with automatic power failure detection, test switch and LED indicator (or combination switch/indicator) located on luminaire exterior, and fully-automatic solid-state charger, battery and inverter integral to a self-contained housing. Provide self-diagnostic function integral to emergency driver. Integral nickel-cadmium battery is required to supply a minimum of 90 minutes of emergency power at 10watts, 10-50 VDC, constant output. Driver must be RoHS compliant, rated for installation in plenum-rated spaces and damp locations, and be warranted for a minimum of five years.
 - 2. Self-Diagnostic Circuitry for LED Drivers: UL 924, NFPA 101. Provide emergency lighting unit with fully-automatic, integral self-testing/diagnostic electronic circuitry. Circuitry must provide for a one minute diagnostic test every 28 days, and a 30 minute diagnostic test every six months, minimum. Any malfunction of the unit must be indicated by LED(s) visible from the exterior of the luminaire. A manual test switch must also be provided to perform a diagnostic test at any given time.

2.08 EQUIPMENT IDENTIFICATION

- A. Manufacturer's Nameplate: Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
- B. Labels: UL 1598. All luminaires must be clearly marked for operation of specific light sources and LED drivers. The labels must be easy to read when standing next to the equipment, and durable to match the life of the equipment to which they are attached. Note the following light source characteristics in the format "Use Only _____":
 - 1. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.
 - 2. Driver and dimming protocol: All markings related to light source type must be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when light sources are in place. LED drivers must have clear markings indicating dimming type and indicate proper terminals for the various outputs.

2.09 FACTORY APPLIED FINISH

- A. Provide all luminaires and lighting equipment with factory-applied painting system that as a minimum, meets requirements of NEMA 250 corrosion-resistance test.

2.10 RECESS- AND FLUSH-MOUNTED LUMINAIRES

- A. Provide access to light source and LED driver from bottom of luminaire. Provide trim and lenses, where required, for the exposed surface of flush-mounted luminaires as indicated on project drawings and specifications. Luminaires

recessed in ceilings which have a fire resistive rating of one hour or more must be enclosed in a box which has a fire resistive rating equal to that of the ceiling. For surface mounted luminaires with brackets, provide flanged metal stem attached to outlet box, with threaded end suitable for supporting the luminaire rigidly in design position. Flanged part of luminaire stud must be of broad base type, secured to outlet box at not fewer than three points.

2.11 SUSPENDED LUMINAIRES

- A. Provide hangers capable of supporting twice the combined weight of luminaires supported by hangers.
- B. Hangers must allow fixtures to swing within an angle of 45 degrees. Brace pendants 4 feet or longer to limit swinging.
- C. Single-unit suspended luminaires must have cable hangers. Multiple-unit or continuous row luminaires with a separate power supply cord must have a tubing or stem for wiring at one point and a tubing or rod suspension provided for each unit length of chassis, including one at each end.
- D. Provide all linear pendent and surface mounted luminaires with two supports per four-foot section or three per eight-foot section unless otherwise recommended by manufacturer.
- E. Provide rods in minimum 0.18 inch diameter.

2.12 LUMINAIRE SUPPORT HARDWARE

- A. Wires: ASTM A641/A641M, galvanized regular coating, soft temper, 0.11 inches in diameter or galvanized, braided steel, minimum 0.08 inches in diameter.
- B. Wires, for Humid Spaces:
 - 1. ASTM A580/A580M. Composition 302 or 304, annealed stainless steel 0.11 inches in diameter.
 - 2. ASTM B164, UNS NO4400, annealed nickel-copper alloy 0.11 inches in diameter.
- C. Rods: Threaded steel rods, 3/16 inch diameter, zinc or cadmium coated.
- D. Straps: Galvanized steel, one by 3/16 inch, conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein. Install luminaires and lighting controls to meet the requirements of ASHRAE 90.1 - IP and ASHRAE 189.1. To encourage consistency and uniformity, install luminaires of the same manufacture and model number when residing in the same facility or building.

- B. Light Source: When light sources are not provided as an integral part of the luminaire, deliver light sources of the type, wattage, lumen output, color temperature (CCT), color rendering index (CRI), and voltage rating indicated to the project site and install just prior to project completion, if not already installed in the luminaires from the factory.
- C. Lighting Fixtures: Set lighting fixtures plumb, square, and level with ceiling and walls, in alignment with adjacent lighting fixtures, and secure in accordance with manufacturers' directions and approved drawings. Mounting heights specified or indicated shall be to the bottom of fixture for ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures. Luminaire catalog numbers do not necessarily denote specific mounting accessories for type of ceiling in which a luminaire may be installed. Obtain approval of the exact mounting for lighting fixtures on the job before commencing installation and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed. Provide wires, straps or threaded rods for lighting fixture support in this section. Install luminaires with vent holes free of air blocking obstacles.
- D. Suspended Fixtures:
1. Measure mounting heights from the bottom of the luminaire for ceiling-mounted luminaires and to center of luminaire for wall-mounted luminaires. Obtain architect approval of the exact mounting height on the job before commencing installation and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed. Support suspended luminaires from structural framework of ceiling or from inserts cast into slab.
 2. Provide suspended luminaires with 45 degree swivel hangers so that they hang plumb and level.
 3. Locate so that there are no obstructions within the 45 degree range in all directions.
 4. The stem, canopy and fixture shall be capable of 45 degree swing.
 5. Rigid pendant stem, aircraft cable, rods, or chains 4 feet or longer excluding fixture shall be braced to prevent swaying using 3 cables at 120 degree separation.
 6. Suspended fixtures in continuous rows shall have internal wireway systems for end to end wiring and shall be properly aligned to provide a straight and continuous row without bends, gaps, light leaks or filler pieces.
 7. Utilize aligning splines on extruded aluminum fixtures to assure minimal hairline joints.
 8. Steel fixtures shall be supported to prevent "oil-canning" effects.
 9. Fixture finishes shall be free of scratches, nicks, dents, and warps, and shall match the color and gloss specified.
 10. Pendants shall be finished to match fixtures. Aircraft cable shall be stainless steel.

11. Canopies shall be finished to match the ceiling and shall be low profile unless otherwise shown.
 12. Maximum distance between suspension points shall be 10 feet or as recommended by the manufacturer, whichever is less.
- E. Recessed and Semi-Recessed Luminaires:
1. Support recessed and semi-recessed luminaires independently from the building structure by a minimum of two wires, straps or rods per luminaire and located near opposite corners of the luminaire. Secure horizontal movement with clips provided by manufacturer. Ceiling grid clips are not allowed as an alternative to independently supported luminaires.
 2. Support round luminaires or luminaires smaller in size than the ceiling grid independently from the building structure by a minimum of four wires, straps or rods per luminaire, spaced approximately equidistant around.
 3. Do not support luminaires by acoustical tile ceiling panels.
 4. Where luminaires of sizes less than the ceiling grid are indicated to be centered in the acoustical panel, support each independently and provide at least two 3/4 inch metal channels spanning, and secured to, the ceiling tees for centering and aligning the luminaire.
 5. Luminaires installed in suspended ceilings must also comply with the requirements.
 6. Adjust aperture rings on all applicable ceiling recessed luminaires to accommodate various ceiling material thickness. Coordinate cut-out size in ceiling to ensure aperture covers cut-out entirely. Install aperture rings such that the bottom of the ring is flush with finished ceiling or not more than 1/16 inch above. Do not install luminaires such that the aperture ring extends below the finished ceiling surface.
- F. LED Drivers: Provide LED drivers integral to luminaire as constructed by the manufacturer.
- G. Exit Lights and Emergency Lighting Units: Wire exit lights and emergency lighting units ahead of the switch to the normal lighting circuit located in the same room or area.
- H. Lighting Controls:
1. Scene Wallstations: Submit labeling templates for all scene wallstations, ganged faceplates and other manual control cover plates. Label each scene control button with approved scene description.
 2. Occupancy/Vacancy Sensors:
 - a. Provide quantity of sensor units indicated as a minimum. Provide additional units to give full coverage over controlled area. Full coverage shall provide hand and arm motion detection for office and administration type areas and walking motion for industrial areas, warehouses, storage rooms and hallways.

- b. Provide testing of sensor coverage in all spaces where sensors are
Locate the sensor(s) as indicated and in accordance with the
manufacturer's recommendations.
- c. Locate ceiling-mounted sensors not closer than 6 feet from the nearest
HVAC supply or return diffuser.

3.02 FIELD APPLIED PAINTING

- A. Paint lighting equipment as required to match finish of adjacent surfaces or to
meet the indicated or specified safety criteria.

3.03 GROUNDING

- A. Ground noncurrent-carrying parts of equipment as specified in SECTION 16100 -
ELECTRICAL WORK. Where the copper grounding conductor is connected to a
metal other than copper, provide specially treated or lined connectors suitable for
this purpose.

3.04 FIELD TESTS

- A. Operating Test: Upon completion of the installation, conduct an operating test to
show that the equipment operates in accordance with the requirements of this
section. Make adjustments and add and/or replace light fixtures and other
equipment as required to correct deficiencies.
- B. Lighting Control Test: Conduct operational control of installed and energized
luminaires. Set time delays as directed by Contracting Officer.
- C. Lighting System Controls Functional Testing: Provide all materials and labor
required to test the lighting system controls to ensure that the control hardware
and software are calibrated, adjusted, programmed, and in proper working
condition in accordance with the contract documents. The Contractor shall
perform and document the functional testing which shall be in accordance with
the applicable paragraphs of the County's Energy Code. The Designer of Record
shall witness the functional testing. The testing documentation shall be provided
to the Designer of Record for review and approval prior to project close-out.
- D. Ground Resistance Tests: Perform as specified in SECTION 16100 -
ELECTRICAL WORK.

END OF SECTION

SECTION 16530 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes providing exterior lighting systems, including but not limited to, lighting poles with brackets, luminaires, lamps, ballasts, drivers, concrete bases, and all other materials necessary for a complete exterior lighting system. Materials not normally furnished by manufacturers of these devices are specified in SECTION 16100 - ELECTRICAL WORK.

1.02 REFERENCES

- A. The publications listed herein form a part of this specification to the extent referenced. The publications may be referred to in the text by the basic designation only. Unless otherwise indicated, the most recent edition of the publication with current revisions and amendments will be enforced.

1.03 RELATED WORK

- A. SECTION 16011 - GENERAL ELECTRICAL REQUIREMENTS applies to this section, with the additions and modifications specified herein.
- B. Luminaires and accessories mounted on exterior surfaces of buildings are specified in SECTION 16510 - INTERIOR LIGHTING.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 - SUBMITTALS.
- B. Data, shop drawings, and reports shall employ terminology, classifications, and methods prescribed by the Illuminating Engineering Society of North America, as applicable, for the lighting system specified.
- C. Submit shop drawings and catalog cuts of the following equipment for approval. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. **Incomplete submittals and those without summary sheets will be returned without review.**
- D. Manufacturer's Catalog Data: When data that describe more than one type, size, model, or item is submitted, clearly mark the data to indicate which type, size, model, or item is being provided. Data shall be sufficient to show conformance to specified requirements.
 - 1. Luminaires, including lamps, ballasts/drivers.
 - 2. Poles and bracket arms.
- E. Shop Drawings:
 - 1. Luminaires.
 - 2. Poles and bracket arms, including dimensions, accessories, installation and construction details.

- F. Manufacturer's Warranty: Submit manufacturer's warranty as stipulated in item entitled "MANUFACTURER'S WARRANTY" hereinbelow.
- G. Reports: Submit test results as stated in the item entitled "FIELD QUALITY CONTROL" hereinbelow.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "must" 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 Contracting Officer. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.
- B. 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 2 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 this section.
- C. Alternative Qualifications: Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
- D. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.06 MANUFACTURER'S WARRANTY

- A. Manufacturer's warranties and guarantees furnished for materials used in the work and instruction sheets and parts lists supplied with materials shall be delivered to the Contracting Officer prior to acceptance of the project.
- B. Manufacturer's LED Luminaire Warranty:
 - 1. Provide a written 5 year minimum replacement warranty for material, fixture finish, and workmanship. Provide written warranty document that contains all warranty processing information needed, including but not limited to, lighting distributor's purchase order number and/or manufacturer's sales order number, manufacturer's toll-free warranty telephone number, customer service point of contact, whether or not a return authorization number is required, return shipping information, and closest return location to the project location.

- a. Finish warranty must include failure and substantial deterioration such as blistering, cracking, peeling, chalking, or fading.
- b. Material warranty must include:
 - 1) All LED drivers and integral control equipment.
 - 2) Replacement when more than 15 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.
- C. Warranty period must begin in accordance with the manufacturer's standard warranty starting date.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Do not store poles on ground. Support poles so they are at least one foot above ground level and growing vegetation. Do not remove factory applied pole wrappings until just before installing pole.

PART 2 - PRODUCTS

2.01 LED LUMINAIRES

- A. UL 1598, NEMA C82.77-10. Provide luminaires as indicated in luminaire schedule or details on project plans. Provide luminaires complete with light sources of quantity, type, and wattage indicated. Luminaires must be specifically designed for use with the LED driver and light source provided. All luminaires of the same type shall be provided by the same manufacturer.
- B. Luminaires: UL 8750, ANSI/IES LM-79, ANSI/ISE LM-80. For all luminaires, provide:
 - 1. Complete system with LED drivers and light sources.
 - 2. Housing constructed of non-corrosive materials. All new aluminum housings must be anodized or powder-coated. All new steel housings must be treated to be corrosion resistant.
 - 3. ANSI/IES TM-21, ANSI/IES LM-80. Minimum L70 lumen maintenance value of 50,000 hours unless otherwise indicated in the luminaire schedule. Luminaire drive current value must be identical to that provided by test data for luminaire in question.
 - 4. Product rated for operation within an ambient temperature range of minus 22 degrees F to 104 degrees F.
 - 5. UL listed for wet locations. Optical compartment for LED luminaires must be sealed and rated a minimum of IP65 per NEMA IEC 60529.
 - 6. IES Lighting Library. Light distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans.
 - 7. Housing finish shall be baked-on enamel, anodized, or baked-on powder coat paint. Finish shall be capable of surviving ASTM B117 salt fog environment testing for 2500 hours minimum without blistering or peeling.

8. LED driver and light source package, array, or module are accessible for service or replacement without removal or destruction of luminaire.
9. ANSI/IES TM-15. Does not exceed the BUG ratings as listed in the luminaire schedule. If BUG ratings are not listed in the luminaire schedule, provide luminaires that meet the following minimum values for each application and mounting conditions:

Lighting Application	Mounting Conditions	BUG Rating
Area and Roadway	All	B3-U0-G3

10. Luminaires shall be fully assembled and electrically tested prior to shipment from factory.
11. The finish color shall be as indicated in the luminaire schedule or detail on the project plans.
12. Luminaire lenses shall be constructed of clear tempered glass or UV-resistant acrylic.
13. All factory electrical connections are made using crimp, locking, or latching style connectors. Twist-style wire nuts are not acceptable.
14. NEMA C136.31. Comply with 3G vibration testing.
15. Luminaire arm bolts shall be 304 stainless steel or zinc-plated steel.
16. Incorporate modular electrical connections, and construct luminaires to allow replacement of all or any part of the optics, heat sinks, power supply units, ballasts, surge suppressors and other electrical components using only a simple tool, such as a manual or cordless electric screwdriver.
17. Roadway and area luminaires shall have an integral tilt adjustment of plus or minus 5 degrees to allow the unit to be leveled in accordance with ANSI C136.3.
18. Luminaires shall have a nameplate bearing the manufacturer's name, address, model number, date of manufacture, and serial number securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.
19. Luminaire must pass 3G vibration testing in accordance with NEMA C136.31.
20. All factory electrical connections shall be made using crimp, locking, or latching style connectors. Twist-style wire nuts are not acceptable.

C. Luminaire Light Sources:

1. LED Light Sources:
 - a. NEMA ANSLG C78.377, NEMA SSL 3. Provide type, lumen rating, and wattage as indicated in luminaire schedule on project plans.

- b. NEMA ANSLG C78.377. Emit white light and have a nominal Correlated Color Temperature (CCT) of 3000 Kelvin.
- c. Minimum Color Rendering Index (CRI) of 80.
- d. Directive 2011/65/EU. Restriction of Hazardous Substances (RoHS) compliant.

D. LED Drivers:

1. NEMA SSL 1, UL 1310. Provide LED Drivers that are electronic, UL Class 1 or Class 2, constant-current type and meet the following requirements:
 - a. Minimum efficiency shall be 85 percent.
 - b. Operate at a voltage of 12VDC volts at 50/60 hertz, with input voltage fluctuations of plus or minus 10 percent.
 - c. Power Factor (PF) greater than or equal to 0.90 at full input power and across specified dimming range.
 - d. Maximum Total Harmonic Distortion (THD) less than or equal to 20 percent at full input power and across specified dimming range.
 - e. Operates for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.
 - f. Meets the "Elevated" (10kV/10kA) requirements per IEEE C62.41.2-2002. Manufacturer must indicate whether failure of the electrical immunity system can possibly result in disconnect of power to luminaire. Provide surge protection that is integral to the LED driver.
 - g. Contains integral thermal protection that reduces the output power to protect the driver and light source from damage if the case temperature approaches or exceeds the driver's maximum operating temperature.
 - h. Complies with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).
 - i. Class A sound rating for all drivers mounted under a covered structure, such as a canopy, or where otherwise appropriate.
 - j. Directive 2011/65/EU. Restriction of Hazardous Substances (RoHS) compliant.
 - k. UL listed for wet locations typical of exterior installations.
 - l. Non-dimmable.
 - m. Rated to operate between ambient temperatures of minus 22 degrees F and 104 degrees F.

2.02 EXTERIOR LUMINAIRE CONTROLS

- A. Provide exterior lighting control system that operates the exterior lighting system as described in the exterior lighting control strategies in the project plans. Submit Sequence of Operation for Exterior Lighting Control System describing the operation of the proposed exterior lighting control system and devices. Sequence of Operation must provide the strategies identified in the exterior lighting control strategies.
- B. Photosensors:
 - 1. UL 773 or UL 773A.
 - 2. Hermetically sealed, silicon diode light sensor type, rated at 45 watts, 120-277 volts, 60 Hz with single-pole, single-throw contacts.
 - 3. Turns ON at 1 to 3 footcandles and turns OFF at 3 to 15 footcandles.
 - 4. Designed to fail to the ON position.
 - 5. Housing is constructed of die cast aluminum, rated to operate within a temperature range of minus 40 to 158 degrees F.
 - 6. Time delay that prevents accidental switching from transient light sources.
 - 7. Designed for 20-year service to match life expectancy of long-life LED fixtures and exceed 15,000 operations at full load. Provide photosensors with zero-cross technology to withstand severe in-rush current and extend relay life.

2.03 POLES

- A. ASCE 7-16. Provide round straight poles designed for wind loading of 130 miles per hour while supporting luminaires and all other appurtenances indicated. The effective projected areas (EPA) of luminaires and appurtenances used in calculations must be specific for the actual products provided on each pole. Provide poles that are anchor-base type. Poles, must have oval-shaped hand hole having a minimum clear opening of 3 by 5 inches. Secure hand hole covers by stainless steel captive screws. Provide metal poles with an internal grounding connection accessible from the hand hole near the bottom of each pole. Install a means of wire disconnection accessible from the hand hole. Do not install square poles. Provide poles from a Manufacturer with a standard provision for protecting the finish during shipment and installation. Do not install scratched, stained, chipped, or dented poles.
- B. Steel Poles: Provide steel poles with hot-dipped galvanized in accordance with ASTM A123/A123M factory finish. Provide poles that meet the following requirements:
 - 1. Minimum 11-gage steel with minimum yield/strength of 48,000 psi.
 - 2. Pole is mounted by anchor bolts.
 - 3. Consists of tapered tubular members, either round in cross section or polygonal.

4. Pole shaft is one piece and is of welded construction with no bolts, rivets, or other means of fastening except as specifically approved.
5. Base covers are of structural quality hot-rolled carbon steel plate, with a minimum yield of 36,000 psi.
6. Markings are approximately 3 to 4 feet above grade and includes manufacturer, year of manufacture, top and bottom diameters, and length.
7. Grounding connection is designed to prevent electrolysis when used with copper ground wire.

2.04 BRACKETS AND SUPPORTS

- A. ANSI C136.3, ANSI C136.13, and ANSI C136.21, as applicable. Pole brackets shall be not less than 1 1/4 inch galvanized steel pipe secured to pole. Slip-fitter or pipe-threaded brackets may be used, but brackets shall be coordinated to luminaires provided, and brackets for use with one type of luminaire shall be identical. Brackets for pole-mounted street lights shall correctly position luminaire no lower than mounting height indicated. Mount brackets not less than 24 feet above street. Special mountings or brackets shall be as indicated and shall be of metal which will not promote galvanic reaction with luminaire head.

2.05 POLE FOUNDATIONS

- A. Anchor bolts shall be steel rod having a minimum yield strength of 50,000 psi; the entire anchor bolt rod shall be galvanized in accordance with ASTM A153/A153M. Concrete shall be as specified in SECTION 03300 - CAST-IN-PLACE CONCRETE.

2.06 EQUIPMENT IDENTIFICATION

- A. Manufacturer's Nameplate: Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
- B. Labels: Provide labeled luminaires in accordance with UL 1598 requirements. Luminaires shall be clearly marked for operation of specific light sources and ballasts according to proper light source type. The following light source characteristics shall be noted in the format "Use Only _____":
 1. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.
 2. Driver and dimming protocol.
 3. Markings related to lamp type shall be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when lamps are in place. LED drivers must have clear markings indicating dimming type and indicate proper terminals for the various outputs.

2.07 FACTORY APPLIED FINISH

- A. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 - EXECUTION


3.01 INSTALLATION

- A. Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.
- B. Install all luminaires in accordance with the luminaire manufacturer's written instructions. Install all luminaires at locations and heights as indicated on the project plans. Level all luminaires in accordance to manufacturer's written instructions.
- C. Provide LED drivers integral to luminaire as constructed by the manufacturer.
- D. Steel Poles: Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 90 degrees at the bottom end. Provide ornamental covers to match pole and galvanized nuts and washers for anchor bolts. Concrete for anchor bases, polyvinyl chloride (PVC) conduit ells, and ground rods shall be as specified in SECTION 16100 - ELECTRICAL WORK. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit ell. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location. After installation, paint exposed surfaces of steel poles with 2 finish coats of exterior oil paint of a color as indicated. Install according to pole manufacturer's instructions. Alterations to poles after fabrication, including non-penetrating attachments to the exterior surfaces of the poles, will void the manufacturer's warranty and shall not be allowed.
- E. Pole Setting: Poles in straight runs shall be in a straight line.

3.02 GROUNDING

- A. Ground noncurrent-carrying parts of equipment including metal poles, luminaires, mounting arms, brackets, and metallic enclosures as specified in SECTION 16100 - ELECTRICAL WORK. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.03 FIELD APPLIED PAINTING

- A. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. 

3.04 FIELD QUALITY CONTROL

- A. Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Conduct an operating test after 100 hours of burn-in time to show that the equipment operates in accordance with the requirements of this section.
- B. Lighting Control Verification Test: Verify lighting control system and devices operate according to approved sequence of operations.

3.05 MISCELLANEOUS

- A. All incidental parts which are not shown on the plans or called for in the proposal or specified herein or in the special provisions and which are necessary to complete the lighting system shall be furnished and installed by the Contractor as though such parts were shown on the plans and/or specified.

END OF SECTION