SPECIFICATIONS FOR:

Fence Replacement at AASF #2 and Physical Security Improvements at Keaukaha Military Reservation (KMR), Hilo, State of Hawaii, Department of Defense, Hawaii Army National Guard, Job No. CA-1328-C1

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

June 2015

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

NOTICE TO BIDDERS

SEALED BIDS for furnishing labor, materials, tools and equipment for "Fence Replacement at AASF #2 and Physical Security Improvements at Keaukaha Military Reservation (KMR), Hilo, State of Hawaii, Department of Defense, Hawaii Army National Guard, Job No. CA-1328-C1" will be received in the Engineering Office, State of Hawaii, Department of Defense, located in Building 306-A, Room 228, 3949 Diamond Head Road, Honolulu, Hawaii, up to 2:00 P.M. on July 22, 2015 and will then and there be publicly opened and read aloud. Bids may also be mailed to State of Hawaii, Department of Defense, 3949 Diamond Head Road, Honolulu, HI, 96816-4495, **ATTN: HIENG, Room 228**. Bids must be received in the Engineering Office, Room 228, prior to the time and date fixed for opening to be considered. All bids received in the Engineering Office after the time and date fixed for opening will not be considered.

Proposed work consists of, but not limited to the following: removing, replacing and adding perimeter fencing and gates, replacing existing roadway, installation of lighting, vehicle traffic arms, card readers, barriers, landscaping, traffic signs and markings.

The estimated cost is between $1,300,000 and $1,600,000.

A Site Visit will be held on June 26, 2015 at 1:00pm. Contractors are to meet Ms. Marlene Salmo outside of the main gate at AASF #2, 1095 Kekuanaoa Street, Hilo, HI 96720 prior to 1:00 pm. Contractors are required to call Ms. Salmo at 808-844-6638 before 4:30 pm on June 25, 2015 to register for the meeting/site visit. If no answer, please leave your company information, attendees names and a contact number, you may assume that you are registered for the site visit. All interested bidders and subcontractors are welcome, but not required to attend. No additional site visits will be scheduled.

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

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

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

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

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

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

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

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

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

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

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

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

Arthur J. Logan
Brigadier General
Adjutant General

Posted on: June 12, 2015

Fence Replacement at AASF #2 and Physical Security Improvements at Keaukaha Military Reservation (KMR), Hilo, State of Hawaii, Department of Defense, Hawaii Army National Guard, Job No. CA-1328-C1

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

Dear Sir:

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

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

☐ A **Hawaii business** incorporated or organized under the laws of the State of Hawaii; **OR**

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

Offeror is:

☐ Sole Proprietor ☐ Partnership ☐ Corporation ☐ Joint Venture

☐ Other _____

Federal I.D. No.: _____

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

Payment address (other than street address below): _____

City, State, Zip Code: _____

Business address (street address): _____

City, State, Zip Code: _____

Respectfully submitted:

(x) _____

Authorized (Original) Signature (*1)

Date: _____

_____

Name and Title (Please Type or Print)

Telephone No.:

_____

*_____

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

Fax No.: _____

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

E-mail Address:

_____ _____

(*1)
Original signature in ink. If unsigned or the affixed signature is a facsimile or a photocopy, the offer shall be automatically rejected unless accompanied by other material, containing an original signature, indicating the Offeror's intent to be bound.

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

AASF #2, Hilo

_____ DOLLARS ($_____).

Additive Bid Item – KMR, Hilo

_____ 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 168 consecutive calendar days for the AASF #2 location or 365 consecutive calendars days for both locations from the date of commencement specified by the written order of the Adjutant General including the date of said order.

NOTE:

1. This project falls under the requirement of the "Buy American Act".

2. Davis-Bacon Act prevailing wage rates apply to this contract.

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

4. A Site Visit will be held on June 26, 2015 at 1:00pm. Contractors are to meet Ms. Marlene Salmo outside of the main gate at AASF #2, 1095 Kekuanaoa Street, Hilo, HI 96720 prior to 1:00 pm. Contractors are required to call Ms. Salmo at 808-844-6638 before 4:30 pm on June 25, 2015 to register for the meeting/site visit. If no answer, please leave your company information, attendees names and a contact number, you may assume that you are registered for the site visit. All interested bidders and subcontractors are welcome, but not required to attend. No additional site visits will be scheduled.

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

6. The State reserves the right to determine the extent of the contract by selecting and/or omitting bid items (not necessarily in sequence) to the extent required to come within

the funds available for the project. The award of the contract shall be made to the responsible bidder whose total bid is the lowest.

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

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

HAWAII PRODUCTS PREFERENCE

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

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

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

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

Change in Availability of Hawaii Product

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

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

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

Hawaii Products available for this project are as follows:

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

APPRENTICESHIP AGREEMENT PREFERENCE

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

1. If applicable to this project, any bidder seeking the preference must be a party to an apprenticeship agreement registered with the State Department of Labor and Industrial Relations (DLIR) at the time the bid is submitted for each apprenticeable trade the bidder will employ to construct the project. "Employ" means the employment of a person in an employer-employee relationship.

   a. The apprenticeship agreement shall be registered with the DLIR and conform to the requirements of Hawaii Revised Statutes Chapter 372.

   b. Subcontractors do not have to be a party to an apprenticeship agreement for the bidder to obtain the preference.

   c. The bidder is not required to have apprentices in its employ at the time the bid is submitted to qualify for the preference.

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

   a. The *Certification of Bidder's Participation – Form 1 s*hall be authorized by an apprenticeship sponsor listed on the DLIR list of registered apprenticeship

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

b. The authorization shall be an original signature by an authorized official of the apprenticeship sponsor.

c. The completed *Certification of Bidder's Participation – Form 1* for each trade must be submitted with the bid. A facsimile or copy is acceptable to be submitted with the bid, however the signed original must be submitted within five (5) working days of the bid open date. If the signed original is not received within this timeframe, the preference may be denied. Previous certifications shall not apply.

d. When filling out the *Certification of Bidder's Participation – Form 1*, the name of Apprenticeable Trade and Apprenticeship Sponsor must be the same as recorded in the List of Construction Trades in Registered Apprenticeship Programs that is posted on the State Department of Labor and Industrial Relations website. "Registered apprenticeship program" means a construction trade program approved by and registered with the DLIR pursuant to HAR § 12-30-1 and §12-30-4.

e. The *Certification of Bidder's Participation – Form 1* and the List of Construction Trades in Registered Apprenticeship Programs is available on the DLIR website at: http://hawaii.gov/labor/wdd

3. Upon receiving the *Certification of Bidder's participation – Form 1,* the Procurement Officer will verify that the apprenticeship program is on the List of Construction Trades in Registered Apprenticeship Programs and that the form is signed by an authorized official of the Apprenticeship Program Sponsor. If the programs and signature are not confirmed by the DLIR, the bidder will not qualify for the preference.

4. If the bidder is certified to participate in an apprenticeship program for each trade which will be employed by the bidder for the project, a preference will be applied to decrease the bidder's bid amount by five (5) percent for evaluation purposes.

5. Should the bidder qualify for other preferences (for example, Hawaii Products), all applicable preference shall be applied to the bid price.

6. If the winning bidder has submitted Form 1 with his bid packet, the Form 2 will be required the first week of each month for the prior month beginning with the month of the start of work.

CHARACTER OF WORKERS OR EQUIPMENT

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

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

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

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

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

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

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

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

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

LICENSE

Due to the nature of the work contemplated, bidder must possess a valid State of Hawaii Contractor's license in the appropriate classification. See Statement of Work for detailed minimum license requirements.

1. The Contractor shall call Mr. Virgil Cadiente at 808-844-6555 and obtain permission before visiting the site.

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

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

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

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

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

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

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

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

   Addendum No. 1 _____ Date Addendum No. 2 _____

   Addendum No. 3 _____ Addendum No. 4 _____

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

ALL JOINT CONTRACTORS & SUBCONTRACTORS TO ENGAGE ON THIS PROJECT

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

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

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

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

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

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

Enclosed herewith as required by law:

Surety Bond
Certificate of Deposit
Certified Check
Cashier's Check
Share Certificate
Legal Tender
(Cross Out Those Not Applicable)

_____ DOLLARS ($ _____).

_____

*Signature

Title _____

_____

Name of Company

_____

Address

_____

_____

Telephone _____

Date _____

HAWAII GENERAL EXCISE TAX

I.D. NO. _____

LICENSE CLASSIFICATION AND/OR SUBCLASSIFICATION NO.

_____

(CORPORATE SEAL)

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

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

FORM 1

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

I. Bidder's Identifying Information

A. Legal Business Name:

B. Project Bid Title & Reference No.:

C. Contact Person's Name:

1. Phone No.: 2. E-Mail:

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

III. Bidder's Certification

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

A. Name (Type) B. Title

C. Signature (original signature required) D. Date

IV. Apprenticeship Sponsor's Contact Information

A. Training Coordinator's Name:

B. Address:

C. Phone No.: D. E-Mail: E. Fax No:

V. Apprenticeship Program Sponsor's Certification

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

A. Name of Authorized Official B. Title

C. Signature (original signature required) D. Date

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

(Rev. 08/25/2010)

(NAME OF CORPORATION)

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

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

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

_____

Secretary

(Names and Addresses of:)
President:
Vice President:
Secretary:
Treasurer:

SPECIAL NOTICE TO BIDDERS - CONSTRUCTION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

B. Legal Tender.

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

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

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

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

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

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

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

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

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

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

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

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

A. Non-compliance with "QUALIFICATION OF BIDDERS".

B. Evidence of collusion among bidders.

C. Lack of responsibility and cooperation as shown by past work.

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

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

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

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

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

I. Failure to pay, or satisfactorily settle, all bids overdue for labor and material on former contracts in force at the time of issuance of proposal forms.

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

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

A. If the proposal is unsigned.

B. Bid security not in accordance with paragraph "BID SECURITY".

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

D. If the proposal shows any non-compliance with applicable law, alteration of form, additions not called, conditional bids, incomplete bids, uninitiated erasures, other defects, or if the prices are obviously unbalanced, or if sufficient funds are not available to prosecute the work.

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

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

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

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

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

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

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

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

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

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

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

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

B. Legal Tender; or

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

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

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

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

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

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

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

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

SPECIAL PROVISIONS FOR CONSTRUCTION CONTRACTS

RESPONSIBILITY OF OFFERORS

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

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

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

COMPREHENSIVE ANNUAL FINANCIAL REPORTING

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

1. Within 30 calendar days of award as applicable to the project, the following shall be submitted:
   a. The total cost of each individual structure;
   b. The total cost of on-site improvement work; and
   c. The total cost of off-site improvement work.

2. After all work, including all change order work has been completed, and prior to a request for final payment, the following shall be submitted:
   a. The total cost of each individual structure including any related change order cost;
   b. The total cost of on-site improvement work including any related change order cost; and
   c. The total cost of off-site improvement work including any related change order cost.

3. The sum total cost of each category noted above shall total to the contract amount awarded, plus all change order work issued.
   a. The cost of each individual structure includes the cost of the structure and any work within five (5) feet of the structure or building line which may include, but is not limited to its foundation, foundation earthwork, and utility improvements within and immediately below the building line.
   b. The on-site improvement cost includes all site improvement work from

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

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

LIABILITY INSURANCE

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

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

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

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

BID PREPARATION

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

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

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

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

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

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

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

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

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

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

AWARD OF CONTRACT

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

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

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

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

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

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

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

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

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

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

Compliance with Section 103D-310(c)(1) and (2), HRS.
Contractors are required to provide a state and federal tax clearance as a prerequisite to entering into a public contract of $2,500 or more. To meet this requirement, all bidders shall submit valid tax clearances with their bid proposals when the bid is $2,500 or more.

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

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

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

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

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

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

SPECIAL PROVISIONS for Act 68, SLH 2010, CONSTRUCTION CONTRACTS

DEFINITIONS FOR TERMS USED IN ACT 68, SLH 2010:

a. "Contract" means contracts for construction under 103D, HRS.

b. "Contractor" has the same meaning as in section 103D-104, HRS, provided that "contractor" includes a Subcontractor where applicable.

c. "Construction" has the same meaning as in section 103D-104, HRS.

d. "Procurement Officer" has the same meaning as in section 103D-104, HRS.

e. "Resident" means a person who is physically present in the State of Hawaii at the time the person claims to have established the person's domicile in the State of Hawaii and shows the person's intent is to make Hawaii the person's primary residence.

f. "Shortage trade" means a construction trade in which there is a shortage of Hawaii residents qualified to work in the trade as determined by the Department of Labor and Industrial Relations.

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

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

b. Prior to starting any construction work, the Contractor shall submit the subcontract dollar amount for each of its Subcontractors.

c. The requirements of this section shall apply to any subcontract of $50,000 or more in connection with the Contractor, that is, such Subcontractors must also ensure that Hawaii residents compose not less than eighty percent of the Subcontractors workforce used to perform the subcontract.

d. The Contractor and any Subcontractor whose subcontract is $50,000 or more shall comply with the requirements of Act 68 for the entire duration of the contract.

1. Certification of Compliance for Employment of State Residents (attached) shall be made on a monthly basis. If no progress payments are made for any month, the Contractor, and any Subcontractor as applicable, shall still be required to submit the certification on a monthly basis to the Contracting Officer Representative. The monthly requirement shall be for the period starting with the Notice to Proceed date and ending with the contract closing date.

2. The Certification of Compliance for Employment of State Residents shall be made under oath by an officer of the company by completing a Certification of Compliance for Employment of State Residents form and executing the Certificate before a licensed notary public.

3. In addition to the monthly certification as indicated above, the Contractor and Subcontractors shall maintain records such as certified payrolls for laborers and mechanics who performed work at the site and time sheets for all other employees who performed work on the project. These records shall include the names, addresses and number of hours worked on the project by all employees of the Contractor and Subcontractor who performed work on the project to validate compliance with Act 68. The Contractor and Subcontractors shall retain these records and provide access to the State for a minimum period of four (4) years after the final payment, except that if any litigation, claim, negotiation, investigation, audit or other action involving the records has been started before the expiration of the four (4) year period, the Contractor and Subcontractors shall retain the records until completion of the action and resolution of all issues that arise from it, or until the end of the four (4) year period, whichever occurs later. Furthermore, it shall be the Contractor's responsibility to enforce compliance with this provision by any Subcontractor.

e. A Contractor who fails to comply with this section shall be subject to any of the following sanctions:

1. Temporary suspension of work on the project until the Contractor or its Subcontractor complies with Act 68;

2. Withholding of payment on the contract until the Contractor or its Subcontractor complies with Act 68;

3. Permanent termination of the Contractor or Subcontractor from any further work on the project;

4. Recovery by the State, as applicable, of any moneys expended on the contract or subcontract as applicable; or

5. Proceedings for debarment or suspension of the Contractor or Subcontractor under Hawaii Revised Statues §103D-702.

Conflict with Federal Law:

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

Davis-Bacon Act:

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

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

Project Title: _____

Agency Project No: _____

Contract No.: _____

As required by Hawai`i Revised Statutes Chapter 103B, as amended by Act 192, Session Laws of Hawaii 2011-Employment of State Residents on Construction Procurement Contracts, I hereby certify under oath, that I am an officer of _____ and
(Name of Contractor or Subcontractor Company)
for the Project Contract indicated above, _____ was in
(Name of Contractor or Subcontractor Company)
compliance with HRS Chapter 103B, as amended by Act 192, SLH 2011, by employing a workforce of which not less than eighty percent are Hawai`i residents, as calculated according to the formula in the solicitation, to perform this Contract.

☐ I am an officer of the **Contractor** for this contract.

☐ I am an officer of the **Subcontractor** for this contract.

CORPORATE SEAL

_____
(Name of Company)

_____
(Signature)

_____
(Print Name)

_____
(Print Title)

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

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

Notary Name: _____

Doc. Description: _____

_____

_____

_____
Notary Public, 1st Circuit, State of Hawai`i
My commission expires: _____

_____
Notary Signature Date
NOTARY CERTIFICATION

SURETY BID BOND

Bond No.

KNOW TO ALL BY THESE PRESENTS:

That we, _____
[Full name or legal title of bidder]
as Offeror, hereinafter called Principal, and _____
[Bonding Company]
_____,
as Surety, hereinafter called Surety, a corporation authorized to transact business as a Surety in the State of Hawaii, are held and firmly bound unto the State of Hawaii, Department of Defense, as Owner, hereinafter called owner, in the penal sum of _____

_____ Dollars ($_____).
[Required amount of bid security]
lawful money of the United States of America, for the payment of which sum well and truly to be made, the said Principal and the said Surety bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS:

The Principal has submitted an offer for _____
[Project number and Title]
_____.

NOW, THEREFORE:

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

Signed this _____ day of _____, 20___.

(Seal) _____
Name of Principal

_____
Signature

Title _____

(Seal) _____
Name of Surety

_____
Signature

Title _____

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ARTICLE 1 - Definitions

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

1.1_ ADDENDUM (plural - Addenda) A written or graphic document, including Drawings and Specifications, issued by the Engineer during the bidding period which modify or interpret the bidding documents, by additions, deletions, clarifications or corrections which shall be considered and made a part of the bid proposal and the contract when executed.

1.2_ ADDITION (to the contract sum) Amount added to the contract Sum by Change Order.

1.3_ ADMINISTRATIVE RULES - Hawaii Administrative Rules for Chapter 103-D of the Hawaii Revised Statutes.

1.4_ ADMINISTRATOR - The Public Works Administrator, Department of Accounting and General Services

1.5_ ADVERTISEMENT - A public announcement soliciting bids or offers.

1.6_ AMENDMENT - A written document properly executed by the Contractor and DOD issued to amend the existing contract between the State and the Contractor.

1.7_ BAD WEATHER DAY - When weather or other conditions prevent a minimum of four hours of work with the Contractor's normal work force on controlling items of work at the site.

1.8_ BENEFICIAL OCCUPANCY - The point of project completion when the State can use the constructed facility in whole or in part for its intended purpose even though substantial completion may not be achieved.

1.9_ BID See OFFER

1.10_ BID SECURITY - The security furnished by the bidder from which the State may recover its damages in the event the bidder breaches its promise to enter into a contract with the State and fails to execute the required bonds covering the work contemplated, if its proposal is accepted.

1.11_ BIDDER - See Offeror

1.12_ BIDDING DOCUMENTS (or SOLICITATION DOCUMENTS) - The advertisement solicitation notice and instructions, Offer requirements, Offer forms, and the proposed contract documents including all addenda, and clarifications issued prior to receipt of the Offer.

1.13_ BULLETIN - A written notice to the Contractor requesting a price and / or time proposal for contemplated changes preparatory to the issuance of a field order or change order.

1.14_ BY OR TO THE ENGINEER - To avoid cumbersome and confusing repetition of expressions in these General Conditions, it is provided that whenever the following words or words of like import are used, they shall be understood as if they were followed by the words "by the Engineer" or "to the Engineer", unless the context clearly indicates another meaning: contemplated, required, determined, directed, specified, authorized, ordered, given, designated, indicated, considered necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient, rejected or condemned.

1.15_ CALENDAR DAY - Any day shown on the calendar beginning at midnight and ending at midnight the following day. If no designation of calendar or working day is made, "day" shall mean calendar day.

1.16_ CHANGE ORDER - A written order signed by the Engineer that establishes the full payment and final settlement of all claims for direct, indirect and consequential costs, including costs of delays, and establishes any adjustments to contract time related to the work covered and affected by one or more field orders, or for change work done or agreed to be done without issuance of a separate field order. A change order signed by all the parties to the contract constitutes a supplemental agreement.

1.17_ COMPLETION - See SUBSTANTIAL COMPLETION and FINAL COMPLETION.

1.18_ COMPTROLLER - The Comptroller of the State of Hawaii, Department of Accounting and General Services.

1.19_ CONSULTANT - A person, firm or corporation having a contract with the State to furnish services with respect to the project

1.20_ CONTRACT - The written agreement between the Contractor and the State of Hawaii by its Adjutant General, by which the Contractor is bound to furnish all labor, equipment, and materials and to perform the specified work within the contract time stipulated, and by which the State of Hawaii is obligated to compensate the Contractor therefore at the prices set forth therein. The contract shall include the Contract Documents and also any and all amendments and change orders which are required to complete the construction in an acceptable manner.

1.21_ CONTRACT COMPLETION DATE - The calendar day on which all work on the project, required by the contract, must be completed. See CONTRACT TIME and FINAL COMPLETION.

1.22_ CONTRACT DOCUMENTS - The Contract, Addenda (which pertain to the Contract Documents, Contractor's Proposal (including Wage Schedule, List of Subcontractors and other documentation accompanying the Bid and any post bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Contract, the Notice to Proceed, the Bonds, these GENERAL CONDITIONS, the SPECIAL CONDITIONS, the Specifications and the Drawings as the same are more specifically identified in the Contract together with all written Amendments, Change Orders, Field Orders, a written order for minor changes in the work and Engineer's written interpretations and clarifications issued on or after the effective date of the Contract.

1.23_ CONTRACT PRICE - The amount designated on the face of the contract for the performance of work including allowances for extra if any.

1.24_ CONTRACT TIME (or CONTRACT DURATION) - The number of calendar (or working) days provided for completion of the contract, inclusive of authorized time extensions. The number of days shall begin running on the effective date in the Notice to Proceed. If in lieu of providing a number of calendar (or working) days, the contract requires completion by a certain date, the work shall be completed by that date.

1.25_ CONTRACTOR - Any individual, partnership, firm, corporation, joint venture, or other legal entity undertaking the execution of the work under the terms of the contract with the State of Hawaii, and acting directly or through its agents, or employees.

1.26_ DEPARTMENT - The Department of Defense, State of Hawaii (abbreviated DOD).

1.27_ DRAWINGS (or Plans) - The contract drawings in graphic or pictorial form, which show the design, location, character, dimensions and details of the Work to be done and which shall be a part of the Contract Documents.

1.28_ ENGINEER - The Department of Defense Engineer, or the authorized person to act in the Engineer's behalf.

1.29_ EQUAL OR APPROVED EQUAL - Whenever this term is used in the drawings or specifications, it shall be interpreted to mean a brand or article, prequalified in accordance with Section 6.3 SUBSTITUTION OF MATERIALS AND EQUIPMENT, that may be used in place of the one specified.

1.30_ FIELD ORDER - A written order issued by the Engineer or the Engineer's authorized representative to the Contractor requiring the contract work to be performed in accordance with a change or changes in the work. A field order may (1) establish a price adjustment and/or time adjustment in an amount the Engineer believes is reasonable for the change; or (2) may declare that the Engineer does not intend to adjust contract time or price for the work; or (3) may request the Contractor to submit a proposal for an adjustment to the contract time and/or price by a certain date.

1.31_ FINAL COMPLETION - The date set by the Engineer that all work required by the contract and any amendments or changes thereto is in full compliance with the contract.

1.32_ FORCE ACCOUNT - Term used when Work is ordered to be done without prior agreements as to lump sum or unit price cost thereof and is to be billed for at cost of labor, materials and equipment, insurances, taxes, etc., plus an agreed percentage for overhead and profit.

1.33_ GUARANTEE - Legally enforceable assurance of the duration of satisfactory performance of quality of a product or Work

1.34_ GOODS - Materials. §103D-104

1.35_ HAZARDOUS MATERIALS - Any and all radioactive materials, asbestos, polychlorinated biphenyls, petroleum, crude oil, chemicals known to cause cancer or reproductive toxicity, pollutants, contaminants, toxic substances or materials cited in Hazardous Material Laws. Abandoned motor vehicles or parts thereof are not hazardous material.

1.36_ HOLIDAYS - The days of each year which are set apart and established as State holidays pursuant to Chapter 8, Hawaii Revised Statutes.

1.37_ INSPECTOR - The person assigned by the Engineer to make detailed inspections of contract performance and materials supplied for the work.

1.38_ LAWS - All Federal, State, City and County Laws, ordinances, rules and regulations, and standard specifications including any amendments thereto effective as of the date of the call for sealed bids.

1.39_ PERFORMANCE LIQUIDATED DAMAGES The amount prescribed in the General Conditions, Section 7.26 FAILURE TO COMPLETE THE WORK ON TIME to be paid to the State or to be deducted from any payments due or to become due the Contractor for each working day or calendar day (as applicable) delay in completing the whole or any specified portion of the work beyond the Contract Time.

1.40_ LETTER OF AWARD - A written notice from the Engineer to the successful bidder(s) stating that its proposal has been accepted by the State.

1.41_ MAJOR UNIT PRICE ITEM - A unit price item which, when extended on its estimated quantities in the proposal form, exceeds five percent (5%) of the total base bid proposal less any allowance and contingent items included in the proposal.

1.42_ NON-CONFORMING WORK - Work that does not fulfill the requirements of the Contract Documents.

1.43_ NOTICE TO CONTRACTORS – See Solicitation.

1.44_ NOTICE TO PROCEED - A written notice from the Contracting Officer to the Contractor advising it of the date on which it is to begin the prosecution of the Work, which date shall also be the beginning of Contract Time.

1.45_ POST CONTRACT DRAWINGS - Drawings issued after the award of the contract for the purpose of clarification and / or changes to the work indicated in the original drawings and which may be made a part of the contract.

1.46_ PROJECT ACCEPTANCE DATE - The calendar day on which the Engineer accepts the project as sufficiently completed in compliance with the contract so that the State can occupy or utilize the Work for its intended use. See SUBSTANTIAL COMPLETION.

1.47_ PROJECT CONTRACT LIMITS (or Contract Zone) - The portion of the site as delineated on the drawings which define the Contractor's primary area of operation for the prosecution of the work. It does not define the exact limits of all construction that may be required under the contract.

1.48_ PROJECT GUARANTEE - A guarantee issued by the Contractor to the State. See GUARANTEE.

1.49_ PROPOSAL (Bid) – See Offer (or Bid).

1.50_ PROPOSAL FORM – See Offer Form (or Bid Form).

1.51_ PUNCH LIST - A list compiled by the Engineer (or Contractor) stating work yet to be completed or corrected by the Contractor in order to substantially complete or finally complete the contract requirements.

1.52_ QUESTIONNAIRE - The specified forms on which the bidder shall furnish required information as to its ability to perform and finance the work.

1.53_ SHOP DRAWINGS - All drawings, diagrams illustrations, schedules and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

1.54_ SPECIAL CONDITIONS - Supplements or modifies the standard clauses of the GENERAL CONDITIONS setting forth conditions or requirements peculiar to the individual project under consideration, which are not thoroughly or

satisfactorily covered, described or explained in these GENERAL CONDITIONS.

1.55_ SPECIFICATIONS - That portion of the Contract Documents consisting of written descriptions for materials, equipment, construction systems, standards, workmanship, directions, provisions and requirements that pertain to the method and manner of performing the work and certain administrative requirements applicable thereto.

1.56_ STATE - The State of Hawaii acting through its authorized representative.

1.57_ SUBCONTRACT - Any written agreement between the Contractor and its subcontractors which contains the conditions under which the subcontractor is to perform a portion of the work for the Contractor.

1.58_ SUBCONTRACTOR - An individual, partnership, firm, corporation, joint venture or other legal entity, as covered in Chapter 444, Hawaii Revised Statutes, which enters into an agreement with the Contractor to perform a portion of the work for the Contractor.

1.59_ SUBSTANTIAL COMPLETION - The status of the project when the Contractor has completed all the work and 1) all utilities and services are connected and working, 2) all equipment is in acceptable working condition, 3) additional activity by the Contractor to correct punch list items as described herein will not prevent or disrupt use of the work or the facility in which the work is located, and 4) the building, structure, improvement or facility can be used for its intended purpose.

1.60_ SUPERINTENDENT - The employee of the Contractor who is charged with the responsibility of all the Work.

1.61_ SURETY - The qualified individual, firm or corporation other than the Contractor, which executes a bond with and for the Contractor to insure its acceptable performance of the contract.

1.62_ UNUSUALLY SEVERE WEATHER Uncommonly harsh weather including but not limited to hurricanes, tornados, tropical storms and tropical depressions, or as otherwise defined in the SPECIAL CONDITIONS.

1.63_ WORK - The furnishing of all labor, materials, equipment, and other incidentals necessary or convenient for the successful completion of the project and the execution of all the duties and obligations imposed by the contract.

1.64_ WORKING DAY - A calendar day, exclusive of Saturdays, Sundays and State-recognized legal holidays for the month in question.

1.65_ OFFER (or Bid) – The executed document submitted by an Offeror in response to a solicitation request, to perform the work required by the proposed contract documents, for the price quoted and within the time allotted.

1.66_ OFFEROR (or BIDDER) – Any individual, partnership, firm, corporation, joint venture or other legal entity submitting directly or through a duly authorized representative or agent, an Offer for the work or construction contemplated.

1.67_ OFFER FORM (or BID FORM) – The form prepared by the Department on which the Offeror submits the written offer or bid. By submitting an offer or bid, the Offeror adopt the language on the form as its own.

1.68_ PROJECT START DATE – The date established in the Notice to Proceed when the Contractor shall begin prosecution of the work and the start of contract time.

1.69_ SOLICITATION – An Invitation to Bid or Request for Proposals or any other document issued by the Department to solicit bids or offers to perform a contract. The solicitation may indicate the time and place to receive the bids or offers and the location, nature and character of the work, construction or materials to be provided.

ABBREVIATIONS

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

BIDDING AND EXECUTION OF CONTRACT REQUIREMENTS

ARTICLE 2 - Proposal Requirements and Conditions

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

2.1.1 Notice of Intention to Bid

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

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

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

2.1.1.4 The Engineer may, in accordance with Section 103D-310 Hawaii Revised Statutes, require the prospective Bidder to submit answers to questions contained in the STANDARD QUALIFICATION QUESTIONNAIRE FOR PROSPECTIVE BIDDERS ON PUBLIC WORKS CONTRACTS, on the form provided by the Department, properly executed and notarized, setting forth a complete statement of the experience of such prospective Bidder and its organization in performing similar work and a statement of the equipment proposed to be used, together with adequate proof of the availability of such equipment, at least two (2) working days prior to the time advertised for the opening of bids. If the information in the questionnaire proves satisfactory, the Bidder's proposal will be received. All information contained in the answers to the questionnaire shall be kept confidential. The questionnaire will be returned to the Bidder after it has served its purpose.

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

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

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

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

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

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

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

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

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

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

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

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

(a) Individual tax clearance certificates from each tax agency, respectively;

(b) Tax clearance certificate from one tax agency and a "special letter" from the other tax agency;

(c) "Special letters" from both tax agencies.

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

2.2 INTERPRETATION OF QUANTITIES IN BID SCHEDULE

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

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

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

2.3 CONTENTS OF PROPOSAL FORMS

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

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

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

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

2.4 THE SITE AND PROPOSED CONTRACT DOCUMENTS

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

2.5 ADDENDA AND BID CLARIFICATIONS

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

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

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

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

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

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

2.6 SUBSTITUTION OF MATERIALS AND EQUIPMENT BEFORE BID OPENING

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

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

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

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

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

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

2.7 PREPARATION OF PROPOSAL

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

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

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

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

2.8 BID SECURITY §3-122-223(d) HAR

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

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

2.8.1.2 Legal Tender; or

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

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

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

(c) **CAUTION** - Bidders are cautioned that certificates of deposit or share certificates with an early withdrawal penalty must have a face value sufficient to cover the maximum penalty amount in addition to the proposal guaranty requirement. If the certificate is made out to two names, the certificate must be assigned unconditionally to the Department of Defense.

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

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

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

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

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

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

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

2.10.1 Withdrawal of Proposals:

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

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

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

2.10.2 Modification of Proposals:

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

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

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

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

2.12.1 Non-compliance with Section 2.1 QUALIFICATION OF BIDDERS.

2.12.2 Evidence of collusion among bidders.

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

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

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

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

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

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

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

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

2.13 PROTEST

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

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

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

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

ARTICLE 3 - Award and Execution of Contract

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

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

3.2.1 If the proposal is unsigned.

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

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

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

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

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

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

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

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

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

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

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

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

(a) Typographical errors;

(b) Transposition errors;

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

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

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

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

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

3.4 AWARD OF CONTRACT

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

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

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

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

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

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

3.7 REQUIREMENT OF PERFORMANCE AND PAYMENT BONDS

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

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

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

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

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

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

3.8 CAMPAIGN CONTRIBUTIONS BY STATE AND COUNTY CONTRACTORS

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

3.9 EXECUTION OF THE CONTRACT

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

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

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

3.10 FAILURE TO EXECUTE THE CONTRACT

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

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

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

3.11 NOTICE TO PROCEED

3.11.1 After the contract is fully executed and signed by the Department of Defense, the Contractor will be sent a formal Notice to Proceed letter advising the Contractor of the date on which it may proceed with the work. The Contractor shall be allowed ten (10) consecutive working days from said date to begin its work. In the event that the Contractor refuses or neglects to start the work, the Engineer may terminate the contract in accordance with Section 7.27 TERMINATION OF CONTRACT FOR CAUSE.

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

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

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

GENERAL CONDITIONS
ARTICLE 4 - Scope of Work

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

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

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

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

4.2.2 Oral Orders

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

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

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

4.2.4 Change Orders

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

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

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

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

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

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

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

4.3 DUTY OF CONTRACTOR TO PROVIDE PROPOSAL FOR CHANGES

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

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

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

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

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

4.4 PRICE ADJUSTMENT HRS 103D-501

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

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

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

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

4.4.1.4 Force Account Method. At the sole option of the Contracting Officer, by the costs attributable to the event or situation covered by the change, plus appropriate profit or fee, all as specified in Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT and the force account provision of Section 8.3 PAYMENT FOR ADDITIONAL WORK before commencement of the pertinent performance;

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

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

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

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

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

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

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

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

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

4.5 ALLOWANCES FOR OVERHEAD AND PROFIT HRS103D-501

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

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

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

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

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

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

4.6 PAYMENT FOR DELETED MATERIAL

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

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

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

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

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

4.8 VARIATIONS IN BOTTOM ELEVATIONS

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

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

4.9 DIFFERING SITE CONDITIONS
§3-125-11 HAR

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

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

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

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

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

4.10 UTILITIES AND SERVICES

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

4.10.1.1 Reviewing and checking all such information and data,

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

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

4.10.1.4 The safety and protection of all such underground and overhead utilities as provided in Section7.17 PROTECTION OF PERSONS AND PROPERTY and repairing any damage thereto resulting from the work.

4.10.2 Unknown Utilities - During the progress of the work, if an underground utility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents, or found at a location that is substantially different than shown or indicated in the Contract Documents, Contractor shall promptly, and before any such conditions are disturbed or damaged (except in an emergency as required by subsection 7.17.8), notify the Engineer. Contractor shall be responsible for the safety and protection of the underground utility as provided in Section7.17 PROTECTION OF PERSONS AND PROPERTY. Refer to subsections 4.9.2 and 4.9.3.

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

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

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

ARTICLE 5 - Control of Work

5.1 AUTHORITY OF THE ENGINEER

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

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

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

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

5.2 AUTHORITY OF THE INSPECTOR

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

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

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

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

5.4 SHOP DRAWINGS AND OTHER SUBMITTALS

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

5.4.1.1 Shop Drawings

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.5.3 Specifications shall govern over drawings.

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

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

5.5.5 Drawings:

5.5.5.1 Schedules shall govern over all other notes and drawings.

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

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

5.5.5.4 Larger scale drawings shall govern over smaller scale drawings.

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

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

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

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

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

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

5.7 EXAMINATION OF DRAWINGS, SPECIFICATIONS, PROJECT SITE

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

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

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

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

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

5.8 COOPERATION BETWEEN THE CONTRACTOR AND THE DEPARTMENT

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

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

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

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

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

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

5.8.3.1 The Engineer shall furnish the requisite bench elevations.

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

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

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

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

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

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

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

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

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

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

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

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

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

5.10 REMOVAL OF DEFECTIVE, NON-CONFORMING AND UNAUTHORIZED WORK

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

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

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

5.11 VALUE ENGINEERING INCENTIVE

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

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

5.11.2 Value Engineering Change Proposal - All VECP must:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.11.6.1 Design calculations;

5.11.6.2 The design criteria used; and

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.12.1.2 Becomes insolvent; or

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

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

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

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

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

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

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

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

ARTICLE 6 - Control of Materials and Equipment

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

6.2 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

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

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

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

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

6.3 SUBSTITUTION AFTER CONTRACT AWARD

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

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

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

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

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

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

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

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

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

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

6.5 TEST SAMPLES

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

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

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

6.6 MATERIAL SAMPLES

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

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

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

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

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

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

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

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

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

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

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

7.1 PROSECUTION OF THE WORK

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.3 INSURANCE REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

7.3.7.4 Property Insurance (Builders Risk)

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

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

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

7.4 PERMITS AND LICENSES

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

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

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

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

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

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

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

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

7.7 PREVAILING WAGES - (§ 104-2 HRS)

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

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

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

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

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

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

7.9 PAYROLLS AND PAYROLL RECORDS

(§ 104-3 HRS)

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

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

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

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

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

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

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

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

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

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

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

7.10 OVERTIME AND NIGHT WORK

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

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

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

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

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

7.11 OVERTIME AND NIGHT PAYMENT FOR STATE INSPECTION SERVICE

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

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

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

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

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

7.11.3 Payment for Inspection Services - The monies due the Department for staff and inspection work and use of vehicles and equipment as determined in subsection 7.11.2 shall be deducted from the monies due or to become due the Contractor. In any and all events, the Contractor shall not pay the Department's employees directly.

7.12 LIMITATIONS OF OPERATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.14 LAWS TO BE OBSERVED

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

7.14.2 The Contractor shall defend, protect, hold harmless and indemnify the State and its Departments and Agencies and all their officers, representatives, employees or agents against any claim or liability arising from or based on the violation of any such laws, ordinances, rules and regulations, orders or decrees, whether such violation is committed by the Contractor or its Subcontractor(s) or any employee of either or both. If any discrepancy or inconsistency is discovered in the contract for the work in relation to any such laws, ordinances, rules and regulations, orders or decrees, the Contractor shall forthwith report the same to the Engineer in writing.

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

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

7.16 SANITARY, HEALTH AND SAFETY PROVISIONS

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

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

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

7.17 PROTECTION OF PERSONS AND PROPERTY

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

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

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

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

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

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

7.17.4 All damage, injury or loss to any property referred to in paragraphs 7.17.1.2 and 7.17.1.3 caused by the fault or negligence or damage or loss attributable to acts or omissions directly or indirectly in whole or part by the Contractor a subcontractor or any one directly or indirectly employed by them, or by anyone for whose acts they might be liable, shall be remedied promptly by the Contractor.

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

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

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

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

7.18 ARCHAEOLOGICAL SITES

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

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

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

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

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

7.19 RESPONSIBILITY FOR DAMAGE CLAIMS; INDEMNITY

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

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

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

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

7.20 CHARACTER OF WORKERS OR EQUIPMENT

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

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

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

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

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

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

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

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

7.21 CONTRACT TIME

7.21.1 Time is of the essence for this contract.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.22 CONSTRUCTION SCHEDULE

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

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

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

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

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

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

7.24 SUSPENSION OF WORK §3-125-7 HAR

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

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

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

7.24.1.3 Failure of the Contractor to:

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

(2) Carry out orders given by the Engineer;

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

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

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

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

7.24.1.6 The convenience of the State.

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

7.24.3 Payment §3-125-7 HAR

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

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

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

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

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

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

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

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

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

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

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

7.25 DISPUTES AND CLAIMS §3-126-31 HAR

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

7.25.1.1 Requirements not clearly covered in the contract, or not ordered by the Engineer as an extra;
7.25.1.2 Failure by the State and Contractor to agree to an Oral Order or an adjustment in price or contract time for a Field Order or a Change Order issued by the State;

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

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

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

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

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

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

7.25.4.1 Date of the protested order, decision or action;

7.25.4.2 The nature and circumstances which caused the claim;

7.25.4.3 The contract provision that support the claim;

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

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

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

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

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

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

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

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

7.25.10 Decision on Claim / Appeal - The Contracting Officer shall decide all controversies between the State and the contractor which arise under, or are by virtue of, this contract and which are not resolved by mutual agreement. The decision of the Contracting Officer on the claim shall be final and conclusive, unless fraudulent or unless the contractor delivers to the Adjutant General a written appeal of the Contracting Officer's decision no later than 30 days after the date of the Contracting Officers decision. The Adjutant General's decision shall be final and conclusive, unless fraudulent or unless the contractor brings an action seeking judicial review of the Adjutant General's decision in an appropriate circuit court of this State within six months from the date of the Adjutant General's decision.

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

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

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

7.26 FAILURE TO COMPLETE THE WORK ON TIME

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

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

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

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

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

7.26.2 Acceptance of Liquidated Damages -The assessment of performance liquidated damages by the Engineer shall be accepted by the parties hereto as final, unless the Contractor delivers a written appeal of the Engineer's decision in accordance with subsection 7.25.10 requirements. Any allowance of time or remission of charges or performance liquidated damages shall in no other manner affect the rights or obligations of the parties under this contract nor be construed to prevent action under Section 7.27 TERMINATION OF CONTRACT FOR CAUSE. If the Department terminates the Contractor's right to proceed, the resulting damage will include such performance liquidated damages for such time as may be required for final completion of the work after the required contract completion date.

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

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

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

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

7.27.3 Costs and Charges

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

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

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

7.28 TERMINATION FOR CONVENIENCE
§3-125-22 HAR

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

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

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

7.28.3.1 Any completed work; and

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

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

7.28.4 Compensation

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

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

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

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

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

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

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

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

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

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

7.31.1 Substantial Completion:

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

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

(b) If the Project is not Substantially Complete, the Engineer shall inform the Contractor. The Contractor shall identify deficiencies which must be corrected, update its Punch list, make the necessary corrections and repeat the previous step. After completing the necessary work, the Contractor shall notify the Engineer in writing that Punch list deficiencies have been corrected and the project is ready for a Final Inspection.

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

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

(1) Field-Posted As-Built Drawings.

(2) Maintenance Service Contract and two (2) copies of a list of all equipment.

(3) Operating and maintenance manuals.

(4) Air conditioning test and balance reports.

(5) Any other final submittal required by the technical sections of the contract.

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

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

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

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

7.32 PROJECT ACCEPTANCE DATE

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

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

7.32.3 The date of Project Acceptance shall determine:

7.32.3.1 End of Contract Time.

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

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

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

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

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

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

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

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

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

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

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

7.33.1.1 All written guarantees required by the contract.

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

7.33.1.3 Certificate of Plumbing and Electrical Inspection.

7.33.1.4 Certificate of Building Occupancy.

7.33.1.5 Certificates for Soil Treatment and Wood Treatment.

7.33.1.6 Certificate of Water System Chlorination.

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

7.33.1.8 All other documents required by the Contract.

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

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

7.34 CONTRACTOR'S RESPONSIBILITY FOR WORK; RISK OF LOSS

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

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

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

7.35 GUARANTEE OF WORK

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

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

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

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

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

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

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

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

7.36 WORK OF AND CHARGES BY UTILITIES

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

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

7.37 RIGHT TO AUDIT RECORDS

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

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

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

7.38 RECORDS MAINTENANCE, RETENTION AND ACCESS

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

7.38.2 The representative of the Department, the Adjutant General of the State of Hawaii, the Attorney General, (the Federal granting agency, the Comptroller General of the United States, and any of their authorized representatives when federal funds are utilized), and the Legislative Auditor of the State of Hawaii shall have the right of access to any book, document, paper, file, or other record of the Contractor and any subcontractor that is related to the performance of services under this Agreement in order to conduct an audit or other examination and / or to make copies, excerpts and transcripts for the purposes of monitoring and evaluating the Contractor and subcontractor's performance of services and the Contractor and subcontractor's program, management, and fiscal practices to assure the proper and effective expenditure of funds and to verify all costs associated with any claims made under this Agreement.

7.38.3 The right of access shall not be limited to the required retention period but shall last as long as the records are retained. The Contractor and subcontractor shall retain all records related to the Contractor and subcontractor's performance of services under this Agreement for four (4) years from the date of final payment, except that if any litigation, claim, negotiation, investigation, audit or other action involving the records has been started before the expiration of the four (4) year period, the Contractor and subcontractors shall retain the records until completion of the action and resolution of all issues that arise from it, or until the end of the four (4)) year retention period, whichever occurs later. Furthermore, it shall be the Contractor's responsibility to enforce compliance with this provision by any subcontractor.

ARTICLE 8 - Measurement and Payment

8.1 MEASUREMENT OF QUANTITIES

8.1.1 All work completed under the Contract shall be measured by the Engineer according to United States standard measures, or as stated in this Contract. The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract shall conform to good engineering practice. These measurements shall be considered correct and final unless the Contractor has protested same to the Engineer and has demonstrated the existence of an error by actual physical measurement before the work has progressed in a manner which would prohibit a proper check.

8.1.2 All measurements of the area of the various surface, pavement and base courses will be made in the horizontal projection of the actual surface and no deductions will be made for fixtures or structures having an area of nine (9) square feet or less. All measurements of headers, curbs, fences and any other type of construction which is to be paid for by its length, will be made in the horizontal projection of the actual driven length from toe to top of cutoff, except where slope exceeds ten percent (10%) and for piles, which will be by actual length. All materials which are specified for measurement by the cubic yard "Loose Measurement" or "Measured in the Vehicle" shall be hauled in approved vehicles and measured therein at the point of delivery. Approved vehicles for this purpose may be of any type or size satisfactory to the Engineer, provided that the body is of such type that the actual contents may be readily and accurately determined. Unless all approved vehicles on a job are of a uniform capacity each approved vehicle must bear a plainly legible identification mark indicating the specific approved capacity. The Inspector may reject all loads not hauled in such approved vehicles.

8.2 NO WAIVER OF LEGAL RIGHTS - The Engineer shall not be precluded or estopped by any measurements, estimate or certificate made either before or after the completion and acceptance of the work and payment therefore, from showing the true amount and character of the work performed and materials furnished

by the Contractor, or from showing that any such measurement estimate or certificate is untrue or incorrectly made, or rejecting the work or materials that do not conform in fact to the contract. The Engineer shall not be precluded or estopped, notwithstanding any such measurement, estimate, or certificate and payment in accordance therewith, from recovering from the Contractor and its sureties such damages as the Department may sustain by reason of the Contractor's failure to comply with the terms of the contract. Neither the acceptance by the Engineer or any representative of the Engineer, nor any payment for or acceptance of the whole or any part of the work, nor any extension of time, or any possession taken by the Engineer, shall operate as a waiver of any portion of the contract, or of any power herein reserved, or any right to damage herein provided. A waiver of any notice requirement or breach of the contract shall not be held to be a waiver of any other notice requirement or subsequent breach.

8.3 PAYMENT FOR ADDITIONAL WORK

8.3.1 Payment for Changed Conditions – A contract modification or change order complying with section 4.4 PRICE ADJUSTMENT and section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT shall be issued for all changes that are directed under Section 4.2 CHANGES. No payment for any change including work performed under the force account provisions will be made until a change order is issued or contract modification is executed.

8.3.1.1 At the completion of the force account work or at an intermediate interval approved by the Engineer, the contractor shall submit its force account cost proposal, including; approved daily force account records with any attached invoices or receipt, to the Engineer for processing a contract modification or change order.

8.3.2 On credit proposals and proposals covering both increases and decreases, the application of overhead and profit shall be on the net change in direct costs for the performance of the work.

8.3.3 When payment is to be made for additional work directed by a field order, the total price adjustment as specified in the field order or if not specified therein for the work contained in the related change order shall be considered full compensation for all materials, labor, insurance, taxes, equipment use or rental and overheads, both field and home office including extended home and branch office overhead and other related delay impact costs.

8.3.4 Force Account Method - When, for the convenience of the Department, payment is to be made by the Force Account method, all work performed or labor and materials and equipment furnished shall be paid for as described below. Payment by the Force Account method will not alter any rights, duties and obligations under the contract.

8.3.4.1 Labor - For all hourly workers, the Contractor will receive the rate of wage including fringe benefits when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work, which shall be agreed upon in writing before beginning work for each and every hour that said labor is actually engaged in said work.

(a) All markups for overhead and profit shall be added subject to limitations established in Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

(b) No allowance for overtime compensation will be given without the written approval of the Engineer prior to performance of such work.

8.3.4.2 Insurance and Taxes - The Contractor and subcontractor(s) will also receive the actual additional costs paid for property damage, liability, workers compensation insurance premiums, State unemployment contributions, Federal unemployment taxes, social security and Medicare taxes to which a markup of up to six percent (6%) may be added.

8.3.4.3 Materials - For materials accepted by the Engineer and used, the Contractor and subcontractor(s) shall receive the actual cost of such materials delivered and incorporated into work, plus a markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

8.3.4.4 Subcontractors - Subcontractor costs shall be the actual costs of the subcontractor marked up as defined in this Section 8.3 plus a markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

8.3.4.5 Equipment

(1) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5.(h) owned or leased by the Contractor or a related entity, the use of which has been authorized by the Engineer:

(a.) The Contractor will be paid at the per-hour rental rates based on the monthly rate established for said machinery or equipment in the then-current edition of the Rental Rate Blue Book for Construction Equipment including the estimated operating cost per hour and regional correction provided therein.

(b.) If no rate is listed for a particular kind, type or size of machinery or equipment, then the monthly, hourly rates shall be as agreed upon in writing by the Contractor and the Engineer prior to the use of said machinery or equipment. If there is no agreement, the Engineer will set a rate. The Contractor may contest the rate pursuant to Section 7.25 DISPUTES AND CLAIMS.

(c.) Rental rates which are higher than those specified in the aforesaid Rental Rate Blue Book publication may be allowed where such higher rates can be justified by job conditions such as work in water and work on lava, etc. Request for such higher rates shall be submitted in writing to the Engineer for approval prior to the use of the machinery or equipment in question.

(2) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5.(h) rented by the Contractor or a related entity specifically for the Force Account work, the use of which has been authorized by the Engineer; The Contractor will be paid the actual rental cost for the machinery or equipment, including mobilization and demobilization costs. A receipt from the equipment supplier shall be submitted to the Engineer.

(3) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5. (h) rented by the Contractor or a related entity for use in the project, but which will also be used for the Force Account work, the use of which has been authorized by the Engineer; The Contractor will be paid the actual rental cost for the machinery or equipment. No additional mobilization and demobilization costs will be paid. A receipt from the equipment supplier shall be submitted to the Engineer.

(4) The rental rate for trucks not owned by the Contractor shall be those as established under the Hawaii State Public Utilities Commission, which will be paid for as an equipment item pursuant to paragraph 8.3.4.5. Rental rates for Contractor-owned trucks not listed in the Rental Rate Blue Book shall be agreed upon in writing by the Contractor and Engineer prior to the use of said trucks. If there is no agreement, the Engineer shall set the rate. The Contractor may contest the rate pursuant to Section 7.25 DISPUTES AND CLAIMS.

(5) The rental period shall begin at the time equipment reaches the site of work, shall include each day that the machinery or equipment is at the site of the work and shall terminate at the end of the day on which the equipment is no longer needed. In the event the equipment must standby due to work being delayed or halted by reason of design, traffic, or other related problems uncontrollable by the Contractor, excluding Saturdays, Sundays and Legal Holidays, unless the equipment is used to perform work on such days, the rental shall be two hours per day until the equipment is no longer needed.

(5.1) The rental time to be paid will be for the time actually used. Any hours or operation in excess of 8 hours in any one day must be approved by the Engineer prior to the performance of such work.

(5.2) Rental time will not be allowed or credited for any day on which machinery or equipment is inoperative due to its breakdown. On such days, the Contractor will be paid only for the actual hours, if any, that the machinery or equipment was in operation.

(5.3) In the event the Force Account work is completed in less than 8 hours, equipment rental shall nevertheless be paid for a minimum 8 hours.

(5.4) For the purpose of determining the rental period the continuous and consecutive days shall be the normal 8-hour shift work day, Monday through Friday excluding legal holidays. Any work day to be paid less than 8 hours shall not be considered as continuous, except for equipment removed from rental for fuel and lubrication.

(5.5) No additional premium beyond the normal rates used will be paid for equipment over 8 hours per day or 40 hours per week.

(6) All rental rates for machinery and equipment shall include the cost of fuel, oil, lubricants, supplies, small tools, necessary attachments, repairs, maintenance, tire wear, depreciation, storage, and all other incidentals.

(7) All machinery and equipment shall be in good working condition and suitable for the purpose for which the machinery and equipment is to be used.

(8) Individual pieces of equipment or tools having a replacement value of one thousand dollars ($1,000) or less, whether or not consumed by use, shall be considered to be small tools and included in the allowed markup for overhead and profit and no separate payment will be made therefore.

(9) The total of all Force Account rental charges accrued over the duration of the contract for a specific item of equipment shall not exceed the replacement cost of that equipment.

(9.1) The Contractor shall provide the cost of replacement to the Engineer prior to using the equipment. If the Engineer does not agree with the replacement cost, the Engineer shall set the replacement cost. The Contractor may contest the replacement cost pursuant to Section 7.25 DISPUTES AND CLAIMS.

(10) Should the item of equipment be rented from an unrelated entity, the rental cost will be treated as an equipment cost under paragraph 8.3.4.5.

(11) Transportation and/or Mobilization: The following provisions shall govern in determining the compensation to be paid to the Contractor for use of equipment or machinery on the Force Account method:

(11.1) The location from which the equipment is to be moved or transported shall be approved by the Engineer.

(11.2) Where the equipment must be transported to the site of the force account work, the Department will pay the reasonable cost of mobilizing and transporting the equipment, including its loading and unloading, from its original location to the site of force account work. Upon completion of the work the Department will pay the reasonable cost of mobilizing and transporting the equipment back to its original location or to another location, whichever cost is less.

(11.3) The cost of transporting the equipment shall not exceed the rates established by the Hawaii State Public Utilities Commission. If such rates are nonexistent, then the rates will be determined by the Engineer based upon the prevailing rates charged by established haulers within the locale.

(11.4) Where the equipment is self-propelled, the Department will pay the cost of moving the equipment by its own power from its original location to the site of the force account work. Upon completion of the work the Department will pay the reasonable cost of moving of the Equipment back to its original or another location, whichever cost is less.

(11.5) At the discretion of the Engineer, when the Contractor desires to use such equipment for other than Force Account work, the costs of mobilization and transportation shall be prorated between the Force Account and non Force Account work.

(12) Pickup trucks, vans, storage trailers, unless specifically rented for the Force Account work, shall be considered incidental to the Force Account work and the costs therefore are included in the markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

8.3.4.6 State Excise (Gross Income) Tax and Bond - A sum equal to the current percentage rate for the State excise (Gross Income) tax on the total sum determined in paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3 and 8.3.4.4 above, and the bond premium shall be added as compensation to the Contractor. The actual bond premium not to exceed one percent (1%) shall be added to items covered by paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3 and 8.3.4.4 when applicable.

The compensation as determined in paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3, 8.3.4.4 and 8.3.4.5 above shall be deemed to be payment in full for work paid on a force account basis.

8.3.4.7 Records - The Contractor and the Engineer shall compare records of the labor, materials and equipment rentals paid by the Force Account basis at the end of each day. These daily records, if signed by both parties, shall thereafter be the basis for the quantities to be paid for by the Force Account method. The Contractor shall not be entitled to payment for Force Account records not signed by the Engineer.

8.3.4.8 Statements - No payment will be made for work on a Force Account basis until the Contractor has submitted to the Engineer, duplicate itemized statements of the cost of such Force Account work detailed as follows:

(a) Laborers - Name, classification, date, daily hours, total hours, rate, and extension for each laborer and foreman and also the amount of fringe benefits payable if any.

(b) Equipment - Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.

(c) Materials

(c.1) Quantities of materials, prices and extensions

(c.2) Costs of transporting materials, if such cost is not reflected in the prices of the materials.

(c.3) Statements shall be accompanied and supported by receipted invoices for all materials used and transportation charges. However, if materials used on the Force Account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices the Contractors shall submit an affidavit certifying that such materials were taken from stock and that the amount claimed represents the actual cost to the Contractor.

(d) Insurance - Cost of property damage, liability and worker's compensation insurance premiums, unemployment insurance contributions, and social security tax.

8.4 PROGRESS AND / OR PARTIAL PAYMENTS

8.4.1 Progress Payments - The Contractor will be allowed progress payments on a monthly basis upon preparing the Monthly Payment Application forms and submitting them to the Engineer. The monthly payment shall be based on the items of work satisfactorily completed and the value thereof at unit prices and/or lump sum prices set forth in the contract as determined by the Engineer and will be subject to compliance with Section 7.9 PAYROLLS AND PAYROLL RECORDS.

8.4.2 In the event the Contractor or any Subcontractor fails to submit certified copies of payrolls in accordance with the requirements of Section 7.9 PAYROLLS AND PAYROLL RECORDS, the Engineer may retain the amount due for items of work for which payroll affidavits have not been submitted on a timely basis notwithstanding satisfactory completion of the work until such records have been duly submitted. The Contractor shall not be due any interest payment for any amount thus withheld.

8.4.3 Payment for Materials - The Contractor will also be allowed payments of the manufacturer's, supplier's, distributor's or fabricator's invoice cost of accepted materials to be incorporated in the work on the following conditions:

8.4.3.1 The materials are delivered and properly stored at the site of Work; or

8.4.3.2 For special items of materials accepted by the Engineer, the materials are delivered to the Contractor or subcontractor(s) and properly stored in an acceptable location within a reasonable distance to the site of Work.

8.4.4 Partial payments shall be made only if the Engineer finds that:

8.4.4.1 The Contractor has submitted bills of sale for the materials or otherwise demonstrates clear title to such materials.

8.4.4.2 The materials are insured for their full replacement value to the benefit of the Department against theft, fire, damages incurred in transportation to the site, and other hazards.

8.4.4.3 The materials are not subject to deterioration.

8.4.4.4 In case of materials stored off the project site, the materials are not commingled with other materials not to be incorporated into the project.

8.5 PROMPT PAYMENT §3-125-23 HAR

8.5.1 Any money paid to a Contractor for work performed by a subcontractor shall be disbursed to such subcontractor within ten (10) days after receipt of the money in accordance with the terms of the subcontract; provided that the subcontractor has met all the terms and conditions of the subcontract and there are no bona fide disputes on which the Engineer has withheld payment.

8.5.2 Upon final payment to the Contractor, full payment to all subcontractors shall be made within ten (10) days after receipt of the money, provided there are no bona fide disputes over the subcontractor's performance under the subcontract.

8.5.3 All sums retained or withheld from a subcontractor and otherwise due to the subcontractor for satisfactory performance under the subcontract shall be paid by the contracting officer to the contractor and subsequently, upon receipt from the contracting officer, by the contractor to the subcontractor within the applicable time periods specified in subsection 8.5.2 and section 103-10 HRS.

8.5.3.1 Where a subcontractor has provided evidence to the contractor of satisfactorily completing all work under their subcontract and has provided a properly documented final payment request as described in subsection (8.5.5) of this section, and;

8.5.3.1.a Has provided to the contractor an acceptable performance and payment bond for the project executed by a surety company authorized to do business in the State, as provided in section 8.6 RETAINAGE; or

8.5.3.1.b The following has occurred:

8.5.3.1.b.1 A period of ninety days after the day on which the last of the labor was done or performed and the

last of the material was furnished or supplied has elapsed without written notice of a claim given to contractor and the surety, as provided for in section 103D-324 HRS; and

8.5.3.1.b.2 The subcontractor has provided to the contractor:

8.5.3.1.b.2.1 An acceptable release of retainage bond, executed by a surety company authorized to do business in the State, in an amount of not more than two times the amount being retained or withheld by the contractor.

8.5.3.1.b.2.2 Any other bond acceptable to the contractor; or
8.5.3.1.b.2.3 Any other form of mutually acceptable collateral.

8.5.4 If the contracting officer or the contractor fails to pay in accordance with this section, a penalty of one and one-half per cent per month shall be imposed upon the outstanding amounts due that were not timely paid by the responsible party. The penalty may be withheld from future payment due to the contractor, if the contractor was the responsible party. If a contractor has violated subsection 8.5.2 three or more times within two years of the first violation, the contractor shall be referred by the contracting officer to the contractor license board for action under section 444-17(14) HRS.

8.5.5 Final Payment Request. A properly documented final payment request from a subcontractor, as required by subsection 8.5.3, shall include:
8.5.5.1 Substantiation of the amounts requested;

8.5.5.2 A certification by the subcontractor, to the best of the subcontractor's knowledge and belief, that:

8.5.5.2.a The amounts requested are only for performance in accordance with the specification, terms, and conditions of the subcontract;

8.5.5.2.b The subcontractor has made payments due to its subcontractors and suppliers from previous payments received under the subcontract and will make timely payments from the proceeds of the payment covered by the certification, in accordance with their subcontract agreements and the requirements of this section; and

8.5.5.2.c The payment request does not include any amounts that the subcontractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of their subcontract; and

8.5.5.2.d The submission of documentation confirming that all other terms and conditions required under the subcontract agreement have been fully satisfied.

8.5.6 The Engineer shall return any final payment request that is defective to the contractor within seven days after receipt, with a statement identifying the defect.

8.5.7 A payment request made by a contractor to the Engineer that includes a request for sums that were withheld or retained from a subcontractor and are due to a subcontractor may not be approved under subsection 8.5.3 unless the payment request includes:

8.5.7.1 Substantiation of the amounts requested; and

8.5.7.2 A certification by the contractor, to the best of the contractor's knowledge and belief, that:

8.5.7.2.a The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;

8.5.7.2.b The subcontractor has made payments due to its subcontractors and suppliers from previous payments received under the contract and will make timely payments from the proceeds of the payment covered by the certification, in accordance with their subcontract agreements and the requirements of this section; and

8.5.7.2.c The payment request does not include any amounts that the contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of their subcontract.

8.5.8 The Engineer shall return any final payment request that is defective to the contractor within seven days after receipt, with a statement identifying the defect.

8.5.9 This section shall not be construed to impair the right of a contractor or a subcontractor at any tier to negotiate and to include in their respective subcontracts provisions that provide for additional terms and conditions that are requested to be met before the subcontractor shall be entitled to receive final payment under subsection 8.5.3 of this section; provided that any such payments withheld shall be withheld by the Engineer.

8.6 RETAINAGE – The Department will retain a portion of the amount due under the contract to the contractor, to ensure the proper performance of the contract.

8.6.1 The sum withheld by the Department from the contractor shall not exceed five percent (5%) of the total amount due the contractor and that after fifty percent (50%) of the contract is completed and progress is satisfactory, no additional sum shall be withheld; provided further that if progress is not satisfactory, the Engineer may continue to withhold as retainage, sums not exceeding five percent (5%) of the amount due the contractor.

8.6.2 The retainage shall not include sums deducted as liquidated damages from moneys due or that may become due the contractor under the contract.

8.6.3 General Obligation Bonds – The contractor may withdraw retainage monies in whole or in part by providing a general obligation bond of the State or its political subdivisions suitable to the Department. The contractor shall endorse over to the Department and deposit with the Department any general obligation bond suitable to the Department, but in no case with a face value less than the value established by law, of the amount to be withdrawn. The Department may sell the bond and use the proceeds in the same way as it may use monies directly retained from progress payments or the final payment.

8.6.4 Any retainage provided for in this section or requested to be withheld by the contractor shall be held by the Engineer.

8.6.5 A dispute between a contractor and subcontractor of any tier shall not constitute a dispute to which the State or any county is a party, and there is no right of action against the State or any county. The State and a county may not be interpleaded in any judicial or administrative proceeding involving such a dispute.

8.6.6 The retention amount withheld by the contractor from its subcontractor shall be not more than the same percentage of retainage as that of the contractor (also applies to subcontractors who subcontract work to other subcontractors) where a subcontractor has provided evidence to the contractor of:

8.6.6.1 A valid performance and a payment bond for the project that is acceptable to the contractor and executed by a surety company authorized to do business in this State;

8.6.6.2 Any other bond acceptable to the contractor; or

8.6.6.3 Any other form of collateral acceptable to the contractor.

8.6.7 A written notice of any withholding shall be issued to a subcontractor, with a copy to the procurement officer, specifying the following:

8.6.7.1 The amount to be withheld;

8.6.7.2 The specific causes for the withholding under the terms of the subcontract; and

8.6.7.3 The remedial actions to be taken by the subcontractor to receive payment of the amounts withheld.

8.6.8 The provisions of this section shall not be construed to require payment to subcontractors of retainage released to a contractor pursuant to an agreement entered into with the contracting officer meeting the requirements of subsection 8.6.3.

8.7 WARRANTY OF CLEAR TITLE - The Contractor warrants and guarantees that all work and materials covered by progress payments made thereon shall be free and clear of all liens, claims, security interests or encumbrances, and shall become the sole property of the Department. This provision shall not, however, be construed as an acceptance of the work nor shall it be construed as relieving the Contractor from the sole responsibility for all materials and work upon which payments have been made or the restoration of any damaged work, or as waiving the right of the Department to require the fulfillment of all the items of the contract.

8.8 FINAL PAYMENT

8.8.1 Upon final settlement, the final payment amount, less all previous payments and less any sums that may have been deducted in accordance with the provisions of the contract, will be paid to the Contractor, provided the Contractor has submitted a Tax Clearance Certificate from the Department of Taxation and the Internal Revenue Service to the effect that all taxes levied or accrued under Federal and State Statutes against the contractor have been paid.

8.8.2 Sums necessary to meet any claims of any kind by the State may be retained from the sums due the Contractor until said claims have been fully and completely discharged or otherwise satisfied.

8.9 CLAIMS ARISING OUT OF PAYMENT FOR REQUIRED WORK - If the Contractor disputes any determination made by the Engineer regarding the amount of work satisfactorily completed, or the value thereof, or the manner in which payment therefore is made or calculated, it shall notify the Engineer in writing of the specific facts supporting the Contractor's position. Such notice shall be delivered to the Engineer no later than thirty (30) days after the Contractor has been tendered payment for the subject work, or, if no payment has been tendered, not later than fifty (50) days after it has submitted the Monthly Payment Application required under Section 8.4 PROGRESS PAYMENTS herein to the Engineer for the work that is the subject of the dispute. The delivery of the written notice cannot be waived and shall be a condition precedent to the filing of the claim. No claim for additional compensation for extra work or change work shall be allowed under this provision, unless the notice requirements of Article 4 SCOPE OF WORK have been followed. Acceptance of partial payment of a Monthly Payment Application amount shall not be deemed a waiver of the right to make a claim described

herein provided the notice provisions are followed. The existence of or filing of a payment claim herein shall not relieve the Contractor of its duty to continue with the performance of the contract in full compliance with the directions of the Engineer. Any notice of claim disputing the final payment made pursuant to Section 8.8 FINAL PAYMENT must be submitted in writing not later than thirty (30) days after final payment that is identified as such has been tendered to the Contractor.

ARTICLE 9 - CONFIDENTIALITY OF PERSONAL INFORMATION

9.1 Definitions. "Personal information" means an individual's first name or first initial and last name in combination with any one or more of the following data elements, when either name or data elements are not encrypted:

1. Social Security number,
2. Driver's license number or Hawaii identification card number; or
3. Account number, credit or debit card number, access code, or password that would permit access to an individual's financial information.

Personal information does not include publicly available information that is lawfully made available to the general public from federal, state or local government records.

"Technological safeguards" means the technology and the policy and procedures for use of the technology to protect and control access to personal information.

9.2 Confidentiality of Material.

(1) All material given to or made available to the CONTRACTOR by the STATE by virtue of this Contract which is identified as personal information shall be safeguarded by the CONTRACTOR and shall not be disclosed without the prior written approval of the STATE.

(2) CONTRACTOR agrees not to retain, use, or disclose personal information for any purpose other than as permitted or required by this Contract.

(3) CONTRACTOR agrees to implement appropriate "technological safeguards" that are acceptable to the STATE to reduce the risk of unauthorized access to personal information.

(4) CONTRACTOR shall report to the STATE in a prompt and complete manner any security breaches involving personal information.

(5) CONTRACTOR agrees to mitigate, to the extent practicable, any harmful effect that is known to CONTRACTOR because of a use or disclosure of personal information by CONTRACTOR in violation of the requirements of this paragraph.

(6) CONTRACTOR shall complete and retain a log of all disclosures made of personal information received from the STATE, or personal information created or received by CONTRACTOR on behalf of the STATE.

9.3 Security Awareness Training and Confidentiality Agreements.

(1) CONTRACTOR certifies that all of its employees who will have access to the personal information have completed training on security awareness topics relating to protecting personal information.

(2) CONTRACTOR certifies that confidentiality agreements have been signed by all of its employees who will have access to the personal information acknowledging that:

(a) The personal information collected, used or maintained by the CONTRACTOR will be treated as confidential;

(b) Access to the personal information will be allowed only as necessary to perform the Contract; and

(c) Use of the personal information will be restricted to uses consistent with the services subject to this Contract.

9.4 Termination for Cause. In addition to any other remedies provided for by this Contract, if the STATE learns of a material breach by CONTRACTOR of this paragraph by CONTRACTOR, the State may at its sole discretion:

(1) Provide an opportunity for the CONTRACTOR to cure the breach or end the violation; or

(2) Immediately terminate this Contract.

9.5 Records Retention.

(1) Upon any termination of this Contract, CONTRACTOR shall pursuant to chapter 487R, HRS, destroy all copies (paper or electronic form) of personal information received from the STATE.

(2) The CONTRACTOR and any subcontractors shall maintain the files, books, and records that relate to

the Contract, including any personal information created or received by the CONTRACTOR on behalf of the STATE, and any cost or pricing data, for three (3) years after the date of final payment under the Contract. The personal information shall continue to be confidential and shall not be disclosed without the prior written approval of the STATE. After the three (3) year retention period has ended, the files, books, and records that contain personal information shall be destroyed pursuant to chapter 487R, HRS.

ADDITIONAL GENERAL CONDITIONS FOR CONSTRUCTION CONTRACTS

The following sections of the Hawaii Administrative Rules, Chapter 3-125 are amended as shown below.

CHANGES FOR CONSTRUCTION CONTRACTS - HAR 3-125-4

1. Change Order. The procurement officer, at any time, and without notice to any surety in a signed writing designated or indicated to be a change order, may make changes in the work within the scope of the contract as may be found to be necessary or desirable. Such changes shall not invalidate the contract or release the sureties, and the contractor will perform the work as changed, as though it had been part of the original contract. Minor changes in the work may be directed by the procurement officer with no change in contract price or time or performance.

2. Adjustments of price or time for performance. If any change order increases or decreases the contractor's cost of, or the time required for performance of any part of the work under this contract, whether or not changed by the order, an adjustment may be made and the contract modified in writing accordingly. Any adjustment in contract price made pursuant to this clause shall be determined in accordance with the price adjustment clause of this contract. Failure of the parties to agree to an adjustment shall not excuse a contractor from proceeding with the contract as changed, provided that the State promptly and duly makes such provisional adjustments in payment or time for the direct costs of the work as changed as the State deems reasonable. The right of the contractor to dispute the contract price or time required for performance or both shall not be waived by its performing the work, provided however, that it follows the notice requirements for disputes and claims established by the contract or these rules.

3. Time Period for Claim. Within thirty days after receipt of a written change order under paragraph (1), unless such period is extended by the procurement officer in writing, the contractor shall file a notice of intent to assert claim for an adjustment. The requirement for timely written notice cannot be waived and shall be a condition precedent to the assertion of a claim.

4. Claim barred after final payment. No claim by the contractor for an adjustment hereunder shall be allowed if written notice is not given prior to final payment under this contract.

5. Claims not barred. In the absence of such a change order, nothing in this clause shall restrict the contractor's right to pursue a claim under the contract or for breach of contract.

PRICE ADJUSTMENT FOR CONSTRUCTION CONTRACTS - HAR 3-125-13.

1. Price adjustment. Any adjustment in contract price pursuant to a clause in this contract shall be made in one or more of the following ways;

a. By agreement on a fixed price adjustment before commencement of the pertinent performance or as soon thereafter as practicable;
b. By unit prices specified in the contract or subsequently agree upon;
c. Whenever there is a variation in quantity for any work covered by any line item in breakdown costs provided by the contractor pursuant to contractual pre-work submittal requirements, by the procurement officer, at the procurement officer's discretion, adjusting the lump sum price proportionately;
d. In such other manner as the parties may mutually agree;
e. At the sole option of the procurement officer, by the costs attributable to the event or situation covered by the change, plus appropriate profit or fee; or
f. In the absence of agreement between the parties, by a unilateral determination by the procurement officer of the costs attributable to the event or situation covered by the clause, plus appropriate profit or fee, all as computed by the procurement officer in accordance with generally accepted accounting principles and applicable sections of chapters 3-123 and 3-126 of the Hawaii Administrative Rules.

2. Determining the cost or credit. In determining the cost or credit to the State resulting from a change, the allowances for all overhead, extended overhead resulting from adjustments to contract time (including home office and field overhead) and profit combined, shall not exceed the percentages set forth below:

a. For the contractor, for any work performed by its own labor forces, fifteen per cent of the cost;
b. For each subcontractor involved, for any work performed by its own forces, fifteen per cent of the cost;
c. For the contractor or any subcontractor, for work performed by their subcontractors, seven per cent of the amount due the performing subcontractor.

3. Percentages for fee and overhead. Not more than three line item percentages for fee and overhead, not to exceed the maximum percentages shown above, will be allowed regardless of the number of tier subcontractors.

PROMPT PAYMENT BY CONTRACTORS TO SUBCONTRACTORS – HAR 3-125-23

1. Prompt payment clause. Any money, other than retainage, paid to a contractor shall be dispersed to subcontractors within ten days after receipt of the money in accordance with the terms of the subcontract; provided that the subcontractor has met all the terms and conditions of the subcontract and there are no bona fide disputes; and, upon final payment to the contractor, full payment to the subcontractor, including retainage, shall be made within ten days after receipt of the money; provided that there are no bona fide disputes over the subcontractor's performance under the subcontract.

(S A M P L E)

Date: _____

Engineering Officer
Department of Defense
State of Hawaii
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Sir:

Subject: REQUEST FOR SUBSTITUTION

PROJECT TITLE: _____

_____

JOB NO. _____

In accordance with the requirements of the Special Provisions, we hereby submit for substitution, three (3) sets of technical brochures and statement of variances for your review and approval for the item(s) shown below.

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

I further certify that my request for substitution of the above item(s) has no other variant features.

_____
SIGNATURE

_____
NAME OF COMPANY AND TITLE

NOTE:
1. Use own letterhead
2. Submit one (1) original and two (2) copies
3. If no variant feature indicate "None".

WEEKLY QUALITY CONTROL REPORT FORM

PROJECT: _____

PROJECT NO: _____

WEEK OF: _____

WORK PERFORMED: _____

_____

_____

_____

_____

_____

INSPECTION REPORT: _____

_____

_____

_____

_____

_____

ATTACH ANY ADDITIONAL INFORMATION

DATE PREPARED: _____

INSPECTOR: _____

VERIFIED BY PRIME CONTRACTOR: _____

SCOPE OF WORK

1. Fence Replacement at AASF #2, Hilo

The project consists of replacing, removing, and adding perimeter fencing and gates on AASF#2 in Hilo. Contractor shall contact Department of Transportation, Airports Division Hilo International Airport Hilo prior to start of work.

2. Physical Security Improvements at Keaukaha Military Reservation (KMR), Hilo

The project consists of replacing, adding, and removing perimeter fencing and gate. Existing entrance road to KMR will be demolished and replaced with a new road design. The new road design consists of lighting, vehicle traffic arms, card readers, vehicle arresting barriers, landscaping, and traffic signs and markings. The existing guard shack will have a concrete pad with underground electrical and communication line.

AASF#2 Fence Replacement (PN15140024) and TS Keaukaha Military Reservation (KMR) Physical Security Improvements (PN15140022) will be listed as separate bid items on the bid form. KMR, Hilo will be an additive bid item.

REQUIREMENTS and SPECIFICATIONS
TO CONSTRUCT

HAWAII ARMY NATIONAL GUARD (HIARNG)
PHYSICAL SECURITY AND IMPROVEMENTS
TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY, PN 15140022
HILO, HAWAII
AND
ARMY AVIATION SUPPORT FACILITY (AASF) #2
FENCE REPLACEMENT, PN 15140024
HILO, HAWAII
STATE JOB NO: CA-1328-D

FOR THE **STATE OF HAWAI‘I, DEPARTMENT OF DEFENSE**

APRIL 2015

Civil Engineer:	HDR Engineering, Inc.
Physical Security Specialist:	HDR Engineering, Inc.
Electrical Engineer:	MK Engineers, Ltd.
Topographic Surveyor:	ControlPoint Surveying, Inc.

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 10 00 - PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Project consists of physical security and fence replacement improvements.
   1. Project Location: Hilo, Hawaii.

B. 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.

C. 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.

D. Contractor shall not alter the Drawings and Specification. If an error or discrepancy is found, notify the Project Manager.

E. Specifying of interface and coordination in the various specification sections is provided for information and convenience only. These requirements in the various sections shall complement the requirements of this Section.

F. All references to specific manufacturer, brand, model numbers, etc. are for reference or color selection only. All brand names and models are assumed to be followed by the statement "approved equal or better".

1.02 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 Project Manager, requested by Project Manager, 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 Project Manager.

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 Project Manager for a decision before proceeding.

1.03 CONTRACT

A. Refer to the Bidding Documents for other contract conditions.

1.04 WORK SEQUENCE

A. The Work will be conducted in a single construction phase.

1.05 USE OF PREMISES AND WORK RESTRICTIONS

A. General: Contractor shall have full use of construction zone for construction operations, including use of project site, during construction period. Contractor's use of premises is limited only by State's right to perform work or to retain other Contractors on portions of the project site.

B. Contractor's use of premises is restricted as follows:
   1. Construction Times and Schedule: As indicated in the Bidding Documents.

   2. Site Access and Parking:
      a. Parking: Parking for the Contractor's employees (or Subcontractors) will be limited to the available areas within the designated Project Contract Limits or in areas designated by the Project Manager. Unauthorized vehicles parked in marked stalls and in any area outside of the designated project construction site will be subject to towing at the Contractor's expense.

      b. Site Access: Refer to ACCESS TO PROJECT SITE AND MAINTAINING HAWAII NATIONAL GUARD AREA PERIMETER SECURITY NOTES on drawings.

   3. Sanitation: Provide self contained combination toilet and urinal units as specified in SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

   4. 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. 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. Contractor shall be required to follow all Federal, State, and local noise requirements.

5. Other Conditions:
   a. Arrange for construction debris and trash to be removed from project site weekly.

   b. Operate machinery and equipment with discretion and with minimum interference to driveways and walkways. Do not leave machinery and equipment unattended on roads and driveways.

   c. Store materials in the areas as designated by the Project Manager. Locate construction equipment, machinery, equipment and supplies within the Project Limits.

   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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 00 - 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 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 Project Manager.

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. 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 Limits. The Contractor of this project shall to the extent ordered by the Project Manager, 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 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 Project Manager in writing.

C. Subject to approval by the Project Manager, 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 Project Manager. This does not relieve the Contractor of the responsibility of proper coordination of the work. If directed by the Project Manager, leave in place any temporary barriers.

   2. Coordinate work that abuts or overlaps work of the other projects with the Project Manager 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 Project Manager, 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 Project Manager provide a combined Contractor's construction schedule.

D. Other Contracts: If known, they are listed in SECTION 01 10 00 - PROJECT REQUIREMENTS.

1.05 PROJECT MEETINGS AND TRAINING

A. General: Schedule and conduct meetings and conferences as directed by the Project Manager at the Contractor's field office, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Project Manager of scheduled meeting dates and times.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Contractor record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Project Manager, within 7 days of the meeting.

B. Preconstruction Conference: Contracting Officer Representative shall schedule a preconstruction conference before the start of construction, at a time convenient to the Contracting Officer Representative. Conference will be held at the Project site or another convenient location. The Contracting Officer Representative shall conduct the meeting to review legal and contracting requirements, review responsibilities, and personnel assignments.
   1. Attendees: Contracting Officer Representative; design consultants; Facility Users; Contractor and its superintendent; major Subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

   2. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Tentative construction schedule.

      b. Phasing.

      c. Critical work sequencing and coordination.

      d. Designation of responsible personnel.

      e. Use of the premises.

      f. Responsibility for temporary facilities and controls.

      g. Parking availability.

      h. Office, work, and storage areas.

      i. Equipment deliveries and priorities.

      j. First aid.

      k. Security.

      l. Sustainable design requirements such as:
         1) Construction Waste Management and recycling

2) Commissioning

3) Recordkeeping, submittals, etc.

m. Progress cleaning.

n. Working hours.

C. Progress Meetings: Conduct progress meetings at monthly or other intervals as determined by the Project Manager. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to Project Manager, each Contractor, Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve 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.

3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
   a. Schedule Updating: Revise Contractor's 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 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Contractor's Construction Schedule.
   2. Submittals Schedule.
   3. Schedule of Prices.
   4. Payment Application.

B. Related Sections include the following:
   1. SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION for preparing a combined Contractor's Construction Schedule.
   2. SECTION 01 33 00 - SUBMITTAL PROCEDURES for submitting schedules and reports.

1.02 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 Prices: 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.

1.03 SUBMITTALS

A. Required Submittals: Submit 8 sets of the list of the required submittals, by Specification Section, within 15 days after award of the contract or upon earlier written instructions from the Project Manager.
   1. The listing shall indicate and include the following:
      a. The number of copies required for submittal.

      b. Planned submittal date.

      c. Approval date required by the Contractor.

      d. A space where the "date of submittal" can be inserted.

      e. A space where the "date of approval" can be inserted.

      f. A space where an "action code" can be inserted.

B. Construction Schedule: Submit 7 sets of the Construction Schedule for review within 15 days after the award of the contract or upon earlier written instructions from the Project Manager.

C. Schedule of Prices: Submit 3 sets of the Schedule of Prices integrated with the Construction Schedule for review within 15 days after the award of the contract or upon earlier written instructions from the Project Manager.

D. Payment Application: Submit the payment application at earliest possible date and no sooner than the last day of the month after all payroll affidavits, updated submittal registers, and schedules have been submitted.

1.04 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate Contractors.

B. Construction Schedule: Coordinate Contractor's Construction Schedule with the Schedule of Prices, Submittals Schedule, loaded monthly event activity, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from parties involved.

   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

C. Schedule of Prices: Coordinate preparation of the schedule with preparation of Contractor's Construction Schedule.
   1. Correlate line items in the Schedule of Prices with other required administrative forms and schedules, including the following:
      a. The Department's Payment Application form and the Construction Progress Report continuation sheet for the event cost estimate per time period.

      b. Submittals Schedule.

PART 2 - PRODUCTS

2.01 SUBMITTALS SCHEDULE

A. Comply with the GENERAL CONDITIONS "SHOP DRAWINGS AND OTHER SUBMITTALS" Article. Furnish required submittals specified in this Section and in the Technical Sections. Submittals include one or more of the following: shop drawings, color samples, material samples, technical data, product data, material safety data information, schedules of materials, schedules of operations, guarantees, test reports, certifications, operating and maintenance manuals, and field posted as-built drawings.

B. Preparation: Furnish a schedule of submittals per Project Manager.
   1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Prices, and Contractor's Construction Schedule.

   2. The schedule shall accommodate a minimum of 25 calendar days for the State's review, as applicable for the Island the project is located.

   3. Prepare and submit an updated list to the Project Manager at monthly intervals or as directed by the Project Manager. The listing shall reflect all approvals received since the last update.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE - PERT CHART CRITICAL PATH METHOD (CPM)

A. The construction schedule shall address the entire project, to the extent required by the Contract Documents, and shall show an expedient and practical execution of work. If requested by the Project Manager, the Contractor shall participate in a preliminary meeting to discuss the proposed schedule and requirements prior to submitting the schedule.

B. The Construction Schedule shall indicate the following:
   1. Elements of the Project in detail time scaled by month or by week, and a project summary.

   2. The order and interdependence of activities and the sequence in which the work is to be accomplished.

   3. How the start of a given activity is dependent upon the completion of preceding activities and how its completion restricts the start of following activities.

   4. The submittal and approval of shop drawings, samples, procurement of critical materials and equipment, receipt of materials with estimated costs of major items for which payment will be requested in advance of installation, fabrication of special materials and equipment, and their installation and testing.

   5. Activities of the State that have an effect on the progress schedule, such as the required delivery dates for State furnished materials and equipment and other similar items.

   6. Provide a separate report with the following:
      a. The description of the activity.

      b. The duration of time in calendar days.

      c. For each activity indicate the early start date.

      d. For each activity indicate the early finish date.

      e. For each activity indicate the late start date.

      f. For each activity indicate the late finish date.

      g. Total float time.

      h. Cost of event.

      i. Contract-required dates for completion of all or parts of the Work.

      j. Events are to be used on “Monthly Progress Report” for monthly payment request.

C. Upon completion of the Project Manager’s review, the Contractor shall amend the schedule to reflect the comments. If necessary, the Contractor shall participate in a meeting with the Project Manager to discuss the proposed schedule and changes required. Submit the revised schedule for review within 7 calendar days after receipt of the comments.

D. Use the reviewed schedule for planning, organizing and directing the work, for reporting progress, and for requesting payment for the work completed. Unless providing an update, do not make changes to the reviewed schedule without the Project Manager's approval.

E. Should changes to the schedule be desired, submit a request in writing to the Project Manager and indicate the reasons for the proposed change. If the changes are major, the Project Manager may require the Contractor to revise and resubmit the schedule at no additional cost to the State. Contractor shall mitigate the impact of all changes by readjusting the sequence of activities, duration of time, or resources utilizing available float.
   1. A change is major if, in the opinion of the Project Manager, the change affects the substantial completion date or other contractual and milestone dates.

   2. Minor changes are those that only affect activities with adequate float time.

F. Once the schedule is reviewed by the Project Manager, the Contractor shall submit 6 sets of the revised schedule within 14 calendar days.

G. Throughout the duration of the project, the Project Manager may require more detailed breakdowns of activities, logic, and schedule submittals from the Contractor.

H. Updated Schedules: Submit at monthly intervals or as directed by the Project Manager. The schedule shall reflect all changes occurring since the last update including the following:
   1. Activities started and completed during the previous period.

   2. The estimated duration to complete each activity that was started but not completed.

   3. Percentage of cost payable for each activity.

   4. Modifications and pending proposed changes.

   5. Narrative report describing current and anticipated problem areas or delaying factors with their impact together with an explanation of corrective actions taken or proposed.

I. Failure on the part of the Contractor to submit updated schedules may be grounds for the Project Manager to withhold progress payments for items noted on the schedule.

J. Contractor shall prosecute the work according to the CPM Schedule. The Project Manager shall rely on the reviewed Contractor's CPM Schedule and regular updates for planning and coordination. The Project Manager's review of the Contractor's CPM Construction Schedule does not relieve the Contractor of its obligation to complete the work within the allotted contract time. Nor does the

review grant, reject or in any other way act on the Contractor's request for adjustments to complete remaining contract work, or for claims of additional compensation. These requests shall be processed in accordance with other relevant provisions of the contract.

K. If the Project Manager issues a field order or change order or other directive that affects the sequence or duration of work activities noted on the construction progress schedule, the Contractor shall promptly update the schedule. To accomplish this update, add, delete or revise the work activities noted or change the logic in the schedule to show the Contractor's plan to incorporate the change into the flow of work. All change orders and time extension requests that affect the construction schedule shall be evaluated based on their impact on the approved Construction Schedule.

L. If the current work is behind schedule or projected to be behind schedule, such as negative float on a critical activity or inability to meet the Contract Completion Date, the Project Manager may require the Contractor, at the Contractor's cost, to take remedial measures to get the project back on schedule. This may require increasing the work force, working overtime and weekends, air freighting materials, or other similar actions.

M. If at any time the Project Manager determines that any critical activity has fallen behind the CPM schedule by 15 calendar days or more, the Contractor shall submit a remedial plan to recapture the lost scheduled time. Include a revised schedule. Furnish the remedial plan no later that 7 calendar days from Project Manager's notification.

N. If an accelerated schedule is proposed, refer to GENERAL CONDITIONS Section 7.22 "CONSTRUCTION SCHEDULE".

2.03 SCHEDULE OF PRICES

A. Furnish a schedule of prices per Project Manager.

B. Provide a breakdown of the Contract Sum in enough detail to facilitate developing and the continued evaluation of Payment Applications. Provide several line items for principal subcontract amounts, or for materials or equipment purchased or fabricated and stored, but not yet installed, where appropriate. Round amounts to nearest whole dollar; total shall equal the Contract Price.

C. Each item in the Schedule of Prices and Payment Application shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

2.04 PAYMENT APPLICATION

A. Use the Schedule of Prices as the Monthly Construction Progress Report. Each Payment Application shall be consistent with previous applications and payments. The Project Manager shall determine the appropriateness of each payment application item.

B. Payment Application Times: The State of Hawaii has 30 days from date of receipt of invoice to make payment. The period covered by each Payment Application starts on the first day of the month or following the end of the preceding period and ends on the last day of the month.

C. Updating: Update the schedule of prices listed in the Payment application when Change Orders or Contract Modifications result in a change in the Contract Price.

D. Provide a separate line item for each part of the Work where Payment Application may include materials or equipment purchased or fabricated and stored, but not yet installed.

E. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.

F. Provide separate line items for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

G. Payment Application Forms: Use and submit copies of the Payment Application and Construction Progress forms provided by Project Manager.

H. Application Preparation: Complete every entry on form. Execute by a person authorized to sign legal documents on behalf of the Contractor.
   1. Entries shall match data on the Schedule of Prices and Contractor's Construction Schedule. Use updated schedules if revisions were made. Include amounts of Change Orders and Contract Modifications issued before last day of construction period covered by application.

I. No payment will be made until the following are submitted each month:
   1. Monthly Estimate, 7 copies.
   2. Monthly Progress Report, 7 copies.
   3. Statement of Contract Time, 7 copies.
   4. Updated Submittal Register, 1 copy.
   5. Updated Progress Schedule, 1 copy.
   6. All Daily Reports, 1 copy.
   7. All Payroll Affidavits for work done, 1 copy.

J. Retainage: The Department will withhold retainage in compliance with the GENERAL CONDITIONS.

K. Transmittal: Submit the signed original.

2.05 CONTRACTOR DAILY PROGRESS REPORTS

A. The General Contractor and all Subcontractors shall keep a daily report of report events.

B. The form of the Contractor Daily Progress Report shall be as directed by the Project Manager.

C. Submit copies of the previous week's reports on Monday morning at 10:00 a.m.

D. Submit copies of the reports with the monthly payment request for the whole period since the last payment request submittal.

E. Deliver the reports in hard copy, by e-mail, or web based construction management as directed by the Project Manager.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Comply with the GENERAL CONDITIONS “Shop Drawings and Other Submittals” section and “Material Samples” section.

B. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

C. Related Sections include the following:
   1. SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION for submitting schedules and reports, including Contractor’s Construction Schedule and the Submittals Schedule.

   2. SECTION 01 77 00 - CLOSEOUT PROCEDURES for submitting warranties, project record documents and operation and maintenance manuals.

1.02 SUBMITTAL PROCEDURES

A. Coordinate Work and Submittals: Contractor shall certify the submittals were reviewed and coordinated.

B. Submittal Certification: Provide in MS Word when submitting electronically. Project Manager will provide an electronic copy of the Submittal Certification. Provide a reproduction (or stamp) of the “Submittal Certification” and furnish the required information with all submittals. Include the certification on:
   1. The title sheet of each shop drawing, or on

   2. The cover sheet of submittals in 8-1/2 inch x 11-inch format,

   3. One face of a cardstock tag (minimum size 3-inch x 6-inch) tied to each sample. On the sample tag, identify the sample to ensure sample can be matched to the tag if accidentally separated. The opposite face of the tag will be used by the Project Manager to receive, review, log stamp and include comments.

C. Variances: The Contractor shall request approval for a variance. Clearly note any proposed deviations or variances from the Specifications, Drawings, and other Contract Documents on the submittal and also in a separately written letter accompanying the submittal.

D. Submittal Certification Form (stamp or digital)

CONTRACTOR'S NAME: _____

PROJECT: _____

As the General Contractor, we checked this submittal and we certify it is correct, complete, and in compliance with Contract Drawings and Specifications. All affected Contractors and suppliers are aware of, and will integrate this submittal into their own work.

SUBMITTAL NUMBER _____ DATE RECEIVED _____

REVISION NUMBER _____ DATE RECEIVED _____

SPECIFICATION SECTION NUMBER /PARAGRAPH NUMBER _____

DRAWING NUMBER _____

SUBCONTRACTOR'S NAME _____

SUPPLIER'S NAME _____

MANUFACTURER'S NAME _____

NOTE: DEVIATIONS FROM THE CONTRACT DOCUMENTS ARE PROPOSED AS FOLLOWS (Indicate "NONE" if there are no deviations)

CERTIFIED BY	

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 SUBMITTAL REGISTER AND TRANSMITTAL FORM

A. Contractor shall use submittal register and transmittal forms as directed by the Project Manager.

B. The listing of required submittals within this Section is provided for the Contractor's convenience. Review the specification technical sections and prepare a comprehensive listing of required submittals. Furnish submittals to the Project Manager for review.

C. Contractor shall separate each submittal item by listing all submittals in the following groups with the items in each group sequentially listed by the specification section they come from:
   1. Administrative
   2. Data
   3. Tests
   4. Closing

D. Contractor shall separate all different types of data as separate line items all with the column requirements.

E. Contractor shall send monthly updates and reconciled copies electronically to the Project Manager and the Design Consultant in MS Word or MS Excel or other format as accepted by the Project Manager.

Section No. - Title	Shop Drawings & Diagrams	Samples	Certificates (Material, Treatment, Applicator, etc.)	Product Data, Manufacturer's Technical Literature	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment or Fixture Listing	Schedules (Project Installation)	Maintenance Service Contract	Field Posted As-Built Drawings	Others	Guaranty or Warranty	Manufacturer's Guaranty or Warranty (Greater than one year)
01 32 00 - Construction Progress Documenta-tion											■			■		
01 33 00 - Submittal Procedures			■											■		
01 50 00 - Temporary Facilities and Controls							■							■		
01 52 40 - Construction Waste Management						■	■							■		
01 70 00 - Execution Requirements														■		
01 77 00 - Closeout Procedures	■								■				■	■	■	
02 41 00 - Demolition														■		
03 30 53 – Miscellaneous Cast-in-Place Concrete	■		■	■			■							■		
07 84 00 – Firestopping	■		■				■									
26 20 00 – Interior Distribution System	■			■			■									

Section No. - Title	Shop Drawings & Diagrams	Samples	Certificates (Material, Treatment, Applicator, etc.)	Product Data, Manufacturer's Technical Literature	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment or Fixture Listing	Schedules (Project Installation)	Maintenance Service Contract	Field Posted As-Built Drawings	Others	Guaranty or Warranty	Manufacturer's Guaranty or Warranty (Greater than one year)
26 56 00 – Exterior Lighting	■		■	■			■							■		
27 10 00 – Building Telecommuni-cations Cabling System	■		■	■			■							■		
28 05 26 – Grounding and Bonding for Electronic Safety and Security				■			■							■		
31 00 00 - Earthwork			■	■			■									
32 11 23 – Aggregate and/or Graded-Crushed Aggregate Base Course				■			■									
32 12 10 – Bituminous Tack and Prime Coats							■									
32 12 16 – Hot-Mix Asphalt (HMA) for Roads		■	■	■			■									
32 16 13 – Concrete Sidewalks and Curbs				■			■									
32 17 24 – Pavement Markings			■	■			■									

Section No. - Title	Shop Drawings & Diagrams	Samples	Certificates (Material, Treatment,	Product Data, Manufacturer's	MSDS Sheets	Calculations	Reports (Testing, Maintenance,	Test Plan	O & M Manual	Equipment or Fixture Listing	Schedules (Project Installation)	Maintenance Service Contract	Field Posted As-Built Drawings	Others	Guaranty or Warranty	Manufacturer's Guaranty or Warranty
32 31 13 – High-Security Chain Link Fences and Gates	■	■	■	■			■							■		
33 71 02 – Underground Electrical Distribution			■	■			■							■		
34 41 26 – Access Control Point Control System	■	■	■	■		■	■							■		

END OF SECTION

SECTION 01 50 00 - 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. Sewers.
   2. Storm drainage.
   3. Water service and distribution.
   4. Sanitary facilities, including toilets, wash facilities, and drinking water facilities.
   5. Ventilation.
   6. Electric power service.
   7. Lighting.
   8. 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.

D. Security and protection facilities and measures include, but are not limited to, the following:
   1. Environmental protection.
   2. Stormwater control.
   3. Tree and plant protection.
   4. Site enclosure fence.
   5. Barricades, warning signs, and lights.

6. Pest control.

7. Fire protection.

E. Related Sections: Refer to Divisions 02 through 33 for other temporary requirements including ventilation, humidity requirements and products in those Sections.

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 or Federal Government working within the contract limits.

   2. Occupants of Project.

   3. Testing agencies.

   4. Project Manager 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, "Safety Requirements for Demolition Operations", NECA's "Temporary Electrical Facilities", and NFPA 241, "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. Electrical 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 Project Manager, 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 Project Manager'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.

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 Project Manager. 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 Project Manager. Provide materials suitable for use intended.

B. Plastic Enclosure Fence: Industry standard 4-feet high plastic fencing with metal (or wood) post supports at 10-feet on center connected with a top and bottom 12-gauge soft annealed galvanized tie wires securely connected to posts. Posts shall be capable of resisting a lateral load of 100 pounds measured at the top of the post.

C. Water: Potable.

2.02 EQUIPMENT

A. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA recommended classes for exposures. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

B. Self Contained Combination Toilet and Urinal Units: Single occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material. One quarter of, or at least one unit(s) shall contain a handwash sink with potable water storage.

C. 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 Field Office(s) including paper cup supply.

D. 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.

E. 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.

F. Data and Communication: Provide service and equipment throughout construction period.
   1. Provide a facsimile machine at Contractor' field office.

   2. Provide plain paper copier, automatic feed, collating capabilities and printing up to 11-inch by 17-inch sheets at Contractor' field office.

3. Computer Internet Connection: Provide a high-speed connection (landline satellite or wireless). Connection shall be separate from the telephone service.

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.

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. General: Engage appropriate local utility company to install temporary service or connect to existing service where directed by the Project Manager. 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 and Sewer Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If storm drains are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off site in a lawful manner.
   1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers, storm drains or pollute waterways before discharge.

   2. Connect temporary sewers, if used as directed by sewer department officials.

   3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.

   4. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.

C. 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. Meter the tapped line and prior to water use, notify the Project Manager to observe an initial meter reading.

   3. Take monthly meter readings. Pay the State, on a monthly basis, for water used at the current rate per 1,000 gallons.

   4. Payments are to be by check as directed by the Project Manager:

   5. Checks shall be accompanied by the following information:
      a. Name of facility, Project Name and Title and State 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.

   6. Upon completion of the project and just prior to removal of the water meter, notify the Project Manager to observe a final meter reading.

   7. 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.

D. 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. Toilets: Install self contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel.

   3. 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.
      a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

4. Locate toilets and drinking water fixtures so personnel need not walk more than 200-feet horizontally to facilities.

E. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnecting means, automatic ground fault interrupters, and main distribution switchgear. Use of State facilities electrical power services will be permitted as long as equipment is maintained in a condition acceptable to the Project Manager. Make arrangements with utility companies for temporary use of electricity for construction use. Pay for all expenses pertaining thereto.

F. Electrical Distribution: Provide receptacle outlets adequate for connection of power tools and equipment. Protect wiring, in conduits or other, measures when exposed to possible damage or traffic areas.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.

H. Telephone Service: Provide temporary telephone service throughout construction period for common use facilities used by all personnel engaged in construction activities. Install separate telephone line for the Contractor's field office and first aid station.
   1. At field office, provide land-line telephone service or if approved by the Project Manager, wireless (digital or cellular) telephone service. Provide internet service with ISP with unlimited access. Provide broadband where available.

   2. At each telephone, post a list of important telephone numbers.
      a. Police and fire departments,

      b. Ambulance service,

      c. Contractor's home office,

      d. Contract contacts,
         1) Subcontractors

         2) Suppliers

      e. Department Staff contacts,
         1) Construction Coordinator

         2) Inspector

      f. State's Emergency contacts,
         1) Construction Coordinator after hours

         2) Inspector after hours

g. Principal Subcontractors' field and home offices,

h. User's office and emergency.

3. Provide a portable wireless telephone with voice-mail or messaging service for superintendent's use in making and receiving telephone calls when away from field office.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Locate field offices, 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 Project Manager.

   2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion.

B. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction and obtain all necessary permits.

C. Site Drainage: Comply with all regulatory Best Management Practices. See Attachment "Construction Site Best Management Practices Checklist" appended to the end of this Section. Checklist shall be submitted to Project Manager and HIARNG Environmental Office.

D. Temporary Sign(s):
   1. Install signs where directed by the Project Manager or where indicated to inform public and persons seeking entrance to the Project. Do not permit installation of unauthorized signs.

   2. Provide temporary signs to provide directional information to constructional personnel and visitors.

   3. Construct signs with durable materials, properly supported or mounted, and visible.

E. Trash, Refuse Disposal:
   1. Department of Health - Illegal Dumping Notice. See Attachment "DEPARTMENT OF HEALTH – ILLEGAL DUMPING NOTICE" appended to the end 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. Cover loads before transporting offsite.

   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.

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.

F. Janitorial Services: Provide janitorial services on a weekly basis for the Project Manager's field office, first aid stations, toilets, wash facilities, lunchrooms, and similar areas.

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 and operational 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 that meet allowable noise limits prior to 6:45 A.M. or equipment exceeding allowable noise levels prior to 7:00 A.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 Project Manager 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.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect existing landscaping and tree root systems from damage, flooding, and erosion due to construction activity.

F. Hazardous Materials: Complete Hazardous Material Inventory Log and submit to Project Manager and HIARNG Environmental Office 30 days prior to start of project. See Attachment “HAZARDOUS MATERIAL INVENTORY LOG” appended to the end of this Section.

G. Pest Control: Comply with pest management procedures and requirements for pesticides at HIARNG facilities. See Attachments “OUTLINE OF PEST MANAGEMENT PROCEDURES AT HAWAII ARNG FACILITIES” and “REQUIREMENTS FOR PESTICIDE (HERBICIDE, INSECTICIDE, RODENTICIDE) APPLICATIONS AT HAWAII ARMY NATIONAL GUARD (HIARNG) FACILITIES” appended to the end of this Section.

H. Spill Incidents:

1. Report spills immediately to HIARNG Environmental Office at (808) 672-1013.

2. Submit spill incident report form to Project Manager and HIARNG Environmental Office within 72 hours of the spill. See Attachment "HIARNG Spill Incident Report Form" appended to the end of this Section.

I. Emergency Contact Sign: Emergency contact sign shall be posted at Contractor's field office. See Attachment "EMERGENCY CONTACTS" appended to the end of this Section.

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 Sections of the GENERAL CONDITIONS.

3.06 BARRICADES AND ENCLOSURES

A. Barricades: Before construction operations begin, erect temporary construction barricade(s) to prevent unauthorized persons from entering the project area and to the extent required by the Project Manager.
   1. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.

   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Project Manager with 2 sets of keys.

   3. Maintain temporary construction barricade(s) throughout the duration of the Work. During the course of the project, the Project Manager may require additional barricades be provided for the safety of the public. Contractor shall erect the additional barricade(s) at its own expense.

   4. Construction: Plastic fencing.

B. Security Enclosure and Lockup:
   1. Install substantial temporary enclosure around partially completed areas of construction.

   2. Provide lockable entrances to temporary baseyard to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

C. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

3.07 TEMPORARY FIRE PROTECTION

A. Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
   1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
      a. Field Offices: Class A stored pressure water type extinguishers.

      b. Other Locations: Class ABC dry chemical extinguishers or a combination of extinguishers of NFPA recommended classes for exposures.

   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.

   5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

   6. Develop and supervise an overall fire prevention and first aid fire protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.08 OPERATION, TERMINATION, AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by heat 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.

3.09 ATTACHMENTS

Attachment A: DEPARTMENT OF HEALTH – ILLEGAL DUMPING NOTICE (1 page)

Attachment B: Construction Site Best Management Practices Checklist (1 page)

Attachment C: HAZARDOUS MATERIAL INVENTORY LOG (2 pages)

Attachment D: INSTRUCTIONS FOR THE USE OF THE PEST MANAGEMENT MAINTENANCE RECORD (DD FORM 1532-1) (5 pages)

Attachment E: OUTLINE OF PEST MANAGEMENT PROCEDURES AT HAWAII ARNG FACILITIES (7 pages)

Attachment F: REQUIREMENTS FOR PESTICIDE (HERBICIDE, INSECTICIDE, RODENTICIDE) APPLICATIONS AT HAWAII ARMY NATIONAL GUARD (HIARNG) FACILITIES (11 pages)

Attachment G: HIARNG Spill Incident Report Form (2 pages)

Attachment H: EMERGENCY CONTACTS (1 page)

END OF SECTION

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.

Construction Site Best Management Practices Checklist

Sites < 1 acre are exempt from needed an NPDES permit, however they still need to implement Best Management Practices and Good housekeeping to prevent a harm to human health and the environment.

Best Management Practices	Yes	No	N/A
Do all containers of POL have secondary containment?			
Are storm drains and UIC protected from sediment and contaminated runoff?			
Are all containers of hazardous material and waste labeled and stored in accordance with applicable federal and state regulations?			
Are spill kits positioned in high risk locations?			
Are all stockpiles covered and/or protected from erosion			
Is the silt fence intact and effective at preventing illicit discharges?			
Are slopes stabilized to prevent erosion?			
Are dip pans being used under leaking equipment?			
Have all spills been cleaned up?			
Is the site free of trash and debris? Good housekeeping?			
Are all metal objects stored on pallets			
Is the entrance to the site stabilized to prevent tracking sediment off site?			
Are tires being washed prior to leaving the site?			

Comments

HAZARDOUS MATERAL INVENTORY LOG

CONTRACTOR NAME: DATE SUBMITTED:

PROJECT NUMBER & NAME:

PROJECT DESCRIPTION:

PROJECT LOCATION:

PROJECT START DATE: PROJECT END DATE:

GOVERNMENT PROJECT MANAGER NAME AND PHONE: REPORT PERIOD *(circle)* : Start Annual End

Submit to HIARNG Environmental Office prior to start of project, within 30 days of completion, and update by 31 January.

PRODUCT NAME AND IDENTIFICATION NUMBER	MANUFACTURER	SIZE OF CONTAINER	ESTIMATED NUMBER OF CONTAINERS FOR PROJECT	MAXIMUM NUMBER OF CONTAINERS STORED ON SITE AT ANY ONE TIME	ACTUAL NUMBER OF CONTAINERS USED	FOR ENV USE

Page_____of _____

HAZARDOUS MATERAL INVENTORY LOG

Continuation Page

PRODUCT NAME AND IDENTIFICATION NUMBER	MANUFACTURER	SIZE OF CONTAINER	ESTIMATED NUMBER OF CONTAINERS FOR PROJECT	MAXIMUM NUMBER OF CONTAINERS STORED ON SITE AT ANY ONE TIME	ACTUAL NUMBER OF CONTAINERS USED	FOR ENV USE

Page _____ of _____

INSTRUCTIONS FOR THE USE OF THE PEST MANAGEMENT MAINTENANCE RECORD (DD FORM 1532-1)

GENERAL INFORMATION

1. The Pest Management Maintenance Record (DD Form 1532-1) provides a standard method for recording pest management operations including surveillance activities, pesticide use, and other pest control information at an installation.

Use of this record complies in part with AR 200-1 (Ch.5), DoDI 4150.7, and Federal Regulation 40 CFR 171.11 (c) (7) of the Federal Insecticide, Fungicide and Rodenticide Act, as amended. It is used as a permanent maintenance record and historical account of pest control operations at a particular site (building, structure, or outdoor site) located at Hawaii Army National Guard (HIARNG) Facilities.

The record also provides continuity in the management and performance of pest control operations at the installation level. Use and analysis of these records can assist in identifying structures, designs and areas which have significantly more pest problems than others.

Historical pest control data can also be used to verify warranties, correlate sites and treatment, and to facilitate analyses for cost effective pest management.

2. All pesticide applications and non-chemical pest management operations accomplished for each structure, building, or outdoor site are to be recorded on DD Form 1532-1 daily by the applicator / inspector and submitted monthly to the HIARNG Environmental Office Pest Management Coordinator (PMC).

3. Pest Management Maintenance Records (DD Form 1532-1) are maintained for 2 years and archived at the installation indefinitely. A comprehensive review of these records will be scheduled annually and in conjunction with on-site visits by the HIARNG Environmental Office PMC. Information on pest infestation treatment frequencies and pesticide application trends gained from this analysis can then be used by the PMC to adjust and improve the installation's pest management plan and operations.

4. Point of Contact: HIARNG Environmental Office PMC:

Craig Blaisdell
Natural Resources Supervisor/
Pest Management Coordinator
HIARNG Environmental Office
1304 A Kekuanaoa St
Hilo, Hawaii 96720
Office: (808) 672-1278
Cell: (808) 206-2043
Fax: (808) 844-6653
Email: craig.p.blaisdell.nfg@mail.mil

DATA ENTRY ON DD FORM 1532-1

1. **Top Line Data Entry on DD Form 1532-1 (Copy of DD Form 1532-1 on pg. 8)**

    a. **Bldg/Area** - Enter the building or structure number when a maintenance record is needed. Similarly, for outdoor areas to be maintained on record, enter a description or area number, if available.

    b. Size – Enter the size of the Bldg/Area to be maintained. Size should be recorded as square feet, cubic feet, linear feet or acres. (See "Measurement Units" at the bottom of DD Form 1532-1).

    c. Type of Construction - Enter the code letters to designate the major "Type of Construction". More than one set of code letters may be used, if desired.

BL = Block	NA = Not applicable
BV = Brick veneer	WO = Wood
CO = Concrete	ST = Steel
OT = Other	

    d. Use Designation – Enter information to identify the major use of the building, structure or area.

2. **Pest Control Operation Information Data Entry on DD Form 1532-1**

    Recording Operations. Each line of the DD Form 1532-1 can be used to record a complete pest control operation. Most operations using a single pesticide can be entered without difficulty, but in operations where two or more pesticides are used as a tank-mix or premixed pesticides, each pesticide is reported as if it were a separate operation. When the applications of two or more pesticides are done simultaneously, the man-hours are simply divided equally for each chemical.

    a. **Date** - Enter the date of the pest management operation in the date column (month, day, year).

    b. **Units Serviced –** Total units treated (number only). This indicates the area, volume, or number of items treated.

    c. **Work Origin** - Enter the code for Work Origin using the symbols in the legend to show how the work was initiated (See "Origin Of Work" at the bottom of DD Form 1532-1).

d. **Unit of Measure** – Enter the amount of area treated using the measurement units listed.

AC = Acres	MCY = 1,000 Cu Yds
CF = Cubic Ft	MLF = 1,000 Linear Ft
CY = Cubic Yds	MLY = 1,000 Linear Yds
EA = Each	MSF = 1,000 Sq Ft
LF = Linear Ft	MSY = 1,000 Sq Yds
LY = Linear Yds	PAC = Per Acre
MCF = 1,000 Cu Ft	SY = Sq Yds

e. **Target Pest –** Find the most appropriate **descriptive term** for the pest and enter on the form.

f. **Control Operation.** Find the most appropriate **descriptive term** listed to identify how the control operation was performed (trap, bait, aerosol, equipment spray)

3. If Pesticide Is Used

a. **Name** – Enter the name of the pesticide used in the control operation. If two or more pesticides are simultaneously used, they must be reported separately.

b. **EPA Registration Number** – Enter the EPA Registration number of the pesticide (from the label).

c. **% Concentration** – Enter the percent concentration of the finished pesticide formulation.

d. **Amount** – Enter the amount of the pesticide applied in the finished or diluted form. This column is left blank for control operations that do not involve pesticides.

4. Labor Time – Include all time associated with the job, for example: travel preparation, execution and cleanup. Do not include the pretreatment inspection or post-treatment survey. Time spent on pest management operations provides historical records of time spent on specific pest management operations. Enter the time required for the pest control operation in this space.

5. Applicators Initials – Enter the initials of the individual applying the pesticide or performing the work. If more than one person was involved, the crew leader should initial the record.

REFERENCES

Army Regulation (AR) 200-1 (Ch. 5 – Pest Management)

Department of Defense Instruction (DoDI) 4150.7

Hawaii Army National Guard Integrated Pest Management Plan (IPMP) (December, 2007)

Technical Guide 42 - Self-Help Pest Management, April 2010

BUILDING/AREA	SIZE	TYPE OF CONSTRUCTION	USE DESIGNATION

Date	Units Serviced	Work Origin	Unit of Measure	Target Pest	Control Operation	If Pesticide is Used				Labor Time	Applicator Initials
						Name	EPA Reg	% Conc	Amount		

DD Form 1532-1 PEST MANAGEMENT MAINTENANCE RECORD

MEASUREMENT UNITS
MSF = 1,000 square feet
MCF = 1,000 cubic feet
LFF = Linear feet
AC = Acres

ORIGIN OF WORK
SW = Scheduled work
WR = Work request
SC = Service or trouble call
R = Routine inspection

TYPE OF CONSTRUCTION
CO = Concrete
BL = Block
BV = Brick veneer
ST = Steet, sheet metal
WO = Wood
OT = Other

OUTLINE OF PEST MANAGEMENT PROCEDURES
AT HAWAII ARNG FACILITIES[1]
1 October 2014

1. **Need Determination**. Each facility manager is authorized to determine if there is a need for pest control. Follow surveillance procedures and criteria listed on IPM Outlines[2] for need determination.

   Potential problems that may require pest control:

   - Rodents or rodent sign observed
   - Unusual or increased mosquito activity
   - Dead animal(s) observed (notify Environmental Pest Management Coordinator immediately)
   - Excessive bird droppings around areas occupied by humans (notify Environmental Pest Management Coordinator for coordination)
   - Swarming or high level of activity of stinging insects
   - Structural damage to buildings by insects
   - Non-native predatory animals present (notify Environmental Pest Management Coordinator for coordination)
   - New species of animal or plant observed, especially insects (notify Environmental Pest Management Coordinator for coordination)
   - Significant digging/rooting in turf or forested areas (notify Environmental Pest Management Coordinator for coordination)
   - Unwanted non-native vegetation (notify Environmental Pest Management Coordinator for coordination)
   - Disease or insect infestation of plants (notify Environmental Pest Management Coordinator if in non-landscaped areas)
   - Others as determined (notify Environmental Pest Management Coordinator for non-routine problems)

[1] HIARNG Integrated Pest Management Plan (IPMP) (http://nghienv/plans_compliance.html#conservplans) - Appendix A
[2] HIARNG IPMP - Appendix C

2. **Pest Control Options**. Once the need for pest control has been determined, the facility manager will take the following steps to resolve the pest problem:

   a. Step 1. Implement preventive non-chemical measures listed on the IPM Outline.

   b. Step 2. If Step 1 does not solve the pest problem, initiate self-help pest control procedures (mice, ants, crawling/flying insects) listed in Appendix B or on the IPM Outline.

   c. Step 3. If Steps 1 and 2 do not solve the pest problem, utilize professional (contract) pest control services to solve the pest problem.

3. **Professional Pest Control**.

   a. The use of chemical pesticides to control arthropods, vegetation or animals beyond those specifically approved for self-help use will be limited to professional (State certified contract or in-house) pest control personnel.

   b. Facility managers may solicit inspection from a local pest control firm to clarify pest control needs.

   c. Once it is determined that contract services are required, pest control work orders should be prepared and these must be reviewed and approved by the Environmental Office Pest Management Coordinator (PMC) by signature. A copy of each final contract for pest control must be forwarded to the PMC located in the Environmental Office. Purchase of any pest control device not specifically discussed in the IPMP such as electronic or light devices must also be approved by the Environmental PMC.

   d. Contract Performance Work Statements should include the following provisions:

      (1) Any contract person applying pesticides must have current state certification in required categories.
      (2) No mixing of pesticides is permitted at HIARNG facilities.
      (3) No storage of pesticides is permitted at HIARNG facilities.
      (4) All persons applying pesticides will wear appropriate personal protective equipment as specified on the pesticide label.
      (5) Advance notification of pesticide application.
      (6) Report each pesticide application on DD Form 1532-1 to the facility manager.

   e. Facility manager (or designated representative) will monitor/observe contractor activities during pesticide application. The Environmental PMC must also be notified when contractor activities will take place.

4. **Procurement**.

(1) Contracts for pest control must be routed through the Engineering and Contracting Office; all contracts must be reviewed and approved by the Pest Management Coordinator in the Environmental Office.
(2) Pesticide purchases for facilities (including herbicides) must be approved by FMO. Any purchases not under the self-help program (see Appendix B for the description of the self-help program) must be reviewed and approved by the Pest Management Coordinator in the Environmental Office.

5. **Storage and Usage Reporting to the Environmental Office**. Periodically, at a minimum annually, Facility Managers will provide a copy of all DD Forms 1532-1 and amounts currently stored to the HIARNG PMC.

6. **Limitations**. Pesticides can only be applied by State-certified pest applicators unless it is under the self-help program (IPMP Appendix B). Note that glyphosate products that must be mixed (e.g. Roundup Pro) are not included under the self-help program.

INSTRUCTIONS FOR THE USE OF THE PEST MANAGEMENT MAINTENANCE RECORD (DD FORM 1532-1)

GENERAL INFORMATION

1. The Pest Management Maintenance Record (DD Form 1532-1) provides a standard method for recording pest management operations including surveillance activities, pesticide use, and other pest control information at an installation.

Use of this record complies in part with AR 200-1 (Ch.5), DoDI 4150.7, and Federal Regulation 40 CFR 171.11 (c) (7) of the Federal Insecticide, Fungicide and Rodenticide Act, as amended.

It is used as a permanent maintenance record and historical account of pest control operations at a particular site (building, structure, or outdoor site) located at Hawaii Army National Guard (HIARNG) Facilities. The record also provides continuity in the management and performance of pest control operations at the installation level.

Use and analysis of these records can assist in identifying structures, designs and areas which have significantly more pest problems than others. Historical pest control data can also be used to verify warranties, correlate sites and treatment, and to facilitate analyses for cost effective pest management.

2. All pesticide applications and non-chemical pest management operations accomplished for each structure, building, or outdoor site are to be recorded on DD Form 1532-1 daily by the applicator / inspector and submitted monthly to the HIARNG Environmental Office Pest Management Coordinator (PMC).

3. Pest Management Maintenance Records (DD Form 1532-1) are maintained for 2 years and archived at the facility indefinitely. A comprehensive review of these records will be scheduled annually and in conjunction with on-site visits by the HIARNG Environmental Office PMC. Information on pest infestation treatment frequencies and pesticide application trends gained from this analysis can then be used by the PMC to adjust and improve the installation's pest management plan and operations.

4. Point of Contact:

HIARNG Environmental Office PMC:
Craig Blaisdell
Office: 672-1278
Cell: 206-2043
Email: craig.p.blaisdell.nfg@mail.mil

BUILDING/AREA					SIZE	TYPE OF CONSTRUCTION	USE DESIGNATION					
Date	Units Serviced	Work Origin	Unit of Measure	Target Pest	Control Operation	If Pesticide is Used				Labor Time	Applicator Initials
						Name	EPA Reg	% Conc	Amount		

DD Form 1532-1 PEST MANAGEMENT MAINTENANCE

RECORD MEASUREMENT UNITS
MSF = 1,000 square feet
MCF = 1,000 cubic feet
LFF = Linear feet
AC = Acres

ORIGIN OF WORK
SW = Scheduled work
WR = Work request
SC = Service or trouble call
R = Routine inspection

TYPE OF CONSTRUCTION
CO = Concrete WO = Wood
BL = Block OT = Other
BV = Brick veneer
ST = Steel, sheet metal

APPENDIX B

HAWAII ARMY NATIONAL GUARD ARMORY, FACILITY, AND TRAINING SITE SELF-HELP PEST CONTROL MATERIALS

1. Cockroach control and bait traps

    a. Combat Source Kill Max R1 (small roach) Manufacturer: Combat Insect Control Systems EPA Reg. No. 64240-33
    b. Combat Source Kill Max R2 (large roach) Manufacturer: Combat Insect Control Systems EPA Reg. No. 64240-34
    c. Trap, roach (Mr. Sticky or equivalent) - NSN 3740-00-252-3384

2. Ant control and bait traps

    a. MaxForce FC Professional Insect Control Ant Bait Manufacturer: Bayer Environmental Science EPA Reg. No. 432-1256
    b. Amdro Fire Ant Bait
    Manufacturer: Ambrands EPA Reg. No. 73342-1
    c. Terro Ant Killer II
    Manufacturer: Senoret Chemical Co., Inc. EPA Reg. No. 149-8

3. Rodent control
    a. Mouse trap, spring - NSN 3740-00-252-3384
    b. Rodent glueboards - NSN 3740-01-240-6170

4. Wasp and Hornet control
    a. Wasp-Freeze Wasp and Hornet Killer
    Manufacturer: Whitmire Micro-Gen Research Laboratories, Inc. EPA Reg. No. 499-362

5. Flying and crawling insect control
    a. PT 565 Plus XLO
    Manufacturer: BASF Corporation EPA Reg. No. 499-290

6. Fly control
    a. Indoor Fly Catcher Traps - NSN 3740-01-412-9263
    b. Fly Catcher (sticky paper) - NSN 3740-01-412-9371
    c. Fly swatter - NSN 3740-00-252-3383

7. Repellents
    a. DEET Insect Repellent
    Manufacturer: Ultrathon EPA Reg. No.
    58007-1

NOTE:

1) The pesticides above are among the safest on the market and should always be used only according to label directions.

2) EPA Registration Number (EPA Reg. No.) is located on the product label (see examples below).

REQUIREMENTS FOR PESTICIDE (HERBICIDE, INSECTICIDE, RODENTICIDE) APPLICATIONS AT HAWAI'I ARMY NATIONAL GUARD (HIARNG) FACILITIES

October 1, 2012

1. **AUTHORITY.** Army Regulation 200-1(Ch. 5 – Pest Management), Department of Defense Instruction (DoDI) 4150.7, the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), and Hawaii Pesticides Law (Hawai'i Revised Statute §149A).

2. **REFERENCES.** Hawai'i Army National Guard Integrated Pest Management Plan, December, 2007.

3. **PURPOSE.** The Hawai'i Army National Guard (HIARNG) Integrated Pest Management Plan (IPMP) outlines the requirements to control pests that could interfere with the military mission, damage real property, increase maintenance costs, and expose personnel to diseases. In accordance with this goal, the utilization of integrated pest management (IPM) is the judicious use of both non-chemical and chemical controls to suppress or prevent pests from exceeding an acceptable population or damage threshold.

4. **GENERAL INFORMATION.** Federal agencies are mandated by Public Law (Section 136r-1 of title 7, United States Code) to use Integrated Pest Management (IPM). The Contractor shall use best management practices and recognized industry standards for managing pests and all pesticide applications. The Contractor shall be responsible for complying with all federal, DoD, Army, state, and local laws, including but not limited to DoDI 4150.07, PL 91-190 the National Environmental Policy Act of 1969, PL 92-516, the Federal Insecticide, Fungicide and Rodenticide Act of 1972, as amended and AR 200-1. This includes, at a minimum:

    - Judiciously using all pesticide products, formulations and application methods that present the lowest potential hazard to human health, non-target animals and the environment.
    - Recording and reporting all pesticide operations including surveillance, inspections, non-chemical and chemical control on appropriate forms.

5. **MAJOR WORK TASKS.** The Contractor shall provide IPM services, use best management practices, and recognized industry standards to suppress, control, and prevent a variety of pests at various facilities. The purpose of utilizing an IPM approach is to establish an environmentally sound and effective IPM program from adversely affecting Army installation operations. This includes, at a minimum:
    - Responsibility for complying with all Army policies, federal, state, and local laws.
    - Thoroughly inspecting all areas of the facility/facilities suspected of pest infestation(s).
    - Using appropriate non-chemical technologies to control pests, where possible.

- Judiciously using pesticide products, formulations and application methods that present the lowest potential hazard to human health, non-target animals and the environment.
- Recording and reporting all integrated pest management operations including surveillance, inspections, and chemical control on appropriate forms.

6. DETAILED WORK TASKS.

6.1. EXPERTISE AND NECESSARY PERSONNEL. The Contractor and all Contractor personnel shall understand IPM principles and practices and be capable of implementing them. The Contractor shall have the background and experience to be capable of identifying pests and knowledgeable about pest life cycles, habits and the conditions that affect pest populations.

6.2. LICENSING AND CERTIFICATION.

6.2.1. LICENSING. The Contractor shall possess a business license issued by the State of Hawai'i to provide pest control services.

6.2.2. CERTIFICATION. All Contract personnel applying pesticides shall have current and possess commercial certification by the State of Hawai'i Department of Agriculture in the appropriate EPA-approved State categories (see Attachment 1) for the work requirements of the contract. The Contractor shall provide proof of certification upon award of contract to the Pest Management Coordinator (PMC) prior to start of project. All contract personnel who apply pesticides shall have full commercial certification. Neither private applicator certification nor registered technician certification are acceptable.

6.3. VEHICLES. Vehicles shall be clearly identifiable and secured at all times to prevent unauthorized access. All pesticides carried on vehicles shall be stored in a locked compartment separate from the cab of the vehicle. Vehicles shall be equipped with a fire extinguisher, emergency wash water, a portable emergency eye wash and a portable spill and decontamination kit. Vehicles shall be marked as required by Hawai'i state law.

6.4. EQUIPMENT. Equipment shall be in good operating condition, free of visible deterioration, shall not leak, and shall be calibrated to apply herbicides in accordance with the product label. Equipment that has failed shall be replaced and/or repaired prior to resuming operations. Proof of calibration may be requested. The Contractor must clearly and plainly mark all pesticide application equipment with the company's and/or organization's name, a point-of-contact, and phone number. The Contractor shall ensure that all labeling is legible and updated accordingly. The Contractor shall assume responsibility for all Contractor-owned equipment or other items.

6.5. PESTICIDES. The Contractor shall procure, handle, store, and apply pesticides in strict accordance with the EPA registered label. Only certified applicators shall operate pesticide application equipment. All pesticides shall be used in accordance with Army policies, federal, State of Hawai'i, and local laws. Pesticides approved for use at HIARNG facilities are listed in Attachment 2. The Contractor shall not deviate from the approved pesticides list without prior approval from the PMC. During the term of the contract, the Contractor shall submit to the PMC all requests (product trade name, and EPA registration # located on the label) for the use of any additional pesticides not listed on approved pesticides list (Attachment 2) prior to use. The PMC will submit therequest for review and approval by the designated DoD-certified Pest Management Consultant prior to use. The Contractor shall ensure that all pesticides proposed for use are EPA registered and registered with the State of Hawai'i. The Contractor shall maintain a binder containing labels and MSDSs for all herbicides used, and have it readily available for inspection at all times.

6.5.1. STORAGE, MIXING, AND DISPOSAL.

6.5.1.1. PESICIDE STORAGE. The Contractor shall not store pesticides on Government property. All pesticides shall be stored off Government property, or inside of the secured Contractor vehicle(s).

6.5.1.2. PESTICIDE MIXING. Pesticides may be mixed on the installation only at an approved designated location or locations. An air gap must be present between the formulation tank and fill hose during all pesticide mixing operations that use potable water. In addition, there must be a backflow prevention device installed on all hoses when filling formulation tanks with potable water. If contractor mixes pesticides away from a hardstand mixing area they must use a portable mixing pad.

6.5.1.3. PESTICIDE DISPOSAL. All pesticides, rinse water, and containers shall be disposed of in accordance with label directions. Contractor shall dispose of any pesticides, pesticide containers, pesticide residue, pesticide rinse water, or any pesticide contaminated article at an authorized disposal area off of Government property.

6.6. PESTICIDE SPILLS. The Contractor shall immediately report all spills of hazardous materials to the HIARNG Facility/Unit Environmental Officer (EO) and contact the HIARNG Emergency Line at (808) 672-1013. Spills shall be managed in accordance with the installation's Spill Prevention Control and Countermeasure Plan and Installation Spill Contingency Plan. Contractor shall be financially responsible for the clean-up of any spills. The Contractor shall have on-hand spill containment equipment and materials necessary to contain spills of pesticides and other pest control materials and supplies that are on the installation.

6.7. PERSONAL PROTECTIVE EQUIPMENT. The Contractor shall provide Personal Protective Equipment (PPE) to each of their pest control applicators. This equipment shall include, at a minimum, the PPE required by the applicable pesticide labels and MSDSs.

6.8. OCCUPIED SPACES. Liquid or aerosol pesticides shall not be applied in occupied spaces when people are present. Dust pesticide formulations shall not be applied in occupied spaces if the dust can be carried by air currents to people.

6.9. RECORDS AND REPORTS.

6.9.1. PEST MANAGEMENT RECORDS. The Contractor shall prepare, submit, and maintain daily pest management records and reports for each pest management service provided to include surveillance, non-chemical controls and pesticide applications. Records shall be accurate and complete. Records shall be reported on DD Form 1532-1 (see Attachment 3). All pest management records shall be submitted electronically (e-mail attachment) or mailed to the PMC monthly.

Records rejected by the PMC due to inadequate or incorrect information shall be corrected and returned to the PMC by the Contractor within 10 business days.

6.9.2. DD FORM 1532-1. All contractor personnel who apply herbicides shall report each herbicide application daily on DD Form 1532-1.

6.9.3. REPORTS OF CONDITIONS CONDUCIVE TO PEST INFESTATION. When the Contractor notices a condition that is promoting or is conducive to pest infestations they shall submit a report describing findings and recommendations to correct these conditions. The Contractor shall report these deficiencies to the PMC within one business day after citing conditions. Report must be legible and can be done electronically or hand-written.

6.10. ADVANCED NOTIFICATION. The Environmental PMC and Facility Manager (or designated representative) must be notified when contractor activities will take place.

6.11. HISTORICAL BUILDING PEST MANAGEMENT. The Contractor shall provide a report of pest issues of historical buildings and/or sites to the HIARNG Environmental PMC prior to treatment. Some methods of pest control may not be suitable for historic structures or sites, and thus must be consulted upon on a case-by case basis.

7. POINT OF CONTACT (POC).

7.1. Craig Blaisdell, Pest Management Coordinator, Hawaii Army National Guard, Environmental Office, 1304 Kekuanaoa St., Hilo, Hawaii 97620; craig.p.blaisdell.nfg@mail.mil; (808) 672-1278, FAX (808) 844-6653

7.2. HIARNG Environmental Office Emergency Line for Spills; (808) 672-1013

Attachment 1. Commercial Pesticide Applicator Certification Categories

EPA Category*	State of Hawai'i Equivalent Category
2: Forest Pest Control	2: Forest Pest Control
3: Turf and Ornamental Pest Control	3: Turf and Ornamental Pest Control
5: Aquatic Pest Control	5: Aquatic Pest Control
6: Right-of-Way Pest Control	6: Right-of-Way Pest Control
7: Industrial, Institutional, Structural and Health Related Pest Control	7: (b) Termite (c) General (d) Industrial and Institutional (f) Specialty
8: Public Health Pest Control	

*Certification categories are from Section 171.3 of FIFRA; Commercial Standards.

Attachment 2. HIARNG Approved Pesticides List

APPROVED HERBICIDES LIST FOR HIARNG

HIARNG IPMP - APPENDIX M Updated: 1 October 2012

EPA #	Trade Name	Active Ingredient	% Active Ingredient	Signal Word	Restricted Use Pesticide (RUP)
100-1091	Reward	diquat dibromide	37.3	Caution	
228-366	Razor PRO	glyphosate	41.0	Caution	
241-365	Plateau	imazapic	23.6	Caution	
241-426	Habitat	imazapyr	28.7	Caution	
241-431	Arsenal Power Line	imazapyr	26.7	Caution	
352-287	Hyvar X	bromacil	80.0	Caution	Yes
352-346	Hyvar X-L	bromacil	21.9	Caution	
352-505	Krovar I DF	bromacil	40.0	Caution	
352-601	Oust XP	sulfometuron methyl	75.0	Caution	
352-692	Karmex DF	diuron	80.0	Caution	
524-343	Aquamaster	glyphosate	53.8	Caution	
524-475	Round Up Pro	glyphosate	41.0	Caution	
524-517	Ranger Pro	glyphosate	41.0	Caution	
524-535	Quick Pro	glyphosate	73.3	Caution	
		diquat dibromide	2.9		
524-579	Round Up Pro Max	glyphosate	48.7	Caution	
34704-648	Diuron 80 WDG	diuron	80.0	Caution	
62719-37	Garlon 3A	triclopyr	44.4	Danger	
62719-324	Rodeo	glyphosate	53.8	Caution	
62719-527	Garlon 4 Ultra	triclopyr	60.45	Caution	
62719-537	Milestone VM	aminopyralid	40.6	Caution	
67690-3	Sonar SRP	fluridone	5.0	Caution	
67690-4	Sonar A.S.	fluridone	41.7	Caution	
70506-44	Surflan AS	oryzalin	40.4	Caution	

1) Pesticides not listed must be approved by NGB Pest Management Consultant prior to application / purchase. Please submit requests (pesticide trade name and EPA Registration Number) to the HIARNG Environmental Pest Management Coordinator (Craig Blaisdell 672-1278).

APPROVED INSECTICIDES LIST FOR HIARNG

HIARNG IPMP - APPENDIX M **Updated: 1 October 2012**

EPA #	Trade Name	Active Ingredient	% Active Ingredient	Signal Word	Restricted Use Pesticide (RUP)
100-722	Award Fire Ant Bait	fenoxycarb	1.0	Caution	
100-990	Demon WP	cypermethrin	40	Warning	
100-1066	Demand CS	lambda-cyhalothrin	9.7	Caution	
100-1240	Demand G	lambda-cyhalothrin	0.045	Caution	
100-1260	Optigard Ant Gel	thiamethoxam	0.01	Caution	
241-392	Phantom	chlorfenapyr	21.45	Caution	
279-3168	Talstar PL	bifenthrin	0.2	Caution	
279-3206	Talstar P	bifenthrin	7.9	Caution	
352-652	Advion Cockroach Gel	indoxacarb	0.6	Caution	
352-746	Advion Ant Gel	indoxacarb	0.05	Caution	
432-763	Suspend SC	deltamethrin	4.75	Caution	
432-772	Delta Dust	deltamethrin	0.05	Caution	
432-1226	Sevin 80 WSP	carbaryl	80.0	Warning	
432-1256	Maxforce FC Bait Stations	fipronil	0.01	Caution	
432-1259	Maxforce FC Select	fipronil	0.01	Caution	
432-1259	Maxforce FC Bait Gel	fipronil	0.01	Caution	
432-1262	Maxforce FG	hydramethylnon	1	Caution	
432-1264	Maxforce Ant Bait	fipronil	0.001	Caution	
432-1304	Tempo Ultra WP	cyfluthrin	10	Caution	
432-1328	Merit 0.5 G	imidacloprid	0.5	Caution	
432-1363	Tempo SC Ultra	cyfluthrin	11.8	Caution	
432-1375	Maxforce Granular Fly Bait	imidacloprid	0.50	Caution	
432-1377	Tempo Ultra WSP	beta-cyfluthrin	10.0	Caution	
432-1455	Maxforce Fly Spot Bait	imidacloprid	10.0	Caution	
432-1460	Maxforce FC Magnum Roach Killer Gel	fipronil	0.05	Caution	
432-1483	Temprid SC	imidacloprid	21.0	Caution	
		cyfluthrin	10.5		
498-116	Kill Zone House & Garden Insect Killer Formula	resmethrin	0.2	Caution	
		d-trans allethrin	0.125		
499-290	Prescription Treatment 565 Plus XLO	pyrethrins	0.5	Caution	
		piperonylbutoxide	1		
		n-octyl bicycloheptene dicarboximide	1		
499-294	Avert Dry Flowable Cockroach Bait	abamectin	0.05	Caution	
499-304	CY-Kick CS	cyfluthrin	6	Caution	
499-362	Wasp Freeze	d-trans allethrin	0.129	Caution	
		phenothrin	0.12		
499-370	Advance Granular Ant Bait	abamectin	0.011	Caution	
499-384	Perma-Dust	boric acid	35.50	Caution	
499-450	ULD BP-300	pyrethrins	3.0	Caution	
		piperonyl butoxide	6.0		
		n-octyl bicycloheptene dicarboximide	10.00		
499-467	Avert Cockroach Bait Stations Formula 1	abamectin	0.05	Caution	
499-470	PT Crack & Crevice I Cyfluthrin (Cy-Kick)	cyfluthrin	0.05	Caution	
499-473	PT 221L Residual	lambda-cyhalothrin	0.05	Caution	
499-496	Advance 360A	abamectin	0.011	Caution	
655-777	Prentox Malathion	malathion	57.0	Warning	
2724-351	Zoecon Gentrol IGR Concentrate	hydroprene	9.0	Caution	
2724-421	Zoecon Altosid XR Extended Residual Briquets	methoprene	2.1	Caution	
2724-446	Zoecon Altosid Liquid Larvicide Conc.	methoprene	20.0	Caution	
2724-448	Zoecon Altosid Pellets Mosquito Growth	methoprene	4.25	Caution	
2724-450	Zoecon Catalyst Emulsified in Water	propetamphos	18.9	Warning	
2724-461	Starbar Quik Strike Fly Abatement Strip	nithiazine	1.0	Caution	
2724-469	Gentrol Point Source Roach Control Device	hydroprene	90.6	Caution	
2724-484	Gentrol Aerosol	hydroprene	0.36	Caution	
2724-490	Precor 2000 Plus Premise Spray	methoprene	0.085	Caution	
		permethrin	0.350		
		phenothrin	0.300		
		piperonyl Butoxide	2.0		

APPROVED INSECTICIDES LIST FOR HIARNG (Cont'd)

HIARNG IPMP - APPENDIX M **Updated: 1 October 2012**

EPA #	Trade Name	Active Ingredient	% Active Ingredient	Signal Word	Restricted Use Pesticide (RUP)
2724-791	Zenivex E20	etofenprox	20.0	Caution	
5481-520	Wisdom TC Flowable	bifenthrin	7.9	Caution	
6218-47	Summit B.t.i. Briquets	bacillus thuringiensis	10.31	Caution	
7969-209	Termidor 80 WG	fipronil	80.0	Warning	
7969-210	Termidor SC	fipronil	9.1	Caution	
9444-217	D-Force Residual	deltamethrin	0.06	Caution	
9688-217-8845	Spectracide Fire Ant Killer Plus	indoxacarb	0.016	Caution	
45385-97-56	Kills Bedbugs II	deltamethrin	0.03	Caution	
46515-48-9688	House & Garden Bug Killer	permethrin	0.15	Caution	
		d-trans Allethrin	0.25		
62719-291	Conserve SC	spinosad	11.6		
64240-33	Combat Plus Quick Kill	fipronil	0.03	Caution	
64240-34	Combat Quick Kill	fipronil	0.03	Caution	
73049-56	VectoBac WDG	bacillus thuringiensis	37.4	Caution	
73342-1	Amdro Fire Ant Bait	hydramethylnon	0.73	Caution	

1) Pesticides not listed must be approved by NGB Pest Management Consultant prior to application / purchase. Please submit requests (pesticide trade name and EPA Registration Number) to the HIARNG Environmental Pest Management Coordinator (Craig Blaisdell 672-1278).

APPROVED RODENTICIDES LIST FOR HIARNG

HIARNG IPMP - APPENDIX M Updated: 1 October 2012

EPA #	Trade Name	Active Ingredient	% Active Ingredient	Signal Word	Restricted Use Pesticide (RUP)
56-42	JT Eaton	diphacinone	0.005	Caution	
7173-202	Maki Mini Blocks	bromadiolone	0.005	Caution	
7173-218	Generation Mini Blocks	difethialone	0.0025	Caution	
7173-288	Generation Blue Max Mini	difethialone	0.0025	Caution	
12455-79	Contrac Blox	bromadiolone	0.005	Caution	
12455-95	Fastrac Blox	bromethalin	0.01	Caution	
12455-89	Final All Weather Blox	brodifacoum	0.005	Caution	
61282-12	Ramik Bars	diphacinone	0.005	Caution	

1) Pesticides not listed must be approved by NGB Pest Management Consultant prior to application / purchase. Please submit requests (pesticide trade name and EPA Registration Number) to the HIARNG Environmental Pest Management Coordinator (Craig Blaisdell 672-1278).

Attachment 3. DD Form 1532-1

BUILDING/AREA					SIZE	TYPE OF CONSTRUCTION	USE DESIGNATION				
						If Pesticide is Used					
Date	Units Serviced	Work Origin	Unit of Measure	Target Pest	Control Operation	Name	EPA Reg	% Conc	Amount	Labor Time	Applicator Initials

DD Form 1532-1 PEST MANAGEMENT MAINTENANCE RECORD

MEASUREMENT UNITS
MSF = 1,000 square feet
MCF = 1,000 cubic feet
LFF = Linear feet
AC = Acres

ORIGIN OF WORK
SW = Scheduled work
WR = Work request
SC = Service or trouble call
R = Routine inspection

TYPE OF CONSTRUCTION
CO = Concrete
BL = Block
BV = Brick veneer
ST = Steet, sheet metal
WO = Wood
OT = Other

HIARNG Spill Incident Report Form

REPORT SPILLS IMMEDIATELY TO HIARNG-ENV AT 672-1013.
Fax this form to 672-1262 or e-mail ng.hi.hiarng.list.nghi-env-comp@mail.mil within 72 hours of the spill.

1	LOCATION OF SPILL (Facility/Address/Bldg):	DATE & TIME OF SPILL:	
2	CALLER NAME & PHONE NUMBER:	OSC NAME & PHONE NUMBER:	
3	ORGANIZATION REPORTING:		
4	DATE AND TIME OF DISCOVERY:	DURATION OF THE SPILL:	
5	TIME & DATE HIARNG ENV NOTIFIED (672-1013):	PERSON NOTIFIED:	
6	SUBSTANCE SPILLED *(Attach SDS):*	AMOUNT SPILLED:	SIZE OF AREA IMPACTED:
7	CAUSE AND SOURCE OF THE SPILL:		
8	EXTENT AND SEVERITY OF SPILL: Potential Dangers: ☐ Fire ☐ Explosion ☐ Toxic Fumes/Fluid ☐ Evacuation Needed ☐ Damage or Injuries *(Specify):*		
	Media into Which the Release Occurred or is Likely to Occur (Check all applicable): ☐ Soil ☐ Concrete ☐ Asphalt ☐ UIC ☐ Storm Drain ☐ Swale ☐ Sewer ☐ Stream ☐ Other *(Specify):* Raining? ☐ No ☐ Yes Raining Imminent? ☐ No ☐ Yes Direction of Flow:		
9	RESPONSE ACTIONS TAKEN TO STOP, REMOVE, AND MITIGATE EFFECTS OF THE SPILL:		
10	ADDITIONAL ASSISTANCE REQURIED? ☐ No ☐ Yes *(Specify):*		
11	OTHER HIARNG OR EXTERNAL AGENCIES NOTIFIED *(Agency, Individual, Date, Time, and Incident Number Assigned by Agency):* ☐ Fire Dept. ☐ Ambulance ☐ Other *(Specify):*		
12	PREVENTIVE ACTIONS TO BE TAKEN: *(NOTE: This incident is required to be covered in the next unit/activity spill training.)*		
13	SUBMITTED BY *(Name, Title, Phone)*		

For Environmental Office Use Only.

1	REPORTABLE? ☐ No ☐ Yes	REPORTABLE QTY:	Samples Taken? ☐ No ☐ Yes
2	VERBAL NOTIFICATIONS MADE *(Indicate Agency, Individual, Date, and Time Notified, and any Incident Number Assigned)* ☐ SERC (HEER): ☐ LEPC: ☐ NRC (800) 424-8801: ☐ Other (Specify): DATE WRITTEN NOTIFICATIONS MADE:		
3	CORRECTIVE ACTIONS TAKEN/ RECOMMENDED TO PRECLUDE RECURRENCE:		

Apr 2013

EMERGENCY CONTACTS

Contractor: [Company Name]

Site Supervisor: [Name, Phone]

Spill/Emergency: [Name, Phone] After Hours: [Name, Phone]

Police/Fire: 911

Government POC: [Name, Phone]

HIARNG Environmental Office Spill Notification Hotline: 672-1013

SECTION 01 52 40 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for the following:
   1. Salvaging nonhazardous demolition and construction waste.

   2. Recycling nonhazardous demolition and construction waste.

   3. Disposing of nonhazardous demolition and construction waste.

B. Related Sections include the following:
   1. SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS for environmental-protection measures during construction, and location of waste containers at Project site.

   2. SECTION 02 41 00 - DEMOLITION for disposition of waste resulting from partial demolition of buildings, structures, and site improvements and for disposition of hazardous waste.

C. The State's goal is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that goal, the Contractor shall:
   1. Practice efficient waste management when sizing, cutting, and installing products and materials and

   2. Use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.02 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.03 REFERENCES

A. *A Contractor's Waste Management Guide: Best Management Practices and Tools for Job Site Recycling and Waste Reduction in Hawaii*, 1999. Request a copy from the State of Hawaii, Clean Hawaii Center (808) 587-3802 or download from www.hawaii.gov/dbedt/ert/cwmg/index.html.

B. *Minimizing Construction & Demolition Waste*. State of Hawaii, Department of Health guidance on construction and demolition (C&D) waste management and listing of permitted C&D waste management facilities. Download from www.state.hi.us/health/eh/shwb/sw.

1.04 PERFORMANCE REQUIREMENTS

A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work.

B. Salvage/Recycle Requirements: State's requirement is to salvage and recycle as much nonhazardous demolition and construction waste as possible including the following materials:
   1. Demolition Waste:
      a. Green waste.
      b. Asphaltic concrete paving.
      c. Concrete.
      d. Concrete reinforcing steel.
      e. Brick.
      f. Concrete masonry units.
      g. Wood studs.
      h. Wood joists.
      i. Plywood and oriented strand board.
      j. Wood paneling.
      k. Wood trim.
      l. Structural and miscellaneous steel.
      m. Rough hardware.
      n. Roofing.

o. Insulation.

p. Doors and frames.

q. Door hardware.

r. Windows.

s. Glazing.

t. Metal studs.

u. Gypsum board.

v. Acoustical tile and panels.

w. Carpet.

x. Carpet pad.

y. Demountable partitions.

z. Equipment.

aa. Cabinets.

bb. Plumbing fixtures.

cc. Piping.

dd. Supports and hangers.

ee. Valves.

ff. Sprinklers.

gg. Mechanical equipment.

hh. Refrigerants.

ii. Electrical conduit.

jj. Copper wiring.

kk. Lighting fixtures.

ll. Lamps.

mm. Ballasts.

nn. Electrical devices.

oo. Switchgear and panelboards.

pp. Transformers.

2. Construction Waste:
   a. Site-clearing waste (including Green Waste, Soil, Rock).

   b. Masonry and CMU.

   c. Lumber.

   d. Wood sheet materials.

   e. Wood trim.

   f. Metals.

   g. Roofing.

   h. Insulation.

   i. Carpet and pad.

   j. Gypsum board.

   k. Piping.

   l. Electrical conduit.

   m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
      1) Paper.

      2) Cardboard.

      3) Boxes.

      4) Plastic sheet and film.

      5) Polystyrene packaging.

      6) Wood crates.

      7) Plastic pails.

1.05 SUBMITTALS

A. Waste Management Plan: Submit 3 copies of plan within 30 days of date established for the Notice to Proceed.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste. Failure to submit this report may render the Payment Application incomplete and delay payment. Include the following information (the Progress Reports may be submitted in a form similar to Attachment "WASTE MANAGEMENT PLAN - Table 2: WASTE REDUCTION WORK PLAN" appended to the end of this Section:
   1. Material category.
   2. Generation point of waste.
   3. Total quantity of waste in tons.
   4. Quantity of waste salvaged, both estimated and actual in tons.
   5. Quantity of waste recycled, both estimated and actual in tons.
   6. Total quantity of waste recovered (salvaged plus recycled) in tons.
   7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
   8. Records (Donations, Sales, Recycling/Processing, Landfill/Incinerator) as described in the following paragraph).

C. Before request for Substantial Completion, submit:
   1. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work. Fill out the actual quantities in Attachment "WASTE MANAGEMENT PLAN - Table 2: WASTE REDUCTION WORK PLAN" appended to the end of this Section. Also include an actual Cost/Revenue analysis to be compared with the projected Cost/Revenue analysis of the Waste Management Plan (See Attachment "WASTE MANAGEMENT PLAN - Table 3: COST/REVENUE ANALYSIS" appended to the end of this Section.
   2. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
   3. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

4. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

5. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

D. Qualification Data: For Waste Management Coordinator and refrigerant recovery technician.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

F. Monthly Waste Generation Report: Complete report form and submit to Project Manager and HIARNG Environmental Office within 30 days of end of the reporting month. See Attachment "MONTHLY WASTE GENERATION REPORT" appended to the end of this Section.

G. Waste Collection Log: Complete log form for each collected waste item. Submit log to Project Manager and HIARNG Environmental Office. See Attachment "WASTE COLLECTION LOG" appended to the end of this Section.

1.06 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Submit qualifications of individual designated as Waste Management Coordinator, including resume and past related projects.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference: Conduct conference at Project site to comply with requirements in SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Review methods and procedures related to waste management including, but not limited to, the following:
   1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.

   2. Review requirements for documenting quantities of each type of waste and its disposition.

   3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.

5. Review waste management requirements for each subcontractor.

1.07 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Use the plan included in Attachment "WASTE MANAGEMENT PLAN" appended to the end of this Section and fill out the appropriate items. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Management Coordinator: Indicate name of individual(s) to be responsible for implementing, monitoring, and reporting status of waste management plan.

C. Waste Identification: Fill out Attachment "WASTE MANAGEMENT PLAN – TABLE 1: WASTE IDENTIFICATION" appended to the end of this Section. Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

D. Waste Reduction Work Plan: Fill out the estimated quantities in Attachment "WASTE MANAGEMENT PLAN – TABLE 2: WASTE REDUCTION WORK PLAN" appended to the end of this Section. The actual quantities will be filled out at the end of the project. List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
   1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

   2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

   3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

   4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

   5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

E. Cost/Revenue Analysis: Fill out Attachment "WASTE MANAGEMENT PLAN – TABLE 3: COST/REVENUE ANALYSIS" appended to the end of this Section. Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
   1. Total quantity of waste.
   2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
   3. Total cost of disposal (with no waste management).
   4. Revenue from salvaged materials.
   5. Revenue from recycled materials.
   6. Savings from reusing materials versus purchasing new materials.
   7. Savings in hauling and tipping fees by donating materials.
   8. Savings in hauling and tipping fees that are avoided.
   9. Handling and transportation costs. Include cost of collection containers for each type of waste.
   10. Net additional cost or net savings from waste management plan.

F. Forms: Prepare waste management plan on forms included in Attachment "WASTE MANAGEMENT PLAN" appended to the end of this Section.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Recycled-content, salvaged, or otherwise resource-efficient products are specified in appropriate sections.

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by the Project Manager. Provide handling, containers, storage, signage, transportation, and

other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS for operation, termination, and removal requirements.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
1. Distribute waste management plan to everyone concerned within three days of submittal return.

2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

3. Provide education for all on-site workers on efficient waste reduction and waste management when, sizing, cutting, and installing products and materials.

4. Use meetings, signage, and subcontractor agreements to communicate the goals of the waste reduction plan. Consider incorporating the meetings with the safety meetings.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

2. Comply with SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS for controlling dust and dirt, environmental protection, and noise control.

E. Provide a central cutting area to facilitate re-use of existing cutoffs and to consolidate scrap for recycling.

3.02 SALVAGING DEMOLITION WASTE

A. First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered.

B. Salvaged Items for Reuse in the Work:
1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until installation.

4. Protect items from damage during transport and storage.

5. Items shall meet or exceed specification requirements.

6. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

C. Salvaged Items for Sale and Donation: Sale not permitted on Project site. Labor for loading donated items is acceptable to local trade practices; union labor if applicable.

D. Salvaged Items for State's Use:
1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until delivery to State.

4. Transport items to storage area designated by State.

5. Protect items from damage during transport and storage.

E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

F. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

G. Metals: Separate metals by type.

H. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

K. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather. Properly dispose of liquids.

L. Plumbing Fixtures: Separate by type and size.

M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

N. Lighting Fixtures: Separate lamps by type and protect from breakage.

O. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

P. Conduit: Reduce conduit to straight lengths and store by type and size.

3.03 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the State.

C. Hazardous Materials:
   1. Materials separated for recycling must be clean: materials must not contain contaminants such as lead-based paint, asbestos, PCB's, or Freon.

   2. Manage hazardous waste materials separately from recyclable materials.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
      a. Make sure bins are in convenient locations as close as possible to where material is being generated.

      b. Inspect containers and bins for contamination and remove contaminated materials if found.

   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

   3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

   4. Store components off the ground and protect from the weather.

5. Remove recyclable waste off State's property and transport to recycling receiver or processor.

3.04 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Grind asphalt to maximum 1-1/2-inch size.
   1. Crush asphaltic concrete paving and screen to comply with requirements in SECTION 31 00 00 - EARTHWORK for use as base course.

B. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

C. Clean Concrete: Remove reinforcement, other metals, and other contaminants from concrete and sort with other metals.
   1. Pulverize concrete to maximum 1-1/2-inch size.

   2. Crush concrete and screen to comply with requirements in SECTION 31 00 00 - EARTHWORK for use as satisfactory soil for fill or subbase.

D. Clean Masonry: Remove metal reinforcement, anchors, ties, and other contaminants from masonry and sort with other metals.
   1. Pulverize masonry to maximum 3/4-inch size.
      a. Crush masonry and screen to comply with requirements in SECTION 31 00 00 - EARTHWORK for use as satisfactory soil for fill or subbase.

   2. Clean and stack undamaged, whole masonry units on wood pallets.

E. Clean untreated, unpainted wood: Send to permitted recycling facility.

F. Green Waste: Send to permitted recycling facility.

G. Clean Metals: Send to permitted recycling facility.

3.05 RECYCLING CONSTRUCTION WASTE

A. Packaging:
   1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

   2. Polystyrene Packaging: Separate and bag materials.

   3. Untreated Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

   4. Untreated Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:
   1. Untreated Clean Cut-Offs of Lumber: Grind or chip into small pieces.

2. Untreated Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
   1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.06 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator currently permitted to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

   2. Remove and transport debris in a manner that will prevent spillage.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off State's property and legally dispose of them at a permitted landfill.

3.07 ATTACHMENTS

Attachment A: WASTE MANAGEMENT PLAN (4 pages)

Attachment B: MONTHLY WASTE GENERATION REPORT (1 page)

Attachment C: WASTE COLLECTION LOG (1 page)

END OF SECTION

WASTE MANAGEMENT PLAN

Project Title: <**Insert Project Title**>

Waste Management Coordinator: <**Insert Name, Title, and contact information**>

Recycling Requirement - To recycle/salvage <**Insert Percentage**> of waste generated on the site.

TABLE 1: WASTE IDENTIFICATION

Material	Est. Qty.	Est. tons *	Point of Generation	Comments/Assumptions

* Avg volume-to-weight conversions are:

Mixed waste	5.7 yds/ton
Wood	6.7 yds/ton
Cardboard	20 yds/ton
Drywall	4 yds/ton
Rubble	1.4 yds/ton

TABLE 2: WASTE REDUCTION WORK PLAN

Material	S/R/D *	Est Qty S/R/D (tons)	Actual Qty S/R/D(tons)	Handling and Transport Procedures	Destination (Name, address, phone) **

* S Salvage/Reuse
R Recycle
D Dispose

** For materials sent for recycling or disposal, send to facilities currently permitted by the DOH, Solid Waste Section (808) 586-4226.

No solid waste management permit required for on-site processing of clean waste concrete, provided the processed product meets the "inert fill material" definition in Chapter 342H, HRS.

Solid Waste Management Permit required if destination site accepts for processing such waste materials (eg. Clean waste concrete) from other sites.

TABLE 3: COST/REVENUE ANALYSIS

Material	Est Cost of Disposal(1)	Est Revenue from Salvage/Recycle(2)	Est Cost of Salvage/Recycle(3)	Est Net Savings/Cost (1)+(2)-(3)

MONTHLY WASTE GENERATION REPORT

REPORTING MONTH/YEAR (MM/YYYY): DATE SUBMITTED:
CONTRACTOR NAME:
PROJECT NUMBER & NAME
PROJECT LOCATION:
GOVERNMENT PROJECT MANGER NAME AND PHONE:

Submit to HIARNG Environmental Office within 30 days of end of the reporting month.

Accumulation Start Date	Accumulation End Date	Container ID Number	Contents	Category[1]	Beginning Weight (lbs.)	End-of-Month Weight (lbs.)	Waste Picked Up (lbs.)	Monthly Generation (lbs.)	NOTES

[1] HW - Hazardous Waste (e.g., lead paint chips); UW - Universal Waste (e.g., fluorescent lamps); PCB - Polychlorinated Biphenyls (e.g., light ballasts; Asbestos -ASB (e.g., asbestos tiles)

WASTE COLLECTION LOG

ACTIVITY/COMMAND:	**CONTAINER ID NUMBER:**
INSTALLATION:	**ITEM COLLECTED:**
ADDRESS/BLDG. NO.:	**TYPE OF CONTAINER:**
EO NAME:	**CONTAINER SIZE:**
EO PHONE:	**FINAL CONTAINER WEIGHT:**

INDICATE "CLOSED" UNDER LAST ENTRY WHEN CONTAINER IS FULL.

DATE	ITEM POURED/DEPOSITED *(Identify known contaminants)**	QTY ADDED GAL/LBS *(circle unit)*	TOTAL QTY	PRINTED NAME	SIGNATURE

** For collection of batteries and gas mask filters, indicate quantity each by type in parenthesis.*

I CERTIFY THAT I HAVE EXAMINED AND AM FAMILIAR WITH THE ABOVE LISTED MATERIAL/WASTE THROUGH ANALYSES AND TESTING AND/OR COLLECTION PROCEDURES TO SUPPORT THIS CERTIFICATION. I CERTIFY THAT ALL INFORMATION SUBMITTED IS ACCURATE AND THAT I HAVE PROPERLY IDENTIFIED THE MATERIAL/WASTE.

PRINT NAME	SIGNATURE	DATE

SECTION 01 70 00 - 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.

B. Related Sections
   1. SECTION 01 77 00 - CLOSEOUT PROCEDURES.

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 Project Manager and the Project Contact Person at least 3 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: Prearrange work related to the temporary disconnection of electrical and other utility systems with the Project Manager. Unless a longer notification period is required elsewhere in the Contract Documents, notify the Project Manager at least 15 days in advance of any interruption of existing utility service. Time and duration of interruptions are subject to the Project Manager's approval. Keep the utility interruptions and duration to a minimum so as not to cause inconvenience or hardship to the facility. If temporary electrical or other utility systems hook-up is required, provide the necessary services. Pay for temporary services as part of the contract, unless specifically noted otherwise.

C. Contractor, Subcontractor(s) and their employees will not be allowed to park in zones assigned to Users or facility personnel. Subject to availability, the Project Manager may designate areas outside of the Contract Zone Limits to be used by the Contractor. Restore any lawn area damaged by construction activities.

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 Project Manager, and make any change in accordance with the Project Manager 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 Project Manager 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 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 Project Manager 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 Project Manager.

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 Project Manager. 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 Project Manager. The intent of this advanced toning is to afford the Project Manager 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 Project Manager 48 hours 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.

I. For newly identified utility lines, if directed by the Project Manager, 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 existing conditions. If discrepancies are discovered, notify the Project Manager 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 Project Manager 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. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level the foundations and piers from 2 or more locations.

E. 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 Project Manager.

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 Project Manager's approval. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to the Project Manager 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 Project Manager.

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 Project Manager.

   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 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.10 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.

3.11 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.

END OF SECTION

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including the following:
   1. Project Record Documents.
   2. Operation and Maintenance Manuals.
   3. Warranties.
   4. Instruction for the State's personnel.

B. Related documents include the following:
   1. SECTION 01 70 00 - EXECUTION REQUIREMENTS.

1.02 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting a Final Inspection to determine Substantial Completion, complete the following items in addition to requirements of Article 7 of the GENERAL CONDITIONS.
   1. Advise the Project Manager of pending insurance changeover requirements.
   2. Submit specific warranties, final certifications, and similar documents.
   3. Obtain and submit occupancy permits, operating certificates, and similar releases and access to services and utilities, unless waived by the Project Manager.
   4. Arrange to deliver tools, spare parts, extra materials, and similar items to a location designated by the Project Manager. Label with manufacturer's name and model number where applicable.
   5. Make final changeover of permanent locks and deliver keys to the Project Manager. Advise the State's personnel of changeover in security provisions.
   6. Complete startup testing of systems.
   7. Submit test, adjust, and balance records.
   8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   9. Advise the Project Manager of changeover in other utilities.

10. Submit changeover information related to the State's occupancy, use, operation, and maintenance.

11. Complete final cleaning requirements, including touch up painting.

12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

13. Submit the O&M Manual(s) for review.

1.03 FINAL COMPLETION

A. Preliminary Procedures: Within 10 days from the Project Acceptance Date, complete the following items in addition to requirements of GENERAL CONDITIONS Article 7 PROSECUTION AND PROGRESS:
   1. Instruct the State's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training media materials.

1.04 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit 2 copies of any updated and action taken list. In addition to requirements of GENERAL CONDITIONS Article 7 PROSECUTION AND PROGRESS, include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.

   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

   3. Include the following information at the top of each page:
      a. Project Name and Title.

      b. State Job No.

      c. Date and page number.

      d. Name of Contractor.

1.05 PROJECT RECORD DOCUMENTS AND REQUIREMENTS

A. General:
   1. Definition: "Project Record Documents", including Record Drawings, shall fulfill the requirements of "Field-Posted As-Built Drawings" listed in the GENERAL CONDITIONS.

2. Do not use Project Record Documents for daily construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Project Manager's reference during normal working hours. Maintain these documents as specified in paragraph entitled "Record Drawings" hereinafter.

3. The Designer, under contract with the State, will update the drawings to show all addendum, PCD, and sketch changes. The Project Manager will transmit these drawings (vellum) to the Contractor who will make all "red-line" corrections to these drawings to record the changes depicted on the Contractor's Field Posted Record ("As-Builts") by accepted drafting practices as approved by the Project Manager.

4. Where the recorded changes depicted on the Contractor's Field Posted Record ("As-Builts") are in the form of shop drawings, the Contractor shall provide those shop drawings on vellum sheets in the same material and size as the drawings transmitted to the Contractor. The new drawing sheets shall be titled and numbered to conform to the construction drawings and clearly indicate what information they supercede in the actual construction drawings. For example a new drawing that replaces drawing M-3, could be numbered M3a.

5. The Contractor shall bring to the attention of the Project Manager any discrepancy between the changes made by the Designer and those depicted on addendum, PCD, and sketch changes. The Project Manager will resolve any conflicts.

6. Submit final Record Documents (Field Posted Record Drawings) within 10 days after the Final Inspection Date but no later than the Contract Completion Date, unless the GENERAL CONDITIONS require an earlier submittal date.

7. The Contractor shall guarantee the accuracy of its final Record Documents. The State will hold the Contractor liable for costs the State incurs as a result of inaccuracies in the Contractor's Record Documents.

8. Prepare and submit construction photographs and electronic files, damage or settlement surveys, property surveys, and similar final record information as required by the Project Manager.

9. Deliver tools, spare parts, extra materials, and similar items to a location designated by the Project Manager. Label with manufacturer's name and model number where applicable.

10. Submit pest-control final inspection report and warranty.

11. Submit Final, corrected O&M Manual(s).

B. Record Drawings:
   1. Maintain a duplicate full-size set of Field Posted Record ("As-Builts") Drawings at the job site. Clearly and accurately record all deviations from alignments, elevations and dimensions, which are stipulated on the drawings and for changes directed by the Project Manager that deviate from the drawings.

   2. Record changes immediately after they are constructed in place and where applicable, refer to the authorizing document (Field Order, Change Order, or Contract Modification). Use red pencil to record changes. Make Field Posted Record Drawings available to the Project Manager at any time so that its clarity and accuracy can be monitored.
      a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.

      b. Accurately record information in an understandable drawing technique.

      c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

      d. Mark the contract drawings or the shop drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on contract drawings.

      e. Mark important additional information that was either shown schematically or omitted from original Drawings.

      f. Locate concealed building utilities by dimension from bench marks or permanent structures. Locate site utilities by dimensions, azimuth and lengths from bench marks or permanent structures.

      g. Note field order numbers, Change Order numbers, Contract Modification numbers, Alternate numbers, post-construction drawing numbers (PCD) and similar identification (RFI numbers) where applicable.

      h. The Contractor shall initial each deviation and each revision marking.

   3. Use the final updated Contract Drawing set plus applicable shop drawings for making the final Field Posted Record Drawings submittal.

   4. Certify drawing accuracy and completeness. Label and sign the record drawings.

5. Label the title sheet and on all sheets in the margin space to the right of the sheet number, written from the bottom upward, with the title “FIELD POSTED RECORD DRAWINGS” and certification information as shown below. Provide a signature line and company name line for each subcontractor that will also certify the respective drawing. Adjust size to fit margin space.

   FIELD POSTED RECORD DRAWINGS Certified By: _____ Date: _____
   [Contractor’s Company Name]

6. Revise the Drawing Index and label the set “FIELD POSTED RECORD DRAWINGS”. Include the label “A COMPLETE SET CONTAINS [_____] SHEETS” in the margin at the bottom right corner of each sheet. Quantify the total number of sheets comprising the set.

7. If the Project Manager determines a drawing does not accurately record a deviation or omits relevant information, the State will correct any FIELD POSTED RECORD DRAWINGS sheet. Contractor will be charged for the State’s cost to correct the error or omission.

8. Use the final Field Posted Record Drawings sheets to create one electronic version of the set. The set shall be recorded in Adobe Acrobat PDF (Portable Document Format). Create a single indexed, bookmarked PDF file of the entire set of drawings and record on the CD. Submit one set of the final Field Posted Record Drawings sheets and the complete electronic CD set(s).

1.06 WARRANTIES

A. Submittal Time: Submit written manufacturer’s warranties at request of the Project Manager for designated portions of the Work where commencement of warranties other than Project Acceptance date is indicated.

B. Partial Occupancy: Submit properly executed manufacturer’s warranties within 45 days of completion of designated portions of the Work that are completed and occupied or used by the State during construction period by separate agreement with Contractor.

C. Organize manufacturer’s warranty documents into an orderly sequence based on the table of contents of the Specifications.
   1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 inch x 11-inch paper.

   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer and prime contractor.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES", Project Name and Title, State Job Number, and name of Contractor.

4. Use the final submittal of the warranties to create an electronic Adobe Acrobat PDF (Portable Document Format) version of the bound warranty documents files. Each sheet shall be separately scanned, at 600 DPI or better into a PDF file, indexed and recorded on a recordable compact disc (CD).

D. Provide 2 sets of manufacturer's warranties that exceed one year and one CD as part of the closing document submittals. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.07 OPERATION AND MAINTENANCE MANUALS

A. Assemble complete sets of operation 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 in individual Specification Sections and 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, Material Safety Data Sheets, and a list of spare parts.

      b. Name, address, and telephone number of installer or supplier.

      c. Maintenance procedures.

      d. Maintenance and service schedules for preventive and routine maintenance.

      e. Maintenance record forms.

      f. Sources of spare parts and maintenance materials.

      g. Copies of maintenance service agreements.

h. Copies of warranties and bonds.

B. Use the following 3 paragraph headings, “Notes, Cautions and Warnings”, to emphasize important and critical instructions and procedures. Place the words “Notes”, “Cautions”, or “Warnings” immediately before the applicable instructions or procedures. Notes, Cautions and Warnings are defined as follows:
   1. Note: highlights an essential operating or maintenance procedure, condition or statement.

   2. Caution: highlights an operating or maintenance procedure, practice, condition or statement which if not strictly observed, could result in damage to or destruction of equipment, loss of designed effectiveness, or health hazards to personnel.

   3. Warning: highlights an operating or maintenance procedure, practice, condition, or statement that if not strictly observed, could result in injury to or death of personnel.

C. Organize the Operation and Maintenance Manuals into suitable sets of manageable size. Bind and index data in heavy-duty, “D” type 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Binder color shall be maroon, or if not available red. Identify each binder on front and spine with the printed title “OPERATION AND MAINTENANCE MANUAL”, Project Name and Title include building number when appropriate, State Job Number, Prepared For: Youth Challenge Academy, Prepared By: Contractor and Volume Number. Each binder is a single volume.

D. Electronic Format
   1. Provide all information (narratives, drawings and manual) on a Compact Disc (CD). Provide drawings and plans prepared for the O&M Manuals drawn electronically and saved as a PDF file. Name and index the files for ease of identification and updates.

   2. Provide the complete O&M Manual using Adobe Acrobat PDF (Portable Document Format) files. Each sheet shall be separately scanned into a PDF file, indexed, bookmarked, hyperlinked to the table of contents and recorded on a compact disc (CD). Scanned documents shall be scanned at 600 DPI or better. Indexes and bookmarks may be highlighted or colored text. The final submittal shall include written instructions for installing, accessing and retrieving information from the compact disc.

E. Pre-Final Submittal: Submit 2 printed sets of Pre-Final Operation and Maintenance Manuals, for review by the Project Manager, at least 5 days prior to scheduled final inspection. Manuals shall be marked as Pre-Final. Make any correction noted before submitting the final Operation and Maintenance Manuals.

1. The user and the Department will each keep one copy of the Pre-Final submittal to operate and maintain the facility from the Project Acceptance Date through submission of the final submittal. Therefore, the submittal shall contain all the required information that is available at the time of submission.

2. One set will be returned with comments. Additional review comments may include problems discovered during the O&M Manual's review, site validation, and facility start up and will be provided to the Contractor after facility Project Acceptance Date.

F. Final Submittal: Use the final submittal of the manuals to create the electronic PDF file version of the bound Operation and Maintenance Manuals documents. Include the Submittal (100 percent) review comments along with a response to each item. Provide 6 Final sets of the printed manuals and 6 Final compact discs, (CDs) as part of the closing document submittal. Final printed manual and disks shall be marked as Final.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 DEMONSTRATION AND TRAINING

A. Instruction: Instruct the State's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Provide instructors experienced in operation and maintenance procedures.

   2. Provide instruction at mutually accepted times.

   3. Schedule training with the State's users, through the Project Manager with at least 7 days advanced notice.

   4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.

B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
   1. System design and operational philosophy.

   2. Review of documentation.

3. Operations.

4. Adjustments.

5. Troubleshooting.

6. Maintenance.

7. Repair.

3.02 FINAL CLEANING

A. General: Provide final cleaning. In addition to requirements of Article 7 of the GENERAL CONDITIONS conduct cleaning and waste-removal operations to comply with local laws and ordinances and federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturers written instructions unless noted otherwise. Complete the following cleaning operations before requesting final inspection for entire Project or for a portion of Project:

1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits resulting from construction activities.

3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

4. Remove tools, construction equipment, machinery, and surplus material from Project site.

5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

6. Remove debris and surface dust from limited access spaces, including: roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

7. Remove labels that are not permanent.

8. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
   a. Do not paint over “UL” and similar labels, including mechanical and electrical nameplates.

9. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

10. Replace parts subject to unusual operating conditions.

11. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the State’s property. Do not discharge volatile, harmful, or dangerous materials into drainage and sewer systems or onto State property. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.1 REFERENCES

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.

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6	(2006) Safety Requirements for Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 2011) Safety and Health Requirements Manual

1.2 PROJECT DESCRIPTION

1.2.1 Demolition Plan

Prepare a Demolition Plan and submit proposed demolition and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Identify components and materials to be salvaged for reuse or recycling with reference to paragraph "EXISTING FACILITIES TO BE REMOVED". Append tracking forms for all removed materials indicating type, quantities, condition, destination, and end use. Coordinate with Waste Management Plan. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan shall be approved by the Project Manager prior to work beginning.

1.2.2 General Requirements

Do not begin demolition until authorization is received from the Project Manager. The work of this section is to be performed in a manner that maximizes the value derived from the salvage and recycling of materials. Remove rubbish and debris from the project site; do not allow accumulations. The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Project Manager. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Project Manager. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement require approval by the Project Manager prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.3.2 Trees

Protect trees within the project site which might be damaged during demolition, and which are indicated to be left in place, by a 6 foot high fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Project Manager.

1.3.3 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off by the Government and disconnected and sealed by the Contractor.

1.3.4 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished, unless directed otherwise by the Project Manager. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and

debris will not be permitted. Where burning is permitted, adhere to Federal, State, and local regulations.

1.5 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be designated by the Project Manager.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Existing Conditions
Demolition Plan

1.7 QUALITY ASSURANCE

Comply with Federal, State, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses", conform to the safety requirements contained in ASSE/SAFE A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

1.8 PROTECTION

1.8.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Project Manager prior to beginning such work.

1.8.2 Protection of Personnel

Before, during and after the demolition work continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the project site.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the Project Manager.

1.10 EXISTING CONDITIONS

Before beginning any demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Project Manager showing the condition of structures and other facilities adjacent to areas of alteration or removal. Include in the record the possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the

Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results.

PART 2 PRODUCTS

2.1 FILL MATERIAL

Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill voids, depressions or excavations resulting from demolition of structures. Fill material shall be waste products from demolition until all waste appropriate for this purpose is consumed.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Structures

Remove existing structures indicated to be removed. Remove sidewalks, curbs, gutters and street light bases as indicated.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Project Manager. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

When utility lines are encountered but are not indicated on the drawings, notify the Project Manager prior to further work in that area.

3.1.3 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled for removal and transport to designated areas. Remove gates as whole units. Cut chain link fabric to 25 foot lengths and store in rolls off the ground.

3.1.4 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs, including aggregate base, as indicated. Provide neat sawcuts at limits of pavement removal as indicated. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

3.1.5 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work

is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated.

3.2 DISPOSITION OF MATERIAL

3.2.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Project Manager of the Contractor's demolition and removal procedures, and authorization by the Project Manager to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.2.2 Reuse of Materials and Equipment

Remove and store materials and equipment to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.2.3 Salvaged Materials and Equipment

Remove materials and equipment that are to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site.

a. Salvage items and material to the maximum extent possible.

b. Store all materials salvaged for the Contractor as approved by the Projecct Manager and remove from Government property before completion of the contract. On site sales of salvaged material is prohibited.

c. Remove salvaged items to remain the property of the Government in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers. Deliver items reserved as property of the Government to the areas designated.

3.2.4 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable combustible material off the site.

3.3 CLEANUP

Remove debris and rubbish. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.4 DISPOSAL OF REMOVED MATERIALS

3.4.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable Federal, State, and local regulations as contractually specified.

3.4.2 Burning on Government Property

Burning of materials removed from demolished structures will not be permitted on Government property.

3.4.3 Removal from Government Property

Transport waste materials removed from demolished structures, except waste soil, from Government property for legal disposal. Dispose of waste soil as directed.

3.5 REUSE OF SALVAGED ITEMS

Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

-- End of Section --

SECTION 03 30 53

MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

Perform all work in accordance with ACI 318.

1.2 REFERENCES

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.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 301	(2010; Errata 2011) Specifications for Structural Concrete
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(2010) Guide to Hot Weather Concreting
ACI 318	(2011; Errata 1 2011; Errata 2 2012; Errata 3-4 2013) Building Code Requirements for Structural Concrete and Commentary
ACI 347	(2004; Errata 2008; Errata 2012) Guide to Formwork for Concrete
ACI SP-66	(2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2013) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A615/A615M	(2014) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C1064/C1064M	(2011) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C143/C143M	(2012) Standard Test Method for Slump of

	Hydraulic-Cement Concrete
ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C1602/C1602M	(2012) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C172/C172M	(2014) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231/C231M	(2014) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C31/C31M	(2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39/C39M	(2014a) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C685/C685M	(2011) Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM C94/C94M	(2014a) Standard Specification for Ready-Mixed Concrete
ASTM D1752	(2004a; R 2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D2240	(2010) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D395	(2014) Standard Test Methods for Rubber Property - Compression Set
ASTM D412	(2006a; R 2013) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D573	(2010) Standard Test Method for Rubber - Deterioration in an Air Oven
ASTM D75/D75M	(2014) Standard Practice for Sampling Aggregates

DEPARTMENT OF TRANSPORTATION

DOT HSS	(2005) Hawaii Standard Specification for

Road and Bridge Construction, as amended

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation Drawings

SD-03 Product Data

Curing Materials
Expansion Joint Filler Strips, Premolded
Joint Sealants - Field Molded Sealants
Waterstops
Batching and Mixing Equipment
Conveying and Placing Concrete
Formwork
Mix Design Data
Ready-Mix Concrete
Curing Compound
Mechanical Reinforcing Bar Connectors

SD-06 Test Reports

Aggregates
Concrete Mixture Proportions
Compressive Strength Testing
Slump
Water

SD-07 Certificates

Cementitious Materials
Aggregates
Delivery Tickets

SD-08 Manufacturer's Instructions

Curing Compound

1.4 QUALITY ASSURANCE

Indicate specific locations of Concrete Placement, Forms, Steel Reinforcement, Expansion Joints, Construction Joints, and Control Joints on installation drawings and include, but not be limited to, square feet of concrete placements, thicknesses and widths, plan dimensions, and arrangement of cast-in-place concrete section.

1.4.1 Regulatory Requirements

The State statutory and regulatory requirements of DOT HSS form a part of this specification to the extent referenced. Conform to the requirements in Section 01 52 40 CONSTRUCTION WASTE MANAGEMENT.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

The Government retains the option to sample and test joint sealer, joint filler material, waterstop, aggregates and concrete to determine compliance with the specifications. Provide facilities and labor as may be necessary to assist the Government in procurement of representative test samples. Obtain samples of aggregates at the point of batching in accordance with ASTM D75/D75M. Sample concrete in accordance with ASTM C172/C172M. Determine slump in accordance with ASTM C143/C143M and ASTM C231/C231M, respectively, when cylinders are molded. Prepare, cure, and transport compression test specimens in accordance with ASTM C31/C31M. Test compression test specimens in accordance with ASTM C39/C39M. Take samples for strength tests not less than once each shift in which concrete is produced. Provide a minimum of five specimens from each sample; two to be tested at 28 days for acceptance, two will be tested at 7 days for information and one held in reserve.

2.1.1 Strength

Acceptance test results are the average strengths of two specimens tested at 28 days. The strength of the concrete is considered satisfactory so long as the average of three consecutive acceptance test results equal or exceed the specified compressive strength, f'c, but not more than 20 percent, and no individual acceptance test result falls below f'c by more than 500 psi.

2.1.2 Construction Tolerances

Apply a Class "C" finish to all surfaces except those specified to receive a Class "D" finish. Apply a Class "D" finish to all post-construction surfaces which will be permanently concealed. Surface requirements for the classes of finish required are as specified in ACI 117.

2.1.3 Concrete Mixture Proportions

Concrete mixture proportions are the responsibility of the Contractor. Mixture proportions must include the dry weights of cementitious material(s); the nominal maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per yard of concrete. Provide materials included in the mixture proportions of the same type and from the same source as will be used on the project. The specified compressive strength f'c is 3,000 psi at 28 days. The maximum nominal size coarse aggregate is 3/4 inch, in accordance with ACI 304R. The maximum water-cementitious material ratio is 0.50. Submit the applicable test reports and mixture proportions that will produce concrete of the quality required, ten days prior to placement of concrete.

2.2 MATERIALS

Submit manufacturer's literature from suppliers which demonstrates compliance with applicable specifications for the specified materials.

2.2.1 Cementitious Materials

Submit Manufacturer's certificates of compliance, accompanied by mill test reports, attesting that the concrete materials meet the requirements of the specifications in accordance with the Special Clause "CERTIFICATES OF COMPLIANCE". Also, certificates for all material conforming to EPA's Comprehensive Procurement Guidelines (CPG), in accordance with 40 CFR 247. Provide cementitious materials that conform to the appropriate specifications listed:

2.2.1.1 Portland Cement

ASTM C150/C150M, Type I.

2.2.2 Aggregates

For fine and coarse aggregates meet the quality and grading requirements of DOT HSS Sections 703.01 and 703.02, respectively. Submit certificates of compliance and test reports for aggregates showing the material(s) meets the quality and grading requirements of the specifications under which it is furnished.

2.2.3 Admixtures

Provide admixtures, when required or approved, in compliance with the appropriate specification listed. Retest chemical admixtures that have been in storage at the project site, for longer than 6 months, at the expense of the Contractor at the request of the Project Manager and will be rejected if test results are not satisfactory.

2.2.4 Water

Mixing and curing water in compliance with the requirements of ASTM C1602/C1602M; potable, and free of injurious amounts of oil, acid, salt, or alkali. Submit test report showing water complies with ASTM C1602/C1602M.

2.2.5 Reinforcing Steel

Provide reinforcing bars conforming to the requirements of ASTM A615/A615M, Grade 60, deformed. Provide welded steel wire reinforcement conforming to the requirements of ASTM A1064/A1064M. Detail reinforcement not indicated in accordance with ACI 301 and ACI SP-66. Provide mechanical reinforcing bar connectors in accordance with ACI 301 and provide 125 percent minimum yield strength of the reinforcement bar.

2.2.6 Expansion Joint Filler Strips, Premolded

Expansion joint filler strips, premolded of sponge rubber conforming to ASTM D1752, Type I.

2.2.7 Joint Sealants - Field Molded Sealants

Conform to ASTM C920, Type M, Grade NS, Class 25, use NT for vertical

joints and Type M, Grade P, Class 25, use T for horizontal joints. Provide polyethylene tape, coated paper, metal foil, or similar type bond breaker materials. The backup material needs to be compressible, nonshrink, nonreactive with the sealant, and a nonabsorptive material such as extruded butyl or polychloroprene foam rubber. Immediately prior to installation of field-molded sealants, clean the joint of all debris and further cleaned using water, chemical solvents, or other means as recommended by the sealant manufacturer or directed.

2.2.8 Formwork

Design and engineer the formwork as well as its construction in accordance with ACI 301 Section 2 and 5 and ACI 347. Fabricate of wood, steel, or other approved material. Submit formwork design prior to the first concrete placement.

2.2.9 Form Coatings

Provide form coating in accordance with ACI 301.

2.2.10 Curing Materials

Provide curing materials in accordance with ACI 301, Section 5.

2.3 READY-MIX CONCRETE

Provide ready-mix concrete with mix design data conforming to ACI 301 Part 2. Submit delivery tickets in accordance with ASTM C94/C94M for each ready-mix concrete delivery, include the following additional information:

a. Type and brand cement

b. Cement content in 94-pound bags per cubic yard of concrete

c. Maximum size of aggregate

d. Amount and brand name of admixture

e. Total water content expressed by water cementitious material ratio

2.4 ACCESSORIES

2.4.1 Waterstops

Waterstop shall be rubber or neoprene. When tested in accordance with the applicable provisions of ASTM D395, ASTM D412, ASTM D573, and ASTM D2240, it shall conform to the following physical requirements:

a. Tensile strength shall be a minimum of 3000 psi.

b. The Shore A durometer hardness shall be 60 to 70.

c. The tensile strength of the test specimen after accelerated aging test of 7 days at 158 degrees F shall be not less than 80 percent of the original test strength. The tensile strength of the test specimen after aging test of 48 hours in oxygen at 158 degrees F and 300 psi shall be not less than 80 percent.

d. The compression set after 22 hours at 158 degrees F shall be not

more than 30 percent.

e. The specific gravity shall be 1.17 plus or minus 0.03.

f. The elongation shall be a minimum of 450 percent.

g. The water absorption shall be a maximum of 5 percent by weight after immersion in water for 2 days at 158 degrees F. Test shall be made on specimen of the waterstop not more than 60 days prior to delivery.

h. Two certified copies of the test results shall be furnished to Project Manager for approval.

2.4.2 Curing Compound

Provide curing compound conforming to ASTM C309. Submit manufactures instructions for placing curing compound.

PART 3 EXECUTION

3.1 PREPARATION

Prepare construction joints to expose coarse aggregate. The surface nust be clean, damp, and free of laitance. Construct ramps and walkways, as necessary, to allow safe and expeditious access for concrete and workmen. Remove standing or flowing water, loose particles, debris, and foreign matter. Satisfactorily compact earth foundations. Make spare vibrators available. Placement cannot begin until the entire preparation has been accepted by the Government.

3.1.1 Embedded Items

Secure reinforcement in place after joints, anchors, and other embedded items have been positioned. Arrange internal ties so that when the forms are removed the metal part of the tie is not less than 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structures. Prepare embedded items so they are be free of oil and other foreign matters such as loose coatings or rust, paint, and scale. The embedding of wood in concrete is permitted only when specifically authorized or directed. Provide all equipment needed to place, consolidate, protect, and cure the concrete at the placement site and in good operating condition.

3.1.2 Formwork Installation

Forms must be properly aligned, adequately supported, and mortar-tight. Provide smooth form surfaces, free from irregularities, dents, sags, or holes when used for permanently exposed faces. Chamfer all exposed joints and edges , unless otherwise indicated.

3.1.3 Production of Concrete

3.1.3.1 Ready-Mixed Concrete

Provide ready-mixed concrete conforming to ASTM C94/C94M except as otherwise specified.

3.1.3.2 Concrete Made by Volumetric Batching and Continuous Mixing

Conform to ASTM C685/C685M.

3.1.3.3 Batching and Mixing Equipment

The option of using an on-site batching and mixing facility is available. The facility must provide sufficient batching and mixing equipment capacity to prevent cold joints. Submit the method of measuring materials, batching operation, and mixer for review, and manufacturer's data for batching and mixing equipment demonstrating compliance with the applicable specifications.

3.1.4 Waterstops

Install and splice waterstops as directed by the manufacturer.

3.2 CONVEYING AND PLACING CONCRETE

Convey and place concrete in accordance with ACI 301, Section 5.

3.2.1 Hot-Weather Requirements

Place concrete in hot weather in accordance with ACI 305R

3.3 FINISHING

3.3.1 Temperature Requirement

Do not finish or repair concrete when either the concrete or the ambient temperature is below 50 degrees F.

3.3.2 Finishing Formed Surfaces

Remove all fins and loose materials , and surface defects including filling of tie holes. Repair all honeycomb areas and other defects. Remove all unsound concrete from areas to be repaired. Ream or chip surface defects greater than 1/2 inch in diameter and holes left by removal of tie rods in all surfaces not to receive additional concrete and fill with dry-pack mortar. Brush-coat the prepared area with an approved epoxy resin or latex bonding compound or with a neat cement grout after dampening and filling with mortar or concrete. Use a blend of portland cement and white cement in mortar or concrete for repairs to all surfaces permanently exposed to view shall be so that the final color when cured is the same as adjacent concrete.

3.3.3 Finishing Unformed Surfaces

Finish unformed surfaces in accordance with ACI 301, Section 5.

3.4 CURING AND PROTECTION

Cure and protect in accordance with ACI 301, Section 5.

3.5 FORMWORK

Provide formwork in accordance with ACI 301, Section 2 and Section 5.

3.5.1 Removal of Forms

Remove forms in accordance with ACI 301, Section 2.

3.6 STEEL REINFORCING

Reinforcement must be free from loose, flaky rust and scale, and free from oil, grease, or other coating which might destroy or reduce the reinforcement's bond with the concrete.

3.6.1 Fabrication

Shop fabricate steel reinforcement in accordance with ACI 318 and ACI SP-66. Provide shop details and bending in accordance with ACI 318 and ACI SP-66.

3.6.2 Splicing

Perform splices in accordance with ACI 318 and ACI SP-66.

3.6.3 Supports

Secure reinforcement in place by the use of metal or concrete supports, spacers, or ties.

3.7 EMBEDDED ITEMS

Before placing concrete, take care to determine that all embedded items are firmly and securely fastened in place. Provide embedded items free of oil and other foreign matter, such as loose coatings of rust, paint and scale. Embedding of wood in concrete is permitted only when specifically authorized or directed.

3.8 TESTING AND INSPECTING

Report the results of all tests and inspections conducted at the project site informally at the end of each shift. Submit written reports weekly. Deliver within three days after the end of each weekly reporting period.

3.8.1 Field Testing Technicians

The individuals who sample and test concrete must have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I.

3.8.2 Preparations for Placing

Inspect foundation or construction joints, forms, and embedded items in sufficient time prior to each concrete placement to certify that it is ready to receive concrete.

3.8.3 Sampling and Testing

a. Provide samples and test concrete for quality control during placement. Sample fresh concrete for testing in accordance with ASTM C172/C172M. Make six test cylinders.

b. Test concrete for compressive strength at 7 and 28 days for each design mix and for every 100 cubic yards of concrete. Test two

cylinders at 7 days; two cylinders at 28 days; and hold two cylinders in reserve. Conform test specimens to ASTM C31/C31M. Perform compressive strength testing conforming to ASTM C39/C39M.

c. Test slump at the site of discharge for each design mix in accordance with ASTM C143/C143M. Check slump twice during each shift that concrete is produced.

d. Determine temperature of concrete at time of placement in accordance with ASTM C1064/C1064M. Check concrete temperature at least twice during each shift that concrete is placed.

3.8.4 Action Required

3.8.4.1 Placing

Do not begin placement until the availability of an adequate number of acceptable vibrators, which are in working order and have competent operators, has been verified. Discontinue placing if any lift is inadequately consolidated.

3.8.4.2 Slump

Whenever a slump test result is outside the specification limits, adjust the batch weights of water and fine aggregate prior to delivery of concrete to the forms. Make the adjustments so that the water-cementitious material ratio does not exceed that specified in the submitted concrete mixture proportion and the required concrete strength is still met.

-- End of Section --

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.1 REFERENCES

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.

ASTM INTERNATIONAL (ASTM)

ASTM E2174	(2014) Standard Practice for On-Site Inspection of Installed Fire Stops
ASTM E2393	(2010a) Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
ASTM E814	(2013a) Standard Test Method for Fire Tests of Through-Penetration Fire Stops
ASTM E84	(2014) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM 4991	(2013) Approval of Firestop Contractors
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

UNDERWRITERS LABORATORIES (UL)

UL 1479	(2003; Reprint Oct 2012) Fire Tests of Through-Penetration Firestops
UL 723	(2008; Reprint Aug 2013) Test for Surface Burning Characteristics of Building Materials
UL Fire Resistance	(2012) Fire Resistance Directory

1.2 SYSTEM DESCRIPTION

1.2.1 General

Furnish and install tested and listed firestopping systems, combination of materials, or devices to form an effective barrier against the spread of flame, smoke and gases, and maintain the integrity of fire resistance rated walls and partitions, including through-penetrations.

Through-penetrations include the annular space around pipes, conduit,

and wires.

1.2.2 Sequencing

Coordinate the specified work with other trades. Apply firestopping materials, at penetrations of pipes, prior to insulating, unless insulation meets requirements specified for firestopping. Apply firestopping materials prior to completion of enclosing walls or assemblies. Cast-in-place firestop devices shall be located and installed in place before concrete placement. Pipe, conduit or cable bundles shall be installed through cast-in-place device after concrete placement but before area is concealed or made inaccessible. Firestop material shall be inspected and approved prior to final completion and enclosing of any assemblies that may conceal installed firestop.

1.2.3 Submittals Requirements

a. Submit detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resistance or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report. For those firestop applications for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation. Submittal shall indicate the firestopping material to be provided for each type of application. When more than a total of 5 penetrations are to receive firestopping, provide drawings that indicate location, "F" "T" and "L" ratings, and type of application.

b. Submit certificates attesting that firestopping material complies with the specified requirements. For all intumescent firestop materials used in through penetration systems, manufacturer shall provide certification of compliance with UL 1479.

c. Submit documentation of training and experience for Installer.

d. Submit inspection report stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Firestopping Materials

SD-06 Test Reports

Inspection

SD-07 Certificates

Firestopping Materials
Installer Qualifications

1.4 QUALITY ASSURANCE

1.4.1 Installer

Engage an experienced Installer who is:

a. FM Research approved in accordance with FM 4991, operating as a UL Certified Firestop Contractor, or

b. Certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products in accordance with specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer installer qualifications on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures. The installer shall obtain from the manufacturer written certification of training, and retain proof of certification for duration of firestop installation.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, protected from damage and exposure to elements and temperatures in accordance with manufacturer requirements. Remove damaged or deteriorated materials from the site. Use materials within their indicated shelf life.

PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

Provide firestopping materials, supplied from a single domestic manufacturer, consisting of commercially manufactured, asbestos-free, nontoxic products FM APP GUIDE approved, or UL listed, for use with applicable construction and penetrating items, complying with the following minimum requirements:

2.1.1 Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resistance or by a nationally recognized testing laboratory.

2.1.2 Toxicity

Material shall be nontoxic and carcinogen free to humans at all stages of application or during fire conditions and shall not contain hazardous chemicals or require harmful chemicals to clean material or equipment. Firestop material must be free from Ethylene Glycol, PCB, MEK, or other types of hazardous chemicals.

2.1.3 Fire Resistance Rating

Firestop systems shall be UL Fire Resistance listed or FM APP GUIDE approved with "F" rating at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected. Where required, firestop systems shall also have "T" rating at least equal to the fire-rated floor in which the openings are to be protected.

2.1.3.1 Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph SYSTEM DESCRIPTION, shall provide "F", "T" and "L" fire resistance ratings in accordance with ASTM E814 or UL 1479. Fire resistance ratings shall be as follows:

2.1.3.1.1 Penetrations of Fire Resistance Rated Walls and Partitions

Rating of wall or partition being penetrated.

PART 3 EXECUTION

3.1 PREPARATION

Areas to receive firestopping shall be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system. For cast-in-place firestop devices, formwork or metal deck to receive device prior to concrete placement shall be sound and capable of supporting device. Prepare surfaces as recommended by the manufacturer.

3.2 INSTALLATION

Completely fill void spaces with firestopping material regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 4 inches or more in any direction shall be capable of supporting the same load as the floor is designed to support or shall be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Install firestopping in accordance with manufacturer's written instructions. Provide tested and listed firestop systems in the following locations, except in floor slabs on grade:

a. Penetrations of conduit through fire-resistance rated walls and partitions.

b. Other locations where required to maintain fire resistance rating of the construction.

3.3 INSPECTION

3.3.1 General Requirements

The firestopped areas shall not be covered or enclosed until inspection is complete and approved by the Project Manager. Inspect the applications initially to ensure adequate preparations (clean surfaces suitable for application, etc.) and periodically during the work to assure that the completed work has been accomplished according to the manufacturer's written instructions and the specified requirements. Submit written reports indicating locations of and types of penetrations and types of

firestopping used at each location; type shall be recorded by UL listed printed numbers.

3.3.2 Inspection Standards

Inspect all firestopping in accordance to ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results to be submitted.

-- End of Section --

SECTION 26 20 00

INTERIOR DISTRIBUTION SYSTEM

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM B1	(2013) Standard Specification for Hard-Drawn Copper Wire
ASTM B8	(2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM D709	(2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE 81	(2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C80.1	(2005) American National Standard for Electrical Rigid Steel Conduit (ERSC)
ANSI C80.3	(2005) American National Standard for Electrical Metallic Tubing (EMT)
NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(2000; R 2008; E 2010) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 6	(1993; R 2011) Enclosures
NEMA KS 1	(2013) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)
NEMA RN 1	(2005; R 2013) Polyvinyl-Chloride (PVC)

	Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	(2013) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TC 3	(2013) Standard for Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA WD 1	(1999; R 2005; R 2010) Standard for General Color Requirements for Wiring Devices
NEMA WD 6	(2012) Wiring Devices Dimensions Specifications
NEMA Z535.4	(2011) American National Standard for Product Safety Signs and Labels

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code
NFPA 70E	(2012; Errata 2012) Standard for Electrical Safety in the Workplace

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-568-C.1	(2009; Add 2 2011; Add 1 2012) Commercial Building Telecommunications Cabling Standard
TIA-569	(2012c; Addendum 1 2013; Errata 2013) Commercial Building Standard for Telecommunications Pathways and Spaces

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.147	Control of Hazardous Energy (Lock Out/Tag Out)

UNDERWRITERS LABORATORIES (UL)

UL 1	(2005; Reprint Jul 2012) Standard for Flexible Metal Conduit
UL 1242	(2006; Reprint Mar 2014) Standard for Electrical Intermediate Metal Conduit -- Steel
UL 1660	(2014) Liquid-Tight Flexible Nonmetallic Conduit
UL 20	(2010; Reprint Feb 2012) General-Use Snap Switches

UL 360	(2013; Reprint Aug 2014) Liquid-Tight Flexible Steel Conduit
UL 467	(2007) Grounding and Bonding Equipment
UL 486A-486B	(2013; Reprint Feb 2014) Wire Connectors
UL 486C	(2013; Reprint Feb 2014) Splicing Wire Connectors
UL 489	(2013; Reprint Mar 2014) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 498	(2012; Reprint Feb 2014) Attachment Plugs and Receptacles
UL 50	(2007; Reprint Apr 2012) Enclosures for Electrical Equipment, Non-environmental Considerations
UL 510	(2005; Reprint Jul 2013) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514A	(2013) Metallic Outlet Boxes
UL 514B	(2012; Reprint Jun 2014) Conduit, Tubing and Cable Fittings
UL 514C	(2014) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 6	(2007; reprint Nov 2010) Electrical Rigid Metal Conduit-Steel
UL 651	(2011; Reprint May 2014) Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings
UL 797	(2007; Reprint Dec 2012) Electrical Metallic Tubing -- Steel
UL 83	(2014) Thermoplastic-Insulated Wires and Cables
UL 854	(2004; Reprint Sep 2011) Standard for Service-Entrance Cables
UL 943	(2006; Reprint Jun 2012) Ground-Fault Circuit-Interrupters

1.2 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE 100.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Marking Strips Drawings

SD-03 Product Data

Receptacles
Switches
Enclosed Circuit Breakers
Manual Motor Starters

SD-06 Test Reports

600-Volt Wiring Test
Grounding System Test
Ground-Fault Receptacle Test

1.4 QUALITY ASSURANCE

1.4.1 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 Project Manager. 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.

1.4.2 Standard Products

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 and:

a. Have been in satisfactory commercial or industrial use for 2 years prior to bid opening including applications of equipment and materials under similar circumstances and of similar size.

b. Have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.

c. Where two or more items of the same class of equipment are required, provide 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.

1.4.2.1 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

6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.2.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site are not acceptable.

1.5 WARRANTY

Provide equipment items supported by service organizations that are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

As a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70 for all materials, equipment, and devices.

2.2 CONDUIT AND FITTINGS

Conform to the following:

2.2.1 Rigid Metallic Conduit

2.2.1.1 Rigid, Threaded Zinc-Coated Steel Conduit

ANSI C80.1 and UL 6.

2.2.2 Rigid Nonmetallic Conduit

PVC Type EPC-40 in accordance with NEMA TC 2 and UL 651.

2.2.3 Intermediate Metal Conduit (IMC)

UL 1242, zinc-coated steel only.

2.2.4 Electrical, Zinc-Coated Steel Metallic Tubing (EMT)

UL 797 and ANSI C80.3.

2.2.5 Plastic-Coated Rigid Steel and IMC Conduit

NEMA RN 1, Type 40 (40 mils thick).

2.2.6 Flexible Metal Conduit

UL 1.

2.2.6.1 Liquid-Tight Flexible Metal Conduit, Steel

UL 360.

2.2.7 Fittings for Metal Conduit, EMT, and Flexible Metal Conduit

UL 514B. Ferrous fittings: cadmium- or zinc-coated in accordance with UL 514B.

2.2.7.1 Fittings for Rigid Metal Conduit and IMC

Threaded-type. Split couplings unacceptable.

2.2.7.2 Fittings for EMT

Steel compression type.

2.2.8 Fittings for Rigid Nonmetallic Conduit

NEMA TC 3 for PVC and UL 514B.

2.2.9 Liquid-Tight Flexible Nonmetallic Conduit

UL 1660.

2.3 OUTLET BOXES AND COVERS

UL 514A, cadmium- or zinc-coated, if ferrous metal. UL 514C, if nonmetallic.

2.3.1 Outlet Boxes for Telecommunications System

Standard type, 4 inches square by 2-1/8 inches deep.

2.4 CABINETS, JUNCTION BOXES, AND PULL BOXES

Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.

2.5 WIRES AND CABLES

Provide wires and cables in accordance applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Do not use wires and cables manufactured more than 12 months prior to date of delivery to site.

2.5.1 Conductors

Provide the following:

a. Conductor sizes and capacities shown are based on copper, unless indicated otherwise.

b. Conductors No. 8 AWG and larger diameter: stranded.

c. Conductors No. 10 AWG and smaller diameter: solid.

d. Conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3: stranded unless specifically indicated otherwise.

2.5.1.1 Minimum Conductor Sizes

Provide minimum conductor size in accordance with the following:

a. Branch circuits: 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.

2.5.2 Color Coding

Provide color coding for service, feeder, branch, control, and signaling circuit conductors.

2.5.2.1 Ground and Neutral Conductors

Provide color coding of ground and neutral conductors 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 color coding: white with a different colored (not green) stripe for each.

2.5.2.2 Ungrounded Conductors

Provide color coding of ungrounded conductors in different voltage systems as follows:

208/120 volt, three-phase

a. Phase A - black

b. Phase B - red

c. Phase C - blue

2.5.3 Insulation

Unless specified or indicated otherwise or required by NFPA 70, provide power and lighting wires rated for 600-volts, Type THWN/THHN conforming to UL 83, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits: Type TW or TF, conforming to UL 83. Provide only conductors with 90-degree C insulation or better.

2.5.4 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.

2.5.5 Service Entrance Cables

Service Entrance (SE) and Underground Service Entrance (USE) Cables, UL 854.

2.6 SPLICES AND TERMINATION COMPONENTS

UL 486A-486B for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires: insulated, pressure-type in accordance with UL 486A-486B or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.7 DEVICE PLATES

Provide the following:

a. UL listed, one-piece device plates for outlets to suit the devices installed.

b. For Metal Outlet Boxes, Plates on Unfinished Walls: Zinc-coated sheet steel or cast metal having round or beveled edges.

c. Plates on Finished Walls: Satin finish stainless steel or brushed-finish aluminum, minimum 0.03 inch thick.

d. Screws: Machine-type with countersunk heads in color to match finish of plate.

e. Sectional type device plates are not be permitted.

f. Plates installed in Wet Locations: Gasketed and UL listed for "wet locations while in use".

2.8 SWITCHES

2.8.1 Toggle Switches

NEMA WD 1, UL 20, single pole, totally enclosed with bodies of thermoplastic or thermoset plastic and mounting strap with grounding screw. Include the following:

a. Handles: Brown thermoplastic.

b. Wiring Terminals: Screw-type, side-wired.

c. Contacts: Silver-cadmium and contact arm - one-piece copper alloy.

d. Switches: Rated quiet-type ac only, 120/277 volts, with current rating and number of poles indicated.

2.8.2 Disconnect Switches

NEMA KS 1. Provide heavy duty-type switches where indicated, where switches are rated higher than 240 volts, and for double-throw switches. Utilize Class R fuseholders and fuses for fused switches, unless indicated otherwise. Provide horsepower rated for switches serving as the motor-disconnect means. Provide switches in NEMA enclosure as indicated per NEMA ICS 6.

2.9 RECEPTACLES

Provide the following:

a. UL 498, hard use (also designated heavy-duty), grounding-type.

b. Ratings and Configurations: As indicated.

c. Bodies: Brown as per NEMA WD 1.

d. Face and Body: Thermoplastic supported on a metal mounting strap.

e. Dimensional Requirements: Per NEMA WD 6.

f. Screw-type, side-wired wiring terminals or of the solderless pressure type having suitable conductor-release arrangement.

g. Grounding pole connected to mounting strap.

h. The Receptacle: Containing triple-wipe power contacts and double or triple-wipe ground contacts.

2.9.1 Weatherproof Receptacles

Provide receptacles, UL listed for use in "wet locations". Include cast metal box with gasketed, hinged, lockable and weatherproof while-in-use, die-cast metal/aluminum cover plate.

2.9.2 Ground-Fault Circuit Interrupter Receptacles

UL 943, duplex type for mounting in standard outlet box. Provide device capable of detecting current leak of 6 milliamperes or greater and tripping per requirements of UL 943 for Class A ground-fault circuit interrupter devices. Provide screw-type, side-wired wiring terminals or pre-wired (pigtail) leads.

2.10 ENCLOSED CIRCUIT BREAKERS

UL 489. Individual molded case circuit breakers with voltage and continuous current ratings, number of poles, overload trip setting, and short circuit current interrupting rating as indicated. Enclosure type as indicated. Provide solid neutral.

2.11 MANUAL MOTOR STARTERS (MOTOR RATED SWITCHES)

Single pole designed for surface mounting with overload protection.

2.12 LOCKOUT REQUIREMENTS

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. Comply with requirements of Division 23, "Mechanical" for mechanical isolation of machines and other equipment.

2.13 TELECOMMUNICATIONS SYSTEM

Provide system of telecommunications wire-supporting structures (pathway), including: outlet boxes, conduits with pull wires, and other accessories for telecommunications outlets and pathway in accordance with TIA-569 and as specified herein. Additional telecommunications requirements are specified in Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM.

2.14 GROUNDING AND BONDING EQUIPMENT

2.14.1 Ground Rods

UL 467. Copper-clad steel with minimum diameter of 3/4 inch and minimum length 10 feet. Sectional ground rods are permitted.

2.15 MANUFACTURER'S NAMEPLATE

Provide on each item of equipment 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.

2.16 FIELD FABRICATED NAMEPLATES

Provide field fabricated nameplates in accordance with the following:

a. ASTM D709.

b. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings.

c. Each Nameplate Inscription: Identify the function and, when applicable, the position.

d. Nameplates: Melamine plastic, 0.125 inch thick, white with black center core.

e. Surface: Matte finish. Corners: square. Accurately align lettering and engrave into the core.

f. Minimum Size of Nameplates: One by 2.5 inches.

g. Lettering Size and Style: A minimum of 0.25 inch high normal block style.

2.17 WARNING SIGNS

Provide warning signs for flash protection in accordance with NFPA 70E and NEMA Z535.4 for switchboards, panelboards, industrial control panels, and motor control centers 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. Provide marking that is clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

2.18 FIRESTOPPING MATERIALS

Provide firestopping around electrical penetrations in accordance with Section 07 84 00 FIRESTOPPING.

2.19 FACTORY APPLIED FINISH

Provide factory-applied finish on electrical equipment in accordance with the following:

a. NEMA 250 corrosion-resistance test and the additional requirements as specified herein.

b. Interior and exterior steel surfaces of equipment enclosures: thoroughly cleaned followed by a rust-inhibitive phosphatizing or equivalent treatment prior to painting.

c. Exterior Surfaces: Free from holes, seams, dents, weld marks, loose scale or other imperfections.

d. Interior Surfaces: Receive not less than one coat of corrosion-resisting paint in accordance with the manufacturer's standard practice.

e. Exterior Surfaces: Primed, filled where necessary, and given not less than two coats baked enamel with semigloss finish.

f. Equipment Located Indoors: ANSI Light Gray.

g. Provide manufacturer's coatings for touch-up work and as specified in paragraph "FIELD APPLIED PAINTING".

PART 3 EXECUTION

3.1 INSTALLATION

Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces: Conform to requirements of NFPA 70 and IEEE C2 and to requirements specified herein.

3.1.1 Underground Service

Underground Service Conductors and Associated Conduit: Continuous from service entrance equipment to outdoor power system connection.

3.1.2 Service Entrance Identification

Service Entrance Disconnect Devices, Switches, and Enclosures: Labeled and identified as such.

3.1.3 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. Grounding conductor: separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Shared neutral, or multi-wire branch circuits, are not permitted with arc-fault circuit interrupters. Minimum conduit size: 1/2 inch in diameter for low voltage lighting and power circuits. Firestop conduit which penetrates fire-rated walls and fire-rated partitions in accordance with Section 07 84 00 FIRESTOPPING.

3.1.3.1 Pull Wire

Install pull wires in empty conduits. Pull Wire: Plastic having minimum 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.

3.1.4 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.

3.1.4.1 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.

3.1.4.2 Restrictions Applicable to Nonmetallic Conduit

PVC Schedule 40

a. Do not use in areas where subject to severe physical damage, including but not limited to, mechanical equipment rooms, electrical equipment rooms, hospitals, power plants, missile magazines, and other such areas.

b. Do not use in penetrating fire-rated walls or partitions, or fire-rated floors.

c. Do not use above grade, except where allowed in this section for rising through floor slab or indicated otherwise.

3.1.4.3 Restrictions Applicable to Flexible Conduit

Use only as specified in paragraph "Flexible Connections". Do not use when the enclosed conductors must be shielded from the effects of High-altitude Electromagnetic Pulse (HEMP).

3.1.4.4 Underground Conduit

PVC, Type EPC-40.

3.1.4.5 Conduit Installed Under Floor Slabs

Conduit Run Under Floor Slab: Located a minimum of 12 inches below the vapor barrier. Seal around conduits at penetrations thru vapor barrier.

3.1.4.6 Conduit Through Floor Slabs

Where conduits rise through floor slabs, do not allow curved portion of bends to be visible above finished slab.

3.1.4.7 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.

3.1.4.8 Conduit Support

Support conduit by pipe straps, wall brackets, threaded rod conduit 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. Do not exceed one-fourth proof test load for load applied to fasteners. Provide vibration resistant and shock-resistant fasteners attached to concrete ceiling. Do not cut main reinforcing bars for any 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. 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: supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Do not share supporting means between electrical raceways and mechanical piping or ducts. Coordinate installationwith 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.

3.1.4.9 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.

3.1.4.10 Locknuts and Bushings

Fasten conduits to sheet metal boxes and cabinets with two 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. Provide locknuts with sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

3.1.4.11 Flexible Connections

Provide flexible steel conduit between 3 and 6 feet in length for recessed

and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for motors. Install flexible conduit to allow 20 percent slack. Minimum flexible steel conduit size: 1/2 inch diameter. Provide liquidtight flexible conduit in wet and damp locations for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

3.1.4.12 Telecommunications and Signal System Pathway

Install telecommunications pathway in accordance with TIA-569.

Horizontal Pathway: Telecommunications pathways from the work area to the telecommunications room: installed and cabling length requirements in accordance with TIA-568-C.1. Size conduits in accordance with TIA-569.

3.1.5 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: 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 7 feet above floors and walkways, and when specifically indicated. Boxes in other locations: sheet steel. Provide each box with volume required by NFPA 70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures: 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: 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; provide readily removable fixturesfor 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. 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.

3.1.5.1 Boxes

Boxes for use with raceway systems: 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. Telecommunications outlets: a minimum of 4 inches square by 2-1/8 inches deep. Mount outlet boxes flush in finished walls.

3.1.5.2 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.

3.1.5.3 Extension Rings

Extension rings are not permitted for new construction. Use only on existing boxes in concealed conduit systems where wall is furred out for new finish.

3.1.6 Mounting Heights

Mount enclosed circuit breakers and disconnecting switches so height of operating handle at its highest position is maximum 78 inches above floor. Mount lighting switches 48 inches above finished floor. Mount receptacles and telecommunications outlets 18 inches above finished floor. Mount other devices as indicated. Measure mounting heights of wiring devices and outlets to center of device or outlet.

3.1.7 Conductor Identification

Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, provide color coding by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, provide color coding by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves. Provide telecommunications system conductor identification as specified in Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEMS.

3.1.7.1 Marking Strips

Provide marking strips in accordance with the following:

a. Provide white or other light-colored plastic marking strips, fastened by screws to each terminal block, for wire designations.

b. Use permanent ink for the wire numbers.

c. Provide reversible marking strips to permit marking both sides, or provide two marking strips with each block.

d. Size marking strips to accommodate the two sets of wire numbers.

e. Assign a device designation in accordance with NEMA ICS 1 to each device to which a connection is made. Mark each device terminal to which a connection is made 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, provide additional wire and cable designations for identification of remote (external) circuits 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.

3.1.8 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.

3.1.9 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.

3.1.10 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated walls and partitions in accordance with Section 07 84 00 FIRESTOPPING.

3.1.11 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 and nonmetallic raceways, telecommunications system grounds, and neutral conductor of wiring systems. Make ground connection at main service equipment. 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 includes electrical service system grounds.

3.1.11.1 Ground Rods

Provide cone pointed ground rods. Measure the resistance to ground using the fall-of-potential method described in IEEE 81. Do not exceed 25 ohms under normally dry conditions for the maximum resistance of a driven ground. If this resistance cannot be obtained with a single rod, one additional rod, spaced on center, not less than twice the distance of the length of the rod. If the resultant resistance exceeds 25 ohms measured not less than 48 hours after rainfall, notify the Project Manager who will decide on the number of ground rods to add.

3.1.11.2 Grounding Connections

Make grounding connections which are buried or otherwise normally inaccessible by exothermic weld.

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.

3.1.11.3 Resistance

Maximum resistance-to-ground of grounding system: do not exceed 25 ohms

under dry conditions. Where resistance obtained exceeds 25 ohms, contact Project Manager for further instructions.

3.1.12 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 and are provided under the section specifying the associated equipment.

3.1.13 Repair of Existing Work

Perform repair of existing work, demolition, and modification of existing electrical distribution systems as follows:

3.1.13.1 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.

3.1.13.2 Existing Concealed Wiring to be Removed

Disconnect existing concealed wiring to be removed from its source. Remove conductors; cut conduit flush with floor, underside of floor, and through walls; and seal openings.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side. Space the signs in accordance with NFPA 70E.

3.4 FIELD APPLIED PAINTING

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.

3.5 FIELD QUALITY CONTROL

Furnish test equipment and personnel and submit written copies of test results. Give Project Manager 5 working days notice prior to each test.

3.5.1 Devices Subject to Manual Operation

Operate each device subject to manual operation at least five times, demonstrating satisfactory operation each time.

3.5.2 600-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: 250,000 ohms.

3.5.3 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.

3.5.4 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 Project Manager, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

-- End of Section --

SECTION 26 56 00

EXTERIOR LIGHTING

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LTS	(2013; Errata 2013) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 189.1	(2011; Errata 1-2 2012; INT 1 2013; Errata 3-8 2013) Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B108/B108M	(2012; E 2012) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B117	(2011) Standard Practice for Operating Salt Spray (Fog) Apparatus

ILLUMINATING ENGINEERING SOCIETY (IES)

IES HB-10	(2011) IES Lighting Handbook
IES LM-79	(2008) Electrical and Photometric Measurements of Solid-State Lighting Products
IES LM-80	(2008) Measuring Lumen Maintenance of LED Light Sources
IES RP-16	(2010; Addendum A 2008; Addenda B & C 2009) Nomenclature and Definitions for Illuminating Engineering
IES RP-8	(2000; Errata 2004; R 2005; Errata 2007) Roadway Lighting

IES TM-15	(2011) Luminaire Classification System for Outdoor Luminaires
IES TM-21	(2011) Projecting Long Term Lumen Maintenance of LED Light Sources

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013) National Electrical Safety Code
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA C136.31	(2010) American National for Roadway and Area Lighting Equipment - Luminaire Vibration
NEMA C82.77	(2002) Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment
NEMA IEC 60529	(2004) Degrees of Protection Provided by Enclosures (IP Code)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices

UNDERWRITERS LABORATORIES (UL)

UL 1310	(2011; Reprint Oct 2013) UL Standard for Safety Class 2 Power Units
UL 1598	(2008; Reprint Oct 2012) Luminaires
UL 773	(1995; Reprint Mar 2002) Standard for Plug-In, Locking Type Photocontrols for Use with Area Lighting
UL 773A	(2006; Reprint Nov 2013) Standard for Nonindustrial Photoelectric Switches for Lighting Control

UL 8750	(2009; Reprint May 2014) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products

1.2 RELATED REQUIREMENTS

Materials not considered to be luminaires or lighting equipment are specified in Section(s) 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION.

1.3 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 and IES RP-16.

b. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in IES LM-80.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Photometric Plan
LED Luminaire Warranty

SD-02 Shop Drawings

Luminaire Drawings
Poles

SD-03 Product Data

LED Luminaires

County of Hawaii: Fixture Type A requires approval from the County of Hawaii for use on this project. If the specified fixture by C & W Energy Solutions is not provided, then the Contractor shall submit evidence in the form of a written letter from the County of Hawaii that the submitted fixture has been approved for use as an exterior LED fixture. Approval of a non-C and W Energy Solutions fixture will NOT be given without this letter or acceptable proof such as formal listing on the County's website or design guide.

Luminaire Light Sources
Luminaire Power Supply Units (Drivers)
Photocell
Aluminum Poles

SD-05 Design Data

Design Data for Luminaires

SD-06 Test Reports

LED Luminaire - IES LM-79 Test Report
LED Light Source - IES LM-80 Test Report
Operating Test

Submit operating test results as stated in paragraph "FIELD QUALITY CONTROL".

SD-07 Certificates

Luminaire Useful Life Certificate

Submit certification from the manufacturer indicating the expected useful life of the luminaires provided. The useful life shall be directly correlated from the IES LM-80 test data using procedures outlined in IES TM-21. Thermal properties of the specific luminaire and local ambient operating temperature and conditions shall be taken into consideration.

1.5 QUALITY ASSURANCE

1.5.1 Drawing Requirements

1.5.1.1 Luminaire Drawings

Include dimensions, effective projected area (EPA), accessories, and installation and construction details. Photometric data, including zonal lumen data, average and minimum ratio, aiming diagram, and computerized candlepower distribution data shall accompany shop drawings.

1.5.1.2 Poles

Include dimensions, wind load determined in accordance with AASHTO LTS, pole deflection, pole class, and other applicable information.

1.5.2 Photometric Plan

For LED luminaires, include computer-generated photometric analysis of the "designed to" values for the "end of useful life" of the luminaire installation using a light loss factor of 0.7. For LED and all other types of luminaires, the submittal shall include the following:

a. Horizontal illuminance measurements at finished grade, taken at a maximum of every 10 feet.

b. Vertical illuminance measurements at 5 feet above finished grade.

c. Minimum and maximum footcandle levels.

d. Average maintained footcandle level.

e. Maximum to minimum ratio for horizontal illuminance only.

1.5.3 Design Data for Luminaires

a. Provide distribution data according to IES classification type as defined in IES HB-10.

b. Shielding as defined by IES RP-8 or B.U.G. rating for the installed position as defined by IES TM-15.

c. Provide safety certification and file number for the luminaire family. Include listing, labeling and identification per NFPA 70 (NEC). Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratories).

d. Provide long term lumen maintenance projections for each LED luminaire in accordance with IES TM-21. Data used for projections shall be obtained from testing in accordance with IES LM-80.

e. Provide wind loading calculations for luminaires mounted on poles. Weight and effective projected area (EPA) of luminaires and mounting brackets shall not exceed maximum rating of pole as installed in particular wind zone area.

1.5.4 LED Luminaire - IES LM-79 Test Report

Submit test report on manufacturer's standard production model luminaire. Submittal shall include all photometric and electrical measurements, as well as all other pertinent data outlined under "14.0 Test Report" in IES LM-79.

1.5.5 LED Light Source - IES LM-80 Test Report

Submit report on manufacturer's standard production LED package, array, or module. Submittal shall include:

a. Testing agency, report number, date, type of equipment, and LED light source being tested.

b. All data required by IES LM-80.

1.5.5.1 Test Laboratories

Test laboratories for the IES LM-79 and IES LM-80 test reports shall be one of the following:

a. National Voluntary Laboratory Accreditation Program (NVLAP) accredited for solid-state lighting testing as part of the Energy-Efficient Lighting Products laboratory accreditation program.

b. One of the qualified labs listed on the Department of Energy - Energy Efficiency & Renewable Energy, Solid-State Lighting web site.

c. A manufacturer's in-house lab that meets the following criteria:

(1) Manufacturer has been regularly engaged in the design and

production of high intensity discharge roadway and area luminaires and the manufacturer's lab has been successfully certifying these fixtures for a minimum of 15 years.

(2) Annual equipment calibration including photometer calibration in accordance with National Institute of Standards and Technology.

1.5.6 Regulatory Requirements

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 Project Manager. 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.

1.5.7 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.5.7.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if the manufacturer has been regularly engaged in the design and production of high intensity discharge roadway and area luminaires for a minimum of 15 years. Products shall have been in satisfactory commercial or industrial use for 15 years prior to bid opening. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 15-year period.

1.5.7.2 Material and Equipment Manufacturing Date

Products manufactured more than 1 year prior to date of delivery to site shall not be used, unless specified otherwise.

1.6 DELIVERY, STORAGE, AND HANDLING OF POLES

1.6.1 Aluminum Poles

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.

1.7 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render

satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.7.1 LED Luminaire Warranty

Provide Luminaire Useful Life Certificate.

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

a. Provide a written five year on-site replacement warranty for material, fixture finish, and workmanship. On-site replacement includes transportation, removal, and installation of new products.

(1) Finish warranty shall include warranty against failure and against substantial deterioration such as blistering, cracking, peeling, chalking, or fading.

(2) Material warranty shall include:

(a) All power supply units (drivers).

(b) Replacement when more than 10 percent of LED sources in any lightbar or subassembly(s) are defective or non-starting.

b. Warranty period must begin on date of beneficial occupancy. Contractor shall provide the Project Manager signed warranty certificates prior to final payment.

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

Products and materials not considered to be luminaires, equipment or accessories are specified in Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION.

2.2 LED LUMINAIRES

UL 1598, NEMA C82.77 and UL 8750. Provide luminaires as indicated in luminaire schedule and XL plates or details on project plans. Provide luminaires complete with light sources of quantity, type, and wattage indicated. All luminaires of the same type shall be provided by the same manufacturer.

LED fixture shall be manufactured by C & W Energy Solutions or any other manufacturer that has a fixture approved for use by the County of Hawaii for outdoor security lighting complying with the Hawaii County Code, Article 9, Table 14-A, Class II applications. The LED light shall have less than 2% blue light content and be traffic color compliant. See paragraph under "LED Luminaires" in SD-03 Product Data herein above.

2.2.1 General Requirements

a. LED luminaire housings shall be die cast or extruded aluminum.

b. LED luminaires shall be rated for operation within an ambient

temperature range of minus 22 degrees F to 104 degrees F.

c. Luminaires shall be UL listed for wet locations per UL 1598. Optical compartment for LED luminaires shall be sealed and rated a minimum of IP65 per NEMA IEC 60529.

d. LED luminaires shall produce a minimum efficacy as shown in the following table, tested per IES LM-79. Theoretical models of initial raw LED lumens per watt are not acceptable.

Application	Luminaire Efficacy in Lumens per Watt
Exterior Pole/Arm-Mounted Area and Roadway Luminaires	65
Exterior Pole/Arm-Mounted Decorative Luminaires	65
Exterior Wall-Mounted Area Luminaires	60
Bollards	35
Parking Garage Luminaires	70

e. Luminaires shall have IES distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans per IES HB-10.

f. 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.

g. Luminaires shall not exceed the following IES TM-15 Backlight, Uplight and Glare (B.U.G.) ratings:

(1) Maximum Backlight (B) rating shall be determined by lighting zone in which luminaire is placed.

(2) Maximum Uplight (U) rating shall be U0.

(3) Maximum Glare (G) rating shall be determined by lighting zone in which luminaire is placed.

h. Luminaires shall be fully assembled and electrically tested prior to shipment from factory.

i. The finish color shall be as indicated in the luminaire schedule or detail on the project plans.

j. Luminaire arm bolts shall be 304 stainless steel or zinc-plated steel.

k. Luminaire lenses shall be constructed of clear tempered glass or UV-resistant acrylic.

l. 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.

m. 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.

n. Luminaire must pass 3G vibration testing in accordance with NEMA C136.31.

o. All factory electrical connections shall be made using crimp, locking, or latching style connectors. Twist-style wire nuts are not acceptable.

2.2.2 Luminaire Light Sources

2.2.2.1 LED Light Sources

LED sources shall comply with the Hawaii County Code, Article 9, Table 14-A, Class II applications. The LED light shall have less than 2 percent blue light content and be traffic color compliant.

2.2.3 Luminaire Power Supply Units (Drivers)

2.2.3.1 LED Power Supply Units (Drivers)

UL 1310. LED Power Supply Units (Drivers) shall meet the following requirements:

a. Minimum efficiency shall be 85 percent.

b. Drive current to each individual LED shall not exceed 600 mA, plus or minus 10 percent.

c. Shall be rated to operate between ambient temperatures of minus 22 degrees F and 104 degrees F.

d. Shall be designed to operate on the voltage system to which they are connected, typically ranging from 120 V to 480 V nominal.

e. Operating frequency shall be 50 or 60 Hz.

f. Power Factor (PF) shall be greater than or equal to 0.90.

g. Total Harmonic Distortion (THD) current shall be less than or equal to 20 percent.

h. Shall meet requirements of 47 CFR 15, Class B.

i. Shall be RoHS-compliant.

j. Shall be mounted integral to luminaire. Remote mounting of power supply is not allowed.

k. Power supplies in luminaires mounted under a covered structure, such as a canopy, or where otherwise appropriate shall be UL listed with a sound rating of A.

l. Shall be equipped with over-temperature protection circuit that turns light source off until normal operating temperature is achieved.

2.2.4 LED Luminaire Surge Protection

Provide surge protection integral to luminaire to meet C Low waveforms as defined by IEEE C62.41.2, Scenario 1, Location Category C.

2.3 EXTERIOR LUMINAIRE CONTROLS

Controls shall comply with ASHRAE 189.1.

2.3.1 Photocell

UL 773 or UL 773A. Photocells shall be hermetically sealed, silicon diode light sensor type, rated at 600 watts, 120 volts, 50/60 Hz with single-pole, single-throw contacts. Photocell shall be designed to fail to the ON position. Housing shall be constructed of die cast aluminum, rated to operate within a temperature range of minus 40 to 158 degrees F. Photocell shall turn on at 1-3 footcandles and turn off at 3 to 15 footcandles. A time delay shall prevent accidental switching from transient light sources.

2.4 POLES

Provide poles designed for wind loading of 110 miles per hour determined in accordance with AASHTO LTS while supporting luminaires and all other appurtenances indicated. The effective projected areas of luminaires and appurtenances used in calculations shall be specific for the actual products provided on each pole. Poles shall be anchor-base type designed for use with underground supply conductors. Poles shall have oval-shaped handhole having a minimum clear opening of 2.5 by 5 inches. Handhole cover shall be secured by stainless steel captive screws. Metal poles shall have an internal grounding connection accessible from the handhole near the bottom of each pole. Scratched, stained, chipped, or dented poles shall not be installed.

2.4.1 Aluminum Poles

Provide aluminum poles manufactured of corrosion resistant aluminum alloys conforming to AASHTO LTS for Alloy 6063-T6 or Alloy 6005-T5 for wrought alloys and Alloy 356-T4 (3,5) for cast alloys. Poles shall be seamless extruded or spun seamless type with minimum 0.188 inch wall thickness. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire. Tops of shafts shall be fitted with a round or tapered cover. Base shall be anchor bolt mounted, made of cast 356-T6 aluminum alloy in accordance with ASTM B108/B108M and shall be machined to receive the lower end of shaft. Joint between shaft and base shall be welded. Base cover shall be cast 356-T6 aluminum alloy in accordance with ASTM B108/B108M. Hardware, except anchor bolts, shall be either 2024-T4 anodized aluminum alloy or stainless steel. Aluminum poles and brackets for area lighting shall have a dark anodic bronze finish to match fixtures. Manufacturer's standard provision shall be made for protecting the finish during shipment and installation. Minimum protection shall consist of spirally wrapping each pole shaft with protective paper secured with tape, and shipping small parts in boxes.

2.5 POLE FOUNDATIONS

Anchor bolts shall be steel rod having a minimum yield strength of 50,000 psi; the top 12 inches of the rod shall be galvanized in accordance with ASTM A153/A153M. Concrete shall be as specified in Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE.

2.6 EQUIPMENT IDENTIFICATION

2.6.1 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.

2.7 FACTORY APPLIED FINISH

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

3.1 INSTALLATION

Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.

3.1.1 Aluminum 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 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION. 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. Install according to pole manufacturer's instructions. Alterations to poles after fabrication will void manufacturer's warranty and shall not be allowed.

3.1.2 Pole Setting

Depth shall be as indicated. Poles in straight runs shall be in a straight line. Dig holes large enough to permit the proper use of tampers to the full depth of the hole. Place backfill in the hole in 6 inch maximum layers and thoroughly tamp. Place surplus earth around the pole in a conical shape and pack tightly to drain water away.

3.1.3 Photocell Switch Aiming

Aim switch according to manufacturer's recommendations.

3.1.4 GROUNDING

Ground noncurrent-carrying parts of equipment including metal poles,

luminaires, mounting arms, brackets, and metallic enclosures as specified in Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.1.5 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.2 FIELD QUALITY CONTROL

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.

-- End of Section --

SECTION 27 10 00

BUILDING TELECOMMUNICATIONS CABLING SYSTEM

PART 1 GENERAL

1.1 REFERENCES

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.

ASTM INTERNATIONAL (ASTM)

ASTM D709	(2013) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-90-661	(2012) Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cables for Use in General Purpose and LAN Communications Wiring Systems Technical Requirements

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)

NECA/BICSI 568	(2006) Standard for Installing Building Telecommunications Cabling

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA WC 66	(2013) Performance Standard for Category 6 and Category 7 100 Ohm Shielded and Unshielded Twisted Pairs

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-1152	(2009) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
TIA-568-C.0	(2009; Add 1 2010; Add 2 2012) Generic Telecommunications Cabling for Customer Premises
TIA-568-C.1	(2009; Add 2 2011; Add 1 2012) Commercial

	Building Telecommunications Cabling Standard
TIA-568-C.2	(2009; Errata 2010) Balanced Twisted-Pair Telecommunications Cabling and Components Standards
TIA-568-C.3	(2008; Add 1 2011) Optical Fiber Cabling Components Standard
TIA-569	(2012c; Addendum 1 2013; Errata 2013) Commercial Building Standard for Telecommunications Pathways and Spaces
TIA-606	(2012b) Administration Standard for the Telecommunications Infrastructure
TIA-607	(2011b) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

U.S. FEDERAL COMMUNICATIONS COMMISSION (FCC)

FCC Part 68	Connection of Terminal Equipment to the Telephone Network (47 CFR 68)

UNDERWRITERS LABORATORIES (UL)

UL 1863	(2004; Reprint Nov 2012) Communication Circuit Accessories
UL 444	(2008; Reprint Apr 2010) Communications Cables
UL 467	(2007) Grounding and Bonding Equipment
UL 514C	(2014) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 969	(1995; Reprint Jun 2014) Standard for Marking and Labeling Systems

1.2 RELATED REQUIREMENTS

Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM applies to this section with additions and modifications specified herein.

1.3 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in this specification shall be as defined in TIA-568-C.1, TIA-568-C.2, TIA-568-C.3, TIA-569, TIA-606 and IEEE 100 and herein.

1.3.1 Campus Distributor (CD)

A distributor from which the campus backbone cabling emanates. (International expression for main cross-connect (MC).)

1.3.2 Building Distributor (BD)

A distributor in which the building backbone cables terminate and at which connections to the campus backbone cables may be made. (International expression for intermediate cross-connect (IC).)

1.3.3 Floor Distributor (FD)

A distributor used to connect horizontal cable and cabling subsystems or equipment. (International expression for horizontal cross-connect (HC).)

1.3.4 Telecommunications Room (TR)

An enclosed space for housing telecommunications equipment, cable, terminations, and cross-connects. The room is the recognized cross-connect between the backbone cable and the horizontal cabling.

1.3.5 Entrance Facility (EF) (Telecommunications)

An entrance to the building for both private and public network service cables (including wireless) including the entrance point at the building wall and continuing to the equipment room.

1.3.6 Equipment Room (ER) (Telecommunications)

An environmentally controlled centralized space for telecommunications equipment that serves the occupants of a building. Equipment housed therein is considered distinct from a telecommunications room because of the nature of its complexity.

1.3.7 Open Cable

Cabling that is not run in a raceway as defined by NFPA 70. This refers to cabling that is "open" to the space in which the cable has been installed and is therefore exposed to the environmental conditions associated with that space.

1.3.8 Open Office

A floor space division provided by furniture, moveable partitions, or other means instead of by building walls.

1.3.9 Pathway

A physical infrastructure utilized for the placement and routing of telecommunications cable.

1.4 SYSTEM DESCRIPTION

The building telecommunications cabling and pathway system shall include permanently installed horizontal cabling, horizontal pathways, telecommunications outlet assemblies, conduit, raceway, and hardware for splicing, terminating, and interconnecting cabling necessary to transport telephone and data (including LAN) between equipment items in a building. The horizontal system shall be wired in a star topology from the telecommunications work area to the floor distributor or campus distributor at the center or hub of the star. Provide telecommunications pathway systems referenced herein as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Telecommunications Drawings

In addition to Section 01 33 00 SUBMITTAL PROCEDURES, provide shop drawings in accordance with paragraph "Shop Drawings".

SD-03 Product Data

Telecommunications Cabling (Horizontal)
Telecommunications Outlet/Connector Assemblies

Submittals shall include the manufacturer's name, trade name, place of manufacture, and catalog model or number. Include performance and characteristic curves. Submittals shall also include applicable federal, military, industry, and technical society publication references. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified in paragraph "Regulatory Requirements" and as required in Section 01 33 00 SUBMITTAL PROCEDURES.

SD-06 Test Reports

Telecommunications Cabling Testing

SD-07 Certificates

Telecommunications Contractor Qualifications
Key Personnel Qualifications
Manufacturer Qualifications
Test Plan

SD-09 Manufacturer's Field Reports

Factory Reel Tests

SD-11 Closeout Submittals

Record Documentation

1.6 QUALITY ASSURANCE

1.6.1 Shop Drawings

In exception to Section 01 33 00 SUBMITTAL PROCEDURES, submitted plan drawings shall be a minimum of 11 by 17 inches in size using a minimum scale of 1/8 inch per foot. 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. Submittals shall include the nameplate data, size, and capacity. Submittals shall also include applicable federal, military, industry, and technical society publication references.

1.6.1.1 Telecommunications Drawings

Provide drawings in accordance with TIA-606. The identifier for each termination and cable shall appear on the drawings. Drawings shall depict final telecommunications installed wiring system infrastructure in accordance with TIA-606. The drawings should provide details required to prove that the distribution system shall properly support connectivity from the EF telecommunications and ER telecommunications and FDs to the telecommunications work area outlets. The following drawings shall be provided as a minimum:

a. T2 - Serving Zones/Building Area Drawings: Drop Locations and Cable Identification (ID'S). Shows a building area or serving zone. These drawings show drop locations, telecommunications rooms, access points and detail call outs for common equipment rooms and other congested areas.

b. T4 - Typical Detail Drawings: Faceplate Labeling, Firestopping, Americans with Disabilities Act (ADA), Safety, Department of Transportation (DOT). Detailed drawings of symbols and typicals such as faceplate labeling, faceplate types, faceplate population installation procedures, detail racking, and raceways.

1.6.2 Telecommunications Qualifications

Work under this section shall be performed by and the equipment shall be provided by the approved Telecommunications Contractor and key personnel. Qualifications shall be provided for: the Telecommunications System Contractor, the Telecommunications System Installer, and the Supervisor (if different from the installer). A minimum of 30 days prior to installation, submit documentation of the experience of the Telecommunications Contractor and of the key personnel.

1.6.2.1 Telecommunications Contractor

The Telecommunications Contractor shall be a firm which is regularly and professionally engaged in the business of the applications, installation, and testing of the specified telecommunications systems and equipment. The Telecommunications Contractor shall demonstrate experience in providing successful telecommunications systems within the past 3 years of similar scope and size. Submit documentation for a minimum of three and a maximum of five successful telecommunication system installations for the Telecommunications Contractor.

1.6.2.2 Key Personnel

Provide key personnel who are regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. There may be one key person or more key persons proposed for this solicitation depending upon how many of the key roles each has successfully provided. Each of the key personnel

shall demonstrate experience in providing successful telecommunications systems within the past 3 years.

Supervisors and installers assigned to the installation of this system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification for each of the key personnel.

In lieu of BICSI certification, supervisors and installers assigned to the installation of this system or any of its components shall have a minimum of 3 years experience in the installation of the specified copper cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. Submit documentation for a minimum of three and a maximum of five successful telecommunication system installations for each of the key personnel. Documentation for each key person shall include at least two successful system installations provided that are equivalent in system size and in construction complexity to the telecommunications system proposed for this solicitation. Include specific experience in installing and testing telecommunications systems and provide the names and locations of at least two project installations successfully completed using copper telecommunications cabling systems. All of the existing telecommunications system installations offered by the key persons as successful experience shall have been in successful full-time service for at least 18 months prior to the issuance date for this solicitation. Provide the name and role of the key person, the title, location, and completed installation date of the referenced project, the referenced project owner point of contact information including name, organization, title, and telephone number, and generally, the referenced project description including system size and construction complexity.

Indicate that all key persons are currently employed by the Telecommunications Contractor, or have a commitment to the Telecommunications Contractor to work on this project. All key persons shall be employed by the Telecommunications Contractor at the date of issuance of this solicitation, or if not, have a commitment to the Telecommunications Contractor to work on this project by the date that the bid was due to the Project Manager.

Note that only the key personnel approved by the Project Manager in the successful proposal shall do work on this solicitation's telecommunications system. Key personnel shall function in the same roles in this contract, as they functioned in the offered successful experience. Any substitutions for the Telecommunications Contractor's key personnel requires approval from the Project Manager.

1.6.2.3 Minimum Manufacturer Qualifications

Cabling, equipment and hardware manufacturers shall have a minimum of 3 years experience in the manufacturing, assembly, and factory testing of components which comply with TIA-568-C.1, TIA-568-C.2 and TIA-568-C.3.

1.6.3 Test Plan

Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the components and accessories for each cable type specified, 60 days prior to the proposed test date. Include procedures for certification, validation,

and testing.

1.6.4 Regulatory Requirements

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 Project Manager. 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.

1.6.5 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

1.6.5.1 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 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.5.2 Material and Equipment Manufacturing Date

Products manufactured more than 1 year prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 DELIVERY AND STORAGE

Provide protection from weather, moisture, extreme heat and cold, dirt, dust, and other contaminants for telecommunications cabling and equipment placed in storage.

1.8 ENVIRONMENTAL REQUIREMENTS

Connecting hardware shall be rated for operation under ambient conditions of 32 to 140 degrees F and in the range of 0 to 95 percent relative humidity, noncondensing.

1.9 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.10 MAINTENANCE

1.10.1 Record Documentation

Provide T5 drawings including documentation on cables and termination hardware in accordance with TIA-606. T5 drawings shall include schedules to show information for cut-overs and cable plant management, patch panel layouts and cover plate assignments, cross-connect information and connecting terminal layout as a minimum. T5 drawings shall be provided in hard copy format. Provide the following T5 drawing documentation as a minimum:

Cables: A record of installed cable shall be provided in accordance with TIA-606. The cable records shall include only the required data fields. Include manufacture date of cable with submittal.

PART 2 PRODUCTS

2.1 COMPONENTS

Components shall be UL or third party certified. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations, submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Project Manager. 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. Provide a complete system of telecommunications cabling and pathway components using star topology. Provide support structures and pathways, complete with outlets, cables, and connecting hardware. Cabling and interconnecting hardware and components for telecommunications systems shall be UL listed or third party independent testing laboratory certified, and shall comply with NFPA 70 and conform to the requirements specified herein.

2.2 TELECOMMUNICATIONS PATHWAY

Provide telecommunications pathways in accordance with TIA-569 and as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

2.3 TELECOMMUNICATIONS CABLING

Cabling shall be UL listed for the application and shall comply with TIA-568-C.0, TIA-568-C.1, TIA-568-C.2, TIA-568-C.3 and NFPA 70. Provide a labeling system for cabling as required by TIA-606 and UL 969. Ship cable on reels or in boxes bearing manufacture date for for unshielded twisted pair (UTP) in accordance with ICEA S-90-661 for all cable used on this project. Cabling manufactured more than 12 months prior to date of installation shall not be used.

2.3.1 Horizontal Cabling

Provide horizontal cable in compliance with NFPA 70 and performance characteristics in accordance with TIA-568-C.1.

2.3.1.1 Horizontal Copper

Provide horizontal copper cable, UTP, 100 ohm in accordance with TIA-568-C.2, UL 444, ANSI/NEMA WC 66, and ICEA S-90-661. Provide four each individually twisted pair, minimum size 24 AWG conductors, Category 6, with a blue thermoplastic jacket. Cable shall be imprinted with manufacturers name or identifier, flammability rating, gauge of conductor, transmission performance rating (category designation) and length marking at regular intervals in accordance with ICEA S-90-661. Provide plenum (CMP), riser (CMR), or general purpose (CM or CMG) communications rated cabling in accordance with NFPA 70. Substitution of a higher rated cable shall be permitted in accordance with NFPA 70. Cables installed in conduit within and under slabs shall be UL listed and labeled for wet locations in accordance with NFPA 70.

2.4 TELECOMMUNICATIONS OUTLET/CONNECTOR ASSEMBLIES

2.4.1 Outlet/Connector Copper

Outlet/connectors shall comply with FCC Part 68, TIA-568-C.1, and TIA-568-C.2. UTP outlet/connectors shall be UL 1863 listed, non-keyed, 8-pin modular, constructed of high impact rated thermoplastic housing and shall be third party verified and shall comply with TIA-568-C.2 Category 6 requirements. Outlet/connectors provided for UTP cabling shall meet or exceed the requirements for the cable provided. Outlet/connectors shall be terminated using a Type 110 IDC PC board connector, color-coded for both T568A and T568B wiring. Each outlet/connector shall be wired as indicated. UTP outlet/connectors shall comply with TIA-568-C.2 for 200 mating cycles.

2.4.2 Cover Plates

Telecommunications cover plates shall comply with UL 514C and TIA-568-C.1, flush design constructed of 302 stainless material. Provide labeling in accordance with the paragraph "LABELING" in this section.

2.5 GROUNDING AND BONDING PRODUCTS

Provide in accordance with UL 467, TIA-607, and NFPA 70. Components shall be identified as required by TIA-606. Provide ground rods, bonding conductors, and grounding busbars as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

2.6 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.

2.7 FIELD FABRICATED NAMEPLATES

ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified 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 by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

2.8 TESTS, INSPECTIONS, AND VERIFICATIONS

2.8.1 Factory Reel Tests

Provide documentation of the testing and verification actions taken by manufacturer to confirm compliance with TIA-568-C.1, TIA-568-C.2, TIA-568-C.3 cables.

PART 3 EXECUTION

3.1 INSTALLATION

Install telecommunications cabling and pathway systems, including the horizontal cable, pathway systems, telecommunications outlet/connector assemblies, and associated hardware in accordance with NECA/BICSI 568, TIA-568-C.1, TIA-568-C.2, TIA-569, NFPA 70, and UL standards as applicable. Provide cabling in a star topology network. Pathways and outlet boxes shall be installed as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Install telecommunications cabling with copper media in accordance with the following criteria to avoid potential electromagnetic interference between power and telecommunications equipment. The interference ceiling shall not exceed 3.0 volts per meter measured over the usable bandwidth of the telecommunications cabling.

3.1.1 Cabling

Install UTP telecommunications cabling system as detailed in TIA-568-C.1. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection (IDC) tool kit for copper cable terminations. Do not exceed manufacturers' cable pull tensions for copper cables. Provide a device to monitor cable pull tensions. Do not exceed 25 pounds pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. For UTP cable, bend radii shall not be less than four times the cable diameter. Cables shall be terminated; no cable shall contain unterminated elements. Cables shall not be spliced. Label cabling in accordance with paragraph "LABELING" in this section.

3.1.1.1 Horizontal Cabling

Install horizontal cabling as indicated on drawings Do not untwist Category 6 UTP cables more than 1/2 inch from the point of termination to maintain cable geometry. Provide slack cable in the form of a figure eight (not a service loop) on each end of the cable, 10 feet in the telecommunications room, and 12 inches in the work area outlet..

3.1.2 Pathway Installations

Provide in accordance with TIA-569 and NFPA 70. Provide building pathway as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

3.1.3 Service Entrance Conduit, Underground

Provide service entrance underground as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

3.1.4 Work Area Outlets

3.1.4.1 Terminations

Terminate UTP cable in accordance with TIA-568-C.1, TIA-568-C.2 and wiring configuration as specified.

3.1.4.2 Cover Plates

As a minimum, each outlet/connector shall be labeled as to its function and a unique number to identify cable link in accordance with the paragraph "LABELING" in this section.

3.1.4.3 Cables

Unshielded twisted pair cables shall have a minimum of 12 inches of slack cable loosely coiled into the telecommunications outlet boxes. Minimum manufacturer's bend radius for each type of cable shall not be exceeded.

3.1.4.4 Pull Cords

Pull cords shall be installed in conduit serving telecommunications outlets that do not have cable installed.

3.1.5 Telecommunications Space Termination

Install termination hardware required for Category 6 system. An insulation displacement tool shall be used for terminating copper cable to insulation displacement connectors.

3.1.6 Grounding and Bonding

Provide in accordance with TIA-607, NFPA 70 and as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

3.2 LABELING

3.2.1 Labels

Provide labeling in accordance with TIA-606. Handwritten labeling is unacceptable. Stenciled lettering for voice and data circuits shall be provided using thermal ink transfer process.

3.2.2 Cable

Cables shall be labeled using color labels on both ends with identifiers in accordance with TIA-606.

3.2.3 Termination Hardware

Workstation outlets and patch panel connections shall be labeled using color coded labels with identifiers in accordance with TIA-606.

3.3 FIELD FABRICATED NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.4 TESTING

3.4.1 Telecommunications Cabling Testing

Perform telecommunications cabling inspection, verification, and performance tests in accordance with TIA-568-C.1. Test equipment shall conform to TIA-1152.

3.4.1.1 Inspection

Visually inspect UTP jacket materials for UL or third party certification markings. Inspect cabling terminations in telecommunications rooms and at workstations to confirm color code for T568A or T568B pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1 and TIA-568-C.2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.

3.4.1.2 Verification Tests

UTP copper cabling shall be tested for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after termination but prior to being cross-connected.

3.4.1.3 Performance Tests

Perform testing for each outlet as follows: Perform Category 6 link tests in accordance with TIA-568-C.1 and TIA-568-C.2. Tests shall include wire map, length, insertion loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, propagation delay, and delay skew.

3.4.1.4 Final Verification Tests

Perform verification tests for UTP systems after the complete telecommunications cabling and workstation outlet/connectors are installed.

-- End of Section --

SECTION 28 05 26

GROUNDING AND BONDING FOR ELECTRONIC SAFETY AND SECURITY

PART 1 GENERAL

1.1 REFERENCES

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.

ASTM INTERNATIONAL (ASTM)

ASTM B3	(2013) Standard Specification for Soft or Annealed Copper Wire

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 81	(2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-889	(1976; Rev B; Notice 2 1988; Notice 3 1993) Dissimilar Metals

UNDERWRITERS LABORATORIES (UL)

UL 467	(2007) Grounding and Bonding Equipment

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Grounding Systems; G
Ground Rods; G
Ground Wires; G
Connectors and Fasteners; G
Bonding Materials; G

SD-06 Test Reports

Bond Resistance Test; G
Ground Resistance Tests; G

Ground Isolation Test; G
Continuity Isolation Test; G

SD-08 Manufacturer's Instructions

Grounding Systems; G

SD-11 Closeout Submittals

Record Drawings; G

1.3 MAINTENANCE MATERIALS SUBMITTAL

Submit manufacturer's instructions for the grounding systems including special provisions required to install equipment components and system packages. Within special notices, detail impedances, hazards and safety precautions.

PART 2 PRODUCTS

Submit material, equipment, and fixture lists for grounding systems, including manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site information.

2.1 EQUIPMENT

Submit equipment and performance data for the following items including life, test, system functional flows, safety features, and mechanical automated details.

2.1.1 Ground Rods

Ensure ground rods conform to the requirements of NFPA 70.

Use copper-clad steel ground rods not less than 3/4-inch in diameter and not less than 10-feet long per section. Ensure ground rods are clean and smooth and have a cone-shaped point on the first section Ensure rods are die-stamped near the top with the name or trademark of the manufacturer and the length of the rod in feet.

2.1.2 Ground Wires

Ensure ground wires are in accordance with NFPA 70.

Ground and bond wires for substations, main panels and distribution points, and ground rod connections are annealed bare copper conforming to ASTM B3, stranded, with 98 percent conductivity. Wire size is in accordance with the grounding requirements of NFPA 70.

Ground wires for equipment receptacles for non-current carrying hardware, installed in conduit is soft drawn copper, in accordance with ASTM B3, stranded, with green insulation. Note wire size.

2.1.3 Connectors and Fasteners

Ensure grounding and bonding fasteners and connectors conform to the requirements of UL 467 and NFPA 70.

Use copper grounding and bonding fasteners.

Use copper bonding straps and jumpers with a cross-sectional area of not less than No. 6 AWG. Bonding straps and jumpers for shock-mounted devices with pivot joints are made of woven-wire braid wire.

PART 3 EXECUTION

3.1 BONDING AND GROUNDING

Ensure bonding and grounding requirements are in accordance with NFPA 70.

3.2 INSTALLATION

3.2.1 Grounding Electrodes

Grounding electrodes shall include ground rods installed expressly for grounding systems.

Minimum ground rod section shall be 10 feet. Thread sections together and exothermically fusion weld.

Install ground rods so that the top of the rod is 4-inches above grade.

3.2.2 Equipment Grounding

In addition to the green colored equipment grounding conductor required in each raceway and sized in accordance with Table 250.122 of the NEC, bond each panelboard/ switchboard enclosure, transformer housing, motor housing, disconnect, starter, and other electrical equipment, addressed under this contract, to the grounding system with a stranded copper conductor, routed external to the feeder raceway.

Ensure metallic raceway systems have electrical continuity with equipment, and equipment is individually and directly connected to the building ground, independent of the raceway system.

Individually and directly connect enclosures for panelboards to the building ground. Install a grounding conductor sized not less than No. 2 AWG and connected from the building ground to a copper ground-bus terminal strip located in each panelboard.

Ground polarized receptacles, lighting fixtures, and equipment enclosures with an identified (green color) insulated conductor, not smaller than No. 12 AWG, connected to the branch circuit ground-bus terminal strip. Isolate ground-bus terminal strip in each panelboard enclosure and independent of the system neutral terminal strip.

Noncurrent carrying metallic parts of electrical equipment, including metallic cable sheaths, conduit, raceways, and electrical structural members, are bonded together and connected to the ground grid or ground connection rods.

Install secure ground systems for power and instrumentation. Independently connect each system to the building counterpoise as shown.

Secure ground systems consists of unspliced ground wires in individual welded or epoxied conduit runs from the secure area to the building counterpoise. Welding and epoxying conforms to NFPA 70.

3.2.3 Grounding Connections

Bond ground connections in accordance with paragraph "Bonding Materials and Methods", of this section.

Weld ground connections that are buried or in inaccessible locations.

In accessible locations, bolt connections together. Use cast-copper-alloy clamp lugs connections for steel building columns in accessible locations that are bolted to the structure.

Clean, grease, and remove foreign matter from ground connection surfaces. Do not penetrate clad material in the cleaning process. Make connection between like metals where possible. Where dissimilar metals are welded or clamped, follow the weld kit manufacturer's instructions. Ensure connections between dissimilar metals do not produce galvanic action in accordance with MIL-STD-889.

3.2.4 Bonding Materials and Methods

Accomplish bonding of metal surfaces by welding.

3.2.4.1 Welding

Weld using the exothermic process. Within the welding procedure, include the proper mold and powder charge and conform to the manufacturer's recommendations.

Use welding processes of the exothermic fusion type that makes a connection without corroding or loosening. Ensure process joins all strands and not causes the parts to be damaged or weakened. Completed connection or joint is equal or larger in size than the conductors joined and have the same current-carrying capacity as the largest conductor. Paint the buried ground connections with a bitumastic paint.

3.2.4.2 Clamping

In external locations, use clamping only where a disconnect type of connection is required. Connection device may utilize spring-loaded jaws and threaded fasteners. Construct device such that positive contact pressure is maintained at all times. Use machine bolts with tooth-type lockwashers.

3.2.4.3 Structural Joining Methods

Consider joints made with high-strength structural bolts, and clean unpainted faying surfaces sufficiently bonded. Install a jumper across the joint in the form of a No. 4 AWG bare copper wire bond welded with a 1/4-inch or larger fillet weld, with a 2-inch minimum length across the connection at each end to the surfaces involved spanning the connection wire jumpers used across joints employing miscellaneous machine bolts.

3.2.4.4 Cleaning of Bonding Surfaces

Thoroughly clean surfaces that comprise the bond before joining. Apply an appropriate abrasive with gentle and uniform pressure to ensure a smooth and uniform surface. Do not remove excessive metal from the surface. Clean clad metals in such a manner that the cladding material is not

penetrated by the cleaning process. Then clean bare metal with an appropriate solvent to remove any grease, oil, dirt, corrosion preventives, and other contaminants. Bond to the cleaned area within one hour after cleaning. Seal joint and refinish the exposed surfaces within two hours of exposure to prevent oxidation. When additional time is required, apply a corrosion preventive compound until the area can be refinished.

3.2.4.5 Bonding Straps and Jumpers

Install jumpers such that the vibration by the shock-mounted device does not change its electrical characteristics.

Weld bonds for outdoor locations unless a disconnect type of connection is required. When a disconnect is required, use clamping with bolts. Insert a tooth-type lockwasher between the strap and metallic member for each bolt.

Bond straps directly to the basic structure and do not penetrate any adjacent parts. Install straps in an area that is accessible for maintenance.

Use single straps for the bonds and install such that they do not restrict movement of structural members. Do not connect two or more straps in series.

Install straps such that they do not weaken structural members to which they are attached.

3.2.4.6 Equipment and Enclosure Bonding

Bond each metallic enclosure and all electrical equipment to ground. Make at least one copper connection from the system ground point to one or more enclosures in the area such that all enclosures and equipment provide a low-impedance path to ground when properly bonded together.

3.2.4.7 Bonding of Conduit and Raceway Systems

Bond all metal conduit, fittings, junction boxes, outlet boxes, armored and metal sheathed cable, and other raceways. Take care to ensure adequate electrical contact at the joints and terminations.

For rigid metal conduit and terminations, ensure threaded connections are wrench-tight with no exposed threads. Ream all ends of the conduit to remove burrs and rough edges. Bond conduits entering boxes and enclosures to the box with locknuts and grounding-type bushings. Locknuts that gouge into the metal box when tightened are not acceptable.

Conduit systems that are interrupted by PVC dielectric links are bonded separately on either side of the link. Do not jumper the dielectric link.

Install flexible metal conduit with an integral grounding conductor.

3.2.4.8 Cable Tray Bonding

Bond cable tray sections together. Cable tray sections in tandem assembly are considered as having electrical continuity when these sections are bonded with the appropriate bolts. Install bond straps across expansion joints. Bond cable trays to the building ground system.

3.2.4.9 Protection of Finished Bonds

Protect finished bonds by painting to match the original finish after the bond is made.

3.3 FIELD TESTS

Submit test reports for the following tests on grounding systems. Within the report include certified record of ground-resistance tests on each driven ground rod, ground rod assembly, and other grounding electrodes. Include within the record the number of rods driven and their depth at each location to meet the required resistance-to-ground measurements specified. Include a statement describing the condition of the soil at the time of measurement.

Perform the following tests in the presence of the Project Manager.

3.3.1 Bond Resistance Test

Resistance of any bond connection cannot exceed 0.5 milliohm. Rework bonds that exceed this resistance at no additional cost to the Government.

3.3.2 Ground Resistance Tests

Test grounding systems for ground resistance. Total resistance from any point on the ground network to the building counterpoise cannot exceed 50 milliohms.

Make ground resistance and counterpoise tests during dry weather, and no sooner than 48 hours after rainfall. Conduct tests using the ratio method that measures the ratio of the resistance to earth of an auxiliary test electrode to the series resistance of the electrode under test and a second auxiliary electrode. Perform measurements in accordance with IEEE 81.

Use self-contained indicating instrument, include a direct-current generator, synchronized current and potential reversers, crossed-current and potential coils, direct-reading ohmmeter, series resistors, and range-selector switch. Calibrate direct-reading ohmmeter for ranges of 0 to 20 ohms and 0 to 200 ohms.

Place auxiliary grounding electrodes in accordance with instrument manufacturer's recommendations but not less than 50-feet apart, in accordance with IEEE 81.

3.3.3 Ground Isolation Test

Test ground systems for isolation from other ground systems.

3.3.4 Continuity Isolation Test

Perform continuity test on all power receptacles to ensure that the ground terminals are properly grounded to the facility ground system.

3.4 CLOSEOUT ACTIVITIES

Submit record drawings indicating the location of ground rods, mats, grids, building ground bus, supplementary grounding electrodes, steel building columns, and other metal structures connected to the grounding system.

Identify the location of each ground rod and ground-rod assembly and other grounding electrodes by letter in alphabetical order and keyed to the record of ground-resistance tests.

-- End of Section --

SECTION 28 20 01

ELECTRONIC SECURITY SYSTEM

PART 1 GENERAL

1.1 SYSTEM SUMMARY

Provide an Electronic Security System (ESS) as described and shown - including installation of any Government Furnished Equipment. All computing devices, as defined in 47 CFR 15, shall be certified to comply with the requirements for Class A computing devices and labeled as set forth in 47 CFR 15. Electronic equipment shall comply with 47 CFR 15.

1.1.1 Field Device Network

The field device network shall provide communication between an ESS control server and field devices of the system. The field device network shall be configured as shown in the drawings. Field devices shall consist of alarm annunciation local processors and entry control local processors. Each field device shall be interrogated during each interrogation cycle. The field device network shall provide line supervision that detects and annunciates communications interruptions or compromised communications between any field device and the ESS control server.

1.1.2 Field Equipment

Field equipment shall include local processors and controls. Local processors shall serve as an interface between the ESS control server and controls. Data exchange between the ESS server and the local processors shall include down-line transmission of commands, software and databases to local processors. The up line data exchange from the local processor to the ESS control server shall include status data such as intrusion alarms, status reports and entry control records. Local processors are categorized as alarm annunciation or entry control or a combination thereof.

1.1.3 Error and Throughput Rates

Error and throughput rates shall be single portal performance rates obtained when processing individuals one at a time.

1.1.3.1 Type I Error Rate

Type I error rate is an error where the system denies entry to an authorized, enrolled identifier or individual. The rate shall be less than 1 percent.

1.1.3.2 Type II Error Rate

Type II error rate is an error where the system grants entry to an unauthorized identifier or individual. The entry control Type II error rate shall be less than 0.1 percent.

1.1.4 System Throughput

At the specified error rates, the system throughput rate through a single

portal shall be as shown.

1.1.5 Passage

Passage is ingress and/or egress past an entry control device, or through a portal. Entry control procedures and equipment shall be implemented for passage through each portal as shown.

1.1.6 Electrical Requirements

Electrically powered ESS equipment shall operate on 120 volt 60 Hz ac sources as shown. Equipment shall be able to tolerate variations in the voltage source of plus or minus 10 percent, and variations in the line frequency of plus or minus 2 percent with no degradation of performance.

1.1.7 System Reaction

1.1.7.1 System Response

The field device network shall provide a system end-to-end response time of one second or less for every device connected to the system. Alarms shall be annunciated at the ESS server within one second of the alarm occurring at a local processor or device controlled by a local processor, and within 100 milliseconds if the alarm occurs at the ESS server. Alarm and status changes shall be displayed within 100 milliseconds after receipt of data by the ESS server. This response time shall be maintained during system heavy load.

1.1.8 System Capacity

The system will be comprised of a scalable central server as shown. The system shall also monitor and control the inputs and outputs shown. The system will discriminate to the individual terminal devices and report status at the central server workstations as shown. Include a minimum expansion capability of 25 percent through additional software capacity, hardware capacity at the local panel level, or hardware capacity at the input module level.

1.1.9 ESS Control Server

ESS control server equipment, unless designated otherwise, shall be rated for continuous operation under ambient environmental conditions of 36 to 122 degrees F and a relative humidity of 20 to 80 percent.

1.2 REFERENCES

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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI INCITS 154	(1988; R 2004) Office Machines and Supplies - Alphanumeric Machines - Keyboard Arrangement
ASC/X9 X9.52	(1998) Triple Data Encryption Algorithm Modes of Operation

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 142	(2007; Errata 2014) Recommended Practice for Grounding of Industrial and Commercial Power Systems - IEEE Green Book
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013) National Electrical Safety Code
IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ANSI ISO/IEC 7816	(R 2009) Identification Cards - Integrated Circuit Cards
ISO 7810	(2003; Amd 1 2009; Amd 2 2012) Identification Cards - Physical Characteristics
ISO 7811-1	(2014) Identification Cards - Recording Technique - Part 1: Embossing
ISO 7811-2	(2014) Identification Cards - Recording Technique - Part 2: Magnetic Stripe - Low Coercivity

INTERNATIONAL TELECOMMUNICATION UNION (ITU)

ITU V.34	(1998) Data Communication Over the Telephone Network: A Modem Operating at Data Signaling Rates of up to 33,600 Bit/S for Use on the General Switched Telephone Network and on Leased Point-To-Point 2-Wire Telephone-Type Circuits
ITU V.42	(2002; Corrigendum 1 2003) Data Communications Over the Telephone Network: Error-Correcting Procedures for DCEs using Asynchronous-to-Synchronous Conversion
ITU V.92	(2000; Am 1 2001, Am 2 2002; Corr 1 2003) Data Communication Over the Telephone Network: Enhancements to Recommendation V.90

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(2000; R 2008; E 2010) Standard for

	Industrial Control and Systems: General Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-232	(1997f; R 2012) Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
TIA-568-C.1	(2009; Add 2 2011; Add 1 2012) Commercial Building Telecommunications Cabling Standard

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices
47 CFR 68	Connection of Terminal Equipment to the Telephone Network

UNDERWRITERS LABORATORIES (UL)

UL 1037	(1999; Reprint Dec 2009) Safety Antitheft Alarms and Devices
UL 1076	(1995; Reprint Sep 2010) Proprietary Burglar Alarm Units and Systems
UL 294	(2013) Access Control System Units
UL 639	(2007; Reprint May 2012) Standard for Intrusion Detection Units
UL 681	(2014) Installation and Classification of Burglar and Holdup Alarm Systems
UL 796	(2010; Reprint Sep 2013) Standard for Printed-Wiring Boards

1.3 DEFINITIONS

1.3.1 Intrusion Alarm

An alarm resulting from the detection of a specified target, attempting to intrude into the protected area or when entry into an entry-controlled area is attempted without successfully using entry control procedures.

1.3.2 Nuisance Alarm

An alarm resulting from the detection of an appropriate alarm stimulus, or failure to use established entry control procedures, but which does not represent an attempt to intrude into the protected area.

1.3.3 Environmental Alarm

A nuisance alarm resulting from environmental factors.

1.3.4 False Alarm

An alarm when there is no alarm stimulus.

1.3.5 Fail-Safe Alarm

An alarm resulting from detection of diminished functional capabilities.

1.3.6 Power Loss Alarm

An alarm resulting from a loss of primary power.

1.3.7 Entry Control Alarm

An alarm resulting from improper use of entry control procedures or equipment.

1.3.8 Identifier

A card credential, keypad personal identification number or code, biometric characteristic or any other unique identification entered as data into the entry control database for the purpose of verifying the identity of an individual. Identifiers shall be used by the ESS for the purpose of validating passage requests for areas equipped with entry control equipment.

1.3.9 Entry Control Devices

Any equipment which gives a user the means to input identifier data into the entry control system for verification.

1.3.10 Facility Interface Device

A facility interface device shall be any type of mechanism which is controlled in response to passage requests and allows passage through a portal.

1.3.11 Portal

Specific control point, such as a door or a gate, providing entry or access from one security level to another.

1.4 SUBMITTAL OF TECHNICAL DATA AND COMPUTER SOFTWARE

All items of computer software and technical data (including technical data which relates to computer software), which is specifically identified in this specification shall be delivered in accordance with the TECHNICAL DATA PACKAGES AND SUBMITTAL REQUIREMENTS. All data delivered shall be identified by reference to the particular specification paragraph against which it is furnished.

1.4.1 Group I Technical Data Package

The data package shall include the following as required:

1.4.1.1 System Drawings

a. Functional System block diagram, identifying communications protocols, wire type and quantity, and approximate distances.

b. ESS control server installation, including block and wiring diagrams and equipment layout.

c. Local processor installation, including typical block and wiring diagrams.

d. Field equipment enclosure with local processor installation and schematics.

e. Device wiring and installation drawings.

f. Details of connections to power sources, including power supplies and grounding.

g. Details of surge protection device installation.

h. Entry control system block diagram and layout.

1.4.1.2 Manufacturer's Data

The data package shall include manufacturer's data for all materials and equipment, including terminal devices, local processors and ESS server equipment provided under this specification.

1.4.1.3 System Description and Analyses

The data package shall include system descriptions, analyses, and calculations used in sizing equipment specified. Descriptions and calculations shall show how the equipment will operate as a system to meet the performance of this specification. The data package shall include the following:

a. On-board Random Access Memory (RAM).

b. Communication speeds and protocol descriptions.

c. Hard disk size and configuration.

d. CD-ROM/CD-RW/DVD/DVD-RW drive speed and protocol descriptions.

e. Streaming tape back-up speed and capacity.

f. Alarm response time calculations.

g. Command response time calculations.

h. Start-up operations including system and database backup operations.

i. Expansion capability and method of implementation.

j. Sample copy of each report specified.

k. System throughput calculation.

The data package shall also include a table comparing the above information for the equipment supplied and the minimum required by the software manufacturer.

1.4.1.4 Software Data

The software data package shall consist of descriptions of the operation and capability of system, and application software as specified.

1.4.1.5 Certifications

Specified manufacturer's certifications shall be included with the data package certification.

1.4.2 Group II Technical Data Package

Prepare and submit a report of "Current Site Conditions" to the Government documenting site conditions that significantly differ from the design drawings or conditions that affect performance of the system to be installed. Provide specification sheets, or written functional requirements to support the findings, and a cost estimate to correct those site changes or conditions. Do not correct any deficiency without written permission from the Government.

1.4.3 Group IV Technical Data Package

1.4.3.1 Operation and Maintenance Manuals

Deliver draft copies of the operator's, software, hardware, functional design, and maintenance manuals, as specified below, to the Government prior to beginning the performance verification test for use during the test period.

1.4.3.2 Operator's Manuals

Fully explain all procedures and instructions for the operation of the system, including:

a. Computers and peripherals.
b. User enrollment.
c. System start-up and shutdown procedures.
d. Use of system and application software.
e. Recovery and restart procedures.
f. Graphic alarm presentation.
g. Use of report generator and generation of reports.
h. Data entry.
i. Operator commands.
j. Alarm and system messages and printing formats.
k. System entry requirements.

1.4.3.3 Software Manual

Describe the functions of all software and include all other information necessary to enable proper loading, testing, and operation. Include the following in the manual:

a. Definition of terms and functions.
b. Use of system and application software.

c. Procedures for system initialization, start-up and shutdown
d. Alarm reports.
e. Reports generation.
f. Database format and date entry requirements.
g. Directory of all disk files.
h. Description of all communication protocols, including data formats, command characters, and a sample of each type of data transfer.
i. Interface definition.

1.4.3.4 Hardware Manual

A manual describing all equipment furnished including:

a. General description and specifications.
b. Installation and checkout procedures.
c. Equipment electrical schematics and layout drawings.
d. System schematics and layout drawings.
e. Alignment and calibration procedures.
f. Manufacturer's repair parts list indicating sources of supply.
g. Interface definition.

1.4.3.5 Functional Design Manual

Identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. Include a description of hardware and software functions, interfaces, and requirements for all system operating modes.

1.4.3.6 Data Entry

Enter all data needed to make the system operational. Deliver the data to the Government on data entry forms, utilizing data from the contract documents, Contractor's field surveys, and other pertinent information in the Contractor's possession required for complete installation of the database. Identify and request from the Government, any additional data needed to provide a complete and operational ESS. The completed forms shall be delivered to the Government for review and approval at least 30 days prior to the Contractor's scheduled need date. When the ESS database is to be populated in whole or in part from an existing or Government furnished electronic database, demonstrate the field mapping scheme to correctly input the data.

1.4.4 Group V Technical Data Package

Deliver final copies of the manuals as specified, bound in hardback, loose-leaf binders, to the Government within 30 days after completing the system test. The draft copy used during site testing shall be updated with any changes required prior to final delivery of the manuals. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of each Subcontractor installing equipment and systems, and nearest service representative for each item of equipment. The manuals shall have a table of contents and tab sheets. Tab sheets shall be placed at the beginning of each chapter or section and at the beginning of each appendix. The final copies delivered after completion of the system test shall include modifications made during installation, checkout, and acceptance. The number of copies of each manual to be delivered shall be as specified below.

1.4.4.1 Operator's Manual

A copy of the final and approved Operator's Manual.

1.4.4.2 Software Manual

A copy of the final and approved Software Manual.

1.4.4.3 Hardware Manual

A copy of the final and approved Hardware Manual.

1.4.4.4 Functional Design Manual

A copy of the final and approved Functional Design Manual.

1.4.4.5 Maintenance Manual

A copy of the final and approved Maintenance Manual.

1.4.4.6 Final System Drawings

Maintain a separate set of drawings, elementary diagrams and wiring diagrams of the system to be used for final system drawings. This set shall be accurately kept up-to-date with all changes and additions to the ESS and shall be delivered to the Government with the final system test report. In addition to being complete and accurate, this set of drawings shall be kept neat and shall not be used for installation purposes. Final drawings submitted with the endurance test report shall be finished drawings on optical disk in the latest version of AutoCAD format.

1.5 QUALITY ASSURANCE

1.5.1 Testing

Perform system testing, site performance verification testing, and adjustment of the completed ESS. Provide personnel, equipment, instrumentation, and supplies necessary to perform testing. Written notification of planned testing shall be given to the Government at least 14 days prior to the test; notice shall not be given until after the Contractor has received written approval of the specific test procedures.

a. Assemble the system as specified, and perform tests to demonstrate that performance of the system complies with specified requirements in accordance with the approved test procedures. The tests shall take place during regular daytime working hours on weekdays. Original copies of all data produced during testing, including results of each test procedure, shall be delivered to the Government at the conclusion of testing, prior to Government approval of the test. The test report shall be arranged so that all commands, stimuli, and responses are correlated to allow logical interpretation.

b. Test Setup: The test setup shall include the following:

(1) All central ESS server station equipment.

(2) The number of local processors shall equal the amount required by the site design.

(3) At least 1 of each type of terminal device used.

(4) At least 1 of each type of portal configuration with all facility interface devices as specified or shown.

(5) Prepare test procedures and reports for the test, and deliver the test procedures to the Government for approval. Deliver the final test report after completion of the test.

1.5.2 Test Procedures and Reports

Test procedures shall explain in detail, step-by-step actions and expected results, demonstrating compliance with the requirements specified. Test reports shall be used to document results of the tests. Reports shall be delivered to the Government within 7 days after completion of each test.

1.5.3 Line Supervision

1.5.3.1 Signal and Data Transmission System (DTS) Line Supervision

All signal and DTS lines shall be supervised by the system. The system shall supervise the signal lines by monitoring the circuit for changes or disturbances in the signal, and for conditions as described in UL 1076 for line security equipment. The system shall initiate an alarm in response to a current change of 5 percent or greater. The system shall also initiate an alarm in response to opening, closing, shorting, or grounding of the signal and DTS lines.

1.5.3.2 Data Encryption

The system shall incorporate data encryption equipment on data transmission circuits as shown. The algorithm used for encryption shall be the Advanced Encryption Standard (AES) algorithm described in Federal Information Processing Standards (FIPS) 197 of TDES as described in FIPS 46-3 standards, ASC/X9 X9.52, as a minimum.

1.6 ENVIRONMENTAL REQUIREMENTS

1.6.1 Exterior Environment

System components that are installed in locations exposed to weather shall be rated for continuous operation under ambient environmental conditions of -30 to plus 122 degrees F dry bulb and 10 to 95 percent relative humidity, condensing. In addition, the system components shall be rated for continuous operation when exposed to performance conditions as specified in UL 294 and UL 639 for outdoor use equipment. Components shall be rated for continuous operation when exposed to rain as specified in NEMA 250 and winds up to 85 mph, measured vertically.

1.6.2 Hazardous Environment

System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flying particles, shall be rated and installed according to Chapter 5 of the NFPA 70 and as shown.

1.7 MAINTENANCE AND SERVICE

1.7.1 Warranty Period

Provide all labor, equipment, and materials required to maintain the entire system in an operational state as specified, for a period of one year after formal written acceptance of the system to include scheduled and nonscheduled adjustments.

1.7.2 Description of Work

The adjustment and repair of the system includes all computer equipment, software updates, communications transmission equipment and DTS, local processors, entry control, and support equipment. Responsibility shall be limited to Contractor installed equipment. Repair, calibration, and other work shall be provided and performed in accordance with the manufacturer's documentation and instruction. The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic prevention maintenance, fault diagnosis, and repair or replacement of defective components.

1.7.3 Personnel

Service personnel shall be certified in the maintenance and repair of the specific type of equipment installed and qualified to accomplish work promptly and satisfactorily. The Government shall be advised in writing of the name of the designated service representative, and of any change in personnel.

1.7.4 Schedule of Work

Perform two minor inspections at 6 month intervals (or more often if required by the manufacturer), and two major inspections offset equally between the minor inspections to effect quarterly inspection of alternating magnitude.

1.7.4.1 Minor Inspections

Minor inspections shall include visual checks and operational tests of peripheral equipment, local processors, and electrical and mechanical controls. Minor inspections shall also include mechanical adjustment of laser printers.

1.7.4.2 Major Inspections

Major inspections shall include work described under paragraph "Minor Inspections" and the following work:

a. Clean interior and exterior surfaces of all system equipment and local processors, including workstation monitors and keyboards.

b. Perform diagnostics on all equipment.

c. Run all system software diagnostics and correct all diagnosed problems.

d. Resolve any previous outstanding problems.

e. Purge and compress data bases.

f. Review network configuration.

1.7.4.3 Scheduled Work

Scheduled work shall be performed during regular working hours, Monday through Friday, excluding federal holidays.

1.7.5 Emergency Service

The Government will initiate service calls when the system is not functioning properly. Qualified personnel shall be available to provide service to the complete system. The Government shall be furnished with a telephone number where the service supervisor can be reached at all times. Service personnel shall be at site within 4 hours after receiving a request for service. The system shall be restored to proper operating condition within 8 hours after service personnel arrive onsite and obtain access to the system.

1.7.6 Operation

Performance verification test procedures shall be used after all scheduled maintenance and repair activities to verify proper component and system operation.

1.7.7 Records and Logs

Keep records and logs of each task, and organize cumulative records for each component, and for the complete system chronologically resulting in a continuous log to be maintained for all devices. The log shall contain all initial settings. Complete logs shall be kept and shall be available for inspection onsite, demonstrating that planned and systematic adjustments and repairs have been accomplished for the system.

1.7.8 Work Requests

Separately record each service call request, as received. The form shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing what has to be done, the amount and nature of the material to be used, the time and date work started, and the time and date of completion. Deliver a record of the work performed within 5 days after work is accomplished.

1.7.9 System Modifications

Make any recommendations for system modification in writing to the Government. System modifications shall not be made without prior approval of the Government. Any modifications made to the system shall result in the updating of the operation and maintenance manuals as well as any other documentation affected.

1.7.10 Software

Provide a description of all software updates to the Government, who will then decide whether or not they are appropriate for implementation. After notification by the Government, implement the designated software updates and verify operation in the system. These updates shall be accomplished in a timely manner, fully coordinated with system operators, and shall be

incorporated into the operation and maintenance manuals, and software documentation. Make a system image file so the system can be restored to its original state if the software update adversely affects system performance.

PART 2 PRODUCTS

2.1 MATERIALS REQUIREMENTS

2.1.1 Materials and Equipment

Units of equipment that perform identical, specified functions shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's model and serial number in a conspicuous place. System equipment shall conform to UL 294 and UL 1076.

2.1.2 Nameplates

Laminated plastic nameplates shall be provided for local processors. Each nameplate shall identify the local processor and its location within the system. Laminated plastic shall be 1/8 inch thick, white with black center core. Nameplates shall be a minimum of 1 x 3 inches, with minimum 1/4 inch high engraved block lettering. Nameplates shall be attached to the inside of the enclosure housing the local processor. Other major components of the system shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a corrosion resistant plate secured to the item of equipment. Nameplates will not be required for devices smaller than 1 x 3 inches.

2.1.3 Power Line Surge Protection

Equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41.1 and IEEE C62.41.2. Fuses shall not be used for surge protection.

2.1.4 Device Wiring and Communication Circuit Surge Protection

Inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. Communications equipment shall be protected against surges induced on any communications circuit. Cables and conductors, except fiber optics, which serve as communications circuits from server console to field equipment, and between field equipment, shall have surge protection circuits installed at each end. Protection shall be furnished at equipment, and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within 3 feet of the building cable entrance. Fuses shall not be used for surge protection. Test the inputs and outputs in both normal mode and common mode using the following two waveforms:

a. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 Volts and a peak current of 60 amperes.

b. An 8 microsecond rise time by 20 microsecond pulse width waveform with a peak voltage of 1000 Volts and a peak current of 500 amperes.

2.1.5 Power Line Conditioners

Furnish a power line conditioner for the ESS control server equipment and each local processor. The power line conditioners shall be of the ferro-resonant design, with no moving parts and no tap switching, while electrically isolating the secondary from the power line side. The power line conditioners shall be sized for 125 percent of the actual connected kVA load. Characteristics of the power line conditioners shall be as follows:

a. At 85 percent load, the output voltage shall not deviate by more than plus or minus 1 percent of nominal when the input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.

b. During load changes of zero to full load, the output voltage shall not deviate by more than plus or minus 3 percent of nominal. Full correction of load switching disturbances shall be accomplished within 5 cycles, and 95 percent correction shall be accomplished within 2 cycles of the onset of the disturbance.

c. Total harmonic distortion shall not exceed 3.5 percent at full load.

2.1.6 Field Enclosures

2.1.6.1 Interior Electronics

System electronics to be used in an interior environment shall be housed in enclosures which meet the requirements of NEMA 250 Type 12.

2.1.6.2 Exterior Electronics

System electronics to be used in an exterior environment shall be housed in enclosures which meet the requirements of NEMA 250 Type 4.

2.1.6.3 Corrosion Resistant

System electronics to be used in a corrosive environment as defined in NEMA 250 shall be housed in metallic non-corrosive enclosures which meet the requirements of NEMA 250 Type 4X.

2.1.6.4 Hazardous Environment Equipment

System electronics to be used in a hazardous environment shall be housed in a enclosures which meet the requirements of paragraph "Hazardous Environment".

2.1.7 Fungus Treatment

System components located in fungus growth inductive environments shall be completely treated for fungus resistance. Treating materials containing a mercury bearing fungicide shall not be used. Treating materials shall not increase the flammability of the material or surface being treated. Treating materials shall cause no skin irritation or other injury to personnel handling it during fabrication, transportation, operation, or maintenance of the equipment, or during use of the finished items when used for the purpose intended.

2.1.8 Tamper Provisions

2.1.8.1 Tamper Switches

Enclosures, cabinets, housings, boxes, and fittings having hinged doors or removable covers and which contain circuits or connections of the system and its power supplies, shall be provided with cover operated, corrosion-resistant tamper switches, arranged to initiate an alarm signal when the door or cover is moved. The enclosure and the tamper switch shall function together and shall not allow direct line of sight to any internal components before the switch activates. Tamper switches shall be inaccessible until the switch is activated; have mounting hardware concealed so that the location of the switch cannot be observed from the exterior of the enclosure; be connected to circuits which are under electrical supervision at all times, irrespective of the protection mode in which the circuit is operating; shall be spring-loaded and held in the closed position by the door or cover; and shall be wired so that the circuit is broken when the door or cover is disturbed.

2.1.8.2 Enclosure Covers

Covers of pull and junction boxes provided to facilitate initial installation of the system need not be provided with tamper switches if they contain no splices or connections, but shall be protected by tamper resistant security fasteners. Labels shall be affixed to such boxes indicating they contain no connections.

2.1.9 Locks and Key-Lock Switches

2.1.9.1 Locks

Locks shall be provided on system enclosures for maintenance purposes. Locks shall be UL listed, conventional key type lock having a combination of 5 cylinder pin and 5-point 3 position side bar. Keys shall be stamped "U.S. GOVT. DO NOT DUP". The locks shall be arranged so that the key can only be withdrawn when in the locked position. Maintenance locks shall be keyed alike and only 2 keys shall be furnished for all of these locks.

2.1.9.2 Key-Lock-Operated Switches

Key-lock-operated switches required to be installed on system components shall be UL listed, conventional key type lock having a combination of 5 cylinder pin and 5-point 3 position side bar. Keys shall be stamped "U.S. GOVT. DO NOT DUP". Key-lock-operated switches shall be 2 position, with the key removable in either position. All key-lock-operated switches shall be keyed differently and only 2 keys shall be furnished for each key-lock-operated-switch.

2.1.9.3 Construction Locks

A set of temporary locks shall be used during installation and construction. The final set of locks installed and delivered to the Government shall not include any of the temporary locks.

2.1.10 System Components

System components shall be designed for continuous operation. Electronic components shall be solid state type, mounted on printed circuit boards conforming to UL 796. Printed circuit board connectors shall be plug-in,

quick-disconnect type. Power dissipating components shall incorporate safety margins of not less that 25 percent with respect to dissipation ratings, maximum voltages, and current carrying capacity. Control relays and similar switching devices shall be solid state type or sealed electro-mechanical.

2.1.10.1 Modularity

Equipment shall be designed for increase of system capability by installation of modular components. System components shall be designed to facilitate maintenance through replacement of modular subassemblies and parts.

2.1.10.2 Maintainability

Components shall be designed to be maintained using commercially available tools and equipment. Components shall be arranged and assembled so they are accessible to maintenance personnel. There shall be no degradation in tamper protection, structural integrity, EMI/RFI attenuation, or line supervision after maintenance when it is performed in accordance with manufacturer's instructions.

2.1.10.3 Interchangeability

The system shall be constructed with off-the-shelf components which are physically, electrically and functionally interchangeable with equivalent components as complete items. Replacement of equivalent components shall not require modification of either the new component or of other components with which the replacement items are used. Custom designed or one-of-a-kind items shall not be used. Interchangeable components or modules shall not require trial and error matching in order to meet integrated system requirements, system accuracy, or restore complete system functionality.

2.1.10.4 Product Safety

System components shall conform to applicable rules and requirements of NFPA 70 and UL 294. System components shall be equipped with instruction plates including warnings and cautions describing physical safety, and special or important procedures to be followed in operating and servicing system equipment.

2.1.11 Controls and Designations

Controls and designations shall be as specified in NEMA ICS 1.

2.1.12 Special Test Equipment

Provide all special test equipment, special hardware, software, tools, and programming or initialization equipment needed to start or maintain any part of the system and its components. Special test equipment is defined as any test equipment not normally used in an electronics maintenance facility.

2.2 ESS SYSTEM SERVER HARDWARE

The ESS computer(s) shall be standard, off the shelf, unmodified digital computer of modular design.

2.2.1 Processor Speed

The processor shall utilize a minimum architecture of a 32-bit CSIC. The operating speed of the processor shall be a minimum of:

Server or Regional Server	2.4 GHZ

2.2.2 Memory

The minimum installed and expandable RAM memory sizes are as follows:

	Installed	Expandable
Server or Regional Server	512 MB	2.0 GB

2.2.3 Power Supply

The power supply shall have a minimum capacity of:

Workstation	200 Watts
Server or Regional Server	330 Watts

2.2.4 Serial Ports

Provide the following ports on each workstation type, as a minimum:

a. Two TIA-232 serial.

b. Serial ports shall have adjustable data transmission rates from 9600 to 115.2 Kbps and shall be selectable under program control.

c. One enhanced parallel port.

d. One RJ-45 Network Interface Connector.

e. Two PS/2 or 6-pin mini-DIN ports for keyboard and mouse.

f. Two USB ports.

2.2.5 Color Monitor

The monitor shall be no less than 17 inches with a minimum resolution of 1280 by 1024 pixels, non-interlaced, and a maximum dot pitch of 0.28 millimeters. The video card shall support at least 256 colors at a resolution of 1280 by 768. The workstations shall operate with the following minimum size and types of video RAM:

Server or Regional Server	Integrated controller with 8 MB of SDRAM

2.2.6 Keyboard A101

A keyboard having a minimum 64 character, standard ASCII character, based on ANSI INCITS 154 shall be furnished.

2.2.7 Enhancement Hardware

Enhancement hardware, such as special function keyboards, special function keys, or mouse shall be provided for frequently used operator commands, or as shown, such as: Help, Alarm Acknowledge, Place Zone In Access, Place Zone In Secure, System Test, Print Reports, Change Operator, and Display Graphics.

2.2.8 Disk Storage

A hard disk with controller having a maximum average access time of 10 milliseconds shall be provided. The hard disk shall provide a minimum formatted storage:

Server or Regional Server	40 GB SCSI\EIDE @7200 RPM

2.2.9 Modem

A modem shall be provided and operate at 57,600 bps, full duplex on circuits using asynchronous communications. Modem shall have error detection, auto answer/autodial, and call-in-progress detection. The modem shall meet the requirements of ITU V.34, ITU V.92 for error correction and ITU V.42 for data compression standards, and shall be suitable for operating on unconditioned voice grade telephone lines in conformance with 47 CFR 68.

2.2.10 Audible Alarm

The manufacturer's standard audible alarm shall be provided. Each of the computer station types shall include a soundboard and speakers to provide audio indications for the operator.

2.2.11 Mouse

A mouse with a minimum resolution of 400 dots per inch shall be provided.

2.2.12 Optical Disk

A Optical Disk nominal storage capacity of 700 megabytes shall be provided. These drives shall have the following minimum characteristics:

Data Transfer Rate	3.6 Mbps
Average Access Time	150 milliseconds
Cache memory	256 Kbytes
Data throughput	3.6 Mbyte/second, minimum
Read speed	48x

Write speed	32x

2.2.13 DVD/DVD-RW

A DVD/DVD-RW nominal storage capacity of 4.7 Gigabytes shall be provided. These drives shall have the following minimum characteristics:

Data Transfer Rate	3.6 Mbps
Average Access Time	150 milliseconds
Cache memory	256 Kbytes
Data throughput	3.6 Mbyte/second, minimum
Read speed	12x
Write speed	4x

2.2.14 Report Printer

Provide a report printer and interconnect to the ESS server equipment. The printer shall be a laser printer with printer resolution of at least 600 dots per inch. The printer shall have at least 2 megabytes of RAM. Printing speed shall be at least 8 pages per minute with a 100-sheet paper cassette and with automatic feed.

2.2.15 Controllers

Provide controllers required for operation of specified peripherals, serial, and parallel ports.

2.2.16 Uninterruptible Power Supply (UPS)

Provide a self contained UPS, suitable for installation and operation at the ESS server. Size the UPS to provide a minimum of 6 hours of operation of the ESS server equipment. If the facility is without an emergency backup generator, the UPS shall provide necessary battery backup power for 24 hours. Equipment connected to the UPS shall not be affected by a power outage of a duration less than the rated capacity of the UPS. UPS shall be complete with necessary power supplies, transformers, batteries, and accessories and shall include visual indication of normal power operation, UPS operation, abnormal operation and visual and audible indication of low battery power. The UPS condition shall be monitored by the ESS and displayed at the ESS server through the use of outputs or data stream from the UPS.

2.2.17 Enrollment Center Equipment

Enrollment of credential user stations shall be provided on ESS server to enroll personnel into, and disenroll personnel from, the system database. The enrollment equipment shall only be accessible to authorized entry control enrollment personnel. Provide 500 credential cards for all personnel to be enrolled at the site plus an extra 50 percent for future use. The enrollment equipment shall include subsystem configuration

controls and electronic diagnostic aids for subsystem setup and troubleshooting with the ESS server. A printer shall be provided for the enrollment station which meets the requirements of paragraph "Report Printer".

2.3 SOFTWARE

2.3.1 System Software

System software shall perform the following functions:

a. Support multi-user operation with multiple tasks for each user.

b. Support operation and management of peripheral devices.

c. Provide file management functions for disk I/O, including creation and deletion of files, copying files, a directory of all files including size and location of each sequential and random ordered record.

d. Provide printer spooling.

e. The system shall be designed to support any industry standard net protocol and topology listed below:

(1) TCP/IP
(2) Novel Netware (IPX/SPX)
(3) Digital PATHWORKS
(4) Banyan VINES
(5) IBM LAN Server (NetBEUI)
(6) IBM SNA Networks
(7) Microsoft LAN Manager (NetBEUI)
(8) NFS Networks
(9) Remote Access Service (RAS) via ISDN, x.25, and standard phone lines

f. The system shall be Open Database Connectivity (ODBC) compliant.

g. The system shall support a relational database management system with the proper 32-bit ODBC drivers. Examples of these databases include, but are not limited to, Microsoft SQL 2000, Oracle Server 8i / 9i, or IBM B2 Universal Server 7.2.

h. The system shall be portable across multiple platforms to take full advantage of multiple hardware architectures, without changing system software.

i. The system shall support any standard video input source that utilizes a Red/Green/Blue (RGB), Composite, or S-Video signal. Monitor resolution shall support a minimum of 1024 x 768 pixels with SVGA graphics standards.

j. The system shall be designed to support any standard thermal dye transfer credential printer with certified drivers. The system shall also support any ink jet, laser, or dot matrix printer with certified drivers.

k. The system shall be designed to support an advanced distributed network architecture, where intelligent system controllers (ISCs)

do not need to be home-run wired back to the database server. ISCs shall be wired to any authorized PC that is licensed to run the system software. The system shall also support dual path upstream communications between the ISC and client database server. ISCs shall be connected to the Local Area Network (LAN)/Wide Area Network (WAN) via industry standard RS-232/485 communications protocol. As such, any alarm in the system shall be capable of being routed to any client workstation(s) on the network, regardless of the ISC that generated the alarm.

2.3.2 Software Scalability

The system software shall be scalable as shown. The software shall have the capability of managing the total operations of the ESS system capacity of credential readers, alarm inputs, control outputs, and peripheral equipment as shown, as governed by licensing agreements. Minimum requirements for server additions shall be driven by bandwidth and latency calculations provided by the manufacturer of the ESS system.

2.3.3 System Architecture

Provide server and workstation configurations with all necessary connectors, interfaces, and accessories as shown.

2.3.4 Database Definition Process

Software shall be provided to define and modify each point in the database using operator commands. The definition shall include all parameters and constraints associated with each commandable output, zone, terminal device, etc. Data entry software shall provide mass enrollment capability, such that multiple devices may be assigned similar parameters with a single entry. Each database item shall be callable for display or printing, including EPROM, ROM and RAM resident data. The database shall be defined and entered into the ESS based upon input from the Government.

2.3.5 Software Tamper

The ESS shall annunciate a tamper alarm when unauthorized changes to the system database files are attempted. Three consecutive unsuccessful attempts to log onto the system shall generate a software tamper alarm. A software tamper alarm shall also be generated when an operator or other individual makes 3 consecutive unsuccessful attempts to invoke central processor functions beyond their authorization level. The ESS shall maintain a transcript file of the last 5000 commands entered at each ESS server to serve as an audit trail. The system shall not allow write access to the system transcript files by any person, regardless of their authorization level. The system shall only allow acknowledgment of software tamper alarms and read access to the system transcript files by operators and managers with the highest password authorization level available in the system.

2.3.6 Application Software

The application software shall provide the interface between the alarm annunciation and entry control local processors; monitor all DTS links; operate displays; report alarms; generate reports; and assist in training system operators. Application software shall perform the following functions:

a. Support operation and management of peripheral devices.

b. Provide printer spooling.

c. The system shall be Open Database Connectivity (ODBC) compliant.

2.3.6.1 Operator's Commands

The operator's commands shall provide the means for entry of monitoring and control commands, and for retrieval of system information. Processing of operator commands shall commence within 1 second of entry, with some form of acknowledgment provided at that time. The operator's commands shall perform tasks including:

a. Request help with the system operation.

b. Acknowledge alarms.

c. Clear alarms.

d. Place zone in access.

e. Place zone in secure.

f. Test the system.

g. Generate and format reports.

h. Print reports.

i. Change operator.

j. Entry control functions.

2.3.6.2 Command Input

Operator's commands shall be full English language words, acronyms, or graphic symbols selected to allow operators to use the system without extensive training or data processing backgrounds. The system shall prompt the operator in English word, phrase, or acronym. Commands shall be available in an abbreviated mode, in addition to the full English language (words and acronyms) commands, allowing an experienced operator to disregard portions, or all, of the prompt-response requirements.

2.3.6.3 Command Input Errors

The system shall supervise operator inputs to ensure they are correct for proper execution. Operator input assistance shall be provided whenever a command cannot be executed because of operator input errors. The system shall explain to the operator, in English words and phrases, why the command cannot be executed. Error responses requiring an operator to look up a code in a manual or other document will not be accepted. Conditions for which operator error assist messages shall be generated include:

a. The command used is incorrect or incomplete.

b. The operator is restricted from using that command.

c. The command addresses a point which is disabled or out of service.

d. The command addresses a point which does not exist.

e. The command would violate constraints.

Additionally, the system shall write all input keystrokes to a file on the hard drive for subsequent audit purposes.

2.3.6.4 Enhancements

The system shall implement the following enhancements by use of special function keys or mouse, in addition to all other command inputs specified:

2.3.6.4.1 Help

Used to produce a display for all commands available to the operator. The help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.

2.3.6.4.2 Acknowledge Alarms

Used to acknowledge that the alarm message has been observed by the operator.

2.3.6.4.3 Clear Alarms

Used to remove an alarm from the active screen.

2.3.6.4.4 Input Guard Response

The system shall provide preprogrammed guard responses to allow the monitoring force to create a log of responses to alarm events. The preprogrammed guard inputs shall include phrases such as "dispatched security personnel", "contacted supervisor", or "false alarm".

2.3.6.4.5 System Test

Allows the operator to initiate a system wide operational test.

2.3.6.4.6 Print Reports

Allows the operator to initiate printing of reports.

2.3.6.4.7 Change Operator

Used for changing operators.

2.3.6.5 System Access Control

The system shall provide a means to define system operator capability and functions through multiple, password protected operator levels. At least 3 operator levels shall be provided. System operators and managers with appropriate password clearances shall be able to change operator levels for all operators. Three successive attempts by an operator to execute functions beyond their defined level during a 24-hour period shall initiate a software tamper alarm. A minimum of 32 passwords shall be usable with the system software. The system shall display the operator's name or initials in the console's first field. The system shall be capable of printing the operator's name or initials, action, date, and time on the

system printer at log-on and log-off. The password shall not be displayed or printed. Each password shall be definable and assignable for the following:

a. Commands usable.

b. Menus available for display.

c. Access to system software.

d. Access to application software.

e. Individual zones which are to be accessed.

f. Access to database.

2.3.6.6 Alarm Monitoring Software

This program shall monitor all local processors and DTS circuits and notify the operator of an alarm condition. Alarms shall be displayed on the console's text and graphics map monitors. Higher priority alarms shall be displayed first; and within alarm priorities, the oldest unacknowledged alarm shall be displayed first. An alarm is latched into the system upon activation/annunciation. Once in alarm, no subsequent alarms from that specific device need be annunciated until the current alarm is investigated and cleared. The system may provide a counter to indicate the number of subsequent alarms from that specific device that occurred after the initial alarm, but no additional alarms are to be annunciated until the current alarm is "cleared". Operator acknowledgment of one alarm silences the audible alarm and changes associated text icons from flashing to steady state red. These icons remain to indicate that the alarm is still open and the system is awaiting identification of the course and resolution by the operator. The operator can resolve the alarm by dispatching guards/ response force to investigate. After the operator has satisfactorily determined the cause of the alarm and is prepared to enter pertinent information into the log, the operator will "clear" the alarm. Clearing the alarm indicates to the system that the operator needs to be notified of any new alarms from that device. Programmable alarm data to be displayed shall include type of alarm, location of alarm, and secondary alarm messages. Alarm data to be printed shall include: type of alarm, location of alarm, date and time (to nearest second) of occurrence, operator acknowledgement instructions, and operator response. A unique message field with a width of 60 characters shall be provided for each alarm. Assignment of messages to a device shall be an operator editable function. Secondary messages shall be assignable by the operator for printing to provide further information and shall be editable by the operator. The system shall provide for 25 secondary messages with a field of 4 lines of 60 characters each. The most recent 1000 alarms shall be stored and shall be recallable by the operator using the report generator.

2.3.6.7 Monitor Display Software

Monitor display software shall provide for text displays that include zone status integrated into the display. Different colors shall be used for the various components and real time data. Colors shall be uniform on all displays. The following color coding shall be followed.

a. FLASHING RED to alert an operator that a zone has gone into an alarm or that primary power has failed.

b. RED to alert an operator that a zone is in alarm and that the alarm has been acknowledged.

c. YELLOW to advise an operator that a zone is in access.

d. GREEN to indicate that a zone is secure or that power is on.

2.3.6.8 User Defined Prompts/Messages Linked to Alarms

The System shall provide a means to relate operator defined prompts and other messages to predefined alarms. Whenever one of the predefined alarms is annunciated on a system control terminal, the prompts or messages related to the alarm shall be automatically displayed.

2.3.6.9 System Test Software

This software shall enable the operator to initiate a test of the system. This test can be of the entire system or of a particular portion of the system at the operator's option. The results of each test shall be stored for future display or print out in report form.

2.3.6.10 Report Generator

Software shall be provided with commands to generate reports for displaying, printing, and storing on disk and tape. Reports shall be stored by type, date, and time and shall be printed on the report printer. Reports shall be spooled, allowing the printing of one report to be complete before the printing of another report commences. The dynamic operation of the system shall not be interrupted to generate a report. The report generation mode, either periodic, automatic or on request, shall be operator selectable. The report shall contain the time and date when the report was printed, and the name of operator generating the report. The exact format of each report type shall be operator configurable.

2.3.6.10.1 Periodic Automatic Report Modes

The system shall allow for specifying, modifying, or inhibiting the report to be generated, the time the initial report is to be generated, the time interval between reports, end of period, and the output peripheral.

2.3.6.10.2 Request Report Mode

The system shall allow the operator to request at any time an immediate printout of any report.

2.3.6.10.3 Alarm Report

The alarm report shall include all alarms recorded by the system over an operator selectable time. The report shall include such information as: the type of alarm (intrusion, tamper, etc.); the type of sensor; the location; the time; and the action taken.

2.3.6.10.4 System Test Report

This report documents the operational status of all system components following a system test.

2.3.6.10.5 Access/Secure Report

This report documents all zones placed in access, the time placed in access, and the time placed in secure mode.

2.3.6.10.6 Entry Control Reports

The system shall generate hard copy reports of identifier, terminal, and tracking reports, and versions with defined parameters of the manufacturer's standard management and activity reports.

2.3.6.11 Entry Control Enrollment Software

The enrollment station shall provide database management functions for the system, and shall allow an operator to change and modify the data entered in the system as needed. The enrollment station shall not have any alarm response or acknowledgment functions as a programmable function of the system. Multiple, password protected access levels shall be provided at the enrollment station. Database management and modification functions shall require a higher operator access level than personnel enrollment functions. The program shall provide a means for disabling the enrollment program when it is unattended to prevent unauthorized use. The program shall provide a method to enter personnel identifying information into the entry control database files through enrollment stations to include a credential unit in use at the installation. The program shall allow entry of this data into the system database files through the use of simple menu selections and data fields. The data field names shall be customized to suit user and site needs. All personnel identity verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry control database files.

2.4 FIELD PROCESSING HARDWARE

2.4.1 Alarm Annunciation Local Processor

The alarm annunciation local processor shall respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the ESS server and change outputs based on commands received from the ESS server. The local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.

2.4.1.1 Inputs

Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions. The local processor shall have at least 8 alarm inputs which allow wiring as normally open or normally closed contacts for alarm conditions. It shall also provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements. The local processor shall report line supervision alarms to the ESS server. Alarms shall be reported for any condition that remains off normal at an input for longer than 500 milliseconds. Each alarm condition shall be transmitted to the ESS server during the next interrogation cycle.

2.4.1.2 Outputs

Local processor outputs shall reflect the state of commands issued by the

ESS server. The outputs shall be a form C contact and shall include normally open and normally closed contacts. The local processor shall have at least four command outputs.

2.4.1.3 Communications

The local processor shall be able to communicate with the ESS server via RS485 or TCP/IP as a minimum.

2.4.1.4 Processor Power Supply

Local processor and devices shall be powered from an uninterruptible power source. The uninterruptible power source shall provide 8 hours of battery back-up power in the event of primary power failure and shall automatically fully recharge the batteries within 12 hours after primary power is restored. If the facility is without an emergency generator, the uninterruptible power source shall provide 24 hours of battery backup power. There will be no equipment malfunctions or perturbations or loss of data during the switch from primary to battery power and vice versa. Batteries shall be sealed, non-outgassing type. The power supply shall be equipped with an indicator for ac input power and an indicator for dc output power. Loss of primary power shall be reported to the ESS server as an alarm.

2.4.1.5 Auxiliary Equipment Power

A GFI service outlet shall be furnished inside the local processor's enclosure.

2.4.2 Entry Control Local Processor

The entry control local processor shall respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the ESS server and change outputs based on commands received from the ESS server. The local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs. The entry control local processor shall provide local entry control functions including communicating with field devices such as card readers, gate and door operators. The processor shall also accept data from entry control field devices as well as database downloads and updates from the ESS server that include enrollment and privilege information. The processor shall also send indications of success or failure of attempts to use entry control field devices and make comparisons of presented information with stored identification information. The processor shall grant or deny entry by sending control signals to portal control devices and mask intrusion alarm annunciation from devices stimulated by authorized entries. The entry control local processor shall use inputs from entry control devices to change modes between access and secure. The local processor shall maintain a date-time and location stamped record of each transaction and transmit transaction records to the ESS server. The processor shall operate as a stand-alone portal controller using the downloaded data base during periods of communication loss between the local processor and the ESS server. The processor shall store a minimum 4000 transactions during periods of communication loss between the local processor and the ESS server for subsequent upload to the ESS server upon restoration of communication.

2.4.2.1 Inputs

Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions. The local processor shall have at least 8 alarm inputs which allow wiring as normally open or normally closed contacts for alarm conditions. It shall also provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements. The local processor shall report line supervision alarms to the ESS server. Alarms shall be reported for any condition that remains off normal at an input for longer than 500 milliseconds. Each alarm condition shall be transmitted to the ESS server during the next interrogation cycle. The entry control local processor shall include the necessary software drivers to communicate with entry control field devices. Information generated by the entry control field devices shall be accepted by the local processor and automatically processed to determine valid identification of the individual present at the portal. Upon authentication of the credentials or information presented, the local processor shall automatically check privileges of the identified individual, allowing only those actions granted as privileges. Privileges shall include, but not be limited to, time of day control, day of week control, group control, and visitor escort control. The local processor shall maintain a date-time and location stamped record of each transaction. A transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.

2.4.2.2 Outputs

Local processor outputs shall reflect the state of commands issued by the ESS server. The outputs shall be a form C contact and shall include normally open and normally closed contacts. The local processor shall have at least 4 addressable outputs. The entry control local processor shall also provide control outputs to portal control devices.

2.4.2.3 Communications

The local processor shall be able to communicate with the ESS server via RS485 or TCP/IP as a minimum. The system manufacturer shall provide strategies for downloading database information for panel configurations and cardholder data to minimize the required download time when using IP connectivity.

2.4.2.4 Processor Power Supply

Local processor and devices shall be powered from an uninterruptible power source. The uninterruptible power source shall provide 6 hours of battery back-up power in the event of primary power failure and shall automatically fully recharge the batteries within 12 hours after primary power is restored. There shall be no equipment malfunctions or perturbations or loss of data during the switch from primary to battery power and vice versa. Batteries shall be sealed, non-outgassing type. The power supply shall be equipped with an indicator for ac input power and an indicator for dc output power.

2.4.2.5 Auxiliary Equipment Power

A GFI service outlet shall be furnished inside the local processor's enclosure.

2.5 FIELD PROCESSING SOFTWARE

All Field processing software described in this specification shall be furnished as part of the complete system.

2.5.1 Operating System

Each local processor shall contain an operating system that controls and schedules that local processor's activities in real time. The local processor shall maintain a point database in its memory that includes all parameters, constraints, and the latest value or status of all points connected to that local processor. The execution of local processor application programs shall utilize the data in memory resident files. The operating system shall include a real time clock function that maintains the seconds, minutes, hours, date and month, including day of the week. Each local processor real time clock shall be automatically synchronized with the ESS server at least once per day to plus or minus 10 seconds (the time synchronization shall be accomplished automatically, without operator action and without requiring system shutdown).

2.5.1.1 Startup

The local processor shall have startup software that causes automatic commencement of operation without human intervention, including startup of all connected Input/Output functions. A local processor restart program based on detection of power failure at the local processor shall be included in the local processor software. The startup software shall initiate operation of self-test diagnostic routines. Upon failure of the local processor, if the database and application software are no longer resident, the local processor shall not restart and systems shall remain in the failure mode indicated until the necessary repairs are made. If the database and application programs are resident, the local processor shall immediately resume operation.

2.5.1.2 Operating Mode

Each local processor shall control and monitor inputs and outputs as specified, independent of communications with the ESS server or designated workstations. Alarms, status changes and other data shall be transmitted to the ESS server or designated workstations when communications circuits are operable. If communications are not available, each local processor shall function in a stand-alone mode and operational data, including the status and alarm data normally transmitted to the ESS server shall be stored for later transmission to the ESS server or designated workstations. Storage for the latest 4000 events shall be provided at each local processor, as a minimum. Each local processor shall accept software downloaded from the ESS server. The panel shall support flash ROM technology to accomplish firmware downloads from a central location.

2.5.1.3 Failure Mode

Upon failure for any reason, each local processor shall perform an orderly shutdown and force all local processor outputs to a predetermined (failure mode) state, consistent with the failure modes shown and the associated control device.

2.5.2 Functions

Provide software necessary to accomplish the following functions, as

appropriate, fully implemented and operational, within each local processor.

a. Monitoring of inputs.

b. Control of outputs.

c. Reporting of alarms automatically to the ESS server.

d. Reporting of sensor and output status to ESS server upon request.

e. Maintenance of real time, automatically updated by the ESS server at least once a day.

f. Communication with the ESS server.

g. Execution of local processor resident programs.

h. Diagnostics.

i. Download and upload data to and from the ESS server.

2.6 ENTRY CONTROL DEVICES

2.6.1 Card Readers and Credential Cards

a. Entry control card readers shall use unique coded data stored in or on a compatible credential card as an identifier. The card readers shall be proximity type, and shall incorporate built-in heaters or other cold weather equipment to extend the operating temperature range as needed for operation at the site. Communications protocol shall be compatible with the local processor. Furnish card readers to read 125 kHz passive proximity detection, contactless smart 3 track magnetic stripe entry cards. The cards shall contain coded data arranged as a unique identification code stored on or within the card, and of the type readable by the card readers. Include within the card's encoded data, a non-duplicated unique identification code. Enrollment equipment to support local encoding of badges including cryptographic and other internal security checks shall be supplied.

b. The encoded data shall adhere to the Government Smart Card Interoperability Specification V2.1 (GSC-IS). Any card formats that differ from the above specification must receive approval of the offered cards, readers, and data panels prior to the bid date be approved by the Government.

2.6.1.1 Data Encryption

Encryption between the card, card reader, and panels shall meet Federal Information Protocol Standards (FIPS) of FIPS 201 (Change Notice 1) and FIPS 197 (AES).

2.6.1.2 Magnetic Stripe

Magnetic stripe card readers shall read credential cards which meet the requirements of ISO 7810, ISO 7811-1, and ISO 7811-2. Magnetic stripe credential cards shall use single layer 4000 oersted magnetic tape material. The magnetic tape material shall be coated with Teflon and affixed to the back of the credential card near the top. The number of

bits per inch, number of tracks, and number of unique codes available for the magnetic tape shall be in accordance with ISO 7811-1, and ISO 7811-2.

2.6.1.3 Wiegand Wire Effect

Wiegand card readers shall read credential cards which are encoded using Wiegand effect ferromagnetic wires laminated into the credential card. The Wiegand card reader shall create a magnetic field and output a coded representation of the unique pattern of magnetic flux changes produced by moving the credential card through the card reader. The output shall be a series of electrical signals and shall constitute a unique identification code number. Wiegand credential cards shall use at least 24 binary digits to generate a unique credential card identification code.

2.6.1.4 Smart Cards

Smart card readers shall read credential cards whose characteristics of size and technology meet those defined by ANSI ISO/IEC 7816. Smart card implementation shall adhere to the Government Smart Card Interoperability Specification (GSC-IS) and adhere to the data formats as specified by the DoD SEIWG format. The readers shall have "flash" download capability to accommodate card format changes. The card reader shall have the capability of reading the card data and transmitting the data, or a portion thereof, to the ESS control panel.

2.6.1.5 Contactless Smart Card

Smart card readers shall read credential cards whose characteristics of size and technology meet those defined by ANSI ISO/IEC 7816. Smart card implementation shall adhere to the Government Smart Card Interoperability Specification (GSC-IS) and adhere to the data formats as specified by the DoD SEIWG format. The readers shall have "flash" download capability to accommodate card format changes. The card reader shall have the capability of reading the card data and transmitting the data, or a portion thereof, to the ESS control panel.

2.6.1.6 Proximity

Proximity card readers shall use passive proximity detection and shall not require contact with the proximity credential card for proper operation. Passive detection proximity card readers shall use a swept-frequency, radio frequency field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number. The card reader shall read proximity cards in a range from 0 to at least 6 inches from the reader. The credential card design shall allow for a minimum of 32,000 unique identification codes per facility.

2.6.1.7 Card Reader Display

The card readers shall include an LED or other visual indicator display. The display shall indicate power on/off, and whether user passage requests have been accepted or rejected.

2.6.1.8 Card Reader Response Time

The card reader shall respond to passage requests by generating a signal to the local processor. The response time shall be 800 milliseconds or less, from the time the card reader finishes reading the credential card until a

response signal is generated.

2.6.1.9 Card Reader Power

The card reader shall be powered from the source as shown and shall not dissipate more than 5 Watts.

2.6.1.10 Card Reader Mounting Method

Card readers shall be suitable for surface, semi-flush, pedestal, or weatherproof mounting as required.

2.6.1.11 Card Size and Dimensional Stability

Credential cards shall be 2-1/8 x 3-3/8 inches. The credential card material shall be dimensionally stable so that an undamaged card with deformations resulting from normal use shall be readable by the card reader.

2.6.1.12 Card Materials and Physical Characteristics

The credential card shall be abrasion resistant, non-flammable, and present no toxic hazard to humans when used in accordance with manufacturer's instructions. The credential card shall be impervious to solar radiation and the effects of ultra-violet light.

2.6.1.13 Card Construction

The credential card shall be of core and laminate or monolithic construction. Lettering, logos and other markings shall be hot stamped into the credential material or direct printed. Provide a means to allow onsite assembly and lamination of credential cards by Government personnel.

2.6.1.14 Card Durability and Maintainability

The credential cards shall be designed and constructed to yield a useful lifetime of at least 5000 insertions or swipes or 5 years whichever results in a longer period of time. The credential card shall be able to be cleaned by wiping the credential card with a sponge or cloth wet with a soap and water solution.

2.6.1.15 Warranty

The credential card shall include a minimum 3-year warranty.

2.7 ENTRY CONTROL SOFTWARE

2.7.1 Interface Device

The entry control software shall control passage. The decision to grant or deny passage shall be based upon identifier data to be input at a specific location. If all conditions are met, a signal shall be sent to the input device location to activate the appropriate electric strike, bolt, electromagnetic lock or other type of portal release or facility interface device.

2.7.2 Operator Interface

Entry control operation shall be entirely automatic under control of the ESS server and local processors except for simple operations required for

display, alarm acknowledgment, zone and portal status change operations, audible or visual alarm silencing and audio annunciation. The system shall immediately annunciate changes in zone and portal status. The alarm printer shall print a permanent record of each alarm and status change. The displays or screens shall display the current status of system zones and portals. The ESS server shall immediately display the current status of any zone or portal upon command. While the system is annunciating an unacknowledged zone or portal alarm, keyboard operations at the ESS server, other than alarm acknowledgment, shall not be possible. The system shall provide the capability to change zone and portal status from alarm (after alarm acknowledgment) or access to secure; from alarm (after alarm acknowledgment) or secure to access, or from access to secure by simple control operations. If the operator attempts to change zone status to secure while there is an alarm output for that zone or portal, the system shall immediately annunciate an alarm for that zone or portal.

2.7.3 Entry Control Functions

2.7.3.1 Multiple Security Levels

The system shall have multiple security levels. Each of the security levels shall be delineated by facility barriers. Access to each security level shall be through portals in the facility barriers using designated entry control procedures. The system shall provide at least 8 security levels. Any attempt to access an area beyond an individual's security level shall initiate an access denial alarm.

2.7.3.2 Anti-Pass back

Portals as shown shall incorporate anti-pass back functions. Anti-pass back functions and identifier tracking shall be system-wide for portals incorporating anti-pass back. Once an authorized, enrolled individual has passed through a portal using entry control procedures, the system shall not allow use of the same identifier to pass through any portal at the same security level until the individual has egressed through a portal at this same security level using entry control procedures. Any attempt to violate anti-pass back procedures shall initiate an access denial alarm. Portals that do not incorporate anti-pass back functions shall allow egress from the area by a push-button switch for activation of the facility interface device or normal egress that does not activate the alarm monitoring function. Portal egress switch shall be located as shown.

2.7.3.3 Immediate Access Change

The system shall provide functions to disenroll and deny access to any identifier or combination of identifiers without consent of the individual or recovery of a credential. The design of the system shall provide entry change capability to system operators and managers with appropriate passwords at the system operator or enrollment consoles.

2.7.3.4 Multiple Time Zones

The system shall provide multiple time zone entry control. Personnel enrolled in the system shall only be allowed access to a facility during the time of day they are authorized to access the facility. Time zone access control shall also include the ability to specify beginning and ending dates that an individual will be authorized to access a facility. The system shall provide automatic activation and deactivation of entry authorization. The design of the system shall provide at least 256 time

zones with overlapping time zones. The system shall provide a means for system operators with proper password clearance, to define custom names for each time zone, and to change the time zone's beginning and ending times through the system operator and enrollment interfaces. The system shall automatically deactivate individuals at the end of their predefined facility access duration. Any attempt during a 24 hour period by an individual or an identifier to gain facility entry outside of the authorized time zone shall initiate an entry denial alarm.

2.7.4 Electronic Entry Control System Capacities

The system shall be designed and configured to provide the following capacities.

2.7.4.1 Enrollees

The system shall be configured for 256,000 enrollees. The system shall provide a facility-tailorable reference file database containing personal, access authorization, identifier and verification data for each enrollee as required.

2.7.4.2 Transaction History File Size

The system capacity shall be at least the amount of transactions for the system during 1 year without any loss of transaction data. Examples of transaction data that are to be retained are: each system alarm, event and status change including operator commands, and the time and date of each occurrence.

2.7.5 Entry Control System Alarms

The system shall annunciate an alarm when the following conditions occur. Alarms shall be annunciated at the console both audibly and visually. An alarm report shall also be printed on the system printer. The alarm annunciation shall continue until acknowledged by the system operator. Only 1 control key shall be needed to acknowledge an alarm. The system shall control, monitor, differentiate, rank, annunciate, and allow operators to acknowledge, in real time, alarm signals generated by system equipment. The system shall also provide a means to define and customize the annunciation of each alarm type. The system shall use audio and visual information to differentiate the various types of alarms. Each alarm type shall be assigned an audio and a unique visual identifier.

2.7.5.1 Entry Denial

The system shall annunciate an alarm when an attempt has been made to pass through a controlled portal and entry has been denied.

2.7.5.2 Portal Open

The system shall annunciate an alarm when an entry controlled portal has been open longer than a predefined time delay. The time delay shall be adjustable, under operator control, over a range of at least 1 second to 1 minute with a maximum resolution of 1 second. The system shall have the capability of resetting the door condition based upon the door monitoring position switch indicating opening and then close.

2.7.5.3 Alarm Shunting/System Bypass

The system shall provide a means to ignore operator selected alarm types at operator selected portals in order to allow standard entry control procedures to be bypassed (shunted). Predefined alarm shunting shall only be available to system operators with the proper password. The system shall also provide for predefined alarm shunting based upon time zones. This capability shall only apply to the entry control alarm type.

2.8 WIRE AND CABLE

Provide all wire and cable not indicated as Government furnished equipment. Wiring shall meet NFPA 70 standards.

2.8.1 Local Area Network (LAN) Cabling

LAN cabling shall be in accordance with TIA-568-C.1, category 5.

2.8.2 Cable Construction

All cable components shall withstand the environment in which the cable is installed for a minimum of 20 years.

2.8.3 Power Line Surge Protection

Equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41.1 and IEEE C62.41.2. Fuses shall not be used for surge protection.

2.8.4 Device Wiring and Communication Circuit Surge Protection

Inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. Communications equipment shall be protected against surges induced on any communications circuit. Cables and conductors, except fiber optics, which serve as communications circuits from server to field equipment, and between field equipment, shall have surge protection circuits installed at each end. Protection shall be furnished at equipment, and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within 3 feet of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two waveforms:

a. A 10-microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 Volts and a peak current of 60 amperes.

b. An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 Volts and a peak current of 500 amperes.

2.8.5 Power Line Conditioners

A power line conditioner shall be furnished for the ESS server equipment. The power line conditioners shall be of the ferro-resonant design, with no moving parts and no tap switching, while electrically isolating the secondary from the power line side. The power line conditioners shall be

sized for 125 percent of the actual connected kVA load. Characteristics of the power line conditioners shall be as follows:

a. At 85 percent load, the output voltage shall not deviate by more than plus or minus 1 percent of nominal when the input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.

b. During load changes of zero to full load, the output voltage shall not deviate by more than plus or minus 3 percent of nominal. Full correction of load switching disturbances shall be accomplished within five cycles, and 95 percent correction shall be accomplished within two cycles of the onset of the disturbance.

c. Total harmonic distortion shall not exceed 3.5 percent at full load.

2.9 CARD READER STANCHION

Furnish a separate mounting housing for the exterior card reader. Provide and install stanchions as shown on the contract drawings to facilitate mounting of all required access control equipment. Coordinate stanchion height with the Project Manager prior to stanchion fabrication. Coordinate housing height with the Project Manager prior to housing fabrication.

The stanchion shall be constructed of 3 inch square zinc coated tubing with an 8 inch welded steel base plate with mounting holes to allow for minimum 1/2 inch anchor bolts. The base shall be furnished with a 2 part snap-together steel base plate cover with zinc plating and beige powder coat finish. Stanchions shall include two 4 inch steel flanges to facilitate the mounting of the housings.

The card reader housing shall include a weather resistant post coupling housing mount. The housing shall be constructed of 12 gauge steel with zinc coating and beige powder coat finish. The panel for mounting the card reader shall be constructed of 1/2-inch opaque Lexan or other sturdy non-metallic material and equipped with a cam lock with two sets of keys each. The panel shall be hinged for access to the housing interior. All hinges and fasteners shall be 316 grade stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

Verify that site conditions are in agreement with the design package and report any changes in the site, or conditions that will affect performance of the system to the Government in a report as defined in paragraph "Group II Technical Data Package". Do not take any corrective action without written permission from the Government.

3.2 GENERAL REQUIREMENTS

Install all system components, including Government furnished equipment, and appurtenances in accordance with the manufacturer's instructions, IEEE C2 and as shown. Furnish necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

3.2.1 Installation

Install the system in accordance with the standards for safety, NFPA 70, UL 681, UL 1037 and UL 1076, and the appropriate installation manual for each equipment type. Components within the system shall be configured with appropriate service points to pinpoint system trouble in less than 20 minutes. Conduit shall be rigid galvanized steel or as shown and a minimum of 1/2 inch in diameter. DTS shall not be pulled into conduits or placed in raceways, compartments, outlet boxes, junction boxes, or similar fittings with other building wiring. Flexible cords or cord connections shall not be used to supply power to any components of the system, except where specifically noted. All other electrical work shall be as specified in NFPA 70 and as shown.

3.2.2 Enclosure Penetrations

Enclosure penetrations shall be from the bottom unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer, and in a manner that does not damage the cable.

3.2.3 Cold Galvanizing

Field welds and/or brazing on factory galvanized boxes, enclosures, conduits, etc., shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.

3.2.4 Installation Software

Load software as specified and required for an operational system, including data bases and specified programs. Upon successful completion of the endurance test, provide original and backup copies on optical disk of all accepted software, including diagnostics.

3.3 SYSTEM STARTUP

Satisfaction of the requirements below does not relieve the Contractor of responsibility for incorrect installations, defective equipment items, or collateral damage as a result of Contractor work/equipment. Do not apply power to the system until after:

a. System equipment items and DTS have been set up in accordance with manufacturer's instructions.

b. A visual inspection of the system has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.

c. System wiring has been tested and verified as correctly connected.

d. System grounding and transient protection systems have been verified as properly installed.

e. Power supplies to be connected to the system have been verified as the correct voltage, phasing, and frequency.

3.4 SUPPLEMENTAL CONTRACTOR QUALITY CONTROL

Provide the services of technical representatives who are familiar with all components and installation procedures of the installed system; and are approved by the Project Manager. These representatives shall be present on the job site during the preparatory and initial phases of quality control to provide technical assistance. These representatives shall also be available on an as needed basis to provide assistance with follow-up phases of quality control. These technical representatives shall participate in the testing and validation of the system and shall provide certification that their respective system portions meet the contractual requirements.

3.5 TRAINING

3.5.1 General

Deliver lesson plans and training manuals for the training phases, including type of training to be provided, and a list of reference material, for Government approval. Conduct training courses for designated personnel in the maintenance and operation of the system as specified. The training shall be oriented to the specific system being installed. Training manuals shall be delivered for each trainee with 2 additional copies delivered for archiving at the project site. The manuals shall include an agenda, defined objectives for each lesson, and a detailed description of the subject matter for each lesson. Furnish audio-visual equipment and other training materials and supplies. Where the Contractor presents portions of the course by audio-visual material, copies of the audio-visual material shall be delivered to the Government either as a part of the printed training manuals or on the same media as that used during the training sessions. A training day is defined as 8 hours of classroom instruction, including 2 15-minute breaks and excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. For guidance in planning the required instruction, assume that attendees will have a high school education or equivalent, and are familiar with ESS. Approval of the planned training schedule shall be obtained from the Government at least 30 days prior to the training.

3.5.2 Operator's Training I

The first course shall be taught at the project site for a period of up to five consecutive training days at least 3 months prior to the scheduled performance verification test. A maximum of 12 personnel shall attend this course. Upon completion of this course, each student, using appropriate documentation, shall be able to perform elementary operations with guidance and describe the general hardware architecture and functionality of the system. This course shall include:

a. General System hardware architecture.

b. Functional operation of the system.

c. Operator commands.

d. Data base entry.

e. Reports generation.

f. Alarm reporting.

g. Diagnostics.

3.5.3 System Manager Training

Two system managers shall be trained for at least 3 consecutive days. The system manager training shall consist of the operator's training and the following:

a. Enrollment/deactivation.

b. Assignments of identifier data.

c. Assign operator password/levels.

d. Change database configuration.

e. System network configuration and management.

f. Print special or custom reports.

g. System backup.

h. Any other functions necessary to manage the system.

3.5.4 Maintenance Personnel Training

The system maintenance course shall be taught at the project site after completion of the endurance test for a period of 5 training days. A maximum of 5 personnel, designated by the Government, will attend the course. The training shall include:

a. Physical layout of each piece of hardware.

b. Troubleshooting and diagnostics procedures.

c. Component repair and/or replacement procedures.

d. Maintenance procedures and schedules to include system testing after repair.

e. Calibration procedures. Upon completion of this course, the students shall be fully proficient in the maintenance of the system.

f. Review of site-specific drawing package, device location, communication, topology, and flow.

3.6 TESTING

3.6.1 General Requirements for Testing

Provide personnel, equipment, instrumentation, and supplies necessary to perform site testing. The Government will witness all performance verification and endurance testing. Written permission shall be obtained from the Government before proceeding with the next phase of testing. Original copies of all data produced during testing shall be turned over to the Government at the conclusion of testing, prior to Government approval of the test.

3.6.2 Contractor's Field Testing

Calibrate and test all equipment, verify DTS operation, place the integrated system in service, and test the integrated system. Test installed ground rods as specified in IEEE 142. Deliver a report describing results of functional tests, diagnostics, and calibrations, including written certification to the Government that the installed complete system has been calibrated, tested, and is ready to begin performance verification testing. It is recommended that the Contractor use the approved performance verification test as a guideline when the field test is conducted.

3.6.3 Performance Verification Test

Demonstrate that the completed system complies with the contract requirements. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown. The performance verification test, as specified, shall not be started until after receipt by the Contractor of written permission from the Government, based on the Contractor's written report. The report shall include certification of successful completion of testing as specified in paragraph Contractor's Field Testing, and upon successful completion of training as specified. The Government may terminate testing at any time when the system fails to perform as specified. Upon termination of testing by the Government or by the Contractor, commence an assessment period as described for Endurance Testing Phase II. Upon successful completion of the performance verification test, deliver test reports and other documentation as specified to the Government prior to commencing the endurance test.

3.6.4 Exclusions

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

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

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

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

d. The occurrence of specified nuisance alarms.

e. The occurrence of specified environmental alarms.

-- End of Section --

SECTION 31 00 00

EARTHWORK

PART 1 GENERAL

1.1 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Pipes or other artificial obstructions, except those indicated, will not be encountered.

c. Borrow material, suitable fill and backfill, bedding and subbedding material in the quantities required are not available at the site or on Government property.

d. Blasting will not be permitted.

e. Hard materials will be encountered.

1.2 REFERENCES

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2010) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
AASHTO T 224	(2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1140	(2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	(2012) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000

	ft-lbf/ft3) (2700 kN-m/m3)
ASTM D1883	(2007; E 2009; E 2009) CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D422	(1963; R 2007; E 2014; E 2014) Particle-Size Analysis of Soils
ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4355	(2007) Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
ASTM D448	(2012) Sizes of Aggregate for Road and Bridge Construction
ASTM D4491	(1999a; R 2009) Water Permeability of Geotextiles by Permittivity
ASTM D4533	(2004; R 2009) Trapezoid Tearing Strength of Geotextiles
ASTM D4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D4759	(2011) Determining the Specification Conformance of Geosynthetics
ASTM D6241	(2004; R 2009) Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe
ASTM D6938	(2010) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 600/4-79/020	(1983) Methods for Chemical Analysis of Water and Wastes
EPA SW-846.3-3	(1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

GW, GM, GW-GM, GP-GM, SW, SM, SW-SM, or SP-SM. Satisfactory materials shall be comprised of soils less than 3 inches in any dimension, free of organic matter, debris, roots, vegetation, clayey soils, unsatisfactory materials, asphaltic and concrete debris, and other deleterious materials. It shall have a California Bearing Ratio of at least 10, and not more than 25 percent by weight passing the No. 200 sieve when tested in accordance with ASTM D1140.

1.3.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Materials classified as PT, OH, OL, CH, CL, SC or GC by ASTM D2487 are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or other deleterious or objectionable material. Unsatisfactory materials shall not be used at the site. Notify the Project Manager when encountering any unsatisfactory materials.

1.3.3 Granular and Cohesive Materials

Granular materials include materials classified in ASTM D2487 as GW, GP, GW-GM, SW, SP, SW-SM and SP-SM. Cohesive materials include materials classified as GC, SC, ML, CL, MH, CH, OH, and OL. Materials classified as GM and SM will be identified as granular only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C136, ASTM D422, and ASTM D1140.

1.3.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with AASHTO T 180 and corrected with AASHTO T 224. To maintain the same percentage of coarse material, use the "remove and replace" procedure as described in NOTE 8 of Paragraph 7.2 in AASHTO T 180.

1.3.5 Topsoil

Material suitable for topsoils obtained from offsite areas or excavations is defined as: Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

1.3.6 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, cemented sand, consolidated calcareous marine sediments, coral

reef rock, coral, volcanic tuff rock, conglomerate materials, hard cobbles, or hard boulders 4 cubic yards or less in volume which are not included in the definition of "rock" herein. These materials usually require the use of heavy excavation equipment, ripper teeth, backhoe-mounted pneumatic hole punchers, or jack hammers for removal.

1.3.7 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and the use of expansion jacks or feather wedges, or the use of rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 4 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and use of expansion jacks or wedges that are performed merely to increase production.

1.3.8 Unstable Material

Unstable materials are too wet or too soft to properly support the utility pipe, conduit, or appurtenant structure or materials that do not readily compact as specified herein. Unstable material also includes materials which contain refuse, unsatisfactory materials, oversize rocks, debris, and other deleterious materials which could result in fill or backfill not being able to be compacted properly. This may be material otherwise identified as satisfactory which has been disturbed or saturated.

1.3.9 Select Granular Material

1.3.9.1 General Requirements

Select granular material consist of materials classified as GW, SW, GW-GM, GP-GM, SW-SM or SP-SM by ASTM D2487 where indicated. The maximum particle size shall be 3 inches. The liquid limit of such material must not exceed 25 percent when tested in accordance with ASTM D4318. The plasticity index must not be greater than 10 percent when tested in accordance with ASTM D4318, and not more than 15 percent by weight may be finer than No. 200 sieve when tested in accordance with ASTM D1140.

1.3.9.2 California Bearing Ratio Values

Bearing Ratio: At 0.1 inch penetration, provide a bearing ratio of at least 30 percent when compacted at optimum moisture content at 95 percent ASTM D1557 maximum dry density as determined in accordance with ASTM D1883 for a laboratory soaking period of not less than 4 days. Provide one percent maximum expansion.

1.3.10 Pipe Bedding Material

Bedding material shall consist of clean, granular, basaltic gravel, conforming to ASTM D448, No. 67 size.

1.3.11 Crushed Rock Subbedding Material

Subbedding material shall consist of clean, granular, basaltic gravel conforming to ASTM D448, No. 5 size.

1.3.12 Controlled Low Strength Material (CLSM)

CLSM may be used to backfill cavities or voids found in coral reef deposits. CLSM shall have a compressive strength of 50 to 150 psi and be excavatable using conventional earthwork equipment. CLSM shall be flowable and self-compacting. An admixture shall be added to the CLSM to reduce shrinkage.

1.3.13 Subgrade

The material in excavation (cuts) and fills (embankments) immediately below any subbase, base, pavement, or other improvement. Also, as a secondary definition, the level below which work above is referenced.

1.3.14 Lift

A layer (or course) of soil placed on top of a previously prepared or placed soil.

1.4 SYSTEM DESCRIPTION

1.4.1 Classification of Excavation

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.4.2 Blasting

Blasting will not be permitted.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Utilization of Excavated Materials; G

SD-06 Test Reports

Fill and Backfill Material Testing
Select Granular Material Testing
Pipe Bedding and Crushed Rock Subbedding Testing
Controlled Low Strength Material (CLSM)
Moisture-Density Relations Tests
Field Dry Density and Moisture Content Tests
Check Tests on In-Place Densities
Testing
Borrow Site Testing

Within 24 hours of conclusion of physical tests, submit 3 copies of test results, including calibration curves and results of calibration tests.

SD-07 Certificates

Testing

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR OFFSITE SOILS

Test offsite soils brought in for use as backfill for Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and full Toxicity Characteristic Leaching Procedure (TCLP) including ignitability, corrosivity and reactivity. Backfill shall contain a maximum of 100 parts per million (ppm) of total petroleum hydrocarbons (TPH) and a maximum of 10 ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and shall pass the TCPL test. Determine TPH concentrations by using EPA 600/4-79/020 Method 418.1. Determine BTEX concentrations by using EPA SW-846.3-3 Method 5030/8020. Perform TCLP in accordance with EPA SW-846.3-3 Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Do not bring material onsite until tests have been approved by the Project Manager.

2.2 BURIED WARNING AND IDENTIFICATION TAPE

Provide 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 inches minimum width, color coded as specified 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 (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes	
Red	Electric
Orange	Telephone and Other Communications

2.2.1 Warning Tape for Metallic Piping

Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.003 inch and a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.2.2 Detectable Warning Tape for Non-Metallic Piping

Provide polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.004 inch, and a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.3 BACKFILL BESIDE STRUCTURES

Soft, spongy, highly plastic, or otherwise unsuitable material is

prohibited. Backfill material beside structures shall be classified as select granular fill or select granular backfill.

2.4 BORROW

Provide materials meeting requirements for select granular fill, select granular backfill, bedding, and crushed rock subbedding. Obtain borrow materials from sources off of Government property.

2.5 NON-WOVEN GEOTEXTILE FABRIC

Provide a pervious sheet of polyester, nylon, or glass or polypropylene filaments woven, spun bonded, fused, or otherwise manufactured into a nonraveling fabric with uniform thickness and strength. Fabric shall have the following manufacturer certified minimum average roll properties as determined by ASTM D4759:

PROPERTY	MINIMUM VALUE	TEST METHOD
Grab Tensile Strength	205 lbs	ASTM D4632
Grab Tensile Elongation	50 percent	ASTM D4632
Trapezoid Tear Strength	80 lbs	ASTM D4533
CBR Puncture Strength	500 lbs	ASTM D6241
Apparent Opening Size (AOS)	80 U.S. Sieve	ASTM D4751
Permittivity	1.4 sec^{-1}	ASTM D4491
Flow Rate	95 $gal/min/ft^2$	ASTM D4491
UV Resistance (at 500 hours)	70 percent strength retained	ASTM D4355

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, strip topsoil to a depth of 4 inches. Spread topsoil on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Remove from the site any surplus of topsoil from excavations and gradings.

3.2 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph "FINISHING". Transport

satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times.

3.2.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown on drawings. Do not excavate ditches and gutters below grades shown. Backfill the excessive open ditch or gutter excavation with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed, except in no case allow material be deposited a maximum 4 feet from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.3 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Provide vertical trench walls where no manufacturer's printed installation manual is available. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter, and do not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.2.3.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell

holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of 3 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

Compact the bottom of the trench excavation to provide a firm bottom and to check for yielding or soft areas. Excavate yielding, soft, or unstable areas to firm soils and replace with properly compacted select granular fill or subbedding material.

If cavities or voids are encountered at the bottom of the bedding level, clean the cavities or voids of loose or soft materials to dense coral reef deposits or hard, cemented coral and backfill with Controlled Low Strength Material or properly compacted select granular fill.

Place bedding and subbedding materials where indicated as specified. After preparing and compacting the bottom of the trench, line the bottom with non-woven geotextile fabric. Overlap geotextile at least 12 inches along joints. Completely wrap bedding and subbedding materials with the fabric.

When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it with compacted subbedding material at no additional cost to the Government.

3.2.3.2 Removal of Unyielding Material

Where overdepth is not indicated and unyielding material is encountered in the bottom of the trench, remove such material at least 6 inches below the required grade and replace with suitable materials as provided in paragraph "BACKFILLING AND COMPACTION".

3.2.3.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular material as provided in paragraph "BACKFILLING AND COMPACTION". When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.2.3.4 Excavation for Appurtenances

Provide excavation for manholes, catch-basins, inlets, or similar structures of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. Remove unstable materials as specified in "Removal of Unstable Material". When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.2.4 Underground Utilities

The Contractor is responsible for movement of construction machinery and equipment over pipes and utilities during construction. Excavation made

with power-driven equipment is not permitted within 2 feet of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Project Manager. Report damage to utility lines or subsurface construction immediately to the Project Manager.

3.2.5 Structural Excavation

Ensure that footing and slab subgrades have been inspected and approved by the Project Manager prior to concrete placement.

3.3 SELECTION OF BORROW MATERIAL

Select borrow material to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Obtain borrow material from the borrow areas from approved private sources. Unless otherwise provided in the contract, the Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval. Consider necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon related operations to the borrow excavation.

3.4 GRADING AREAS

Where indicated, divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.5 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Do not excavate to final grade until just before concrete is to be placed. Only use excavation methods that will leave the foundation rock in a solid and unshattered condition. Roughen the level surfaces, and cut the sloped surfaces, as indicated, into rough steps or benches to provide a satisfactory bond. Protect shales from slaking and all surfaces from erosion resulting from ponding or water flow.

3.6 GROUND SURFACE PREPARATION

3.6.1 General Requirements

Remove and replace unsatisfactory material with satisfactory materials, as

directed by the Project Manager, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 6 inches before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 5 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 6 inches, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inches and compact it as specified for the adjacent fill.

3.7 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials and unused satisfactory materials removed from excavations shall become the property of the Contractor and shall be removed from Government property. Use satisfactory material removed from excavations, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Submit procedure and location for disposal of unused satisfactory material. Submit proposed source of borrow material. Do not waste any satisfactory excavated material without specific written authorization.

3.8 BURIED TAPE

3.8.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.9 BACKFILLING AND COMPACTION

a. Backfill material shall consist of satisfactory material, select granular material, bedding, or crushed rock subbedding material as required. Moisten or aerate material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

b. Fill and backfill shall not be placed when weather conditions detrimentally affect the quality of the finished course. Do not construct fill and backfill in the rain or on saturated subgrades. If weather conditions are windy, hot or arid, with high rate of evaporation, schedule the placement in cooler portions of the day and furnish equipment to add moisture to the fill or backfill during and after placement.

c. Backfill adjacent to any and all types of structures shall consist of select granular fill. Place and compact fill and backfill to prevent wedging action or eccentric loading upon or against the structure. Do not place backfill against concrete structures until at least 28 days after concrete is placed. Do not place backfill against hydraulic structures until the structure has passed leakage tests. Ground surface on which backfill is to be placed shall be prepared as specified.

d. Place select granular fill and select granular backfill in loose horizontal lifts of not more than 8 inches in loose thickness. Do not place material on surfaces that are muddy. Compact each lift

of fill with equipment well suited to the fill being placed. Moisture condition material to within 2 percent of its optimum moisture content. Compact each lift to at least the degree of compaction as specified in Table I before placing the overlying lift. Compaction shall be accomplished continuously over the entire area. Sufficient passes shall be made to ensure that specified density is obtained.

e. Place satisfactory fill and satisfactory backfill at the locations and to lines and grades indicated. Use only approved materials in constructing fill on the prepared subgrade. Place satisfactory fill and satisfactory backfill in horizontal lifts not exceeding 10 inches in loose thickness. Do not place material on surfaces that are muddy. Compact each lift to at least the degree of compaction as specified in Table I before placing the overlying lift with equipment well suited to the soil being compacted.

f. Place crushed rock subbedding material in loose horizontal lifts not more than 12 inches in loose thickness. Compact with compaction equipment to a dense consistency as evident by little to no settlement of the gravel under repeated passes of the compaction equipment but not less than 6 passes per lift.

g. Place bedding material in loose horizontal lifts not more than 6 inches in loose thickness. Compact with compaction equipment to a dense consistency as evident by little to no settlement of the gravel under repeated passes of the compaction equipment but not less than 6 passes per lift.

3.10 TRENCH BACKFILL

Backfill trenches to the grade shown.

3.10.1 Replacement of Unyielding Material

Replace unyielding material removed from the bottom of the trench with select granular material or bedding material.

3.10.2 Replacement of Unstable Material

Replace unstable material removed from the bottom of trenches or excavations with select granular material.

3.10.3 Bedding (Initial Backfill)

Construct backfill in two operations (initial and final) as specified. Bedding shall be of the type specified herein and thickness shown. Place non-woven geotextile fabric and initial backfill consisting of bedding material and compact with approved tampers from at least 6 inches below the pipe invert to a height of at least 12 inches above the pipe crown for pipes less than 12 inches in diameter. For pipes 12 inches to 24 inches in diameter, the bedding shall extend from at least 12 inches below the pipe invert to a height of at least 18 inches above the pipe crown. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe to avoid damage or displacement of pipes. Care shall be taken to ensure thorough compaction of the bedding material under the haunches of the pipe. Bedding material shall be compacted with compaction equipment to a dense consistency as evident by little to no settlement of the gravel under repeated passes with the compaction equipment, but not

less than 6 passes per lift. Use hand operated, plate type, or other suitable hand tampers for compaction of bedding. Ensure pipes and protective coatings are not damaged during compaction. If necessary, alter, change or modify equipment or compaction method and procedures to meet specified compaction requirements without damaging pipes. Bedding and initial backfill shall be completely wrapped in non-woven geotextile fabric. The fabric shall overlap a minimum of 12 inches along all joints.

3.10.4 Final Backfill

The remainder of the trench above the bedding shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows: Backfill shall be placed in layers of a maximum of 10 inch loose thickness, moisture conditioned to between optimum and 3 percent wet of its optimum moisture content, and compacted to at least the degree of compaction as indicated in Table I. For utilities under pavement, the top at least 24 inches of trench backfill below the finish pavement surface shall consist of AC, base course, and select granular backfill. Select granular backfill shall be placed in not more than 8 inch thick loose horizontal lifts, moisture conditioned to within 2 percent of its optimum moisture content, and compacted to at least 95 percent of ASTM D1557 maximum laboratory dry density.

3.11 BACKFILL FOR APPURTENANCES

a. After manholes or similar structures have been constructed and the concrete has been allowed to cure for at least 28 days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be placed in loose horizontal lifts not more than 8 inches in thickness, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress. Each lift shall be compacted as specified herein before placing the next lift.

b. Place select granular fill and select granular backfill under pavements in loose horizontal lifts of not more than 8 inches in thickness. Do not place material on surfaces that are wet or muddy. Compact with equipment well suited to the soil being compacted. Moisture condition to within 2 percent of its optimum moisture content. Compact each lift to at least 95 percent of ASTM D1557 maximum laboratory dry density as specified herein before placing the overlaying lift. Compaction shall be accomplished continuously over the entire area. Sufficient passes shall be made to ensure that specified density is obtained.

3.12 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.12.1 Electrical Distribution System

Provide a minimum cover of 24 inches from the finished grade to direct burial cable and conduit or duct line, unless otherwise indicated.

3.13 SUBGRADE PREPARATION

Unsatisfactory material in surfaces to receive fill or in excavated areas

shall be removed and replaced with properly compacted select granular fill as directed by the Project Manager. The surface shall be scarified to a depth of at least 6 inches and compacted as specified herein before the fill is started. Sloped surfaces steeper than 1 vertical to 5 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material.

After clearing and grubbing and just prior to filling, the moisture content of the subgrade in the areas to receive fill shall be checked. The top at least 6 inches of the subgrade shall be compacted to at least the percent of ASTM D1557 laboratory maximum dry density indicated in Table I.

Any soft or loose materials, or yielding or pumping areas observed in the subgrade that do not readily compact as specified herein shall be over excavated to a depth of at least 12 inches or as directed by the Project Manager and replaced with properly compacted select granular fill.

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other suitable equipment well suited to the soil being compacted.

3.13.1 Construction

Shape subgrade to line, grade, and cross section, and compact as specified. Include plowing, disking, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 6 inches below finished grade for the subgrade. Bring up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire subgrade to line, grade, and cross section and compact as specified. After rolling, the surface of the subgrade for roadways shall not show deviations greater than 1/2 inch when tested with a 12-foot straightedge applied both parallel and at right angles to the centerline of the area. Do not vary the elevation of the finish subgrade more than 0.05 foot from the established grade and cross section.

3.13.2 Compaction

Perform compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other suitable equipment well suited to the condition and material being compacted.

Compact each layer or lift of material specified so that the in-place dry density is not less than the percent ASTM D1557 laboratory maximum dry density specified in Table I.

TABLE I

	Minimum Percent ASTM D1557 Laboratory Maximum Dry Density	
	Granular Material	Cohesive Material
Fill, Embankment and Backfill		
Satisfactory fill and satisfactory backfill	95	---
Select granular fill and select granular backfill under pavements, footings, and structures	95	---
Refill undercut materials	95	---
Utilities under roadway, top 2 feet	95	---
Utilities under roadways, below top 2 feet	90	---
Utilities in landscape areas	90	---
Subgrade (Top of fill, backfill, or bottom of excavation)		
Top at least 6 inches	95	90 to 95

3.13.2.1 Subgrade for Pavements

Compact subgrade for pavements to at least 95 percent of ASTM D1557 laboratory maximum dry density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, thoroughly blend, reshape, and compact at least the top 6 inch of subgrade.

3.14 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph "SUBGRADE PREPARATION". Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.14.1 Subgrade and Embankments

During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do not disturb the finished subgrade by traffic or other operation. Protect and maintain the finished subgrade in a satisfactory condition until ballast, subbase, base, or pavement is placed. Do not

permit the storage or stockpiling of materials on the finished subgrade. Do not lay subbase, base course, ballast, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy or spongy subgrade.

3.15 PLACING TOPSOIL

On areas to receive topsoil, prepare the compacted subgrade soil to a 2 inches depth for bonding of topsoil with subsoil. Spread topsoil evenly to a thickness of 3 inch and grade to the elevations and slopes shown. Do not spread topsoil when excessively wet or dry. Obtain material required for topsoil in excess of that produced by excavation within the grading limits from offsite areas.

3.16 TESTING

Perform testing by Contractor's validated testing facility. Submit qualifications of the Contractor's validated testing facilities. If the Contractor elects to establish testing facilities, do not permit work requiring testing until the Contractor's facilities have been inspected by the Project Manager.

3.16.1 Fill and Backfill Material Testing

Test fill and backfill material in accordance with ASTM C136 for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; and ASTM D1557 for moisture density relations.

3.16.2 Select Granular Material Testing

Test select granular material in accordance with ASTM C136 for conformance to ASTM D2487 gradation limits; ASTM D1140 for material finer than the No. 200 sieve; ASTM D4318 for liquid limit and for plastic limit; ASTM D1557 for moisture density relations; and ASTM D1883 for CBR value.

3.16.3 Pipe Bedding and Crushed Rock Subbedding Testing

Test in accordance with ASTM C136 for conformance to gradation specified in ASTM D448.

3.16.4 Moisture-Density Relations Tests

Test in accordance with ASTM D1557. Submit test results for each material at least 7 days prior to the compaction of each material.

3.16.5 Field Dry Density and Moisture Content Tests

a. Determine field in-place density in accordance with ASTM D1556 or ASTM D6938.

b. Check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D6938; check the calibration of both the density and moisture gauges at the beginning of a job on each different type of material encountered and at intervals as directed by the Project Manager. When test results indicate that compaction is not as specified, remove the material, replace and recompact to meet specification requirements.

c. Perform tests on recompacted areas to determine conformance with specification requirements. Appoint a registered professional Civil Engineer to certify inspections and test results. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.16.6 Check Tests on In-Place Densities

Field in-place density shall be determined in accordance with ASTM D1556 or ASTM D6938. If ASTM D6938 is used to test in-place density, verify test results by performing at least one test per day using ASTM D1556 at location already tested within ASTM D6938. Perform at least one additional test using ASTM D1556 for every 10 tests performed with a nuclear device, at locations checked in accordance with ASTM D6938.

Submit field dry density and moisture content test results within 2 working days after the tests are performed. Furnish a plan showing test locations, test number, test elevations, and test results.

3.16.7 In-Place Densities

a. One test per 2,000 square feet, or fraction thereof, of subgrade and each lift of fill or backfill for buildings, structures, roads, and pavements, but not less than one test per structure.

b. One test per lift of trench backfill for every 50 feet, or fraction thereof, of utility installation.

-- End of Section --

SECTION 32 11 23

AGGREGATE AND/OR GRADED-CRUSHED AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2010) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
AASHTO T 224	(2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C117	(2013) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	(2012) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C128	(2012) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C131	(2006) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C88	(2013) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D1556	(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	(2012) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000

	ft-lbf/ft3) (2700 kN-m/m3)
ASTM D2167	(2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4318	(2010; E 2014) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D5821	(2013) Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	(2010) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D75/D75M	(2014) Standard Practice for Sampling Aggregates
ASTM E11	(2013) Wire Cloth and Sieves for Testing Purposes

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Graded-Crushed Aggregate Base Course

Graded-crushed aggregate (GCA) base course is well graded, crushed, durable aggregate uniformly moistened and mechanically stabilized by compaction. GCA is similar to ABC, but it has more stringent requirements and it produces a base course with higher strength and stability.

1.2.3 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve are expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00

SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools

SD-06 Test Reports

Sampling and Testing
Field Density Tests

1.4 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor and performed by a testing laboratory approved by the Project Manager. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements; perform testing at the specified frequency. The Project Manager may specify the time and location of the tests. Furnish copies of test results to the Project Manager within 24 hours of completion of the tests.

1.4.1 Sampling

Take samples for laboratory testing in conformance with ASTM D75/D75M. When deemed necessary, the sampling will be observed by the Project Manager.

1.4.2 Tests

Perform the following tests in conformance with the applicable standards listed.

1.4.2.1 Sieve Analysis

Make sieve analysis in conformance with ASTM C117 and ASTM C136. Sieves shall conform to ASTM E11.

1.4.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D4318.

1.4.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture content in accordance with ASTM D1557.

1.4.2.4 Field Density Tests

Measure field density in accordance with ASTM D1556, ASTM D2167 or ASTM D6938. For the method presented in ASTM D1556 use the base plate as shown in the drawing. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D6938. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph "Calibration" of ASTM D6938, on each different type of material being tested at the beginning of a job and at intervals as directed.

a. Submit certified copies of test results for approval not less than

30 days before material is required for the work.

b. Submit calibration curves and related test results prior to using the device or equipment being calibrated.

c. Submit copies of field test results within 24 hours after the tests are performed.

1.4.2.5 Wear Test

Perform wear tests on ABC course material in conformance with ASTM C131.

1.4.2.6 Soundness

Perform soundness tests on GCA in accordance with ASTM C88.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

Perform one of each of the following tests, on the proposed material prior to commencing construction, to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

e. Soundness.

1.4.3.2 In Place Tests

Perform each of the following tests on samples taken from the placed and compacted ABC and GCA. Samples shall be taken and tested at the rates indicated.

a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 500 square yards, or portion thereof, of material placed.

c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.

d. Measure the total thickness of the base course at intervals, in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

1.4.4 Approval of Material

Select the source of the material 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted course(s).

PART 2 PRODUCTS

2.1 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. Submit a list of proposed equipment, including descriptive data. Provide adequate equipment having the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

2.2 AGGREGATES

Provide ABC and GCA consisting of clean, sound, durable particles of crushed stone, crushed gravel, angular sand, or other approved material. ABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. GCA shall be free of silt and clay as defined by ASTM D2487, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve is known as coarse aggregate; that portion passing the No. 4 sieve is known as fine aggregate.

2.2.1 Coarse Aggregate

Provide coarse aggregates with angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel manufactured by crushing gravels, and meets all the requirements specified below.

b. Crushed Stone: Provide crushed stone consisting of freshly mined quarry rock, meeting all the requirements specified below.

2.2.1.1 Aggregate Base Course

ABC coarse aggregate shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces determined in accordance with ASTM D5821. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in TABLE 1.

2.2.1.2 Graded-Crushed Aggregate Base Course

GCA coarse aggregate shall not show more than 40 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C131. GCA coarse aggregate shall not exhibit a loss greater than 18 percent weighted average, at five cycles, when tested for soundness in magnesium sulfate, or 12 percent weighted average, at five cycles, when tested in sodium sulfate in accordance with ASTM C88. The amount of flat and elongated particles shall not exceed 20 percent for the fraction retained on the 1/2 inch sieve nor 20 percent for the fraction passing the 1/2 inch sieve. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregate shall contain at least 90 percent by weight of crushed pieces having two or more freshly fractured faces determined in accordance with ASTM D5821. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 90 percent of which by weight are retained on the maximum size sieve listed in TABLE 1.

2.2.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.2.2.1 Aggregate Base Course

ABC fine aggregate shall consist of screenings, angular sand, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.2.2.2 Graded-Crushed Aggregate Base Course

Provide GCA fine aggregate consisting of angular particles produced by crushing stone or gravel that meets the requirements for wear and soundness specified for GCA coarse aggregate.

2.2.3 Gradation Requirements

Apply the specified gradation requirements to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E11.

TABLE 1. GRADATION OF AGGREGATES

Percentage by Weight Passing Square-Mesh Sieve	
Sieve Designation	
2 inch	100
1-1/2 inch	90-100
3/4 inch	50-90

TABLE 1. GRADATION OF AGGREGATES	
Percentage by Weight Passing Square-Mesh Sieve	
Sieve Designation	
No. 4	25
No. 200	3-9
NOTE 1: Particles having diameters less than No. 635 shall not be in excess of 3 percent by weight of the total sample tested.	
NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C127 and ASTM C128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Project Manager.	

2.3 LIQUID LIMIT AND PLASTICITY INDEX

Apply liquid limit and plasticity index requirements to the completed course and to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC or GCA is constructed in more than one layer, clean the previously constructed layer of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Provide adequate drainage during the entire period of construction to prevent water from collecting or standing on the working area. Provide line and grade stakes as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating are the responsibility of the Contractor. Operate the aggregate sources to produce the quantity and quality of materials meeting the specified requirements in the specified time limit. Upon completion of the work, the aggregate sources on Government property shall be conditioned to drain readily and shall be left in a satisfactory condition. Aggregate sources on private lands shall be conditioned in agreement with local laws or authorities.

3.3 STOCKPILING MATERIAL

Clear and level storage sites prior to stockpiling of material. Stockpile

all materials, including approved material available from excavation and grading, in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Project Manager to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the base course(s), the underlying course or subgrade shall be cleaned of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. The underlying course shall conform to Section 31 00 00 EARTHWORK. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D2487, the surface shall be stabilized prior to placement of the base course(s). Stabilization shall be accomplished by mixing ABC or GCA into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the base course is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

Mix the coarse and fine aggregates in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. Make adjustments in mixing procedures or in equipment, as directed, to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to ensure a satisfactory base course meeting all requirements of this specification.

3.5.2 Placing

Place the mixed material on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, place the material in a single layer. When a compacted layer in excess of 6 inches is required, place the material in layers of equal thickness. No layer shall be thicker than 6 inches or thinner than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to ensure an acceptable base course.

3.5.3 Grade Control

The finished and completed base course shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that

the finished base course and the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

The base course(s) shall be placed so that the completed section will be a minimum of 2 feet wider, on all sides, than the next layer that will be placed above it. Additionally, place approved fill material along the outer edges of the base course in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 2 foot width of this material to be rolled and compacted simultaneously with rolling and compacting of each layer of base course. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Compact each layer of the base course, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in this Section. Begin rolling at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Continue compaction until each layer has a degree of compaction that is at least 95 percent of laboratory maximum density through the full depth of the layer. Make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Construct the compacted thickness of the base course as indicated. No individual layer shall be thicker than 6 inches nor be thinner than 3 inches in compacted thickness. The total compacted thickness of the base course(s) shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, correct such areas by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

3.5.7 Finishing

The surface of the top layer of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-

wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least 3 inches and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and ensure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.5.8 Smoothness

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50 foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 TRAFFIC

Completed portions of the base course may be opened to limited traffic, provided there is no marring or distorting of the surface by the traffic. Heavy equipment shall not be permitted except when necessary to construction, and then the area shall be protected against marring or damage to the completed work.

3.7 MAINTENANCE

Maintain the base course in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any base course that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Dispose of any unsuitable materials that must be removed as directed. No additional payments will be made for materials that must be replaced.

-- End of Section --

SECTION 32 12 10

BITUMINOUS TACK AND PRIME COATS

PART 1 GENERAL

1.1 REFERENCES

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 102	(2009) Standard Method of Test for Spot Test of Asphaltic Materials
AASHTO T 40	(2002; R 2006) Sampling Bituminous Materials

ASTM INTERNATIONAL (ASTM)

ASTM D140/D140M	(2014) Standard Practice for Sampling Bituminous Materials
ASTM D2995	(1999; R 2009) Determining Application Rate of Bituminous Distributors
ASTM D977	(2013; E 2014) Emulsified Asphalt

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Sampling and Testing

1.3 DELIVERY, STORAGE, AND HANDLING

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

1.4 ENVIRONMENTAL REQUIREMENTS

Apply bituminous coat only when the surface to receive the bituminous coat is dry.

PART 2 PRODUCTS

2.1 PLANT, EQUIPMENT, MACHINES AND TOOLS

Plant, equipment, machines and tools used in the work are subject to approval and must be maintained in a satisfactory working condition at all times. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, must have been recalibrated by a calibration laboratory within 12 months prior to commencing work.

2.1.1 Bituminous Distributor

Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 650 psi of tire width to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. Design and equip the distributor to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with a pressure range of 25 to 75 psi and with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the bituminous material during the heating process.

2.1.2 Heating Equipment for Storage Tanks

The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Provide steam heaters consisting of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. Fix an armored thermometer to the tank with a temperature range from 40 to 400 degrees F so that the temperature of the bituminous material may be determined at all times.

2.1.3 Power Brooms and Power Blowers

Use power brooms and power blowers suitable for cleaning the surfaces to which the bituminous coat is to be applied.

2.2 PRIME COAT

2.2.1 Emulsified Asphalt

Provide emulsified asphalt conforming to ASTM D977, Type SS1h.

2.3 TACK COAT

2.3.1 Emulsified Asphalt

Provide emulsified asphalt conforming to ASTM D977, Type SS1h. Dilute the emulsified asphalt with equal parts of water. The base asphalt used to manufacture the emulsion shall show a negative spot when tested in accordance with AASHTO T 102 using standard naphtha.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, remove all loose material, dirt, clay, or other objectionable material from the surface to be treated by means of a power broom or blower supplemented with hand brooms. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Project Manager.

3.2.1 Tack Coat

Apply bituminous material for the tack coat in quantities of not less than 0.05 gallon nor more than 0.15 gallon per square yard of pavement surface.

3.2.2 Prime Coat

Apply bituminous material for the prime coat in quantities of not less than 0.18 gallon nor more than 0.35 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. Furnish the temperature viscosity relation to the Project Manager.

3.3.2 Temperature Ranges

The viscosity requirements determine the application temperature to be used. The following is a normal range of application temperatures:

	Degrees F
Emulsions	
SS-1h	70-160
*This temperature range exceed the flash point of the material and care should be taken when heating.	

3.4 APPLICATION

3.4.1 General

Following preparation and subsequent inspection of the surface, apply the bituminous prime or tack coat with the Bituminous Distributor at the specified rate with uniform distribution over the surface to be treated. Properly treat all areas and spots missed by the distributor with the hand spray. Until the succeeding layer of pavement is placed, maintain the

surface by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, spread clean dry sand to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment are permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. Prevent all traffic, except for paving equipment used in constructing the surfacing, from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

3.4.2 Prime Coat

Apply a prime coat at locations shown on the Drawings. Apply the bituminous material uniformly over the surface to be treated at a pressure range of 25 to 75 psi; the rate shall be as specified above in paragraph "APPLICATION RATE". To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, spread building paper on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper and to ensure that all sprayers will operate at full force on the surface to be treated. Immediately after application remove and destroy the building paper.

3.4.3 Tack Coat

Apply tack coat at the locations shown on the drawings. Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate as specified above in paragraph "APPLICATION RATE". Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.5 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of pavement, allow the bituminous coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up and cure excess bituminous material.

3.6 FIELD QUALITY CONTROL

Samples of the bituminous material used shall be obtained by the Contractor as directed, under the supervision of the Project Manager. The sample may be retained and tested by the Government at no cost to the Contractor.

3.7 SAMPLING AND TESTING

Submit copies of all test results for emulsified asphalt, and bituminous materials, within 24 hours of completion of tests. Perform sampling and testing by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

3.7.1 Sampling

The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D140/D140M or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the Project Manager within 15 days after the award of the contract.

3.7.2 Calibration Test

Furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibrate the bituminous distributor in accordance with ASTM D2995.

3.7.3 Trial Applications

Before providing the complete bituminous coat, apply three lengths of at least 100 feet for the full width of the distributor bar to evaluate the amount of bituminous material that can be satisfactorily applied.

3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous tack coat materials in the amount of 0.05 gallons per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous materials in the amount of 0.25 gallon per square yard. Other trial applications shall be made using various amounts of material as may be deemed necessary.

3.7.4 Sampling and Testing During Construction

Perform quality control sampling and testing as required in paragraph "FIELD QUALITY CONTROL".

3.8 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

-- End of Section --

SECTION 32 12 16

HOT-MIX ASPHALT (HMA) FOR ROADS

PART 1 GENERAL

1.1 REFERENCES

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 140	(2013) Standard Specification for Emulsified Asphalt
AASHTO M 156	(2013) Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO M 17	(2011) Standard Specification for Mineral Filler for Bituminous Paving Mixtures
AASHTO M 320	(2010) Standard Specification for Performance-Graded Asphalt Binder
AASHTO T 104	(1999) Standard Method of Test for Soundess of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
AASHTO T 11	(2005) Standard Method of Test for Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
AASHTO T 176	(2008) Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
AASHTO T 182	(2002) Standard Method of Test for Coating and Stripping of Bitumen-Aggregate Mixtures
AASHTO T 245	(2013) Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
AASHTO T 246	(2010) Standard Method of Test for Resistance to Deformation and Cohesion of Bituminous Mixture by Means of Hveem Apparatus
AASHTO T 247	(2002) Standard Method of Test for Preparation of Test Specimens for Biuminous Mixture by Means of California

	Kneading Compactor
AASHTO T 27	(2011) Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
AASHTO T 84	(2013) Standard Method of Test for Specific Gravity and Absorption of Fine Aggregate
AASHTO T 85	(2013) Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate
AASHTO T 96	(2002) Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM INTERNATIONAL (ASTM)

ASTM C207	(2011) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM D1461	(2011) Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D2489/D2489M	(2008) Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D3666	(2013) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4791	(2010) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5148	(2010) Standard Test Method for Centrifuge Kerosine Equivalent

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mix Design
Material Acceptance

SD-04 Samples

Asphalt Cement Binder
Aggregates

SD-06 Test Reports

Aggregates

SD-07 Certificates

Asphalt Cement Binder
Testing Laboratory

1.3 ENVIRONMENTAL REQUIREMENTS

Do not place the hot-mix asphalt upon a wet surface.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Perform the work consisting of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. HMA designed and constructed in accordance with this section shall conform to the lines, grades, thicknesses, and typical cross sections indicated. Construct each course to the depth, section, or elevation required by the drawings and roll, finish, and approve it before the placement of the next course.

2.1.1 Asphalt Mixing Plant

Plants used for the preparation of hot-mix asphalt shall conform to the requirements of AASHTO M 156 with the following changes:

2.1.1.1 Truck Scales

Weigh the asphalt mixture on approved, certified scales at the Contractor's expense. Inspect and seal scales at least annually by an approved calibration laboratory.

2.1.1.2 Testing Facilities

Provide laboratory facilities at the plant for the use of the Government's acceptance testing and the Contractor's quality control testing.

2.1.1.3 Inspection of Plant

Provide the Project Manager with access at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant; verifying weights, proportions, and material properties; checking the temperatures maintained in the preparation of the mixtures and for taking samples. Provide assistance as requested, for the Government to procure any desired samples.

2.1.1.4 Storage Bins

Use of storage bins for temporary storage of hot-mix asphalt will be permitted as follows:

a. The asphalt mixture may be stored in non-insulated storage bins for a period of time not exceeding 3 hours.

b. The asphalt mixture may be stored in insulated storage bins for a period of time not exceeding 8 hours. The mix drawn from bins shall meet the same requirements as mix loaded directly into

trucks.

2.1.2 Hauling Equipment

Provide trucks for hauling hot-mix asphalt having tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Petroleum based products shall not be used as a release agent. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers (tarps) shall be securely fastened.

2.1.3 Asphalt Pavers

Provide asphalt pavers which are self-propelled, with an activated screed, heated as necessary, and capable of spreading and finishing courses of hot-mix asphalt which will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

2.1.3.1 Receiving Hopper

Provide paver with a receiving hopper of sufficient capacity to permit a uniform spreading operation and equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

2.1.4 Rollers

Rollers shall be in good condition and shall be operated at slow speeds to avoid displacement of the asphalt mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition. Do not use equipment which causes excessive crushing of the aggregate.

2.2 AGGREGATES

Aggregate for hot-mix asphalt (HMA) pavement shall be crushed and screened basalt free of soft or disintegrated pieces, clay, dirt, and other deleterious substances. Course aggregate is defined as material retained on No. 4 sieve, and fine aggregate is defined as material passing No. 4 sieve.

At least 90 percent, by weight, of material retained on No. 4 sieve shall consist of crushed particles. At least 70 percent of material passing No. 4 sieve and retained on No. 8 sieve shall consist of crushed particles. A crushed particle is defined as having at least one mechanically fractured face. The combined aggregate for HMA pavement, including filler, if any, shall conform to TABLE 1 - HMA TEST REQUIREMENTS and TABLE 2 - HMA GRADING REQUIREMENTS.

TABLE 1 - HMA TEST REQUIREMENTS		
TEST	TEST METHOD	REQUIREMENT
Sand Equivalent	AASHTO T 176	45 percent minimum
Los Angeles Abrasion	AASHTO T 96	30 percent minimum
Stripping	AASHTO T 182	Above 95 percent
K-factor	ASTM D5148	Kc-2.0 maximum Km-1.7 maximum
Flat and elongated pieces (length to thickness ratio of 3)	ASTM D4791 (By weight)	25 percent maximum
Grading	AASHTO T 11 AASHTO T 27	Job-mix formula based on TABLE 2
Soundness	AASHTO T 104 (5 cycles using sodium sulfate)	9 percent maximum
Absorption	AASHTO T 84 AASHTO T 85	5 percent maximum

TABLE 2 - HMA GRADING REQUIREMENTS	
SIEVE SIZES	COMBINED AGGREGATE PERCENT PASSING BY WEIGHT
1 inch	---
3/4 inch	100
1/2 inch	90-100
3/8 inch	72-90
No. 4	45-68
No. 8	32-48
No. 16	21-37
No. 30	15-27
No. 50	9-21
No. 100	6-16
No. 200	4-8

If chemical additive resulting in bituminous film retention greater than 95 percent is used, aggregates not meeting stripping test requirements for HMA pavement may be used.

2.3 ASPHALT CEMENT BINDER

Performance-graded (PG) asphalt binder shall be PG 64-16 and conform to AASHTO M 320. Mixing application temperature shall be by temperature/viscosity graph.

2.4 EMULSIFIED ASPHALT

Anionic emulsified asphalt shall conform to AASHTO M 140, except penetration on residue for Type SS-1 and Type RS-1 shall be 50-120. Mixing application temperature shall be 75 to 130 degrees Fahrenheit.

2.5 FILLER

Filler shall conform to AASHTO M 17.

2.6 HYDRATED LIME

Hydrated lime shall conform to ASTM C207, Type N.

2.7 MIX DESIGN

2.7.1 General

HMA pavement shall be plant mixed and shall include mixture of aggregate and asphalt cement, and may include reclaimed asphalt pavement (RAP) or filler, or both.

HMA pavement shall include surface course and may include one or more binder courses, depending on HMA pavement thickness indicated in the contract documents.

RAP is defined as removed or reprocessed pavement materials containing asphalt and aggregates. Process RAP by crushing until 100 percent of RAP passes 3/4-inch sieve. Size, grade uniformly, and combine materials such that blend of RAP and aggregate material conforms to grading requirements of paragraph "AGGREGATES".

In surface and binder courses, aggregate for HMA may include RAP quantities up to 15 percent of total mix weight.

Quantities of filler material to correct deficiencies in aggregate gradation passing the No. 200 sieve shall not exceed 3 percent by weight of fine aggregates.

2.7.2 Job-Mix Formula and Tests

Design job-mix formula in accordance with procedures contained in current edition of Asphalt Institute's Mix Design Methods for Asphalt Concrete and Other Hot Mix Types, Manual Series No. 2 (MS-2) for either Marshall Method or Hveem Method of Mix Design.

Limit compacted lift thickness and asphalt content of job-mix formula as specified below.

Minimum to Maximum Compacted Thickness for Individual Lifts (inches)	1-1/2 to 3
Asphalt Content Limits (Percent of Total Weight of Mix)	4.3 to 6.5

Asphalt content limits for porous aggregate may be exceeded only if accepted in writing by the Project Manager.

Meet job-mix formula design criteria specified in TABLE 3.

TABLE 3 - JOB-MIX FORMULA DESIGN CRITERIA	
Hveem Method Mix Criteria (AASHTO T 246 and AASHTO T 247)	
Stability, minimum (pounds)	37
Air Voids (percent)[1]	3-5
Marshall Method Mix Criteria (AASHTO T 245)	
Compaction (number of blows each end of specimen)	75
Stability, minimum (pounds)	1,800
Flow (x 0.01 inch)	8-16
Air Voids (percent)*	3-5
* Air Voids: AASHTO T 166 or AASHTO T 275; AASHTO T 209, AASHTO T 269	

Minimum percent voids in mineral aggregates (VMA) of job-mix formula shall be as specified in TABLE 4.

TABLE 4 - MINIMUM PERCENT VOIDS IN MINERAL AGGREGATES (VMA)					
Nominal Maximum Particle Size (inches)	1-1/2	1	3/4	1/2	3/8
VMA (percent)*	11	12	13	14	15
* VMA: See Asphalt Institute Manual MS-2, Chapter 4					

2.7.3 Range of Tolerances for HMA

Provide HMA within allowable tolerances of accepted job-mix formula as specified in TABLE 5.

TABLE 5 - RANGE OF TOLERANCES FOR HMA	
Passing No. 4 and larger sieves (percent)	+/-7
Passing No. 8 to No. 100 sieves (inclusive) (percent)	+/-4
Passing No. 200 sieve (percent)	+/-3
Asphalt Content (percent)	+/-0.4
Mixture Temperature (degrees F)	+/-20

PART 3 EXECUTION

3.1 PREPARATION OF ASPHALT BINDER MATERIAL

Heat the asphalt cement material avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 325 degrees F when added to the aggregates.

3.2 PREPARATION OF MINERAL AGGREGATE

Heat and dry the aggregate for the mixture prior to mixing. No damage shall occur to the aggregates due to the maximum temperature and rate of heating used. The temperature of the aggregate and mineral filler shall not exceed 350 degrees F when the asphalt cement is added. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.3 PREPARATION OF HOT-MIX ASPHALT MIXTURE

The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the mix design. Mix the combined materials until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but no less than 25 seconds for batch plants. Establish the wet mixing time for all plants based on the procedure for determining the percentage of coated particles described in ASTM D2489/D2489M, for each individual plant and for each type of aggregate used. The wet mixing time will be set to at least achieve 95 percent of coated particles. The moisture content of all hot-mix asphalt upon discharge from the plant shall not exceed 0.5 percent by total weight of mixture as measured by ASTM D1461.

3.4 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the hot mix asphalt, clean the underlying course of dust and debris. Apply a tack coat in accordance with the contract specifications.

3.5 TESTING LABORATORY

Submit certification of compliance and Plant Scale Calibration Certification. Use a laboratory to develop the mix design that meets the requirements of ASTM D3666. The Government will inspect the laboratory

equipment and test procedures prior to the start of hot mix operations for conformance to ASTM D3666. A statement signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Project Manager prior to the start of construction. The statement shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A listing of equipment to be used in developing the job mix.

c. A copy of the laboratory's quality control system.

d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

3.6 TRANSPORTING AND PLACING

3.6.1 Transporting

Transport the hot-mix asphalt from the mixing plant to the site in clean, tight vehicles. Schedule deliveries so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Provide adequate artificial lighting for night placements. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F. To deliver mix to the paver, use a material transfer vehicle operated to produce continuous forward motion of the paver.

3.6.2 Placing

Place and compact the mix at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, place the mixture to the full width by an asphalt paver; it shall be struck off in a uniform layer of such depth that, when the work is completed, it will have the required thickness and conform to the grade and contour indicated. Regulate the speed of the paver to eliminate pulling and tearing of the asphalt mat.

3.7 COMPACTION OF MIXTURE

After placing, the mixture shall be thoroughly and uniformly compacted by rolling. Compact the surface as soon as possible without causing displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once. Continue rolling until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, keep the wheels properly moistened but excessive water will not be permitted. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective shall be removed full depth, replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching will not be allowed.

3.8 MATERIAL ACCEPTANCE

3.8.1 Surface Smoothness

Use the following straight edge testing method to test and evaluate surface smoothness of the pavement. Perform all testing in the presence of the Project Manager. Keep detailed notes of the results of the testing and furnish a copy to the Government immediately after each day's testing. Where drawings show required deviations from a plane surface (crowns, drainage inlets, etc.), the surface shall be finished to meet the approval of the Project Manager.

3.8.1.1 Smoothness Requirements

3.8.1.1.1 Straightedge Testing

The finished surfaces of the pavements shall have no abrupt change of 1/4 inch or more, and all pavements shall be within the tolerances of 1/4 inch in both the longitudinal and transverse directions, when tested with an approved 12 feet straightedge.

3.8.1.2 Testing Method

After the final rolling, but not later than 24 hours after placement, test the surface of the newly placed pavement in such a manner as to reveal all surface irregularities exceeding the tolerances specified above. If any pavement areas are ground, these areas shall be retested immediately after grinding.

3.8.1.2.1 Straightedge Testing

Hold the straightedge in contact with the surface and move it ahead one-half the length of the straightedge for each successive measurement. Determine the amount of surface irregularity by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points.

-- End of Section --

SECTION 32 16 13

CONCRETE SIDEWALKS AND CURBS

PART 1 GENERAL

1.1 REFERENCES

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(2005; R 2009) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2013) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A615/A615M	(2014) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C143/C143M	(2012) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C171	(2007) Standard Specification for Sheet Materials for Curing Concrete
ASTM C172/C172M	(2014) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C31/C31M	(2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2004a; R 2013) Standard Specification for

	Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D5893/D5893M	(2010) Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

INTERNATIONAL CODE COUNCIL (ICC)

ICC A117.1	(2009) Accessible and Usable Buildings and Facilities

1.2 SYSTEM DESCRIPTION

1.2.1 General Requirements

Provide plant, equipment, machines, and tools used in the work subject to approval and maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Project Manager shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.2.2 Slip Form Equipment

Slip form paver or curb forming machine, will be approved based on trial use on the job and shall be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in 1 pass.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Concrete

SD-06 Test Reports

Field Quality Control

1.4 ENVIRONMENTAL REQUIREMENTS

1.4.1 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

PART 2 PRODUCTS

2.1 CONCRETE

Provide concrete conforming to the applicable requirements of Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE, except as otherwise specified. Concrete shall have a minimum compressive strength of 3000 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches. Submit copies of certified delivery tickets for all concrete used in the construction.

2.1.1 Slump

The concrete slump shall be 2 inches plus or minus 1 inch where determined in accordance with ASTM C143/C143M.

2.1.2 Reinforcement Steel

Reinforcement bars shall conform to ASTM A615/A615M. Wire mesh reinforcement shall conform to ASTM A1064/A1064M.

2.2 CONCRETE CURING MATERIALS

2.2.1 Impervious Sheet Materials

Impervious sheet materials shall conform to ASTM C171, type optional, except that polyethylene film, if used, shall be white opaque.

2.2.2 Burlap

Burlap shall conform to AASHTO M 182.

2.2.3 White Pigmented Membrane-Forming Curing Compound

White pigmented membrane-forming curing compound shall conform to ASTM C309, Type 2.

2.3 JOINT FILLER STRIPS

2.3.1 Contraction Joint Filler for Curb

Contraction joint filler for curb shall consist of hard-pressed fiberboard.

2.3.2 Expansion Joint Filler, Premolded

Expansion joint filler, premolded, shall conform to ASTM D1751 or ASTM D1752, 1/2 inch thick, unless otherwise indicated.

2.4 JOINT SEALANTS

Joint sealant, cold-applied shall conform to ASTM C920 or ASTM D5893/D5893M.

2.5 FORM WORK

Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches

nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.5.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.5.2 Curb Forms

Curb outside forms shall have a height equal to the full depth of the curb. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

2.6 Detectable Warning System

Detectable Warning Systems shown on the contract plans are to meet requirements of ICC A117.1 - Section 705.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted as shown on drawings.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in

conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed.

3.2 FORM SETTING

Set forms to the indicated alignment, grade and dimensions. Hold forms rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed.

3.2.1 Sidewalks

Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment shall be checked with a 10 foot straightedge. Forms shall have a transverse slope of 1/4 inch per foot with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Place concrete in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated by tamping and spading or with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, finish the surface with a wood or magnesium float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the

surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators.

3.4.2 Curb Finishing

Approved slip formed curb machines may be used in lieu of hand placement.

3.4.3 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the curb top.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D1752 or building paper. Joint filler shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and filled with cold-applied joint sealant. Joint sealant shall be gray or stone in color. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 CURB JOINTS

Curb joints shall be constructed at right angles to the line of curb.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.

a. Contraction joints (except for slip forming) shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of thecurb. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

b. When slip forming is used, the contraction joints shall be cut in the top portion of the curb hardened concrete in a continuous cut across the curb, using a power-driven saw. The depth of cut shall be at least one-fourth of the curb depth and 1/8 inch in width.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb. Expansion joints shall be provided in curb directly opposite expansion joints of abutting portland cement concrete pavement, and shall be of the same type and thickness as joints in the pavement. Where curb does not abut Portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not less than 30 feet nor greater than 120 feet. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit. Expansion joints and the top 1 inch depth of curb contraction-joints shall be sealed with joint sealant. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

The entire exposed surface shall be covered with 2 or more layers of burlap. Mats shall overlap each other at least 6 inches. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.7.1.2 Impervious Sheeting Method

The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall not be less than 18 inches wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.7.1.3 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface.

Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet/gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary precautions shall be taken to ensure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is resprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Completed concrete shall be protected from damage until accepted. Repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.8 FIELD QUALITY CONTROL

Submit copies of all test reports within 24 hours of completion of the test.

3.8.1 General Requirements

Perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, take the action and submit reports as required below, and any additional tests to ensure that the

requirements of these specifications are met.

3.8.2 Concrete Testing

3.8.2.1 Strength Testing

Provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 250 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C172/C172M. Cylinders for acceptance shall be molded in conformance with ASTM C31/C31M by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

3.8.2.2 Slump Test

Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.8.3 Thickness Evaluation

The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, the subgrade shall be true to grade prior to concrete placement and the thickness will be determined by measuring each edge of the completed slab.

3.8.4 Surface Evaluation

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess

of the limits specified above shall be removed and replaced.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

-- End of Section --

SECTION 32 17 24

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 REFERENCES

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 247	(2013) Standard Specification for Glass Beads Used in Pavement Markings

ASTM INTERNATIONAL (ASTM)

ASTM D4280	(2012) Extended Life Type, Nonplowable, Raised, Retroreflective Pavement Markers
ASTM D4505	(2012) Preformed Retroflective Pavement Marking Tape for Extended Service Life
ASTM D792	(2013) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM E28	(2014) Softening Point of Resins Derived from Naval Stores by Ring and Ball Apparatus

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-B-1325	(Rev D; Notice 1) Beads (Glass Spheres) Retro-Reflective (Metric)
FS TT-P-1952	(Rev E) Paint, Traffic and Airfield Markings, Waterborne

1.2 SYSTEM DESCRIPTION

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition. Submit lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this section. List of removal equipment shall include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation. Equipment operating on roads shall display low speed traffic markings and traffic warning lights.

1.2.1 Paint Application Equipment

1.2.1.1 Hand-Operated, Push-Type Machines

All machines, tools, and equipment used in performance of the work shall be approved and maintained in satisfactory operating condition. Hand-operated push-type machines of a type commonly used for application of paint to pavement surfaces will be acceptable for marking small streets and parking areas. Applicator machine shall be equipped with the necessary paint tanks and spraying nozzles, and shall be capable of applying paint uniformly at coverage specified. Sandblasting equipment shall be provided as required for cleaning surfaces to be painted. Hand-operated spray guns shall be provided for use in areas where push-type machines cannot be used.

1.2.2 Thermoplastic Application Equipment

1.2.2.1 Thermoplastic Material

Thermoplastic material shall be applied to the primed pavement surface by spray techniques or by the extrusion method, wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of, suitable equipment for heating and controlling the flow of material. By either method, the markings shall be applied with equipment that is capable of providing continuous uniformity in the dimensions of the stripe.

1.2.2.2 Application Equipment

a. Application equipment shall provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the extrusion shoe or spray gun shall prevent accumulation and clogging. All parts of the equipment which come into contact with the material shall be easily accessible and exposable for cleaning and maintenance. All mixing and conveying parts up to and including the extrusion shoes and spray guns shall maintain the material at the required temperature with heat-transfer oil or electrical-element-controlled heat.

b. The application equipment shall be constructed to ensure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off stripe ends squarely and shall provide a method of applying "skiplines". The equipment shall be capable of applying varying widths of traffic markings.

c. The applicator shall be equipped with a drop-on type bead dispenser capable of uniformly dispensing reflective glass spheres at controlled rates of flow. The bead dispenser shall be automatically operated and shall begin flow prior to the flow of composition to assure that the strip is fully reflectorized.

1.2.2.3 Mobile and Maneuverable

Application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The equipment used for the placement of thermoplastic pavement markings shall be of portable applicator type.

Portable Application Equipment: The portable applicator shall be defined as hand-operated equipment, specifically designed for placing special markings such as crosswalks, stopbars, legends, arrows, and short lengths of lane, edge and centerlines. The portable applicator shall be capable of applying thermoplastic pavement markings by the extrusion method. The portable applicator shall be loaded with hot thermoplastic composition from the melting kettles on the mobile applicator. The portable applicator shall be equipped with all the necessary components, including a materials storage reservoir, bead dispenser, extrusion shoe, and heating accessories, so as to be capable of holding the molten thermoplastic at a temperature of 375 to 425 degrees F, of extruding a line of 3 to 12 inches in width, and in thicknesses of not less than 0.125 inch nor more than 0.190 inch and of generally uniform cross section.

1.2.3 Reflective Media Dispenser

The dispenser for applying the reflective media shall be attached to the paint dispenser and shall operate automatically and simultaneously with the applicator through the same control mechanism. The dispenser shall be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in paragraph "APPLICATION", at all operating speeds of the applicator to which it is attached.

1.2.4 Surface Preparation Equipment

1.2.4.1 Waterblast Equipment

The water pressure shall be specified at 2600 psi at 140 degrees F in order to adequately clean the surfaces to be marked.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment
Composition Requirements
Qualifications

SD-06 Test Reports

Sampling and Testing

SD-07 Certificates

Volatile Organic Compound (VOC)

1.4 QUALITY ASSURANCE

1.4.1 Qualifications

Submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of chemicals.

1.4.2 Traffic Controls

Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.4.3 Maintenance of Traffic

1.4.3.1 Roads, Streets, and Parking Areas

When traffic must be rerouted or controlled to accomplish the work, the necessary warning signs, flagpersons, and related equipment for the safe passage of vehicles shall be provided.

1.5 DELIVERY, STORAGE, AND HANDLING

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.6 ENVIRONMENTAL REQUIREMENTS

Operation shall cease during thunderstorms. Operation shall cease during rainfall, except for waterblasting and removal of previously applied chemicals. Waterblasting shall cease where surface water accumulation alters the effectiveness of material removal.

PART 2 PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints for roads, parking areas, and streets shall conform to FS TT-P-1952. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

2.2 THERMOPLASTIC COMPOUNDS

The thermoplastic reflectorized pavement marking compound shall be extruded or sprayed in a molten state onto a primed pavement surface. Following a surface application of glass beads and upon cooling to normal pavement temperatures, the marking shall be an adherent reflectorized strip of the specified thickness and width that is capable of resisting deformation by traffic.

2.2.1 Composition Requirements

Submit Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use. The binder component shall be formulated as a hydrocarbon resin. The pigment,

beads and filler shall be uniformly dispersed in the binder resin. The thermoplastic composition shall be free from all skins, dirt, and foreign objects and shall comply with the following requirements:

Component	Percent by Weight	
	White	Yellow
Binder	17 min.	17 min.
Titanium dioxide	10 min.	-
Glass beads	20 min.	20 min.
Calcium carbonate and inert fillers	49 max.	*
Yellow pigments	-	*
*Amount and type of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, providing the other composition requirements of this specification are met.		

2.2.2 Physical Properties

2.2.2.1 Color

The color shall be as indicated.

2.2.2.2 Drying Time

When installed at 70 degrees F and in thicknesses between 1/8 and 3/16 inch, after curing 15 minutes.

2.2.2.3 Softening Point

The composition shall have a softening point of not less than 194 degrees F when tested in accordance with ASTM E28.

2.2.2.4 Specific Gravity

The specific gravity of the composition shall be between 1.9 and 2.2 as determined in accordance with ASTM D792.

2.2.3 Asphalt Concrete Primer

The primer for asphalt concrete pavements shall be a thermosetting adhesive with a solids content of pigment reinforced synthetic rubber and synthetic plastic resin dissolved and/or dispersed in a volatile organic compound (VOC). Submit certificate stating that the proposed pavement marking paint meets the VOC regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located. Solids content shall not be less than 10 percent by weight at 70 degrees F and 60 percent relative humidity. A wet film thickness of 0.005 inch plus or minus 0.001 inch, shall dry to a tack-free condition in less than 5 minutes.

2.2.4 Portland Cement Concrete Primer

The primer for Portland cement concrete pavements shall be an epoxy resin primer. The primer shall be of the type recommended by the manufacturer of the thermoplastic composition. Epoxy primers recommended by the manufacturer shall be approved by the Project Manager prior to use. Requests for approval shall be accompanied with technical data, instructions for use, and a 1 quart sample of the primer material.

2.3 PREFORMED TAPE

The preformed tape shall be an adherent reflectorized strip in accordance with ASTM D4505 Type I or IV, Class optional.

2.4 RAISED REFLECTIVE MARKERS

Either metallic or nonmetallic markers of the button or prismatic reflector type may be used. Markers shall be of permanent colors, as specified for pavement marking, and shall retain the color and brightness under the action of traffic. Button markers shall have a diameter of not less than 4 inches, and shall be spaced not more than 40 feet apart on solid longitudinal lines. Broken centerline marker spacings shall be in segments of 10 feet with gaps of 30 feet between segments. Markers shall have rounded surfaces presenting a smooth contour to traffic and shall not project more than 3/4 inch above level of pavement. Pavement markers and adhesive epoxy shall conform to ASTM D4280.

2.5 REFLECTIVE MEDIA

Reflective media for roads and streets shall conform to FS TT-B-1325, Type I, Gradation A or AASHTO M 247, Type I.

2.6 SAMPLING AND TESTING

Materials proposed for use shall be stored on the project site in sealed and labeled containers, or segregated at source of supply, sufficiently in advance of needs to allow 60 days for testing. Submit certified copies of the test reports, prior to the use of the materials at the jobsite. Testing shall be performed in an approved independent laboratory. Upon notification by the Contractor that the material is at the site or source of supply, a sample shall be taken by random selection from sealed containers in the presence of the Project Manager. Samples shall be clearly identified by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quantity involved. Materials will be sampled and tested by the Government. No material shall be used at the project prior to receipt by the Contractor of written notice that the materials meet the laboratory requirements. The cost of initial testing of samples from each lot of materials will be borne by the Government. If the sample fails to meet specification requirements, the material represented by the sample shall be replaced and the new material will be tested. Cost of sampling and testing the new material will be borne by the Contractor. Testing shall be performed in an approved independent laboratory. If materials are approved based on reports furnished by the Contractor, samples will be retained by the Government for possible future testing should the material appear defective during or after application.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Thoroughly clean surfaces to be marked before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be recleaned, when work has been stopped due to rain.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

3.2.1 Paint

Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are less than 95 degrees F. New asphalt pavement surfaces shall be allowed to cure for a period of not less than 30 days before applications of paint. Provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.

3.2.1.1 Rate of Application

a. Reflective Markings: Pigmented binder shall be applied evenly to the pavement area to be coated at a rate of 105 plus or minus 5 square feet/gallon. Glass spheres shall be applied uniformly to the wet paint on road and street pavement at a rate of 6 plus or minus 0.5 pounds of glass spheres per gallon of paint.

b. Nonreflective Markings: Paint shall be applied evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet/gallon.

3.2.1.2 Drying

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected.

3.2.2 Thermoplastic Compounds

Thermoplastic pavement markings shall be placed upon dry pavement; surface dry only will not be considered an acceptable condition. Thermoplastics, as placed, shall be free from dirt or tint.

3.2.2.1 Longitudinal Markings

All centerline, skipline, edgeline, and other longitudinal type markings shall be applied with a mobile applicator. All special markings, crosswalks, stop bars, legends, arrows, and similar patterns shall be placed with a portable applicator, using the extrusion method.

3.2.2.2 Primer

After surface preparation has been completed the asphalt and/or concrete pavement surface shall be primed. The primer shall be applied with spray equipment. Primer materials shall be allowed to "set-up" prior to applying the thermoplastic composition. The asphalt concrete primer shall be allowed to dry to a tack-free condition, usually occurring in less than 10 minutes.

Asphalt Concrete Primer: Primer shall be applied to all asphalt concrete pavements at a wet film thickness of 0.005 inch, plus or minus 0.001 inch (265-400 square feet/gallon).

3.2.2.3 Markings

After the primer has "set-up", the thermoplastic shall be applied at temperatures no lower than 375 degrees F nor higher than 425 degrees F at the point of deposition. Immediately after installation of the marking, drop-on glass spheres shall be mechanically applied so that the spheres are held by and imbedded in the surface of the molten material.

a. Extruded Markings: All extruded thermoplastic markings shall be applied at the specified width and at a thickness of not less than 0.125 inch nor more than 0.190 inch.

b. Sprayed Markings: All sprayed thermoplastic markings shall be applied at the specified width and the thicknesses designated in the contract plans. If the plans do not specify a thickness, centerline markings shall be applied at a wet thickness of 0.090 inch, plus or minus 0.005 inch, and edgeline markings at a wet thickness of 0.060 inch plus or minus 0.005 inch.

c. Reflective Glass Spheres: Immediately following application, reflective glass spheres shall be dropped onto the molten thermoplastic marking at the rate of 1 pound/20 square feet of compound.

3.2.3 Preformed Tape

The preformed markings shall be placed in accordance with the manufacturer's written instructions.

3.2.4 Raised Reflective Markers

Prefabricated markers shall be aligned carefully at the required spacing and permanently fixed in place by means of epoxy resin adhesives. To ensure good bond, pavement in areas where markers will be set shall be thoroughly cleaned by sandblasting and use of compressed air prior to applying adhesive.

3.2.5 Reflective Media

Application of reflective media shall immediately follow application of pigmented binder. Drop-on application of glass spheres shall be accomplished to ensure that reflective media is evenly distributed at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, operations shall be discontinued immediately until deficiency is corrected.

-- End of Section --

SECTION 32 31 13

HIGH-SECURITY CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 REFERENCES

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.

ASTM INTERNATIONAL (ASTM)

ASTM A1023/A1023M	(2009; E 2012) Standard Specification for Stranded Carbon Steel Wire Ropes for General Purposes
ASTM A116	(2011) Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric
ASTM A121	(2013) Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2014) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength
ASTM A392	(2011a) Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A475	(2014) Standard Specification for Zinc-Coated Steel Wire Strand
ASTM A491	(2011) Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A563	(2014) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A780/A780M	(2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A824	(2001; R 2012) Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence
ASTM B117	(2011) Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM C94/C94M	(2014a) Standard Specification for Ready-Mixed Concrete
ASTM F1043	(2013) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework
ASTM F1083	(2013) Standard Specification for Pipe, Steel, Hot-Dipped Zinc Coated (Galvanized) Welded, for Fence Structures
ASTM F1145	(2011) Standard Specification for Turnbuckles, Swaged, Welded, Forged
ASTM F1184	(2005; R 2010) Industrial and Commercial Horizontal Slide Gates
ASTM F567	(2014a) Standard Practice for Installation of Chain Link Fence
ASTM F626	(2014) Standard Specification for Fence Fittings
ASTM F844	(2013) Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F900	(2011) Industrial and Commercial Swing Gates

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS FF-C-450	(Rev. D) Clamps, Wire Rope
FS RR-F-191/3	(Rev E; Am 1) Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)
FS RR-F-191/4	(Rev F) Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fence Installation
Installation Drawings
Location of Gate, Corner, End, and Pull Posts
Gate Assembly
Gate Hardware and Accessories

SD-03 Product Data

Fence Installation

Gate Assembly
Gate Hardware and Accessories

SD-04 Samples

Fabric
Posts
Post Caps
Braces
Line Posts
Bottom Rail
Tension Wire
Barbed Wire
Barbed Wire Supporting Arms
Stretcher Bars
Gate Posts
Gate Hardware and Accessories
Padlocks
Wire Ties

SD-06 Test Reports

Zinc Coating
Aluminum Alloy Coating

SD-07 Certificates

Chain Link Fence
Reports
Zinc Coating
Aluminum Alloy Coating
Fabric
Barbed Wire
Stretcher Bars
Gate Hardware and Accessories
Concrete

SD-08 Manufacturer's Instructions

Fence Installation
Gate Assembly
Hardware Assembly
Accessories

1.3 QUALITY ASSURANCE

1.3.1 Required Report Data

Submit reports, signed by an official authorized to certify on behalf of the manufacturer, of chain-link fencing listing and accessories regarding weight in ounces for zinc coating and chemical composition and thickness of aluminum alloy coating.

1.3.2 Assembly and Installation Drawings

Submit Manufacturer's instructions and complete Fence Installation Drawings for review and approval by the Project Manager prior to shipment. Drawing details shall include, but are not limited to: Fence Installation, Location of gate, corner, end, and pull posts, Gate Assembly, and Gate

Hardware and Accessories.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

PART 2 PRODUCTS

2.1 FENCE FABRIC

2.1.1 General

Provide ASTM A392, Class 2, zinc-coated steel wire with minimum coating weight of 2.0 ounces of zinc per square foot of coated surface or ASTM A491, Type I, aluminum-coated steel wire. Fabricate fence fabric of 9 gauge wire woven in 2 inch mesh conforming to ASTM A116. Set fabric height as shown. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage. Secure fabric to posts using stretcher bars or ties spaced 15 inches on center, or by integrally weaving to integral fastening loops of end, corner, pull, and gate posts for full length of each post. Install fabric on opposite side of posts from area being secured.

2.2 POSTS

2.2.1 Metal Posts for Chain Link Fence

Provide posts conforming to ASTM F1083, zinc-coated. Group IA, with external coating Type A steel pipe. Group IC steel pipe, zinc-coated with external coating Type A or Type B. Post sizes shall be as indicated in the Table below. Line posts and terminal (corner, gate, and pull) posts selected shall be of the same designation throughout the fence. Provide gate post for the gate type specified subject to the limitation specified in ASTM F900 and/or ASTM F1184. Post spacing shall conform to the recommended guidelines as set forth in the CLFMI "Wind Load Guide for the Selection of Line Post Spacing and Size" unless specified to exceed those guidelines.

FS RR-F-191/3 line posts; Class 1, steel pipe, Grade B. End, corner, and pull posts; Class 1, steel pipe, Grade B.

TABLE 1 - FENCE POST SIZE

PIPE	SIZE
Bottom or Brace Rails	1-5/8 inches
Line Posts (See NOTE below)	2-1/2 inches
Corner, end, anchor posts and pull posts	4 inches
Single Gate Posts	4 inches
Double Gate Posts - Equal or less than 24 feet	4 inches

TABLE 1 - FENCE POST SIZE	
Double Gate Posts - Greater than 24 feet and less than 36 feet	6-5/8 inches
NOTE: For fencing reinforcement, last line post to receive cable reinforcing shall be 4 inch.	

2.2.2 Accessories

a. Provide accessories conforming to ASTM F626. Ferrous accessories shall be zinc or aluminum coated.

b. Furnish truss rods for each terminal post. Provide truss rods with turnbuckles or other equivalent provisions for adjustment.

c. Provide Barbed wire supporting arms of the single 45 degree outward angle 3-strand or V 6 strand arm type and of the design required for the post furnished. Secure arms by top tension wire.

d. Furnish post caps in accordance with manufacturer's standard accessories.

e. Provide 9 gauge steel tie wire for attaching fabric to rails, braces, and posts and match the coating of the fence fabric. Miscellaneous hardware coatings shall conform to ASTM A153/A153M unless modified.

2.3 BRACES AND RAILS

ASTM F1083, zinc-coated, Group IA, steel pipe, size NPS 1-1/4. Group IC steel pipe, zinc-coated, shall meet the strength and coating requirements of ASTM F1043.

Braces and bottom rail; Class 1, steel pipe, Grade B, in minimum sizes listed in FS RR-F-191/3 for each class and grade. Steel pipe, Class 1, Grade B shall meet the following performance criteria when subjected to salt spray testing in accordance with ASTM B117: Exterior 1,000 hours with maximum 5 percent red rust; Interior 650 hours with maximum 5 percent red rust.

2.4 WIRE

2.4.1 Wire Ties

Submit samples as specified. FS RR-F-191/4. Provide wire ties constructed of the same material as the fencing fabric.

2.4.2 Barbed Wire

Provide barbed wire conforming to ASTM A121 zinc-coated, Type Z, Class 3, or aluminum-coated, Type A, with 12.5 gauge wire with 14 gauge, round, 4-point barbs spaced no more than 5 inches apart.

2.4.3 Tension Wire

Provide Type I or Type II tension wire, Class 4 coating, in accordance with

ASTM A824.

2.5 CONCRETE

ASTM C94/C94M, using 3/4 inch maximum size aggregate, and having minimum compressive strength of 4000 psi at 28 days. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

2.6 FENCING REINFORCING

Cables shall be minimum 3/4 inch diameter, Class 6 by 19 wire rope. The wire rope shall be regular lay, extra improved plow steel (EIPS), independent wire rope core (IWRC), Class A in accordance with ASTM A1023/A1023M and galvanized in accordance with ASTM A475.

Turnbuckles shall be 1-1/4 inch by 18 inch, Type 1, Grade 1, Class 4 zinc coated in accordance with ASTM F1145.

Wire rope clamps shall be Type 1, Class 1, galvanized in accordance with FS FF-C-450.

Threaded rods, U-bolts and bolts shall be in accordance with ASTM A307 and shall be installed with ASTM F844 washers and ASTM A563 nuts. Entire bolt assembly shall be galvanized in accordance with ASTM A153/A153M. Install according to manufacturer's recommendations.

2.7 GATES

2.7.1 Gate Assembly

Provide gate assembly conforming to ASTM F900 and/or ASTM F1184 of the type and swing shown. Provide gate frames conforming to strength and coating requirements of ASTM F1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size (NPS) 1-1/2. Provide gate frames conforming to strength and coating requirements of ASTM F1043, for Group IC, steel pipe with external coating Type A or Type B, nominal pipe size (NPS) 1-1/2. Gate fabric shall be as specified for chain link fabric.

2.7.2 Gate Leaves

For gate leaves, more than 8 feet wide, provide either intermediate members and diagonal truss rods or tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 8 feet wide shall have truss rods or intermediate braces. Provide intermediate braces on all gate frames with an electro-mechanical lock. Attach fabric to the gate frame by method standard with the manufacturer except that welding will not be permitted.

2.7.3 Gate Hardware and Accessories

Submit manufacturer's catalog data. Furnish and install latches, hinges, stops, keepers, rollers, and other hardware items as required for the operation of the gate. Arrange latches for padlocking so that the padlock will be accessible from both sides of the gate. Provide stops for holding the gates in the open position. For high security applications, each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence.

2.8 PADLOCKS

The Contractor shall purchase and provide padlocks and keys for all newly installed gates. Padlocks and keys shall be "AMERICAN LOCK", Series A5260. There shall be no master key for all padlocks. The padlocks shall be keyed differently. Provide a total of 7 sets of keys for each padlock. All keys shall be stamped "DO NOT DUPLICATE".

PART 3 EXECUTION

3.1 FENCE INSTALLATION

Perform complete installation conforming to ASTM F567.

3.1.1 Line and Grade

Install fence to the lines and grades indicated. Clear the area on either side of the fence line to the extent indicated. Space line posts equidistant at intervals not exceeding 10 feet. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Provide fabric continuous between terminal posts; however, runs between terminal posts shall not exceed 500 feet. Repair any damage to galvanized surfaces, including welding, with paint containing zinc dust in accordance with ASTM A780/A780M.

3.1.2 Excavation

Clear all post holes of loose material. Spread waste material where directed. Eliminate ground surface irregularities along the fence line to the extent necessary to maintain a 2 inch clearance between the bottom of the fabric and finish grade.

3.2 POST INSTALLATION

3.2.1 Earth and Bedrock

a. Set posts plumb and in alignment. Except where solid rock is encountered, set posts in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, set posts to a minimum depth of 18 inches in rock. Where solid rock is covered with an overburden of soil or loose rock, set posts to the minimum depth indicated on the drawing unless a penetration of 18 inches in solid rock is achieved before reaching the indicated depth, in which case terminate depth of penetration. Grout all portions of posts set in rock.

b. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Make diameters of holes in solid rock at least 1 inch greater than the largest cross section of the post. Thoroughly consolidate concrete and grout around each post, free of voids and finished to form a dome. Allow concrete and grout to cure for 72 hours prior to attachment of any item to the posts. Group II line posts may be mechanically driven, for temporary fence construction only, if rock is not encountered. Set driven posts to a minimum depth of 3 feet and protect with drive caps when setting.

c. Test fence post rigidity by applying a 50 pound force on the post, perpendicular to the fabric, at 5 feet above ground. Post movement measured at the point where the force is applied shall be less than or equal to 3/4 inch from the relaxed position. Test every tenth post for rigidity. When a post fails this test, make further tests on the next four posts on either side of the failed post. All failed posts shall be removed, replaced, and retested at the Contractor's expense.

3.3 RAILS

Bolt bottom rail to double rail ends and securely fasten double rail ends to the posts. Peen bolts to prevent easy removal. Install bottom rail before chain link fabric.

3.4 FABRIC INSTALLATION

a. Install chain link fabric on the side of the post indicated. Attach fabric to terminal posts with stretcher bars and tension bands. Space bands at approximately 15 inch intervals. Install fabric and pull taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fasten fabric to line posts at approximately 15 inch intervals and fastened to all rails and tension wires at approximately 12 inch intervals.

b. Cut fabric by untwisting and removing pickets. Accomplish splicing by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 2 plus or minus 1/2 inch above the ground.

c. After the fabric installation is complete, exercise the fabric by applying a 50 pound push-pull force at the center of the fabric between posts; the use of a 30 pound pull at the center of the panel shall cause fabric deflection of not more than 2.5 inches when pulling fabric from the post side of the fence; every second fence panel shall meet this requirement; resecure and retest all failed panels at the Contractor's expense.

3.5 SUPPORTING ARMS

Install barbed wire supporting arms and barbed wire as indicated on the drawings and as recommended by the manufacturer. Anchor supporting arms with 3/8 inch diameter plain pin rivets or, at the Contractor's option, with studs driven by low-velocity explosive-actuated tools for steel, wrought iron, ductile iron, or malleable iron. Studs driven by an explosive-actuated tool shall not be used with gray iron or other material that can be fractured. Use a minimum of two studs per support arm. Pull barbed wire taut and attach to the arms with clips or other means that will prevent easy removal.

3.6 FENCING REINFORCEMENT INSTALLATION

Cables shall be continuous from deadman to deadman. No splices in cable shall be allowed. Cable barrier shall be installed between fence posts and fence fabric as detailed on the drawings. U-bolts on line posts shall be installed perpendicular to the strands of the wire rope and shall be tightened after sag in cable barrier has been removed. Concrete deadman spacing shall be at maximum 200 feet intervals and turning points (external

corners).

Wire rope ends shall terminate around turnbuckles, gate posts or extra heavy-duty wire rope thimbles (at gates). These terminations shall require 18 inch minimum of rope for turn back and a minimum of 4 clips each of equal spacing.

Welded brace rails shall be installed as indicated on the drawings and at corner, end, gate and pull posts. Any areas where coating is damaged or removed shall be covered with a zinc rich compound.

3.7 GATE INSTALLATION

a. Install gates at the locations shown. Mount gates to swing as indicated. Install latches, stops, and keepers as required. Install gates as recommended by the manufacturer.

b. Attach padlocks to gates or gate posts with chains. Weld or otherwise secure hinge pins, and hardware assembly to prevent removal.

3.8 SECURITY

Install new security fencing, remove existing security fencing, and perform related work to provide continuous security for facility. Schedule and fully coordinate work with Project Manager and cognizant Security Officer.

3.9 CLEANUP

Remove waste fencing materials and other debris from the work site each workday.

-- End of Section --

SECTION 33 71 02

UNDERGROUND ELECTRICAL DISTRIBUTION

PART 1 GENERAL

1.1 REFERENCES

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.

ASTM INTERNATIONAL (ASTM)

ASTM B1	(2013) Standard Specification for Hard-Drawn Copper Wire
ASTM B3	(2013) Standard Specification for Soft or Annealed Copper Wire
ASTM B8	(2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM F512	(2012) Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 81	(2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-7 2013) National Electrical Safety Code
IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2013) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C119.1	(2011) Electric Connectors - Sealed Insulated Underground Connector Systems Rated 600 Volts
NEMA RN 1	(2005; R 2013) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

NEMA TC 2	(2013) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TC 3	(2013) Standard for Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA TC 9	(2004) Standard for Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code

SOCIETY OF CABLE TELECOMMUNICATIONS ENGINEERS (SCTE)

ANSI/SCTE 77	(2013) Specification for Underground Enclosure Integrity

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-758	(2012b) Customer-Owned Outside Plant Telecommunications Infrastructure Standard

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS Bull 1751F-644	(2002) Underground Plant Construction

UNDERWRITERS LABORATORIES (UL)

UL 44	(2014; Reprint Jun 2014) Thermoset-Insulated Wires and Cables
UL 467	(2007) Grounding and Bonding Equipment
UL 486A-486B	(2013; Reprint Feb 2014) Wire Connectors
UL 510	(2005; Reprint Jul 2013) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514A	(2013) Metallic Outlet Boxes
UL 514B	(2012; Reprint Jun 2014) Conduit, Tubing and Cable Fittings
UL 6	(2007; reprint Nov 2010) Electrical Rigid Metal Conduit-Steel
UL 651	(2011; Reprint May 2014) Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings
UL 83	(2014) Thermoplastic-Insulated Wires and Cables

UL 854 (2004; Reprint Sep 2011) Standard for Service-Entrance Cables

1.2 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE Stds Dictionary.

b. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Composite/Fiberglass Handholes

SD-06 Test Reports

Field Acceptance Checks and Tests
Cable Installation Plan and Procedure

Six copies of the information described below in 8-1/2 by 11 inch binders having a minimum of three rings from which material may readily be removed and replaced, including a separate section for each cable pull. Separate sections by heavy plastic dividers with tabs, with all data sheets signed and dated by the person supervising the pull.

a. Site layout drawing with cable pulls numerically identified.

b. A list of equipment used, with calibration certifications. The manufacturer and quantity of lubricant used on pull.

c. The cable manufacturer and type of cable.

d. The dates of cable pulls, time of day, and ambient temperature.

e. The length of cable pull and calculated cable pulling tensions.

f. The actual cable pulling tensions encountered during pull.

SD-07 Certificates

Cable Installer Qualifications

1.4 QUALITY ASSURANCE

1.4.1 Cable Installer Qualifications

Provide at least one onsite person in a supervisory position with a

documentable level of competency and experience to supervise all cable pulling operations. Provide a resume showing the cable installers' experience in the last three years, including a list of references complete with points of contact, addresses and telephone numbers. Cable installer must demonstrate experience with a minimum of three medium voltage cable installations. The Project Manager reserves the right to require additional proof of competency or to reject the individual and call for an alternate qualified cable installer.

1.4.2 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "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 Project Manager. Equipment, materials, installation, and workmanship must be in accordance with the mandatory and advisory provisions of IEEE C2 and NFPA 70 unless more stringent requirements are specified or indicated.

1.4.3 Standard Products

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 must have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items must 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.

1.4.3.1 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 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.4.3.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site are not acceptable, unless specified otherwise.

PART 2 PRODUCTS

2.1 CONDUIT, DUCTS, AND FITTINGS

2.1.1 Rigid Metal Conduit

UL 6.

2.1.1.1 Rigid Metallic Conduit, PVC Coated

NEMA RN 1, Type A40, except that hardness must be nominal 85 Shore A durometer, dielectric strength must be minimum 400 volts per mil at 60 Hz, and tensile strength must be minimum 3500 psi.

2.1.2 PVC Conduit for Direct Burial

UL 651, Schedule 40.

2.1.3 PVC Duct for Concrete Encasement

UL 651 and ASTM F512, NEMA TC 2, Type EPC-40-PVC.

2.1.4 Conduit Sealing Compound

Compounds for sealing ducts and conduit must have a putty-like consistency workable with the hands at temperatures as low as 35 degrees F, must neither slump at a temperature of 300 degrees F, nor harden materially when exposed to the air. Compounds must adhere to clean surfaces of fiber or PVC ducts; metallic conduits or conduit coatings; concrete, masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds must form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds must have no injurious effect upon the hands of workmen or upon materials.

2.1.5 Fittings

2.1.5.1 Metal Fittings

UL 514B.

2.1.5.2 PVC Conduit Fittings

NEMA TC 3.

2.1.5.3 PVC Duct Fittings

NEMA TC 9.

2.1.5.4 Outlet Boxes for Steel Conduit

Outlet boxes for use with rigid or flexible steel conduit must be cast-metal cadmium or zinc-coated if of ferrous metal with gasketed closures and must conform to UL 514A.

2.2 LOW VOLTAGE INSULATED CONDUCTORS AND CABLES

Insulated conductors must 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 are not acceptable. Service entrance conductors must conform to UL 854, type USE.

2.2.1 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 must be copper.

2.2.2 Conductor Material

Unless specified or indicated otherwise or required by NFPA 70, wires in

conduit, other than service entrance, must be 600-volt, Type THWN/THHN conforming to UL 83 or Type XHHW conforming to UL 44. Copper conductors must be annealed copper complying with ASTM B3 and ASTM B8.

2.2.3 In Duct

Cables must be single-conductor cable.

2.2.4 Cable Marking

Insulated conductors must have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout the cable length.

Identify each cable by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, in each handhole, junction box, and each terminal. Each tag must contain the following information; cable type, conductor size, circuit number, circuit voltage, cable destination and phase identification.

Conductors must be color coded. Provide conductor identification within each enclosure where a tap, splice, or termination is made. Conductor identification must 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 must be properly identified. Color must 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 must be white with a different colored (not green) stripe for each. Color of ungrounded conductors in different voltage systems must be as follows:

208/120 volt, three-phase

(1) Phase A - black

(2) Phase B - red

(3) Phase C - blue

2.3 LOW VOLTAGE WIRE CONNECTORS AND TERMINALS

Must provide a uniform compression over the entire conductor contact surface. Use solderless terminal lugs on stranded conductors.

For use with copper conductors: UL 486A-486B.

2.4 LOW VOLTAGE SPLICES

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.

2.4.1 Heat Shrinkable Splice

Provide heat shrinkable splice insulation by means of a thermoplastic adhesive sealant material applied in accordance with the manufacturer's written instructions.

2.4.2 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 must not require heat or flame, or any additional materials such as covering or adhesive. It must be designed for use with inline compression type connectors, or indoor, outdoor, direct-burial or submerged locations.

2.5 TAPE

2.5.1 Insulating Tape

UL 510, plastic insulating tape, capable of performing in a continuous temperature environment of 80 degrees C.

2.5.2 Buried Warning and Identification Tape

Provide detectable tape in accordance with Section 31 00 00 EARTHWORK.

2.6 PULL ROPE

Plastic or flat pull line (bull line) having a minimum tensile strength of 200 pounds.

2.7 GROUNDING AND BONDING

2.7.1 Driven Ground Rods

Provide copper-clad steel ground rods conforming to UL 467 not less than 3/4 inch in diameter by 10 feet in length.

2.7.2 Grounding Conductors

Stranded-bare copper conductors must conform to ASTM B8, Class B, soft-drawn unless otherwise indicated. Solid-bare copper conductors must conform to ASTM B1 for sizes No. 8 and smaller. Insulated conductors must be of the same material as phase conductors and green color-coded, except that conductors must be rated no more than 600 volts. Aluminum is not acceptable.

2.8 CAST-IN-PLACE CONCRETE

Provide concrete for encasement of underground ducts with 3000 psi minimum 28-day compressive strength. Concrete associated with electrical work for other than encasement of underground ducts must be 4000 psi minimum 28-day compressive strength unless specified otherwise.

2.9 UNDERGROUND STRUCTURES

Provide underground structures as indicated. Locate duct entrances and windows near the corners of structures to facilitate cable racking. Covers must fit the frames without undue play.

2.9.1 Composite/Fiberglass Handholes and Covers

Provide handholes and covers of polymer concrete, reinforced with heavy weave fiberglass conforming to ANSI/SCTE 77.

2.10 CABLE TAGS IN HANDHOLES

Provide tags for each power cable located in handholes. The tags must be polyethylene. Do not provide handwritten letters. The first position on the power cable tag must denote the voltage. The second through sixth positions on the tag must identify the circuit. The next to last position must denote the phase of the circuit and include the Greek "phi" symbol. The last position must 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.

2.10.1 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 F. 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 must have a minimum loop tensile strength of 175 pounds. The cable tags must have black block letters, numbers, and symbols one inch high on a yellow background. Letters, numbers, and symbols must not fall off or change positions regardless of the cable tags' orientation.

PART 3 EXECUTION

3.1 INSTALLATION

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.

3.2 CABLE INSPECTION

Inspect each cable reel for correct storage positions, signs of physical damage, and broken end seals prior to installation. If end seal is broken, remove moisture from cable prior to installation in accordance with the cable manufacturer's recommendations.

3.3 CABLE INSTALLATION PLAN AND PROCEDURE

Obtain from the manufacturer an installation manual or set of instructions which addresses such aspects as cable construction, insulation type, cable diameter, bending radius, cable temperature limits for installation, lubricants, coefficient of friction, conduit cleaning, storage procedures, moisture seals, testing for and purging moisture, maximum allowable pulling tension, and maximum allowable sidewall bearing pressure. Prepare a checklist of significant requirements and submit along with the manufacturer's instructions in accordance with SUBMITTALS. Install cable strictly in accordance with the cable manufacturer's recommendations and the approved installation plan.

3.4 UNDERGROUND FEEDERS SUPPLYING BUILDINGS

Terminate underground feeders supplying building at a point 5 feet outside the building and projections thereof, except that conductors must be continuous to the terminating point indicated. Coordinate connections of

the feeders to the service entrance equipment with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Provide PVC, Type EPC-40 conduit from the supply equipment to a point 5 feet outside the building and projections thereof. Protect ends of underground conduit with plastic plugs until connections are made.

Encase the underground portion of the conduit in a concrete envelope and bury as specified for underground duct with concrete encasement.

3.5 UNDERGROUND CONDUIT AND DUCT SYSTEMS

3.5.1 Requirements

Run conduit in straight lines except where a change of direction is necessary. Provide numbers and sizes of ducts as indicated. Ducts must 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. Short-radius manufactured 90-degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable. The minimum manufactured bend radius must be 18 inches for ducts of less than 3 inch diameter, and 36 inches for ducts 3 inches or greater in diameter. Otherwise, long sweep bends having a minimum radius of 25 feet must be used 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 must be 30 degrees and manufactured bends must be used. Provide ducts with end bells whenever duct lines terminate in structures.

3.5.2 Treatment

Ducts must be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers must be made with proper tools and match factory tapers. A coupling recommended by the duct manufacturer must be used whenever an existing duct is connected to a duct of different material or shape. Ducts must be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts must be thoroughly cleaned before being laid. PVC ducts must be stored on a flat surface and protected from the direct rays of the sun.

3.5.3 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.

3.5.4 Jacking and Drilling Under Roads and Structures

Conduits to be installed under existing paved areas which are not to be disturbed, and under roads, must be zinc-coated, rigid steel, jacked into place. Where ducts are jacked under existing pavement, rigid steel conduit must be installed because of its strength. To protect the corrosion-resistant conduit coating, predrilling or installing conduit

inside a larger iron pipe sleeve (jack-and-sleeve) is required. Separators or spacing blocks must be made of steel, concrete, plastic, or a combination of these materials placed not farther apart than 4 feet on centers.

3.5.5 Galvanized Conduit Concrete Penetrations

Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations must be PVC coated and must extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

3.5.6 Multiple Conduits

Stagger the joints of the conduits by rows (horizontally) and layers (vertically) to strengthen the conduit assembly. Provide PVC duct spacers that interlock vertically and horizontally. Spacer assembly must 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 two spacer assemblies per 10 feet of conduit assembly.

3.5.7 Conduit Plugs and Pull Rope

New conduit indicated as being unused or empty must be provided with plugs on each end. Plugs must contain a weephole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

3.5.8 Conduit and Duct Without Concrete Encasement

Depths to top of the conduit 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. 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 inch layer of backfill cover must be sand compacted as previously specified. The rest of the excavation must be backfilled and compacted in 3 to 6 inch layers. Provide color, type and depth of warning tape as specified in Section 31 00 00 EARTHWORK.

3.5.8.1 Encasement Under Roads and Structures

Under roads and paved areas, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3 inch concrete cover around ducts. Concrete encasement must extend at least 5 feet beyond the edges of paved areas and roads. Depths to top of the concrete envelope must be not less than 24 inches below finished grade.

3.5.9 Duct Encased in Concrete

Construct underground duct lines of individual conduits encased in concrete. Depths to top of the concrete envelope must be not less than 18 inches below finished grade, except under roads and pavement, concrete envelope must be not less than 24 inches below finished grade. Do not mix different kinds of conduit in any one duct bank. Concrete encasement surrounding the bank must be rectangular in cross-section and must provide at least 3 inches of concrete cover for ducts. Separate conduits by a

minimum concrete thickness of 3 inches. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies from floating during concrete pouring. Anchoring must be done by driving reinforcing rods adjacent to duct spacer assemblies and attaching the rods to the spacer assembly. Provide color, type and depth of warning tape as specified in Section 31 00 00 EARTHWORK.

3.5.9.1 Connections to Existing Underground Structures

For duct bank connections to existing structures, break the structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and extend into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.

3.5.9.2 Removal of Ducts

Where duct lines are removed from existing underground structures, close the openings to waterproof the structure. Chip out the wall opening to provide a key for the new section of wall.

3.6 CABLE PULLING

Test existing 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 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 turnups into switches, transformers, switchgear, switchboards, and other enclosures. 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.

3.6.1 Cable Lubricants

Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables.

3.7 CABLES IN UNDERGROUND STRUCTURES

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, and support on brackets and cable insulators. Support cable splices in underground structures by racks on each side of the splice. Locate splices to prevent cyclic bending in the spliced sheath. Install cables at middle and bottom of cable racks, leaving top space open for future cables, except as otherwise indicated for existing installations. Provide one spare three-insulator rack arm for each cable rack in each underground structure.

3.7.1 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.

3.8 CONDUCTORS INSTALLED IN PARALLEL

Conductors must be grouped such that each conduit of a parallel run contains 1 Phase A conductor, 1 Phase B conductor, 1 Phase C conductor, and 1 neutral conductor.

3.9 LOW VOLTAGE CABLE SPLICING AND TERMINATING

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 or aboveground termination pedestals.

3.10 GROUNDING SYSTEMS

NFPA 70 and IEEE C2, except provide grounding systems with a resistance to solid earth ground not exceeding 25 ohms.

3.10.1 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 must 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, notify the Project Manager immediately.

3.10.2 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 must be as recommended by the manufacturer. An embossing die code or other standard method must provide visible indication that a connector has been adequately compressed on the ground wire.

3.10.3 Grounding Conductors

Provide bare grounding conductors, except where installed in conduit with associated phase conductors. Ground cable sheaths, cable shields, conduit, and equipment with No. 6 AWG. Ground other noncurrent-carrying metal parts and equipment frames of metal-enclosed equipment. Ground metallic frames and covers of handholes and pull boxes with a braided, copper ground strap with equivalent ampacity of No. 6 AWG.

3.10.4 Ground Cable Crossing Expansion Joints

Protect ground cables crossing expansion joints or similar separations in structures and pavements by use of approved devices or methods of installation which provide the necessary slack in the cable across the joint to permit movement. Use stranded or other approved flexible copper cable across such separations.

3.11 EXCAVATING, BACKFILLING, AND COMPACTING

Provide in accordance with NFPA 70 and Section 31 00 00 EARTHWORK.

3.11.1 Reconditioning of Surfaces

3.11.1.1 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 topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching.

3.11.1.2 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.

3.12 CAST-IN-PLACE CONCRETE

Provide concrete as indicated on drawings and in accordance with Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE.

3.12.1 Concrete Slabs for Equipment

Unless otherwise indicated, the slab must be at least 8 inches thick, reinforced with a 6 by 6 - W2.9 by W2.9 mesh, placed uniformly 4 inches from the top of the slab. Slab must be placed on a 6 inch thick, well-compacted gravel base. Top of concrete slab must be approximately 4 inches above finished grade with gradual slope for drainage. Edges above grade must have 1/2 inch chamfer. Slab must be of adequate size to project at least 8 inches beyond the equipment.

Stub up conduits, with bushings, 2 inches into cable wells in the concrete pad. Coordinate dimensions of cable wells with cable training areas.

3.12.2 Sealing

When the installation is complete, seal all conduit and other entries into the equipment enclosure with an approved sealing compound. Seals must be of sufficient strength and durability to protect all energized live parts of the equipment from rodents, insects, or other foreign matter.

3.13 FIELD QUALITY CONTROL

3.13.1 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.

3.13.1.1 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 ensure correct cable connection.

3.13.1.2 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 must 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.

3.13.2 Follow-Up Verification

Upon completion of acceptance checks and tests, 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 Project Manager must be given 5 working days advance notice of the dates and times of checking and testing.

-- End of Section --

SECTION 34 41 26

ACCESS CONTROL POINT CONTROL SYSTEM

PART 1 GENERAL

1.1 REFERENCES

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO GDHS-5	(2011, Errata 2012) A Policy on Geometric Design of Highways and Streets
AASHTO RSDG-4	(2011; Errata 2012) Roadside Design Guide

ASTM INTERNATIONAL (ASTM)

ASTM A1023/A1023M	(2009; E 2012) Standard Specification for Stranded Carbon Steel Wire Ropes for General Purposes
ASTM D2487	(2011) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D698	(2012; E 2014) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM F2656	(2007) Standard Test Method for Vehicle Crash Testing of Perimeter Barriers

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO/IEC 17025	(2005) General Requirements for the Competence of Testing and Calibration Laboratories

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2008) Enclosures for Electrical Equipment

	(1000 Volts Maximum)
NEMA ICS 1	(2000; R 2008; E 2010) Standard for Industrial Control and Systems: General Requirements
NEMA TS-2	(2003) Traffic Controller Assemblies with NTCIP Requirements - Version 02.06

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008; Errata 2011) Safety and Health Requirements Manual

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009) Manual on Uniform Traffic Control Devices
NCHRP 350	(1993) Recommended Procedures for the Safety Performance Evaluation of Highway Features

UNDERWRITERS LABORATORIES (UL)

UL 1076	(1995; Reprint Sep 2010) Proprietary Burglar Alarm Units and Systems
UL 796	(2010; Reprint Sep 2013) Standard for Printed-Wiring Boards

1.2 ACRONYM LIST

a. ACP - Access Control Point
b. ACPCS - Access Control Point Control System
c. AVBCS - Active Vehicle Barrier Control System
d. DTS - Data Transmission System
e. EFO - Emergency Fast Operate (active barrier emergency fast close control)
f. GCC - Gatehouse Control Console
g. PVT - Performance Verification Test
h. UPS - Uninterruptible Power Supply
i. VPD - Vehicle Presence Detector

1.3 SYSTEM DESCRIPTION

Furnish and install a complete and functional ACPCS for the Access Control Point including actuated traffic arms, actuated traffic arm controls, vehicle presence detectors, data transmission, and all interconnecting conduit and wiring. Provide a Health and Safety Plan in accordance with EM 385-1-1.

1.3.1 Design Strategy

The primary objective of the ACP is to prevent an unauthorized vehicle from entering the Installation.

1.3.2 Barrier System Description

Provide a complete passive vehicle barrier system meeting design and performance requirements presented in this Specification Section and in the Contract Drawings. Vehicle barriers covered by this Specification Section includes post/cable barriers.

1.3.3 Crash Resistance Requirements

Minimum performance requirements for the post/cable barriers are provided in this Specification Section. Similar-type vehicle barriers meeting higher crash resistance rating may be submitted for approval.

1.3.3.1 Impact Condition

Make the post/cable barriers to withstand an impact corresponding to ASTM F 2656, Impact Condition ASTM M50SD-STD-02.01.

1.3.3.2 Penetration Rating

When subjected to the specified Impact Condition, vehicle barriers are to respond with Penetration rating equal to or better than ASTM M50 as defined in ASTM F2656.

1.3.4 Crash Resistance Demonstration of Compliance

Submit the following demonstration of compliance with the specified crash resistance requirements for each manufactured post/cable vehicle barrier proposed for this project.

1.3.4.1 Crash Test Report

Submit a Crash Test Report for a barrier with an identical configuration to the barrier being provided, from a testing laboratory accredited by a nationally recognized agency in accordance with ISO/IEC 17025.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Crash Resistance Demonstration of Compliance
Crash Test Report

SD-02 Shop Drawings

Shop Drawings, including testing lab as-built certification
Group I Technical Data Package; G
Group IV Technical Data Package; G
Group V Technical Data Package; G

SD-03 Product Data

Group I Technical Data Package; G
Group II Technical Data Package; G
Group IV Technical Data Package; G
Group V Technical Data Package; G

SD-04 Samples

Post Color

SD-05 Design Data

Calculations for all Proposed UPS Systems
Group I Technical Data Package; G

SD-06 Test Reports

Contractor Field Test, including test plan, test schedule, and report
Performance Verification Test (PVT), including test plan, test schedule, and report
Test Report
Group III Technical Data Package; G
Group IV Technical Data Package; G

SD-07 Certificates

Group I Technical Data Package; G
Technical Specialists; G

SD-08 Manufacturer's Instructions

Manufacturer's Written Installation Instructions
Group I Technical Data Package; G

SD-11 Closeout Submittal

As-Tested Certification
Installation Certification

1.5 QUALITY ASSURANCE

1.5.1 Project Manager Qualifications

Designate a Project Manager for all work under this specification. The Project Manager shall provide technical and managerial leadership to all contractor personnel and Subcontractors during the design, manufacturer, and installation phases of this specification. The Project Manager shall be the primary point of contact for the Government for this specification. The Project Manager shall have a minimum of 5 years of experience in the design, manufacture, and installation of similar systems.

1.5.2 Installation Superintendent Qualifications

Designate an Installation Superintendent responsible for onsite installation team direction and leadership. The Superintendent shall provide first line supervision of tradesmen and Subcontractors. The

Superintendent shall be responsible for job planning and shall coordinate the work with trades, Subcontractors, vendors, and site personnel. The Superintendent shall be responsible for scheduling materials, equipment, and labor to maintain the flow of work commensurate with the task schedule. The Superintendent shall administer and execute the provisions of the Accident Prevention Plan. The Superintendent shall have a minimum of 5 years of experience in the installation, operation, and testing of similar systems.

1.5.3 QC Representative Qualifications

Provide a Quality Control Representative responsible for establishing, executing and reporting on the Government approved Contractor Quality Control Plan as required in the Group I Technical Data Package. Quality Control Representative shall report independently to the Project Manager on matters of quality control. The Quality Control Representative shall have a minimum of 5 years experience in performing quality control duties.

1.5.4 Technical Specialists Qualifications

Provide the services of technical specialists for the Traffic Controller Unit subsystem. Submit names and qualifications for each of the technical specialists involved. The technical specialists shall have a minimum of 5 years of experience in the installation, operation, and testing of all components, software, and interconnecting wiring of their particular equipment/subsystem. In addition, the technical specialist for the Traffic Controller Unit subsystem shall have valid International Municipal Signals Association (IMSA) certifications for Traffic Signals and Work Zone Safety. Submit the names and qualifications (including proof of IMSA certifications for the Traffic Controller Unit subsystem technical specialist) of the candidate technical specialists to the Project Manager for approval. Each technical specialist shall be present in the factory during manufacture and assembly of the subsystem, during Factory Tests of the subsystem, during subsystem installation in the field, and shall serve as the Contractor's Commissioning Specialist for their designated equipment/subsystem for the commissioning tests as specified.

1.5.5 Line Supervision

1.5.5.1 General

All signal and Data Transmission System (DTS) lines shall be supervised by the system. The system shall supervise the signal lines by monitoring the circuit for changes or disturbances in the signal and for conditions as described in UL 1076 for line security equipment. The system shall initiate an alarm in response to a current change of 10 percent or greater. The system shall also initiate an alarm in response to opening, closing, shorting, or grounding of the signal and DTS lines.

1.5.5.2 Data Transmission System (DTS)

Provide DTS as specified in Section 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM.

1.5.6 Manufacturer

Use a company specializing in manufacturing the products specified in this Specification Section.

1.5.7 As-Tested Certification

Submit written verification that vehicle barriers provided under this contract are the As-Tested configurations.

1.5.8 Installation Certification

Submit written verification that the vehicle barriers provided under this contract are installed in the As-Tested configurations, including soil conditions at foundations.

1.6 DELIVERY OF TECHNICAL DATA AND COMPUTER SOFTWARE

All items of computer software and technical data (including technical data which relates to computer software), which is specifically identified in this specification shall be delivered in accordance with the CONTRACT CLAUSES, SPECIAL CONTRACT REQUIREMENTS, and in accordance with the Contract Data Requirements List (CDRL), DD FORM 1423, which is attached to and thereby made a part of this contract. All data delivered shall be identified by reference to the particular specification paragraph against which it is furnished.

1.6.1 Group I Technical Data Package

Submit Group 1 Technical Data Package 30 days after receipt of the Notice to Proceed. The data package includes system descriptions, analyses, calculations used in sizing equipment specified, manufacturer's data for all equipment and end devices provided under these specifications. Descriptions and calculations shall show how the equipment will operate as a system to meet the performance of this specification. The software data package consists of descriptions of the operation and capability of all subsystem software. Key control plan for all Contractor provided enclosures requiring locks and all keyed control switches. The key control plan shall include the following: (1) Procedures that will be used to log and positively control all keys during installation. (2) A listing of all keys and where they are used. (3) A listing of all persons allowed access to the keys. Quality Control Plan for approval. The QC Plan shall describe all Contractor and Subcontractor activities during design, manufacture, and installation of the ACPCS. The QC Plan shall include all Contractor and Subcontractor technical data reviews, inspections, certifications, and approvals and the QC documentation procedures. Certifications from the manufacturers of the following equipment shall be submitted with the data package: Traffic Controller Unit, Traffic Arm, Annunciator, Alarm Panels, and all sensors including vehicle presence and tamper. The data package shall include the following:

a. Functional System Block Diagram, identifying all major equipment, interconnecting wire types and quantities, approximate distances, and communications protocols.

b. Block and Wiring Diagrams of each subsystem.

c. Drawing showing layout and dimensions of the Gatehouse Control Console with the Alarm Display.

d. Drawing showing equipment layout in the Gatehouse including the Gatehouse Control Console, UPS, and other hardware intended to be located in the Gatehouse.

e. Drawing showing equipment layout around the vehicle presence detectors and Traffic Arms.

f. Device wiring and installation drawings.

g. Point to point wiring diagram of complete interconnected system including database listing of wire numbers, to and from designations, and wire characteristics.

h. Details of connections to power sources, including power supplies and grounding.

i. Details of surge protection device installation.

j. Vehicle presence detector locations and sensor detection patterns.

k. Communications speeds and protocol descriptions.

l. CD-ROM/CD-RW/DVD-RW drive speed and protocol descriptions.

m. Alarm response time.

n. Command response time.

o. Start-up operations including system and database backup operations.

p. Expansion capability and method of implementation.

q. Sample copy of sequence of events report.

r. Uninterruptible Power Supply (UPS) Calculations.

1.6.2 Group II Technical Data Package

Submit Group II Technical Data Package within 60 days of Notice to Proceed. Prepare and submit a report of "Current Site Conditions" to the Government documenting site conditions that significantly differ from the design drawings or conditions that affect performance of the system to be installed. Provide specification sheets, or written functional requirements to support the findings, and a cost estimate to correct those site changes or conditions. Do not perform any field work until the "Current Site Conditions" report is approved by the Government. Do not correct any deficiencies identified in the report without written permission from the Government.

1.6.3 Group III Technical Data Package

Submit Test Plan for the Factory Acceptance Test, Test Plan for Contractor Field Test, Factory Acceptance Test Report, and Contractor Field Test Report. Test Plans, a minimum of 30 days before the scheduled start of all factory acceptance tests and 15 days before the scheduled start of the Contractor Field Tests. Submit the Factory Acceptance Test Report and Contractor Field Test Report no more than 1 week after the completion of each test.

1.6.4 Group IV Technical Data Package

Submit Group IV Technical Data Package 30 days prior to the start of the

Performance Verification Test. Submit the Performance Verification Test Report no more than 1 week after the test. Submit the Commissioning Report no more than 2 weeks after completion of the Endurance Test. The data package shall contain an Operator's Manual fully explaining all procedures and instructions for the operation of the system, including:

a. System start-up and shutdown procedures.

b. Use of system and application software.

c. Recovery and restart procedures.

d. Use of report generator and generation of reports.

e. Data entry.

f. Operator commands.

g. Alarm and system messages and printing formats.

h. System entry requirements.

i. Test Plan for the Performance Verification Test.

j. Performance Verification Test Report.

k. Commissioning Report.

1.6.4.1 Application Software

Where an application software installed on a computer (computers) is involved, provide the default (manufacturer's standard) software installation package on optical disk. Provide also, on optical disk separate from the default software, the complete image of the installed software, with all custom changes and configuration data specific for the installed system. The software image shall be the same as that of the system used when it is put in operation before the final acceptance tests, and a subsequent one that is used for the final (30-day) acceptance tests, after all pending corrections and adjustments have been implemented.

1.6.4.2 Software Manual

The software manual shall describe the functions of all software and shall include all other information necessary to enable proper loading, testing, and operation. The manual shall include:

a. Definition of terms and functions.

b. Use of system and application software.

c. Procedures for system initialization, start-up and shutdown.

d. Alarm reports.

e. Reports generation.

f. Database format and date entry requirements.

g. Directory of all disk files.

h. Description of all communication protocols, including data formats, command characters, and a sample of each type of data transfer.

i. Interface definition.

1.6.4.3 Hardware Manual

The hardware manual shall describe all equipment furnished including:

a. General description and specifications.

b. Installation and checkout procedures.

c. Equipment electrical schematics and layout drawings.

d. System schematics and layout drawings.

e. Alignment and calibration procedures.

f. Manufacturer's repair parts list indicating sources of supply.

g. Interface definition.

1.6.4.4 Functional Design Manual

The functional design manual shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be included for all system operating modes.

1.6.4.5 Maintenance Manual

The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic prevention maintenance (include specific time intervals for each recommended preventative maintenance tasks), fault diagnosis, and repair or replacement of defective components.

1.6.4.6 Training Documentation

Lesson plans and training manuals for the training phases, including type of training to be provided, and a list of reference material, shall be delivered for Government approval.

1.6.4.7 Data Entry

Enter all data needed to make the system operational. Deliver the data to the Government on data entry forms, utilizing data from the contract documents, Contractor's field surveys, and other pertinent information in the Contractor's possession required for complete installation of the database. Identify and request from the Government, any additional data needed to provide a complete and operational ACPCS. The completed forms shall be delivered to the Government for review and approval at least 30 days prior to the Contractor's scheduled need dates. When the ACPCS database is to be populated in whole or in part from an existing or Government furnished electronic database, demonstrate the field mapping scheme to correctly input the data.

1.6.5 Group V Technical Data Package

Provide the Group V Technical Data Package within 30 days after completing the Endurance Test. The data package shall include:

1.6.5.1 Group IV Manuals

Submit finalized Group IV Manuals, as specified in Group IV Technical Data Package, bound in hardback, loose-leaf binders. The draft copy used during site testing shall be updated with any changes required prior to final delivery of the manuals. Each manual's contents shall be identified on the cover. Each manual shall include names, addresses, and telephone numbers of each Subcontractor installing equipment and systems, and the nearest service representative for each item of equipment. The manuals shall have a table of contents and tab sheets. Tab sheets shall be placed at the beginning of each chapter or section and at the beginning of each appendix. The final copies delivered after completion of the endurance test shall include modifications made during installation, checkout, and acceptance. The number of copies of each manual to be delivered shall be as specified on DD FORM 1423.

1.6.5.2 Final System Drawings

Maintain a separate set of drawings (including site, civil, electrical, mechanical, structural, and architectural plans, elevations, and details), elementary diagrams, wiring diagrams, control diagrams, and programming flow charts of the system to be used for final system drawings. This set shall be accurately kept up-to-date with all changes and additions to the ACPCS and shall be delivered to the Government with the final endurance test report. In addition to being complete and accurate, this set of drawings shall be kept neat and shall not be used for installation purposes. Final drawings submitted with the endurance test report shall be finished drawings on optical disk in AutoCAD 2006 or more recent format.

1.7 WARRANTY

Provide all labor, equipment, and materials required to maintain the entire system in an operational state as specified, for a period of two years after formal written acceptance of the system to include scheduled and nonscheduled adjustments.

1.8 MAINTENANCE AND SERVICE

1.8.1 Description of Work

The adjustment and repair of the system includes all traffic arms, computer equipment, software updates, communications transmission equipment and DTS, local processors, vehicle presence detection sensors, facility interface, and support equipment. All repair, calibration, and other work shall be provided and performed in accordance with the manufacturer's documentation and instruction. Responsibility shall be limited to Contractor installed equipment.

1.8.2 Service Personnel

Service personnel shall be certified in the maintenance and repair of the specific type of equipment installed and qualified to accomplish work promptly and satisfactorily. The Government shall be advised in writing of

the name of the designated service representative, and of any change in personnel.

1.8.3 Schedule of Work

Perform two minor inspections at 6 month intervals (or more often if required by the manufacturer), and two major inspections offset equally between the minor inspections to effect quarterly inspection of alternating magnitude.

1.8.3.1 Minor Inspections

Minor inspections shall include visual checks and operational tests of traffic arms, console equipment, peripheral equipment, local processors, sensors, and electrical and mechanical controls.

1.8.3.2 Major Inspections

Major inspections shall include work described under paragraph "Minor Inspections" and the following work:

a. Clean interior and exterior surfaces of all system equipment and local processors, including console equipment.

b. Perform diagnostics on all equipment.

c. Check, test, and calibrate each device.

d. Run all system software diagnostics and correct all diagnosed problems.

e. Resolve any previous outstanding problems.

1.8.3.3 Scheduled Work

Scheduled work shall be performed during regular working hours, Monday through Friday, excluding federal holidays.

1.8.4 Emergency Service

The Government will initiate service calls to the Contractor when the system is not functioning properly. Qualified personnel shall be available to provide service to the complete system. The Government shall be furnished with a telephone number where the service supervisor can be reached at all times. Service personnel shall be at site within 4 hours after receiving a request for service. The system shall be restored to proper operating condition within 8 hours after service personnel arrive onsite and obtain access to the system.

1.8.5 Operation

Performance verification test procedures shall be used after all scheduled maintenance and repair activities to verify proper component and system operation.

1.8.6 Records and Logs

Maintain records and logs of each performed task and organize cumulative records for each component and for the complete system chronologically

resulting in a continuous log to be maintained for all devices. The log shall contain all initial settings. Complete logs shall be kept and shall be available for inspection onsite, demonstrating that planned and systematic adjustments and repairs have been accomplished for the system.

1.8.7 Work Requests

Record separately each service call request, as received. The form shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing what has to be done, the amount and nature of the material to be used, the time and date work started, and the time and date of completion. Deliver a record of the work performed within 5 days after work is accomplished.

1.8.8 System Modifications

Make any recommendations for system modification in writing to the Government. System modifications shall not be made without prior approval of the Government. Any modifications made to the system shall result in the updating of the operation and maintenance manuals as well as any other documentation affected.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Materials and Equipment

Units of equipment that perform identical, specified functions shall be products of a single manufacturer. All material and equipment shall be new and currently in production. Each major component of equipment shall have the manufacturer's model and serial number in a conspicuous place.

2.1.2 Field Enclosures

2.1.2.1 Interior Sensors

Sensors to be used in an interior environment shall have a housing that provides protection against dust, falling dirt, and dripping non-corrosive liquids.

2.1.2.2 Exterior Sensors

Sensors to be used in an exterior environment shall have a housing that provides protection against windblown dust, rain and splashing water, and hose directed water. Sensors shall be undamaged by the formation of ice on the enclosure.

2.1.2.3 Interior Electronics

Systems electronics to be used in an interior environment shall be housed in enclosures which meet the requirements of NEMA 250, Type 12.

2.1.2.4 Exterior Electronics

Systems electronics to be used in an exterior environment shall be housed in enclosures which meet the requirements of NEMA 250, Type 4X.

2.1.2.5 Corrosion Resistant

System electronics to be used in a corrosive environment as defined in NEMA 250 shall be housed in non-metallic non-corrosive enclosures which meet the requirements of NEMA 250, Type 4X.

2.1.3 Nameplates

Nameplates shall be provided for major components of the system. Nameplates shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a corrosion resistant plate secured to the item of equipment. Nameplates will not be required for devices smaller than 1 by 3 inch.

2.1.4 Tamper Switches

Equipment enclosures for the ACPCS equipment shall have hinged doors or removable covers. The doors or covers shall be provided with cover operated, corrosion-resistant tamper switches, arranged to initiate an alarm signal when the door or cover is moved. The enclosure and the tamper switch shall function together and shall not allow direct line of sight to any internal components before the switch activates. Tamper switches shall be inaccessible until the switch is activated; have mounting hardware concealed so that the location of the switch cannot be observed from the exterior of the enclosure; be connected to circuits which are under electrical supervision at all times, irrespective of the protection mode in which the circuit is operating; shall be spring-loaded and held in the closed position by the door or cover; and shall be wired so that the circuit is broken when the door or cover is disturbed.

2.1.5 Locks and Key-Lock Switches

2.1.5.1 Locks

Locks shall be provided on system enclosures for maintenance purposes. Locks shall be UL listed, conventional key type lock having a combination of 5 cylinder pin and 5-point 3 position side bar. Keys shall be stamped "U.S. GOVT. DO NOT DUP". The locks shall be arranged so that the key can only be withdrawn when in the locked position. Maintenance locks shall be keyed alike and only 2 keys shall be furnished for all of these locks.

2.1.5.2 Key-Lock-Operated Switches

Key-lock-operated switches required to be installed on system components shall be UL listed, conventional key type lock having a combination of 5 cylinder pin and 5-point 3 position side bar. Keys shall be stamped "U.S. GOVT. DO NOT DUP". Key-lock-operated switches shall be 2 or 3 position, with the key removable in specified positions. All key-lock-operated switches shall be keyed differently and only 2 keys shall be furnished for each key-lock-operated-switch. Keys shall be removable in the positions described in these specifications or as shown on the drawings.

2.1.5.3 Construction Locks

A set of temporary locks shall be used during installation and construction. The final set of locks installed and delivered to the Government shall not include any of the temporary locks.

2.1.6 System Components

System components shall be designed for continuous operation. Electronic components shall be solid state type, mounted on printed circuit boards conforming to UL 796. Printed circuit board connectors shall be plug-in, quick-disconnect type. Power dissipating components shall incorporate safety margins of not less than 25 percent with respect to dissipation ratings, maximum voltages, and current carrying capacity. Control relays and similar switching devices shall be solid state type or sealed electro-mechanical.

2.1.6.1 Modularity

Equipment shall be designed for increase of system capability by installation of modular components. System components shall be designed to facilitate maintenance through replacement of modular subassemblies and parts.

2.1.6.2 Maintainability

Components shall be designed to be maintained using commercially available tools and equipment. Components shall be arranged and assembled so they are accessible to maintenance personnel. There shall be no degradation in tamper protection, structural integrity, EMI/RFI attenuation, or line supervision after maintenance when it is performed in accordance with manufacturer's instructions.

2.1.6.3 Interchangeability

The system shall be constructed with off-the-shelf components which are physically, electrically and functionally interchangeable with equivalent components as complete items. Replacement of equivalent components shall not require modification of either the new component or of other components with which the replacement items are used. Custom designed or one-of-a-kind items shall not be used without explicit approval from the Project Manager. Interchangeable components or modules shall not require trial and error matching in order to meet integrated system requirements, system accuracy, or restore complete system functionality.

2.1.6.4 Product Safety

System components shall conform to applicable rules and requirements of NFPA 70. System components shall be equipped with instruction plates including warnings and cautions describing physical safety and any special or important procedures to be followed in operating and servicing system equipment.

2.1.7 Controls and Designations

Controls and designations shall be as specified in NEMA ICS 1, Special Test Equipment. Provide all special test equipment, special hardware, software, tools, and programming or initialization equipment needed to start or maintain any part of the system and its components. Special test equipment is defined as any test equipment not normally used in an electronics maintenance facility.

2.1.8 System Integration

The ACPCS shall be supplied as an integrated system, and shall include all

sub systems specified hereafter. Hardware integration shall be required for the ACPCS to function as one integrated system. The Contractor is responsible for all integration and appetencies required for the system to behave as one system. Supply of separate sub systems without integration is not acceptable. The extent and nature of integration shall be extensively documented and demonstrated in the Group 1 Technical Data Package.

2.1.9 Environmental Conditions

2.1.9.1 Interior Conditions

Equipment installed in environmentally protected interior areas shall meet performance requirements specified for the following ambient conditions:

a. Temperature: 32 to 120 degrees F. Components installed in unheated security protected areas shall meet performance requirements for temperatures as low as zero degrees F;

b. Pressure: Sea level to 15,000 feet above sea level;

c. Relative humidity: 5 to 95 percent;

d. Fungus: System components located in fungus growth inductive environments shall be completely treated for fungus resistance. Treating materials containing a mercury bearing fungicide shall not be used. Treating materials shall not increase the flammability of the material or surface being treated. Treating materials shall cause no skin irritation or other injury to personnel handling it during fabrication, transportation, operation, or maintenance of the equipment, or during use of the finished items when used for the purpose intended; and

e. Acoustical Noise: Components shall be suitable for use in high noise areas above 100 dB, such as boiler rooms, power plants, and foundries without adversely affecting their performance.

2.1.9.2 Exterior Conditions

Exterior Conditions Components mounted in locations exposed to weather shall be housed in corrosion-resistant enclosures with appropriate environmental protection. Component performance shall not degrade because of improper housing design. Components in enclosures shall meet performance requirements when exposed to the following ambient conditions:

a. Temperature: -25 to 140 degrees F;

b. Pressure: Sea level to 15,000 feet above sea level;

c. Solar radiation: Six hours of solar radiation at dry bulb temperature of 120 degrees F including 4 hours of solar radiation at 104 watts psf;

d. Sand and Dust: Wind driven for up to 6 mph;

e. Rain: 2 inches per hour and 5 inches per hour cyclic with wind plus one period of 12 inches per hour;

f. Humidity: 5 to 95 percent;

g. Fungus: Warm, humid atmosphere conducive to the growth of heterotrophic plants;

h. Salt Fog: Salt atmosphere with 5 percent salinity;

i. Wind: Up to 50 mph with gusts to 66 mph.

2.2 ACTIVE VEHICLE BARRIER CONTROL SYSTEM (AVBCS)

2.2.1 General Requirements

The AVBCS shall collect alarm, status, and control switch inputs at the ACP and provide control signals to the Traffic Arms. The AVBCS shall provide alarm, status, and control information to the Guard Booth Control Panel.

2.3 POST/CABLE BARRIERS

Provide post/cable barriers as shown on the drawings. Include all gates shown on drawings.

2.3.1 Minimum Allowable Horizontal Length

The minimum allowable length of a single horizontal run of the post/cable barrier is the length of the barrier tested, as documented in the Crash Test Report. A horizontal run is considered to be a section of the vehicle barrier with terminal posts at either end with no intermediate change in direction.

If the final layout indicates horizontal runs shorter than the minimum allowable horizontal length, notify the Project Manager prior to fabrication.

2.3.2 Spacing of Terminal and Line Posts

Verify that the spacing of line and terminal posts is in conformance with the Crash Test Report configuration.

2.3.3 Post Color

Color the posts GREY. Submit samples for approval prior to fabrication. Match color of all fittings and connections.

2.3.4 Standard Post/Cable Barrier

Provide post/cable barriers as shown on the drawings.

2.3.4.1 Concrete

Concrete strength is as shown on the drawings and as specified in Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE.

2.3.4.2 Concrete

Concrete strength is as shown on the drawings and as specified in Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE.

2.3.4.3 Reinforcing Steel

Reinforcing steel is fy = 60,000 psi unless otherwise noted on the drawings.

2.3.4.4 Cable

Provide cable as shown on the drawings and per requirements of ASTM A1023/A1023M. No substitutions are acceptable.

2.3.4.5 Pipe Steel

Provide pipe steel as shown on the drawings and provide shop-primed and site painted. Paint color: GREY.

2.3.4.6 Over-excavation and Backfill

Over-excavate soil below post foundations by at least 12 inches and backfill with any materials classified by ASTM D2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP. Ensure the soil is free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and deleterious, or objectionable materials. Unless specified otherwise, make the maximum particle diameter one-half the lift thickness at the intended location.

Compact the 12 inches of over-excavation to 95 percent of ASTM D698 (unless noted otherwise on the drawings). Backfill areas of over-excavation at sides of post foundations to meet same fill and compaction requirements. Make the maximum lifts for over excavation and backfill 6 inches.

2.3.4.7 Terminal and Line Post Spacing

Ensure the spacing of line and terminal posts is as shown on the drawings.

2.3.5 Components Requirements

2.3.5.1 Single Manufacturer

Ensure a single manufacturer supplies all parts, components, accessories, fittings and fasteners as required by manufacturer's written requirements, manufacturer's written installation instructions and written warranty, unless otherwise noted in this Specification Section.

2.3.5.2 Metal Component Primer and Color

Ensure all above ground metal components are shop-primed and site painted,unless otherwise specified.

2.3.5.3 Accessories

Provide all accessories as required for a complete and finished barrier system. Accessories to be, at a minimum, as required by manufacturer's instructions.

2.3.5.4 Fabrication and Shop Assembly

Shop assemble the vehicle barriers to the greatest extent possible.

2.3.5.5 Manufacturer Verification

Provide written verification that vehicle barriers provided under this contract conform to the "As-Tested certification" configuration, based on the manufacturer crash testing.

2.3.5.6 Contractor/Installer Verification

Provide written verification that the vehicle barriers provided under this contract are installed per the "As-Tested certification" configuration, based on the Crash Test Report.

2.3.5.7 Shop Drawings

Show the locations of gates and openings on the Shop Drawings. Submit Shop Drawings that include layout, locations, components, materials, dimensions, sizes, weights, finishes of components, installation and operational clearances, location of gates and gate swings, terminal and line post sizes and locations, details of post anchorage, and post attachment/bracing, and other pertinent details as applicable. Provide Crash Test Report testing lab as-built certification drawings at the same time as the Shop Drawings. Shop Drawings cannot be approved without the corresponding Crash Test Report.

2.4 GATEHOUSE CONTROL CONSOLE (GCC)

Provide a GCC with all necessary displays and controls to allow the operator to control ACP equipment. The GCC shall be mounted in the gatehouse in a manner to allow a Gatehouse guard to easily use the controls and monitor the displays while, at the same time, oversee ACP operations. The GCC shall include the following:

a. Alarm Display. See next paragraph for description and requirements.

b. Active Vehicle Barrier Controls. Provide Active Barrier Master Control Panel, as shown on the drawings.

2.5 ALARM DISPLAY IN THE GCC

Provide annunciation on the GCC for displaying alarms for annunciation at the Gatehouse.

2.6 GUARD BOOTH AND OVERWATCH POSITION CONTROL PANELS

Provide a Control Panel for Guard Booth. Control panel shall include the indicating lights and alarms. Control panel shall include an audible alarm. The audible alarm shall be loud enough to be heard over ambient traffic noise. Alarm acknowledgement shall be provided to silence the audible alarm.

2.7 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

Provide UPS in the event of loss of normal electrical power for the following functions:

a. Primary communications system.

b. Security Monitoring subsystem including GCC, Alarm Panels, and all

ACP equipment, etc.

c. AVBCS subsystem including all controls for gate arms.

d. Active barrier activation systems for one complete operation cycle (open to close and close to open).

UPS shall be capable of carrying required loads for a minimum of 10 minutes. Submit calculations for all proposed UPS systems identifying all connected loads plus 50 percent spare capacity and submit in accordance with Group I Technical Data Package.

2.8 INDUCTION LOOPS

Induction loops may be used for vehicle presence detection, wrong-way detection, and point over-speed detection. Induction loops shall be capable of detecting passenger vehicles, motorcycles, and high bed trucks. Tests for all three types of vehicles shall be conducted on each installed loop during the Performance Verification Test.

a. Tuning: Automatic, with temperature compensation.

b. Loop Input: To withstand minimum 2000V, both normal and common modes.

c. Loop Sensing Frequency: Minimum four user selectable frequencies to minimize cross talk with adjacent loops.

d. Sensitivity: User selectable, minimum 12 ranges, 20 to 2500 micro henries with a Q factor of minimum 5.

e. Diagnostic: Provide diagnostics and related indication for short and open loop circuit.

f. Detector Output: Dry form C contact set, rated a minimum of 0.25 A at 24 Volts dc.

g. Operating humidity: 0 to 95 percent.

h. Operating temperature: -40 to 170 degrees F.

i. Vibration: NEMA TS-2 -2.1.9 or better.

j. Shock: NEMA TS-2 -2.1.10 or better.

k. User Selectable Operation Modes: presence, pulse on entrance, pulse on exit - factory set on presence mode.

l. User Selectable Operation: Fail Safe or Fail Secure - factory set at Fail Safe.

m. User selectable sensitivity boost feature, which boosts sensitivity after a presence detection and holds the increased sensitivity until the detection drops out, at which time sensor sensitivity returns to the original setting.

n. Power requirement: 120V/60Hz, or be provided with appropriate power module/assembly and appurtenance, which is suitable for operation with 120V/60Hz.

o. Loop Wire:

(1) Provide number of inductive loops as per manufacturer's recommendations based on loop size and distance between loop and loop amplifier.

(2) Ensure that the loop slots in which the loop wire is laid are free from debris, sharp objects, and are completely dry. Clean out slots with compressed air before installing loop wire.

(3) Install loop wire in layers. Install backer rods over top wire at a minimum of 1 foot spacing to ensure uniform placement of wire in the slot. Fill the loop slots with sealant per recommendation of the loop wire manufacturer.

(4) Use 16AWG stranded cable with Cross Linked Polyethylene insulation installed in a PVC sleeve. Loop wire extending from the loop to the loop amplifier shall be twisted with a minimum twist pitch of 6 per foot.

(5) Check conductor resistance to ground with "megger" of 500V or higher. Remove and replace the whole installation if ground resistance of less than 10 mega-Ohms is measured.

(6) Provide TVSS (Transient Voltage Surge Suppressor) for both loop-wire terminations at or near the loop detector module. Ground the TVSS with minimum 10AWG insulated ground wire of high strand-count to the closest ground termination point.

(7) Loops shall be capable of detecting motorcycles, passenger vehicles, and high bed trucks with the same sensitivity setting.

2.9 ACTUATED TRAFFIC ARMS

Traffic arms in the ID Check Area shall be controlled by control switches in the Guard Booths. The housing for the traffic arm controller shall be weather proof and constructed of stainless steel not less than 14 gauge, carbon steel not less than 1/8 inch thick, or cast steel not less than 1/4 inch thick. All seams, joints, and supports shall be electric bead welded. Access to the motor compartment shall be provided with a removable cover secured in a weather proof manner with a lock.

2.9.1 Traffic Arm Assembly

The traffic arm drive assembly shall be directly linked to the gear motor by a heavy duty connecting rod. The traffic arm travel shall not exceed 4 seconds for raising or lowering. Override stops shall be provided to limit the gate arm travel in vertical or horizontal position and shall operate through 90 degrees. The assembly shall be capable of a minimum of 500 duty cycles per hour. A motor of at least 1/3 HP shall be used to power the system. The traffic arm assembly shall consist of a hollow aluminum assembly, wood, steel or fiberglass material with a length of 9 feet. Provide a spare arm for each traffic arm assembly. The traffic arm shall be covered with retroreflective red and white sheeting. See MUTCD for proper orientation of sheeting. Each traffic arm shall be equipped with an obstruction detector that will automatically reverse the traffic arm motor when an obstruction is detected.

2.10 WIRE AND CABLE

Provide all wire, cable, and conduit connecting all Contractor furnished and, where indicated on the drawings, Government furnished equipment. Wiring shall be in accordance with NFPA 70. The wiring shall be copper cable in accordance with the manufacturers' requirements. Copper signaling line circuits and initiating device circuit field wiring shall be No. 18 AWG size conductors at a minimum. Wire size shall be sufficient to prevent voltage drop problems. Circuits operating at 24 VDC shall not operate at less than 21.6 volts. Circuits operating at any other voltage shall not have a voltage drop exceeding 5 percent of nominal voltage.

2.10.1 Cable Construction

All cable components shall withstand the environment in which the cable is installed for a minimum of 20 years.

2.11 POWER LINE SURGE PROTECTION

Equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall withstand surge test waveforms described in IEEE C62.41.1 and IEEE C62.41.2. Fuses shall not be used for surge protection.

2.11.1 Device Wiring and Communication Circuit Surge Protection

Inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. Communications equipment shall be protected against surges induced on any communications circuit. Cables and conductors which serve as communications circuits between systems shall have surge protection circuits installed at each end. Protection shall be furnished at equipment, and additional triple electrode gas surge protectors rated for the application on each wireline circuit shall be installed within 3 feet of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two waveforms:

a. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 Volts and a peak current of 60 amperes.

b. An 8 microsecond rise time by 20 microsecond pulse width waveform with a peak voltage of 1000 Volts and a peak current of 500 amperes.

2.11.2 Power Line Conditioners

A power line conditioner shall be furnished for equipment in each subsystem. The power line conditioners shall be of the Ferro-resonant design, with no moving parts and no tap switching, while electrically isolating the secondary from the power line side. The power line conditioners shall be sized for 125 percent of the actual connected kVA load. Characteristics of the power line conditioners shall be as follows:

a. At 85 percent load, the output voltage shall not deviate by more than plus or minus 1 percent of nominal when the input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.

b. During load changes of zero to full load, the output voltage shall not deviate by more than plus or minus 3 percent of nominal. Full correction of load switching disturbances shall be accomplished within 5 cycles, and 95 percent correction shall be accomplished within 2 cycles of the onset of the disturbance.

c. Total harmonic distortion shall not exceed 3.5 percent at full load.

2.12 FACTORY ACCEPTANCE TEST

2.12.1 General

Provide personnel, equipment, instrumentation, and supplies necessary to perform a Factory Acceptance Test of the complete Active Vehicle Barrier Control System. The Factory Acceptance Test shall demonstrate the required barrier. The test shall also demonstrate the required alarm annunciation and sequence of events recording. The test set-up must include the Traffic Controller Unit; the Gatehouse Control Console with all control panels, control switches; and all Alarm Panels. The active vehicle barrier open and close position switches the VPDs may all be simulated.

2.12.2 Test Plan

In accordance with the Group III Technical Data Package, submit a Test Plan including a schedule, test procedures, equipment catalog cuts, one line diagrams showing interconnections of all subsystem components, and diagrams showing control logic for the barriers, traffic signals, and alarm and status points to the Project Manager 30 days prior to the proposed test start date of the Factory Acceptance Test.

2.12.3 Test

Upon Test Plan approval by the Project Manager, assemble the test system and perform the Factory Acceptance Test. The Factory Acceptance Test shall demonstrate that the subsystems comply with the requirement specified herein. The Factory Acceptance Test shall be conducted during regular daytime working hours on weekdays. The Project Manager reserves the right to witness all or a portion of the Factory Acceptance Test.

2.12.4 Test Report

Within seven days of successful completion of the Factory Acceptance Test, submit a Test Report to the Project Manager documenting the results of the test. The Test Report shall include the results of all test procedures showing all commands, stimuli, and responses to demonstrate compliance with the contract requirements. The Test Report shall also include a certification from Technical Specialists from the active vehicle barrier and the Traffic Controller Unit that their subsystem meets the contract requirements. The Project Manager will notify the Contractor within 7 days of receipt of the Test Report whether the Test Report is approved. If disapproved, the Project Manager will note the specific procedures that are disapproved; retest those procedures. Do not ship equipment to the field until the Test Report is approved by the Project Manager.

PART 3 EXECUTION

3.1 EXAMINATION

After becoming familiar with all details of the work, verify that site conditions are in agreement with the contract drawings. In accordance with Group II Technical Data Package, prepare a report describing any differences in site conditions or conditions that will affect performance of the system to the Project Manager. Do not take any corrective action without written permission from the Project Manager.

3.1.1 Sub-surface Conflicts

Verify all existing conditions prior to performing any work. Locate all underground utilities and structures, including publicly and privately owned, prior to excavating. Coordinate with all involved parties in order to accomplish indicated work with minimal interference to existing underground utilities and structures. If unforeseen conditions exist that prohibit the execution of work as indicated, immediately coordinate with Project Manager for viable alternative solutions.

3.2 INSTALLATION

3.2.1 Oversight

The Contractor designated Technical Specialist from the AVBCS shall oversee installation.

3.2.2 Installation Schedule

Before beginning any site work, provide a schedule of all installation and testing activities. The project activities in the proposed schedule shall be arranged in chronological order. All installation and testing activities, specifically those requiring ACP outages, shall be coordinated with the Project Manager. No site work shall be done without an approved schedule by the Project Manager.

3.2.3 Wiring

Furnish and install all cables and conduits for all wiring interconnecting Contractor furnished equipment. Install all wiring per NFPA 70.

3.2.4 Grounding

Provide adequate grounding system for all equipment in this scope of work.

3.2.5 Enclosure Penetrations

Enclosure penetrations shall be from the bottom unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in a manner that does not damage the cable.

3.2.6 Cold Galvanizing

Field welds and/or brazing on factory galvanized boxes, enclosures, conduits, etc., shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.

3.2.7 Other Requirements

Install the system in accordance with the standards for safety included in NFPA 70 and the appropriate installation instructions from the manufacturers of the equipment. Components within the system shall be configured with appropriate service points to pinpoint system trouble in less than 20 minutes.

3.2.8 Layout

All vehicle barrier installations shall be laid out and certified by a Registered Professional Land Surveyor in accordance with the Contract Documents and approved Shop Drawings, prior to installation.

3.2.9 Soil Conditions

3.2.9.1 Comparable Soils

Certify that the existing soil conditions are comparable to those in the Crash Test Report. If not, either remedy the soil conditions at each foundation point or provide additional testing to verify that the actual soil conditions provide the required performance.

3.2.9.2 Grade Between Terminal Posts

Ensure that the grade between terminal posts (and for no less than 10 feet on either side of the vehicle barriers, along the running length) is constant such that the cables consistently match the design distance from grade between terminal posts.

3.2.10 Protection

Ensure that adjacent structures, utilities, and roadways are protected from damage during construction.

3.2.11 Contractor's Project Manager Oversight

Contractor's project manager shall oversee all vehicle barrier installation activities.

3.2.12 Certified Installers

Vehicle Barriers shall be installed by manufacturer certified installers in accordance with manufacturer's written installation instructions. Submit Manufacturer's Written Installation Instructions.

3.2.13 Manufacturer's Representative

Manufacturer's representative is required to inspect vehicle barrier installation.

3.2.14 Vertical Alignment

Install all vertical elements plumb and in alignment with a tolerance of 1/2 inch.

3.2.15 Horizontal Alignment

Install all horizontal elements in the alignment indicated on the approved Shop Drawings with a tolerance of 1/2 inch in 6 feet-6 inches.

3.2.16 Field Welding

Field welding is unacceptable as it will cause significant damage to the galvanizing and powder coat protective finishes.

3.2.17 Field Cutting and Drilling

Avoid unnecessary cutting and drilling of pre-finished components. If necessary to cut or drill or otherwise modify product due to field conditions, repair factory finish in accordance manufacturer's written installation instructions.

3.2.18 Incidental Infrastructure

Provide all incidental construction as indicated. Incidental construction shall be designed and constructed in accordance with local/state DOT requirements, AASHTO GDHS-5, AASHTO RSDG-4, NCHRP 350, and the MUTCD.

3.3 CONTRACTOR FIELD TEST

In accordance with Group III Technical Data Package, the Contractor's Commissioning Team shall submit a Test Plan including a test schedule. Calibrate and test all equipment, verify communications links between all subsystem components and between subsystems, place the integrated system in service, and test the integrated system using the approved test procedures for the Performance Verification Test. Deliver a report certifying that the installed complete system has been calibrated, tested, and is ready to begin performance verification testing. The report shall also include certifications from the Technical Specialists of the Active Vehicle Barrier, Traffic Controller Unit, and equipment/subsystems that the equipment/subsystems have been installed and tested and that they meet the requirements of the specifications.

3.4 COMMISSIONING

3.4.1 General

Commissioning shall consist of successfully completing a Performance Verification Test, the training of Installation security and maintenance personnel, and successfully completing an Endurance Test as described below. Commissioning shall begin only after the Project Manager approves the Test Report from the Contractor Field Test and all materials in the Group IV Technical Data Package.

3.4.2 Commissioning Team Leader

Designate a Commissioning Team Leader to be responsible for scheduling all tests, coordinating attendance of all required Commissioning Team members, conducting the tests, and preparing appropriate Test Reports and the final

Commissioning Report.

3.4.3 Commissioning Team

The Commissioning Team shall consists of the Commissioning Team Leader; the Technical Specialists from the traffic arm supplier, the Traffic Controller Unit subsystem; a representative of the design agent; a Project Manager's representative; and a representative from the Installation. The programmer of the Traffic Controller Unit shall also be present during commissioning tests if he/she is not the Traffic Controller Unit Technical Specialist.

3.4.4 Training

3.4.4.1 General Requirements

Conduct training courses for designated personnel in the operation and maintenance of the ACPCS. The training shall be oriented to the specific system being installed. Training manuals shall be delivered for each trainee with 2 additional copies delivered for archiving at the project site. The manuals shall include an agenda, defined objectives for each lesson, and a detailed description of the subject matter for each lesson. Furnish audio-visual equipment and other training materials and supplies. Where the Contractor presents portions of the course by audio-visual material, copies of the audio-visual material shall be delivered to the Government either as a part of the printed training manuals or on the same media as that used during the training sessions. A training day is defined as 8 hours of classroom instruction, including two 15-minute breaks and excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. For guidance in planning the operator training for the guards, assume that guards will have a high school education or equivalent and are familiar with Access Control Points operations. For maintenance training, assume mechanical and electrical maintenance personnel typically employed at military installations. Approval of the planned training schedule shall be obtained from the Government at least 30 days prior to the training.

3.4.4.2 Guard's Training

The Guard Training Course shall be taught at the project site for a period of up to eight hours during or after the Contractor's field testing, but before commencing the performance verification test. A maximum of 12 personnel shall attend the course. No part of the training given during this course will be counted toward completion of the performance verification test. The course shall include instruction on the specific hardware configuration of the installed system and specific instructions for operating the installed system. Upon completion of this course, each student shall be able to operate the ACPCS including the following:

a. Operate the active vehicle barriers in both the Test, Local and EFO modes.

b. Understand the differences between the normal and EFO operation of the barriers.

c. Understand when to use Test, Local and EFO modes for each barrier.

d. Monitor, acknowledge, and reset alarms.

3.4.4.3 Maintenance Personnel Training

The Maintenance Personnel Training Course shall be taught at the project site for a period of up to eight hours during or after the Contractor's field testing, but before commencing the performance verification test. A maximum of 12 personnel shall attend the course. The course shall include the following:

a. Instruction on each equipment and its configuration in the installed system.

b. Trouble shooting and diagnostic procedures.

c. Component repair and replacement procedures.

d. Emphasis on the importance of periodic testing and preventative maintenance. Provide a list of periodic preventative maintenance tasks for the active vehicle barriers and other critical equipment.

e. Calibration procedures.

f. Review of system drawings to identify device locations, communications, topology, and flow.

3.4.4.4 System Manager Training

Two System Managers shall be trained for a minimum of 8 hours in addition to the Guard and Maintenance Personnel described above. System Manager Training shall provide training for trainers, such that, system managers will be able to train new guards and maintenance personnel in the future.

3.4.5 Performance Verification Test (PVT)

3.4.5.1 Test Plan

In accordance with the Group IV Technical Data Package, the Contractor's Commissioning Team Leader shall submit a Test Plan including a schedule, test procedures, equipment catalog cuts, one line diagrams showing interconnections of all subsystem components, and diagrams showing control logic for the barriers, and alarm and status points to the Project Manager 30 days prior to the proposed start date of the Performance Verification Test. For each test in the PVT, the test procedures shall clearly indicate which Commissioning Team members must witness and certify the test.

3.4.5.2 Test Equipment

Have the following equipment available for all PVT tests:

a. A minimum of 4 hand held radios/walkie-talkies.

b. Safety vests for all participants.

c. Stop watch.

d. Flash lights.

e. Multi-meter.

3.4.5.3 Test

Per approved test procedures and under the direction of the Contractor's Commissioning Team Leader, the Commissioning Team shall perform a Performance Verification Test of the installed Access Control Point Control System. The PVT shall demonstrate that the system complies with the requirements specified herein. Where possible, the PVT shall be conducted during regular daytime working hours on weekdays. At the successful completion of each test in the PVT, appropriate Commissioning Team Members shall sign the completed test procedure to certify that the test was successful.

3.4.5.4 Test Report

Within 7 days of successful completion of the PVT, the Contractor's Commissioning Team Leader shall submit a Test Report to the Project Manager documenting the results of the test. The Test Report shall include the results of all test procedures showing all commands, stimuli, and responses to demonstrate compliance with the contract requirements. The Test Report shall also include a certification from each Commissioning Team member that the tests were successful. The Project Manager will notify the Contractor, within 7 days of receipt of the Test Report, whether the Test Report is approved. If disapproved, the Project Manager will note the specific procedures that are disapproved; retest those procedures. Do not start the Endurance Test until the PVT Test Report is approved by the Project Manager.

3.4.6 Adjusting and Cleaning

3.4.6.1 Clean Jobsite

Clean jobsite of excess materials and other debris.

3.4.6.2 Above Ground Components

Thoroughly clean all above ground components of concrete spatter and dirt.

3.4.6.3 Tensioning

After installing all barriers, ensure that the tensioning of all cable is in accordance with manufacturer's written installation instructions.

3.4.6.4 Metal Finishes

Repair damage to coated and painted finishes in accordance with manufacturer's written installation instructions. In the case where the manufacturer does not have written instructions, submit recommended coating repair instructions (referencing published standards) for approval.

3.4.7 Commissioning Report

Upon successful completion of the Endurance Test, the Contractor's Commissioning Team Leader shall prepare a Commissioning Report documenting that the Contractor has successfully completed the PVT and Endurance Test and recommending that the completed system be accepted. The Commissioning Report shall include signatures of the Commissioning Team.

3.5 APPENDIX A

APPENDIX A

Normally Deployed Active Barrier Safety System

1 NORMALLY DEPLOYED SYSTEM FEATURES. Provide the following features for the Barrier Normally Closed Safety System:

1.1 Vehicle presence detectors located immediately before and immediately after each barrier. Presence detectors can be induction loops, video motion sensors, or other suitable technologies capable of sensing vehicle presence.

1.2 One Master Control Panel and one Guard Booth Control panel for each Guard Booth along with all control switches and indicating lights as shown on the Drawings. The Master Control Panel will normally be located in the Gatehouse for use by the lead ACP guard.

1.3 An Actuated Traffic Arm for each inbound lane in the ID Check Area. ATAs shall be installed near the Guard Booths as shown on the Drawings. An ATA Control Panel with Open and Close control switches for the ATA shall be provided and mounted in the Guard Booth.

2 BARRIER CONTROL SWITCHES.

2.1 Per the Drawings, the traffic arm control system shall have one Control Power On/Off switch, one key operated 3 position Manual - Auto - Off mode selector switch for the traffic arms.

3 TRAFFIC SIGNAL AND BARRIER CONTROLS.

3.1 AUTO MODE OF OPERATION.

3.1.1 The close circuit for all barriers shall be supervised by the Vehicle Presence Detectors (VPDs) in front of and behind the barrier, such that if either VPD detects a vehicle, the barrier close circuit shall be suppressed.

3.2 MANUAL MODE OF OPERATION. When the Barriers Manual - Auto - Off mode switch is placed in the Manual mode, the barriers shall be controlled from the individual barrier Open and Close switches on the Master Control Panel. Initiation of a Close command to an open barrier shall cause that barrier's Traffic Signal to change from Green to Amber for 3 seconds and then to Red. After an additional one second of Red, the barrier's close circuit shall be energized through the VPD's immediately in front of and behind the barrier. If the VPDs are clear, the barrier shall close. Initiation of an Open commend to a closed barrier shall energize the open circuit for the barrier and open the barrier. After the barrier is fully open, the Traffic Signal shall change from Red to Green. In the Manual mode, barriers can be opened.

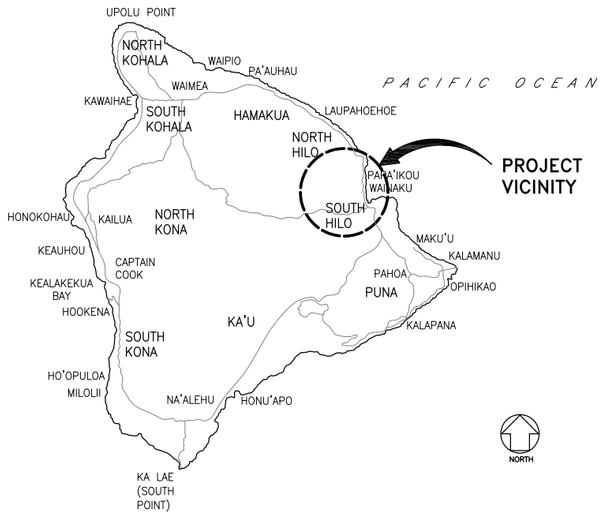
-- End of Section --

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

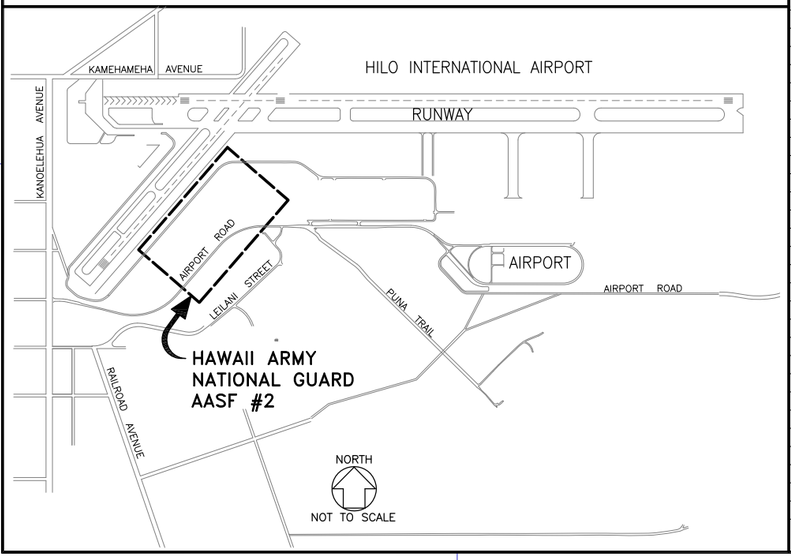
AASF #2 FENCE REPLACEMENT

HILO, HAWAII

VICINITY MAP



LOCATION MAP



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SYM	DESCRIPTION	DATE	APPR

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DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HILO, HAWAII
AASF #2
FENCE REPLACEMENT
TITLE SHEET, LOCATION MAP, VICINITY MAP, AND INDEX OF DRAWINGS

SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140024

SHEET 1 OF 14

G-01

TCL #1 04/09/15
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LIST OF ABBREVIATIONS

AASF	ARMY AVIATION SUPPORT FACILITY
ABAND	ABANDONED
A.C., AC	ASPHALT CONCRETE
A/C	AIR CONDITIONING
APPROX	APPROXIMATE
ARV	AIR RELEASE VALVE
BC	BOTTOM CURB
BFP	BACK FLOW PREVENTER
BLDG	BUILDING
BOT., BOT	BOTTOM
BW	BOTTOM WALL
CATV	CABLE TELEVISION
C.B., CB	CATCH BASIN
C.L.	CHAIN LINK
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL.	COLUMN
COMM.	COMMUNICATION
CONC., CONC	CONCRETE
CRM	CONCRETE RUBBLE MASONRY
D	DIAMETER OR DRAIN
D.I.	DRAIN INLET
DS	DOWNSPOUT
DWY.	DRIVEWAY
E, ELEC	ELECTRIC
ELEV., EL., ELEV	ELEVATION
EXIST, E/	EXISTING
F.A. BOX	FIRE ALARM BOX
F.H., FH	FIRE HYDRANT
FM	FORCE MAIN
G	GAS
G.I.	GRATED INLET
GMH	GAS MANHOLE
GND., GND	GROUND
G.P.	GUARD POST/GUY POLE/GATE POST
G.W.	GUY WIRE
GV	GATE VALVE
H	HEIGHT
H.B., HB	HOSE BIBB
HH	HAND HOLE
ICV	IRRIGATION CONTROL VALVE
INV., INV	INVERT
JTS	JOINT TRUNKING SYSTEM
LAT	LATERAL
L.P.	LIGHT POLE
MAX., MAX	MAXIMUM
MH	MANHOLE
MIN., MIN	MINIMUM
O/H	OVERHEAD
PAV'T., PAVT	PAVEMENT
P/N	PROJECT NUMBER
P.M.	PARKING METER
P.P.	POWER POLE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSL	PEDESTRIAN SIGNAL LIGHT
REQ'D	REQUIRED
S	SEWER OR SPREAD
SC	SIGNAL CORPS
SCMH	SIGNAL CORPS MANHOLE
SDMH	STORM DRAIN MANHOLE
S.L., SL	STREET LIGHT OR SEWER LINE
SLB	STREET LIGHT BOX
SMH	SEWER MANHOLE
SPR.	SPRINKLER
ST. NAME	STREET NAME
STA., STA	STATION
TC	TOP CURB
TDC	TOP DROP CURB
TEL., TEL	TELEPHONE
TP	TOP PIPE
TRC	TOP ROLLED CURB
TS	TOP STEM
TV	TOP VALVE
TW	TOP WALL
TYP., TYP	TYPICAL
U.P.	UTILITY POLE
U.P./S.L.	UTILITY POLE W/STREET LIGHT
W	WATER OR WIDTH
WL	WATER LINE
WM	WATER METER
WWF	WELDED WIRE FABRIC
WWH	WATER MANHOLE
WV	WATER VALVE
X-WALK	CROSS WALK

SYMBOLS

EXISTING		NEW	
	A.C. PATCH		6-FT-HIGH FENCE
BFP	BACKFLOW PREVENTER		8-FT HIGH FENCE
B-1	BORING LOCATION		REMOVE EXIST FENCE
	BUILDING		PROPERTY LINE
	CHAIN LINK FENCE		
	CONCRETE PAVEMENT		
110	CONTOUR LINE		
	CONTROL POINT		
	DIRT ROAD		
D15	DRAIN LINE		
E	ELECTRIC DUCT		
	ELEC MANHOLE		
	ELEC PULLBOX		
FH #115	FIRE HYDRANT		
G.V.	GATE VALVE		
G.P.	GUARD POST		
H.B.	HOSE BIBB		
	LAMP POLE		
S8	SEWER LINE		
SMH	SEWER MANHOLE		
	SIGNS, VARIOUS TYPES		
107.7	SPOT ELEVATION		
	STORM DRAIN INLET		
SDMH	STORM DRAIN MANHOLE		
	TREES, VARIOUS TYPES		
UL	UNDERGROUND LIGHTING		
US	UNDERGROUND SECONDARY ELECTRICAL		
UP	UNDERGROUND PRIMARY ELECTRICAL		
	UTILITY POLE		
W8	WATER LINE		
WV	WATER VALVE		
WM	WATER METER		

CROSS REFERENCING SYSTEM

SECTION IDENTIFICATION LETTER

A
C-39|C-40

NUMBER OF SHEET ON WHICH SECTION IS TAKEN

NUMBER OF SHEET ON WHICH SECTION IS DRAWN

SYMBOL WHERE SECTION IS TAKEN

SECTION A
SCALE: 1/4" = 1'-0" C-39|C-40

SUBTITLE FOR SECTION DRAWING

DETAIL IDENTIFICATION NUMBER

2
C-39|C-40

NUMBER OF SHEET ON WHICH DETAIL IS REFERENCED

NUMBER OF SHEET ON WHICH DETAIL IS SHOWN

SYMBOL FOR CONDITION FOR WHICH THERE IS A DETAIL

DETAIL 2
SCALE: 1/4" = 1'-0" C-39|C-40

SUBTITLE FOR DETAIL DRAWING

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HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

AASF #2
FENCE REPLACEMENT

SYMBOLS AND ABBREVIATIONS

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140024
SHEET 2 OF 14

G-02

PM: TDL
OPER: PT
DATE REV: 04/09/15

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SCALE: 1"=30'-0"
FILE: 20130333-401

GENERAL NOTES:

1. ELEVATIONS SHOWN ARE BASED ON MEAN SEA LEVEL ELEVATION (ELEVATION = 0 FEET).
2. DIMENSIONS TAKE PRECEDENCE OVER SCALE.
3. THE TOPOGRAPHIC SURVEY WAS PREPARED BY CONTROLPOINT SURVEYING INC. DATED AUGUST 2014 AND SUPPLEMENTARY INFORMATION FROM RECORD DRAWINGS AND FIELD INVESTIGATIONS BY HDR. THE DRAWINGS DO NOT REFLECT SITE CHANGES THAT HAVE OCCURRED SINCE THE TOPOGRAPHIC SURVEY WAS COMPLETED.
4. AZIMUTHS ARE REFERENCED FROM TRUE SOUTH = 0° 00' 00" AND INCREASE CLOCKWISE.
5. DURING NON-WORKING HOURS, ALL TRENCHES AND EXCAVATIONS SHALL BE BARRICADED, COVERED AND/OR MARKED.
6. THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES AS SHOWN ON THE PLANS ARE BASED ON THE AVAILABLE DATA. THE CONTRACTOR SHALL TONE THE PROJECT AREA, VERIFY THE LOCATIONS AND DEPTHS OF THE EXISTING UTILITIES SHOWN AND EXERCISE CARE WHEN EXCAVATING IN THE AREA.

   WHEREVER CONNECTIONS AND CROSSINGS OF PROPOSED UTILITIES TO EXISTING UTILITIES ARE SHOWN, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES. IF UTILITIES NOT SHOWN ARE ENCOUNTERED, OR IF POTENTIAL UTILITY CONFLICTS ARISE, NOTIFY THE PROJECT MANAGER IMMEDIATELY. THE CONTRACTOR SHALL PROVIDE STRUCTURAL SUPPORT FOR ALL EXISTING UTILITY LINES UNCOVERED IN THE TRENCHES.
7. IF EXISTING UTILITIES, WHETHER OR NOT SHOWN ON PLANS, ARE DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL REPAIR SUCH UTILITIES AT HIS OWN EXPENSE.
8. CONTRACTOR SHALL, AT HIS OWN EXPENSE, KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE AND WITHIN ALLOWABLE NOISE LEVELS. THE WORK SHALL BE IN CONFORMANCE WITH AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.
9. THE CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM HIS WORK DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS. THE COSTS INCURRED FOR ANY NECESSARY REMEDIAL ACTION SHALL BE PAYABLE BY THE CONTRACTOR.
10. EXISTING SITE DRAINAGE SYSTEMS SHALL BE FUNCTIONAL AT ALL TIMES.
11. PRIOR TO COMMENCING EXCAVATION, THE CONTRACTOR SHALL NOTIFY THE PROJECT MANAGER. THE CONTRACTOR SHALL COORDINATE, BE HELD RESPONSIBLE AND PAY FOR ALL DAMAGE TO EXISTING UTILITIES AND STRUCTURES. PERSONAL INJURY RESULTING FROM CONTACT WITH THE EXISTING UTILITIES SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
12. EXISTING UTILITIES SHALL REMAIN IN-SERVICE AND IN PLACE. IF RELOCATION OF EXISTING UTILITIES IS REQUIRED FOR THE CONTRACTOR'S CONVENIENCE, INTERRUPTION OF SERVICE SHALL BE KEPT TO A MINIMUM AND SHALL BE DONE AT THE CONTRACTOR'S EXPENSE AND ONLY WITH THE APPROVAL OF THE PROJECT MANAGER.
13. IF DEWATERING IS REQUIRED, DISPOSE DEWATERING EFFLUENT WITHOUT DISCHARGE TO WATERS OF THE STATE OF HAWAII, STORM DRAIN SYSTEMS, DRAINAGE SWALES, ETC. THE DEWATERING EFFLUENT WILL NOT BE ALLOWED TO POND, EXCEPT IN AREAS APPROVED BY THE PROJECT MANAGER. IF DISCHARGE OF DEWATERING EFFLUENT IS REQUIRED, CONTRACTOR IS RESPONSIBLE TO OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PRIOR TO DISCHARGING TO THE STORM DRAINAGE SYSTEM. DEWATERING INTO SANITARY SEWER SYSTEM IS PROHIBITED.
14. THE CONTRACTOR SHALL RESTORE TO THEIR ORIGINAL CONDITION, WHETHER OR NOT SHOWN ON PLANS, 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 AT CONTRACTOR'S EXPENSE.
15. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND LICENSES REQUIRED. THE CONTRACTOR SHALL CONDUCT ALL TESTS AS REQUIRED BY THE CONSTRUCTION MANAGER AND BE RESPONSIBLE FOR ALL EXPENSES INCURRED IN CONDUCTING THESE TESTS.
16. THE CONTRACTOR SHALL VERIFY AND CHECK ALL DIMENSIONS, ELEVATIONS, AND DETAILS SHOWN ON THE DRAWINGS PRIOR TO START OF CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE PROJECT MANAGER OF ANY DISCREPANCY OR CONFLICT FOUND IN THE FIELD PRIOR TO OR DURING THE COURSE OF CONSTRUCTION AND SHALL NOT PROCEED WITH CONSTRUCTION UNTIL THE PROJECT MANAGER RESOLVES THE SAID DISCREPANCY OR CONFLICT. DIMENSIONS AND ELEVATIONS SHOWN ARE BASED ON LIMITED FIELD MEASUREMENTS AND ORIGINAL CONSTRUCTION DRAWINGS. DIMENSIONS AND ELEVATIONS FOR THE NEW WORK SHALL BE ADJUSTED AS REQUIRED BASED ON THE CONTRACTOR'S FIELD MEASUREMENTS WITH THE APPROVAL OF THE PROJECT MANAGER.

GENERAL NOTES (CONTINUED):

17. THE CONTRACTOR SHALL BEAR ALL COSTS ASSOCIATED WITH THE REMOVAL/ AVOIDANCE OF ABANDONED UTILITIES, WHETHER OR NOT SHOWN ON PLANS.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER QUALITY AND WATER POLLUTION CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS" AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL". BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING THE CONSTRUCTION PERIOD.
19. THE CONTRACTOR SHALL OBTAIN AND COMPLY WITH NPDES PERMIT REQUIREMENTS FOR ALL PROJECTS WHICH WILL DISTURB ONE (1) ACRE OR MORE OF LAND. THE CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL NOTICE OF GENERAL PERMIT COVERAGE IS RECEIVED FROM THE DEPARTMENT OF HEALTH, STATE OF HAWAII AND ANY OTHER APPLICABLE REQUIREMENTS OF THE NPDES PERMIT PROGRAM HAVE BEEN MET.
20. IF CAVITIES AND/OR VOIDS ARE ENCOUNTERED DURING EXCAVATION WORK, STOP WORK IMMEDIATELY AND NOTIFY THE PROJECT MANAGER.
21. CONFINE ACTIVITIES WITHIN THE PROJECT LIMITS.
22. PROJECT MANAGER IS THE COORDINATOR BETWEEN THE CONTRACTOR AND ACTIVITY. NOTIFY THE PROJECT MANAGER PRIOR TO CONTACTING THE ACTIVITY. COORDINATE ALL WORK WITH THE PROJECT MANAGER TO ENSURE THAT CONSTRUCTION ACTIVITIES DO NOT INTERFERE WITH BASE OPERATIONS.
23. THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH, SAFETY AND ENVIRONMENTAL QUALITY.
24. ALL WORK PERFORMED SHALL COMPLY WITH US ARMY CORPS OF ENGINEERS EM 385-1-1, SAFETY AND HEALTH REQUIREMENTS, AND WITH ALL APPLICABLE FEDERAL, SAFETY AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH, SAFETY AND ENVIRONMENTAL QUALITY. WHERE REQUIREMENTS VARY, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
25. THE CONTRACTOR SHALL PROVIDE SAFE ACCESS TO AND FROM ALL DRIVEWAYS AND STREETS.
26. THE CONTRACTOR SHALL PLAN OPERATIONS TO MINIMIZE THE AMOUNT OF EXCAVATED TRENCHES LEFT OPEN AT THE END OF EACH WORK DAY WITH THE TOTAL LENGTH OF OPEN TRENCHES NOT TO EXCEED 500 FEET. OPEN TRENCHES SHALL BE COVERED BY NON-SKID STEEL PLATES CAPABLE OF CARRYING H-20 VEHICLES IN TRAFFIC AREAS AND 100 POUNDS PER SQUARE FOOT IN NON-TRAFFIC AREAS. PROVIDE ANCHORING OF THE PLATES IN NON-TRAFFIC AREAS. PROVIDE FLASHING BARRICADES TO DELINEATE COVERED TRENCHES IN NON-TRAFFIC AREAS AND ALL STOCK/SPOIL PILES.
27. WHEREVER EXISTING FENCE IS REMOVED, REINSTALL CHAIN LINK FENCE AS NECESSARY TO SECURE PROTECTED AREAS PRIOR TO THE END OF EACH WORK DAY. TRENCHES CROSSING ANY FENCE, EXISTING OR PROVIDED, SHALL NOT BE LEFT OPEN DURING NON-WORK HOURS. BACKFILL A MINIMUM OF 10 FEET ON EACH SIDE OF FENCE AT THE END OF WORK DAY. OTHER MEASURES MAY BE UTILIZED AS APPROVED BY THE PROJECT MANAGER.

ARCHAEOLOGICAL NOTES:

1. PURSUANT TO CHAPTER 6E OF THE HAWAII REVISED STATUTES, ALL CONTRACTORS SHALL ENSURE THAT IN THE EVENT THAT ANY HUMAN SKELETAL REMAINS ARE INADVERTENTLY DISCOVERED DURING CONSTRUCTION, THE REMAINS SHALL NOT BE MOVED AND ANY ACTIVITY IN THE IMMEDIATE AREA THAT COULD DAMAGE THE REMAINS OR THE POTENTIAL HISTORIC SITE SHALL CEASE AND THE DEPARTMENT OF LAND AND NATURAL RESOURCES' HISTORIC PRESERVATION DIVISION (TELEPHONE: 243-5119), THE APPROPRIATE MEDICAL EXAMINER OR CORONER, AND THE POLICE DEPARTMENT (TELEPHONE: 244-6400), SHALL BE CONTACTED. SEE SECTION 00710, "GENERAL CONDITIONS", PARAGRAPH 6.6, "UNAVOIDABLE DELAYS" IF ARCHAEOLOGICAL FINDINGS RESULT IN UNAVOIDABLE DELAYS TO THE PROJECT.
2. CAREFULLY PROTECT IN-PLACE AND REPORT IMMEDIATELY TO THE PROJECT MANAGER HISTORICAL AND ARCHAEOLOGICAL ITEMS, HUMAN SKELETAL REMAINS, STONE WALLS, STONE TOOLS, SHELL MIDDENS OR CHARCOAL DEPOSITS DISCOVERED IN THE COURSE OF WORK. STOP WORK IN THE IMMEDIATE AREA OF THE DISCOVERY UNTIL DIRECTED BY THE PROJECT MANAGER TO RESUME WORK. THE PROJECT MANAGER MAY REQUIRE THE CONTRACTOR TO RELOCATE TO OTHER PORTIONS OF THE PROJECT WHILE RECOVERY OPERATIONS, IF NECESSARY, ARE CONDUCTED. THE CONTRACTOR SHALL FOLLOW THE DIRECTIONS OF THE HIARNG ENVIRONMENTAL BRANCH SHOULD ARTIFACTS AND BURIALS BE DISCOVERED.
3. THE GOVERNMENT RETAINS OWNERSHIP AND CONTROL OVER HISTORICAL AND ARCHAEOLOGICAL RESOURCES.

TRAFFIC CONTROL NOTES:

1. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES, AND OTHER PROTECTIVE FACILITIES SHALL CONFORM WITH THE TRAFFIC REGULATIONS "ADMINISTRATIVE RULES OF HAWAII GOVERNING THE USE OF TRAFFIC CONTROL DEVICES AT WORK SITES ON OR ADJACENT TO PUBLIC STREETS AND HIGHWAYS", ADOPTED BY THE DIRECTOR OF TRANSPORTATION, AND THE CURRENT U.S. FEDERAL HIGHWAY ADMINISTRATION "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, PART VI – STANDARDS AND GUIDES FOR TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION, MAINTENANCE, UTILITY, AND INCIDENT MANAGEMENT OPERATIONS".
2. ALL LANES SHALL BE OPENED TO TRAFFIC DURING THE MORNING PEAK HOURS OF 6:30 A.M. TO 8:30 A.M. AND DURING THE AFTERNOON PEAK HOURS FROM 3:00 P.M. TO 5:00 P.M. DURING WORKING HOURS, TWO LANES OF TRAFFIC SHALL BE OPEN AT ALL TIMES. FOR STREETS WITH TWO LANES, ONLY ONE LANE OF TRAFFIC SHALL BE CLOSED AT ANY ONE TIME. THE CONTRACTOR SHALL PROVIDE AT LEAST TWO FLAGMEN TO DIRECT ALTERNATING TRAFFIC IN THE OPEN LANE. THE CONTRACTOR SHALL PROVIDE ONE LANE FOR TRAFFIC ACCESS TO ALL DRIVEWAYS, PARKING AREAS, ETC. AT ALL TIMES.
3. DURING NON-WORKING HOURS, ALL LANES SHALL BE OPEN TO TRAFFIC. ALL TRENCHES SHALL BE COVERED WITH NON-SKID BRIDGING MATERIAL WITH SUITABLE MATERIAL AT THE EDGES TO PROVIDE A SMOOTH TRANSITION.
4. WHEREVER PEDESTRIAN WALKWAYS EXIST, THEY SHALL BE MAINTAINED IN PASSABLE CONDITION OR OTHER FACILITIES FOR PEDESTRIANS SHALL BE PROVIDED. PASSAGE BETWEEN WALKWAYS AT INTERSECTIONS SHALL LIKEWISE BE PROVIDED.
5. THE CONTRACTOR SHALL REPLACE OR REPAIR ALL TRAFFIC SIGNS, POSTS, AND MARKINGS DISTURBED BY THE CONTRACTOR'S ACTIVITIES TO EXISTING CONDITIONS OR BETTER.
6. THE CONTRACTOR SHALL COORDINATE ALL TRAFFIC CONTROL PLANS WITH THE PROJECT MANAGER.

ACCESS TO PROJECT SITE AND MAINTAINING HAWAII NATIONAL GUARD AREA PERIMETER SECURITY NOTES:

1. THE PROJECT IS GENERALLY LOCATED WITHIN A SECURED PERIMETER AREA HOUSING THE HAWAII ARMY NATIONAL GUARD AASF #2 COMPLEX. THE SECURED PERIMETER RUNS ALONG AIRPORT ACCESS ROAD AND HIARNG AIRFIELD. VEHICLE ACCESS IS CONTROLLED BY SECURED GATE NEAR AASF BUILDING. THE AIRPORT OPERATIONS AREA IS SECURED AT ALL TIMES.
2. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH THE PROJECT MANAGER IMPACTS AND DISRUPTION TO GATE FACILITIES AND OPERATION(S). TEMPORARY RELOCATION OF GATE SECURITY FACILITIES AND TEMPORARY ACCESS CONTROL MAY BE BY THE HAWAII NATIONAL GUARD OR BY THE CONTRACTOR AS DIRECTED. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS FOR TEMPORARY AND RESTORATION WORK, AND SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE CONTRACT. TEMPORARY ACCESS VIA OTHER AVAILABLE GATES SHALL BE COORDINATED WITH THE PROJECT MANAGER AND SHALL BE PROVIDED FOR BY THE CONTRACTOR AS DIRECTED.
3. CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE ALL GATE FACILITIES AND OPERATIONS BACK TO ORIGINAL CONDITIONS AND AS DIRECTED AT NO ADDITIONAL COST TO THE CONTRACT.
4. CONTRACTOR SHALL COORDINATE ACCESS FOR ALL CONTRACTOR PERSONNEL, VEHICLES, EQUIPMENT, AND DELIVERIES, AND SHALL OBTAIN PERMISSIONS, CLEARANCES, PASSES, ETC. AS REQUIRED FROM THE HAWAII ARMY NATIONAL GUARD. SECURITY IDENTIFICATION BADGES SHALL BE COORDINATED AND OBTAINED WITH THE PROJECT MANAGER AND DEPARTMENT OF TRANSPORTATION, AIRPORTS DIVISION, HILO INTERNATIONAL AIRPORT. FOR AIRPORT IDENTIFICATION BADGES, SCHEDULE WITH BADGING OFFICE AT (808) 961-9350. CONSTRUCTION VEHICULAR TRAFFIC SHALL BE ONLY VIA GATES AS DIRECTED BY THE HAWAII ARMY NATIONAL GUARD.
5. CONTRACTOR SHALL COORDINATE WITH THE PROJECT MANAGER DESIGNATION BY THE HAWAII NATIONAL GUARD OF SITE(S) WITHIN THE SECURED AREA FOR THE CONTRACTOR FIELD OFFICE AND BASE YARD.
6. AIRPORT OPERATIONS AREA (AOA) SHALL BE SECURED AT ALL TIMES DURING CONSTRUCTION. CONTRACTOR IS SUBJECT TO FINES BY TSA INSPECTORS AND AIRPORT SECURITY IF AOA IS FOUND TO BE UNSECURED.

EROSION/TEMPORARY DUST CONTROL NOTES:

1. DURING CONSTRUCTION, PREVENTIVE MEASURES SHALL BE USED TO CONTROL FORESEEABLE DUST, EROSION OR SEDIMENTATION PROBLEMS WHICH MAY ARISE AS WORK PROGRESSES.
2. FUGITIVE DUST AND SOLID WASTE DISPOSAL DURING GRUBBING AND GRADING ACTIVITIES SHALL MEET THE REQUIREMENTS OF STATE OF HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 60, AIR POLLUTION CONTROL AND CHAPTER 56, SOLID WASTE MANAGEMENT CONTROL.
3. ALL AREAS WHICH ARE AT FINAL GRADE SHALL BE IMMEDIATELY HYDROMULCHED AND SEEDED WITH COMMON BERMUDA GRASS AT A RATE OF 5 POUNDS PER 1000 SQUARE FEET OR PERMANENTLY LANDSCAPED.
4. ALL EXPOSED AREAS WHICH ARE NOT AT FINAL GRADE AND WHICH ARE TO BE LEFT EXPOSED LONGER THAN 6 WEEKS SHALL BE HYDROMULCHED AND SEEDED WITH COMMON BERMUDA GRASS.
5. REGRASS ALL EXPOSED AREAS.

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A/E INFO

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APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE: FINAL

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DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HILO, HAWAII

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

AASF #2
FENCE REPLACEMENT

GENERAL NOTES, SHEET 1

SCALE: AS NOTED

STATE JOB NO.: CA-1328-D

FEDERAL PROJECT NO.: 15140024

SHEET 3 OF 14

G-03

HAWAII ARMY NATIONAL GUARD ENVIRONMENTAL COMPLIANCE NOTES:

1. IN ORDER TO FACILITATE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA) REPORTING REQUIREMENTS, PRIOR TO PROJECT START AND WITHIN 30 DAYS OF COMPLETION OF THE PROJECT, CONTRACTOR SHALL SUBMIT TO HIARNG-ENV A HAZARDOUS MATERIAL INVENTORY LOG OF CHEMICAL PRODUCTS TO BE USED IN THE PROJECT, AND PROVIDE AN UPDATE NO LATER THAN 31 JANUARY OF EACH CALENDAR YEAR. THE LOG SHALL INCLUDE THE PRODUCT NAME AND MANUFACTURER ID NUMBER, CONTAINER SIZE, AMOUNT USED, AND MAXIMUM NUMBER OF CONTAINERS TO BE STORED ON SITE AT ANY GIVEN DAY DURING THE PROJECT. HIARNG-ENV MAY WAIVE THIS REQUIREMENT BASED UPON CONTRACTOR REQUEST. SAFETY DATA SHEETS (SDSs) SHALL BE PROVIDED OR MADE AVAILABLE TO THE PROJECT MANAGER AND HIARNG-ENV UPON REQUEST.

2. PRIOR TO PROJECT START, CONTRACTOR WILL PROVIDE TO HIARNG-ENV AND THE PROJECT MANAGER AN ESTIMATE OF THE MAXIMUM AMOUNT OF HAZARDOUS WASTE, UNIVERSAL WASTE, AND OTHER REGULATED WASTE (E.G., ASBESTOS, LEAD PAINT CHIPS, FLUORESCENT LAMPS, PCB BALLASTS) EXPECTED TO BE GENERATED PER MONTH, AND THE TOTAL AMOUNT ANTICIPATED TO BE STORED ON-SITE AT ANY GIVEN TIME. CONTRACTOR SHALL ALSO PROVIDE NAME OF DISPOSAL/RECYCLING FACILITIES AND TRANSPORTERS TO BE USED FOR HAZARDOUS WASTE, INCLUDING THEIR EPA ID NUMBERS; DISPOSAL/RECYCLING FACILITIES AND TRANSPORTERS USED MUST BE LISTED ON DRMS's LISTS OF QUALIFIED FACILITIES AND QUALIFIED TRANSPORTERS AT http://www.dispositionservices.dla.mil/newenv/hwdisposal.shtml. ALL WASTE WILL BE STORED IN A SECURED AREA PENDING REMOVAL FOR DISPOSAL, WITH SIGNAGE INDICATING CONTACT INFORMATION, AND SHALL BE MANAGED, PACKAGED, AND TRANSPORTED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS. MONTHLY WASTE GENERATION REPORTS SHALL BE PROVIDED TO HIARNG-ENV AND THE PROJECT MANAGER BY THE 5TH OF THE MONTH AFTER THE END OF THE MONTH BEING REPORTED. THE REPORTS SHALL INDICATE THE TYPE OF WASTE AND THE NUMBER OF POUNDS OF EACH TYPE GENERATED IN EACH CONTAINER EACH MONTH.

3. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS FOR DISPOSAL OF WASTE GENERATED FROM THIS PROJECT AND SHALL PROVIDE COPIES OF ALL WASTE DISPOSAL DOCUMENTATION (INCLUDING ANY REQUIRED LAB ANALYSES, WASTE PROFILES, AND ANY OTHER SUPPORTING DOCUMENTATION) TO THE HIARNG-ENV AND THE PROJECT MANAGER, ALONG WITH DRAFT COPIES OF THE WASTE MANIFESTS FOR REVIEW PRIOR TO WASTE SHIPMENT OFF-SITE FOR DISPOSAL. THE APPLICABLE HIARNG EPA ID NUMBER SHALL BE USED ON WASTE MANIFESTS, AND MANIFESTS WILL ONLY BE SIGNED BY INDIVIDUALS AUTHORIZED BY HIARNG-ENV.

4. ALL CONSTRUCTION SITES ARE SUBJECT TO THE REGULATIONS OF 40 CFR 112 OIL POLLUTION PREVENTION AND ARE REQUIRED TO PREPARE A SITE SPECIFIC SPILL PREVENTION, CONTROL AND COUNTERMEASURE (SPCC) PLAN IF STORING MORE THAN 1320 GALLONS (G) OF POL ON SITE. A COPY OF THE SPCC PLAN MUST BE SUBMITTED TO HIARNG-ENV BEFORE START OF THE PROJECT AND KEPT READILY AVAILABLE ON SITE. IF THE SITE IS STORING LESS THAN 1320 G OF POL NO SPCC PLAN IS REQUIRED, HOWEVER, THE CONTRACTOR SHALL IMPLEMENT THE APPLICABLE HIARNG SPCC PLAN.

5. CONTRACTOR, IN GENERAL, SHALL BE RESPONSIBLE FOR ASSESSING WHETHER THE PROJECT AND/OR PROJECT ACTIVITIES REQUIRE ENVIRONMENTAL PERMITS AND ARE RESPONSIBLE FOR OBTAINING, IMPLEMENTING AND MAINTAINING ALL APPLICABLE PERMIT REQUIREMENTS.

6. ALL PROJECTS THAT DISTURB MORE THAN 1 ACRE OF SOIL, INCLUDING PROJECTS THAT, CONSIDERED WITH OTHER RELATED PROJECTS (I.E., ARE PART OF A LARGER COMMON PLAN OF DEVELOPMENT OR SALE), CUMULATIVELY DISTURB MORE THAN 1 ACRE OF SOIL, ARE REQUIRED TO OBTAIN AN APPLICABLE POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGE PERMIT FROM THE HAWAII DEPARTMENT OF HEALTH (HDOH) AND IMPLEMENT ALL PERMIT REQUIREMENTS, PLANS, AND INSPECTIONS. SITES LESS THAN 1 ACRE ARE REQUIRED TO IMPLEMENT BEST MANAGEMENT PRACTICES (BMP'S) TO PREVENT CONTAMINATED STORMWATER FROM LEAVING THE SITE.

7. CONTRACTORS SHALL BE RESPONSIBLE FOR DETERMINING THE NEED FOR AND OBTAINING ANY ALL REQUIRED ENVIRONMENTAL PERMITS, E.G. NPDES PERMITS FOR CONSTRUCTION ACTIVITY, UNDERGROUND INJECTION CONTROL WELL (UIC), COUNT-REQUIRED INDUSTRIAL WASTEWATER DISCHARGE PERMITS, MINOR POLLUTION SOURCE AIR PERMITS, ETC. FOR ANY CONTRACT-RELATED WORK. THE HIARNG-ENV OFFICE SHALL BE COPIED ON ALL PERMIT CORRESPONDENCE, AND SHALL BE PROVIDED THE ORIGINAL COPY OF ALL PERMITS.

8. CONTRACTORS ARE REQUIRED TO INSTALL AND MAINTAIN STORMWATER BEST MANAGEMENT PRACTICES (BMPs) AND PROTECTIVE MEASURES (REGARDLESS OF PROJECT SIZE OR SCOPE) TO PREVENT THE POLLUTION OF STORMWATER TO THE MAXIMUM EXTENT PRACTICABLE (MEP).

9. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL EXISTING AND APPLICABLE HIARNG ENVIRONMENTAL PERMITS, E.G., NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS, UIC PERMITS, INDUSTRIAL WASTEWATER DISCHARGE PERMITS (IWDPs), INDIVIDUAL WASTEWATER SYSTEM (IWS) PERMITS, ETC.

HAWAII ARMY NATIONAL GUARD ENVIRONMENTAL COMPLIANCE NOTES (CONTINUED):

10. CONTRACTOR SHALL POST EMERGENCY CONTACT SIGN INDICATING THE NAME AND PHONE NUMBER FOR THE PROJECT MANAGER, THE CONTRACTOR EMERGENCY CONTACT, POLICE/FIRE DEPARTMENT 911, AND HIARNG ENV 672-1013. CONTRACTOR SHALL REPORT SPILLS IMMEDIATELY TO THE PROJECT MANAGER AND HIARNG-ENV AND COMPLETE THE HIARNG SPILL INCIDENT REPORT FORM AS REQUIRED. CONTRACTOR SHALL IMMEDIATELY CLEAN UP ALL SPILLS IAW FEDERAL AND STATE GUIDELINES AND TO THE SATISFACTION OF HIARNG-ENV. CONTRACTOR SHALL MAINTAIN ADEQUATE SPILL SUPPLIES COMMENSURATE WITH THE POTENTIAL FOR SPILLS, AND WILL CONTRACT OUT SPILL CLEANUP BEYOND THEIR CAPABILITIES. CONTRACTOR SHALL ACCOMPLISH ALL REGULATORY VERBAL AND WRITTEN NOTIFICATIONS TO THE STATE EMERGENCY RESPONSE COMMISION, LOCAL EMERGENCY PLANNING COMMITTEE (LEPC), NATIONAL RESPONSE CENTER (NRC), ENVIRONMENTAL PROTECTION AGENCY (EPA), AS APPLICABLE, AND PROVIDE HIARNG-ENV COPIES OF ALL SPILL REPORTS SUBMITTED.

11. SEND TO HIARNG-ENV THE DATA FOR NON-HAZARDOUS RECYCLED/DIVERTED WASTE (I.E. WASTE THAT DOES NOT GO INTO THE LANDFILL OR H-POWER) AND NON-HAZARDOUS DISPOSED WASTE FOR ALL CONSTRUCTION PROJECTS. DATA CAN BE PROVIDED BY ANY MEANS (E.G. RECEIPT COPIES, EXCEL TABLE, EMAIL MESSAGE)

    DATA SHOULD INCLUDE:

    RECYCLED/DIVERTED WASTE

    - TYPE OF MATERIAL
    - NET WEIGHT
    - RECYCLE FACILITY (E.G. SCHNITZER, ISLAND RECYCLING, REFRIGERANT RECYCLING)
    - TICKET NUMBER (IF AVAILABLE)
    - COST/REVENUE (IF APPLICABLE)

    DISPOSED WASTE

    - NET WEIGHT
    - DISPOSAL FACILITY (E.G. PVT, SCHNITZER)
    - TICKET NUMBER (IF AVAILABLE)
    - COST (IF APPLICABLE)

HAWAII ARMY NATIONAL GUARD SOLID WASTE CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL SUBMIT SOLID WASTE REPORTS TO THE HIARNG PROJECT MANAGER FOR THE DURATION OF THE PROJECT. THE REPORTS SHALL ADDRESS:

    A. DIVERTED WASTE (I.E. WASTE THAT DOES NOT GO INTO LANDFILL)

    B. RECYCLED WASTE

    C. LANDFILL WASTE

    D. RECOVERED WASTE (I.E. FREON FROM AC EQUIPMENT AND REFRIGERATORS

2. THE CONTRACTOR SHALL SUBMIT LEGIBLE COPIES OF DUMP TICKET RECEIPT FROM VENDOR SHOWING THE TONNAGE OF WASTE TO THE HIARNG PROJECT MANAGER. IF WASTE PRODUCTS ARE COMBINED WITH OTHER PROJECTS, THE CONTRACTOR SHALL PROVIDE A BREAKDOWN PER PROJECT.

DATE: 08/28/14
SCALE: 1" = NOT TO SCALE
FILE: 201033-403

PM: TCL
DESIGN: ET
DATE REV. 04/09/15

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/28/15
DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

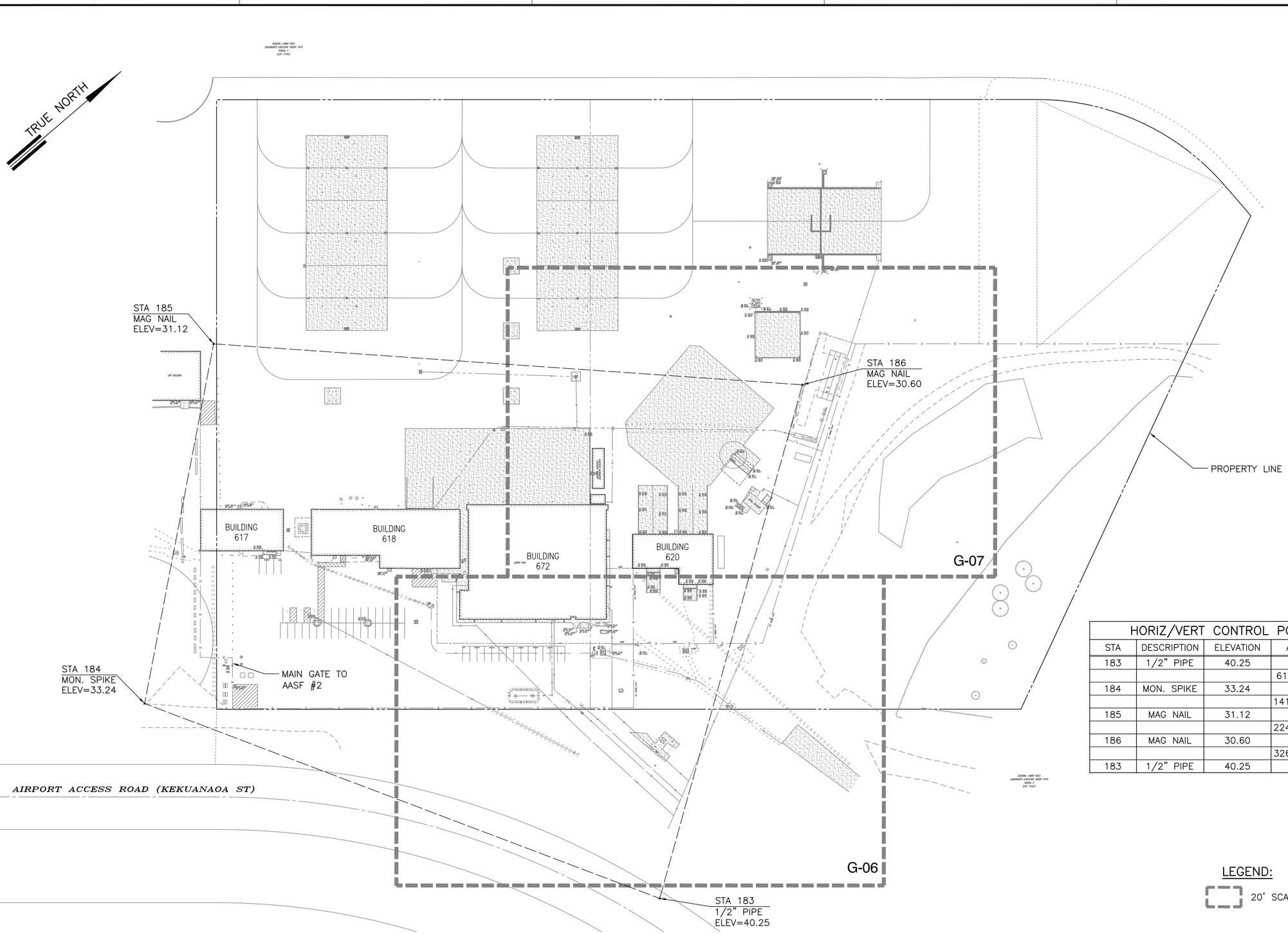
HILO, HAWAII

AASF #2 FENCE REPLACEMENT

GENERAL NOTES, SHEET 2

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140024
SHEET 4 OF 14

G-04



GENERAL LOCATION AND KEY PLAN

SCALE: 1" = 60'

HORIZ/VERT CONTROL POINT DATA				
STA	DESCRIPTION	ELEVATION	AZIMUTH	DISTANCE
183	1/2" PIPE	40.25		
			61° 22' 01"	677.89
184	MON. SPIKE	33.24		
			141° 31' 14"	450.55
185	MAG NAIL	31.12		
			224° 37' 40"	726.53
186	MAG NAIL	30.60		
			326° 11' 19"	655.84
183	1/2" PIPE	40.25		

LEGEND:

20' SCALE SHEET LOCATION

GRAPHIC SCALE:

60' 30' 0 60' 120'

SCALE: 1" = 60'

TCL #1 04/09/15
PM: DPER: DATE REV.
DATE: 08/28/14
SCALE: 1"=30'-0"
FILE: 2013033-404

A/E INFO

TONY C.G. LAU
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HAWAII, U.S.A.

SEAL

NO.	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/28/15

DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HILO, HAWAII

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

AASF #2 FENCE REPLACEMENT

GENERAL LOCATION AND KEY PLAN

SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140024

SHEET 5 OF 14

G-05

MATCH LINE – SEE SHEET G-07

BUILDING 672

CONC. WALKWAY

A.C. PAV'T.

C.L. FENCE, H=6'

GATE

WHEEL STOP (TYP.)

DRYWELL TOP=30.49 INV=

TEL. BOX TOP=30.93

ELEC. BOX TOP=30.88

SIDEWALK DRAIN TOP=31.94 INV=31.39

SIDEWALK DRAIN TOP=31.89 INV=31.39

SIDEWALK DRAIN TOP=31.81 INV=31.31

SIDEWALK DRAIN TOP=31.85 INV=31.35

SIDEWALK DRAIN TOP=31.85 INV=31.35

CONC. RAMP

SCMH TOP=31.32

PANEL BOX

3-A/C UNIT

CONC. 31.91 AC 31.61

CONC. 31.89 AC 31.59

CONC. 31.84 AC 31.54

CONC. 31.84 AC 31.34

CONC. 31.85 AC 31.35

METER WALL TW 32.1 BW 31.51

ELEC. BOX TOP=31.72

TEL. BOX TOP=31.53

ELEC. TRANSF.

G.P. (TYP.)

CONC. 31.78 AC 31.58

WV TOP=31.61 TS=

DRY STANDPIPE TW 34.5 BW 31.65

METAL BOX TOP=31.72

RISER

EXPOSED 4" PIPE

ELEC. METER

8-G.P.

WV TOP=32.43 TS=

WV TOP=32.24 TS=

TEL. BOX TOP=31.93

UTL. BOX TOP=31.76

SMH TOP=31.70 INV=

SMH TOP=31.75 INV=

A.C. CURB

C.O.

BFP W/4-G.P.

F.H. W/4-G.P.

WM

A.C. PATCH

C.L. FENCE, H=6'

GATE

PROPERTY LINE

CONC. PAVEMENT

WV TOP=32.37 TS=

WV TOP=32.15 TS=

ELEC. BOX TOP=32.71

ELEC. BOX TOP=32.79

EDGE PAV'T.

CONC. PAVEMENT

TO STA. 184 + 677.89

AIRPORT ACCESS ROAD (KEKUANAOA ST)

TRUE NORTH

GRAPHIC SCALE:

20' 10' 0 20' 40'

SCALE: 1" = 20'

EXISTING CONDITIONS PLAN

SCALE: 1" = 20'

DATE: 12/17/14
SCALE: 1" = 20'
FILE: 20100333-405

PM: TCL
DFER: KT
DATE REV. 04/09/15

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.

SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITAL PHASE: FINAL

SUBMITAL DATE: 04/28/15

DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

AASF #2 FENCE REPLACEMENT

EXISTING CONDITIONS PLAN, SHEET 1

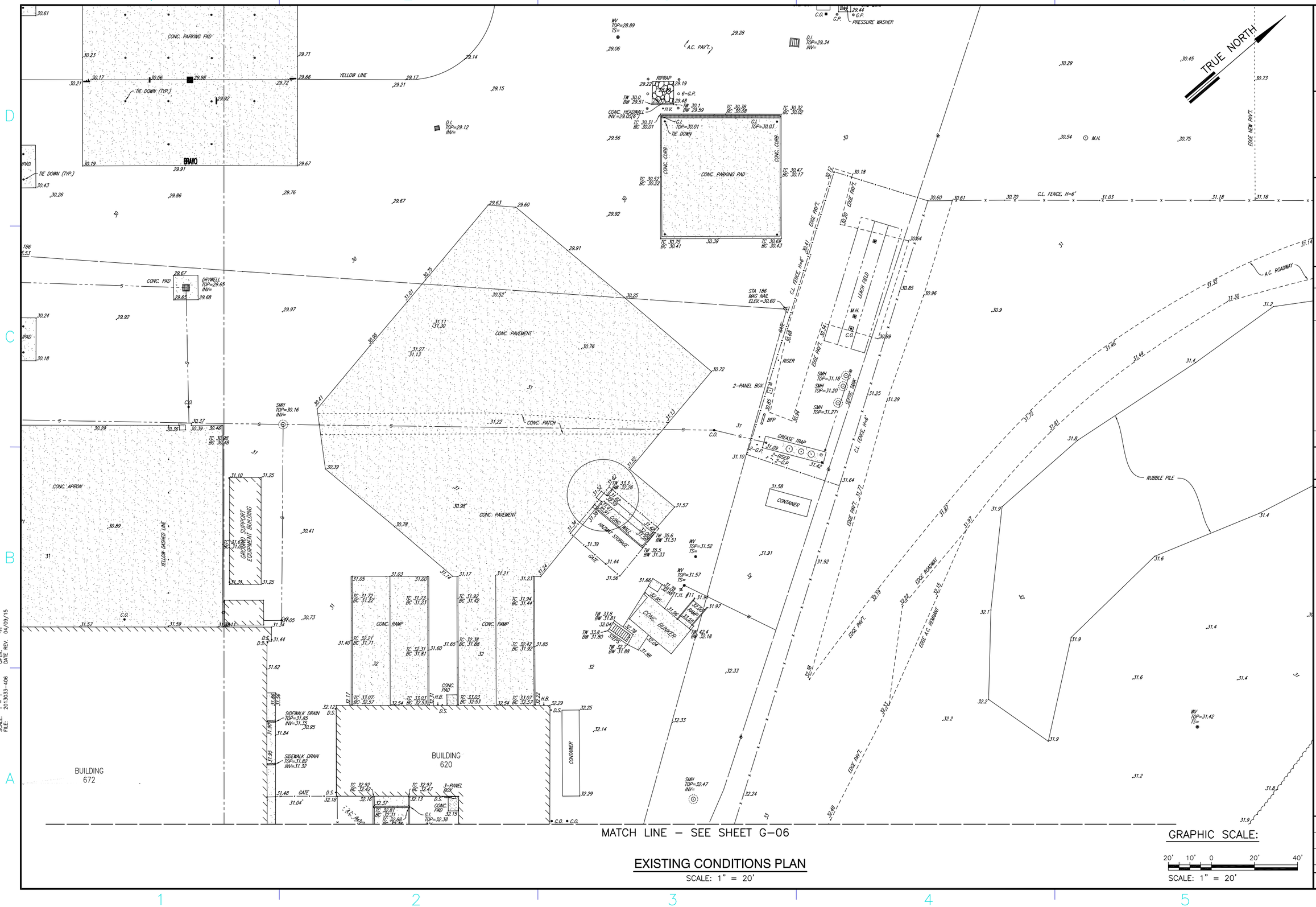
SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140024

SHEET 6 OF 14

G-06



MATCH LINE – SEE SHEET G-06

EXISTING CONDITIONS PLAN

SCALE: 1" = 20'

GRAPHIC SCALE:

20' 10' 0 20' 40'

SCALE: 1" = 20'

TCL 04
PM: OPER.
DATE: 04/09/15
DATE REV.
DATE: 12/17/14
SCALE: AS NOTED
FILE: 2015033-406

HAWAII ARMY NATIONAL GUARD

HDR

A/E INFO

TONY C. G. LAU
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HAWAII, U.S.A.

SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
FINAL

SUBMITTAL DATE 04/28/15

DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HILO, HAWAII

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

AASF #2
FENCE REPLACEMENT

EXISTING CONDITIONS PLAN, SHEET 2

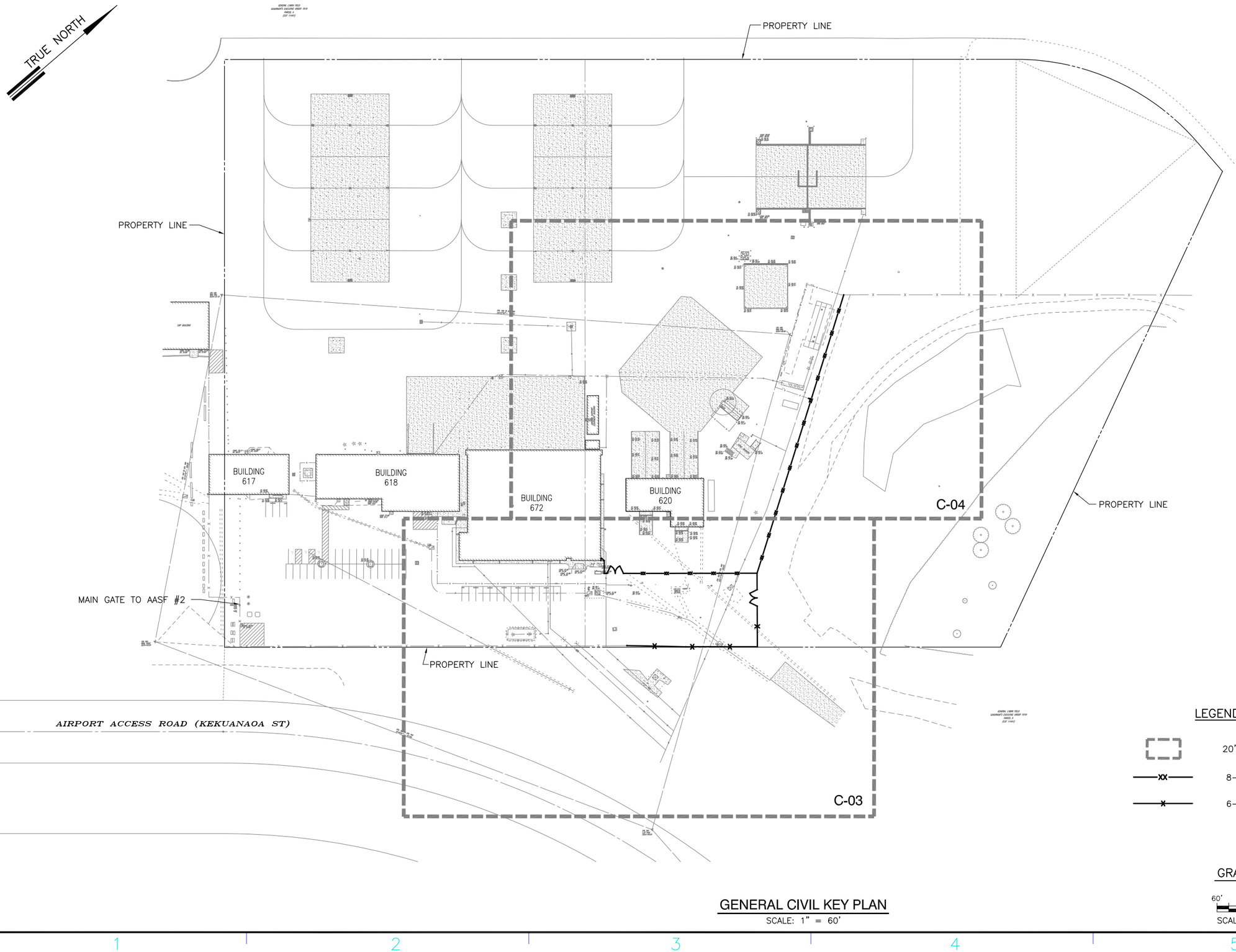
SCALE: AS NOTED

STATE JOB NO.
CA-1328-D

FEDERAL PROJECT NO.
15140024

SHEET 7 OF 14

G-07



GENERAL CIVIL KEY PLAN
SCALE: 1" = 60'

PM:
DES: TCL
DATE: 04/09/15
REV.

DATE: 12/17/14
SCALE:
FILE: 20130S3-407

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.

SEAL

NO.	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
FINAL
SUBMITTAL DATE 04/28/15
DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

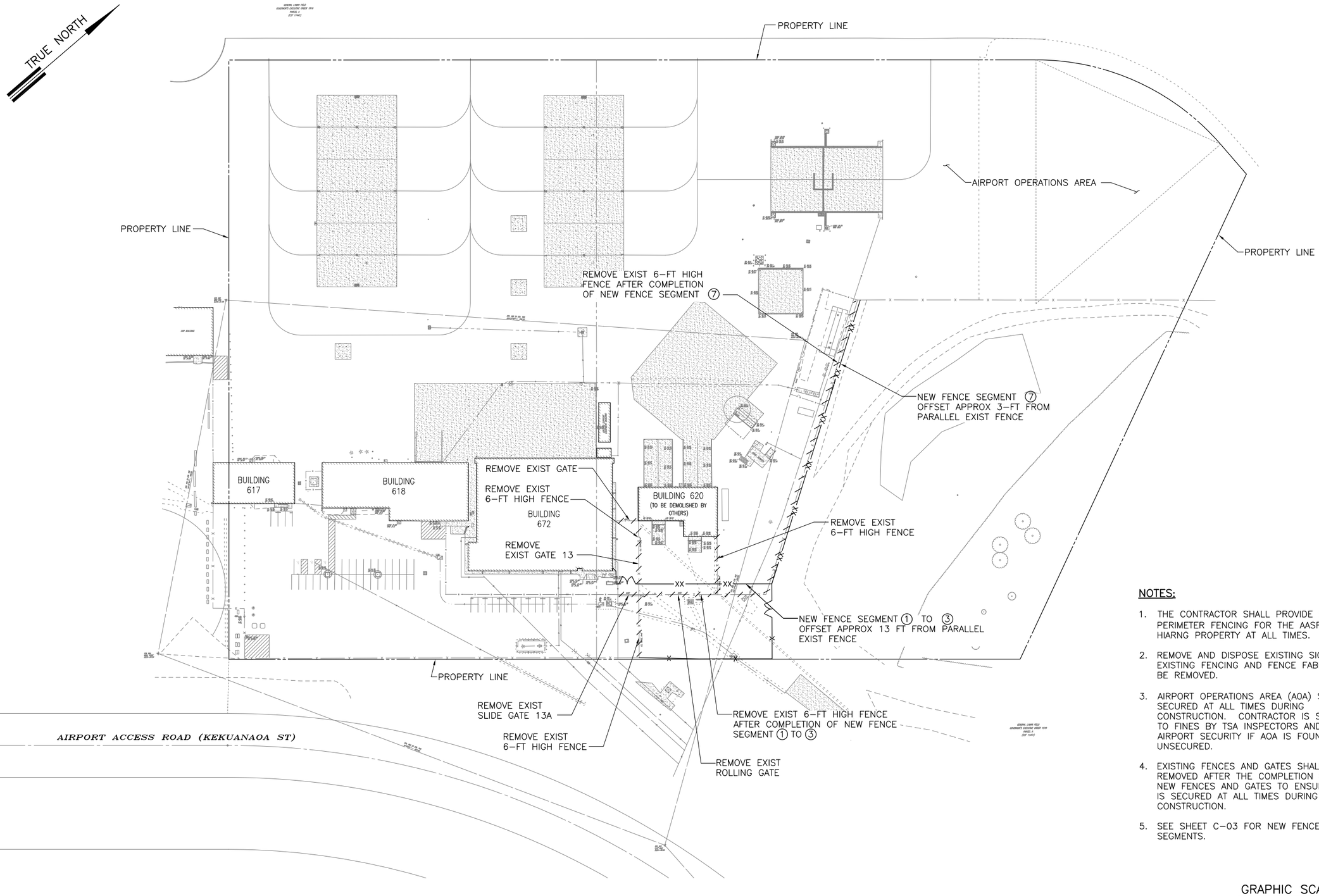
HILO, HAWAII

AASF #2 FENCE REPLACEMENT

GENERAL CIVIL KEY PLAN

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140024
SHEET 8 OF 14

C-01



DEMOLITION PLAN

SCALE: 1" = 60'

NOTES:

1. THE CONTRACTOR SHALL PROVIDE SECURE PERIMETER FENCING FOR THE AASF #2 HIARNG PROPERTY AT ALL TIMES.
2. REMOVE AND DISPOSE EXISTING SIGNS ON EXISTING FENCING AND FENCE FABRIC TO BE REMOVED.
3. AIRPORT OPERATIONS AREA (AOA) SHALL BE SECURED AT ALL TIMES DURING CONSTRUCTION. CONTRACTOR IS SUBJECT TO FINES BY TSA INSPECTORS AND AIRPORT SECURITY IF AOA IS FOUND TO BE UNSECURED.
4. EXISTING FENCES AND GATES SHALL BE REMOVED AFTER THE COMPLETION OF THE NEW FENCES AND GATES TO ENSURE AOA IS SECURED AT ALL TIMES DURING CONSTRUCTION.
5. SEE SHEET C-03 FOR NEW FENCE SEGMENTS.

GRAPHIC SCALE:

60' 30' 0 60' 120'

SCALE: 1" = 60'

PM: TCL
DESIGNER: RT
DATE REV.: 04/10/15

DATE: 12/17/14
SCALE: 1" = 60'
FILE: 2010033-408

A/E INFO

LICENSED PROFESSIONAL ENGINEER
No. 9021-C
TONY C.G. LAU
HAWAII, U.S.A.
SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/28/15
DES ET | DRW BTY | CHK RA

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG
DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HILO, HAWAII
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

AASF #2 FENCE REPLACEMENT

DEMOLITION PLAN

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140024
SHEET 9 OF 14

C-02

MATCH LINE – SEE SHEET C–04

TRUE NORTH

BUILDING 620

BUILDING 672

CONC. WALKWAY

PROVIDE 3–FT WIDE SINGLE SWING GATE

PROVIDE 21–FT WIDE DOUBLE SWING GATE

PROVIDE 8–FT HIGH FENCE

PROVIDE 8–FT HIGH FENCE

PROVIDE 21–FT WIDE DOUBLE SWING GATE

PROVIDE 6–FT HIGH FENCE

CONNECT NEW FENCE TO EXIST FENCE WITH NEW PULL POST

PROVIDE 6–FT HIGH FENCE

PROPERTY LINE

PROPERTY LINE

SEE SHEET G–05 FOR STA 184

TIE: 210° 19' 52" 578.15 (STA 184 TO BEGIN SEGMENT (1))

TIE: 122° 51' 44" 236.95 (STA 183 TO BEGIN SEGMENT (4))

SEE SHEET G–05 FOR STA 183

AIRPORT ACCESS ROAD (KEKUANAOA ST)

FENCE DATA

SEGMENT	AZIMUTH	DISTANCE
(1)	220° 51' 58"	4.25'
(2)	310° 45' 09"	16.46'
(3)	220° 35' 00"	194.95'
(4)	221° 46' 50"	75.02'
(5)	220° 38' 06"	91.42'
(6)	130° 24' 16"	93.81'
(7)	147° 56' 34"	371.91'

NOTES:

1. FOR 6–FT AND 8–FT HIGH FENCE, SEE DETAIL 1 / C–03 | C–05
2. FOR SINGLE SWING GATE, SEE DETAIL 3 / C–03 | C–07
3. FOR DOUBLE SWING GATE, SEE DETAIL 1 / C–03 | C–07
4. PROVIDE "RESTRICTED AREA" SIGN ON OUTER FENCE SEGMENTS (4) (5) (6) (7) EVERY 100 FT, SEE DETAILS 1 / C–03 | C–06 AND 2 / C–03 | C–06

SITE PLAN

SCALE: 1" = 20'

GRAPHIC SCALE:

20' 10' 0 20' 40'

SCALE: 1" = 20'

TCL PT 04/09/15
PM: OPER: DATE REV.
DATE: 12/17/14
SCALE: 1"=20'
FILE: 20130333-409

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

AASF #2
FENCE REPLACEMENT

SITE PLAN, SHEET 1

HILO, HAWAII

HIARNG

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH

HAWAII ARMY NATIONAL GUARD

HDR

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

APPR | DATE | DESCRIPTION | SYM

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/28/15
DES ET | DRW BTY | CHK RA

SCALE: AS NOTED
STATE JOB NO. CA–1328–D
FEDERAL PROJECT NO. 15140024
SHEET 10 OF 14

C-03

TRUE NORTH

TIE: 184° 26' 39"
85.23 (STA 186
TO END OF FENCE
SEGMENT (7))

STA 186
MAG NAIL
ELEV=30.60

CONNECT NEW FENCE TO
EXIST FENCE WITH NEW
CORNER/PULL POST

PROVIDE 8-FT
HIGH FENCE

CONNECT NEW
FENCE TO EXIST
FENCE, WITH
NEW PULL POST

PROVIDE 6-FT
HIGH FENCE
AS REQUIRED

147° 56' 34"
371.91

BRAVO

BUILDING
672

BUILDING
620

GROUND SUPPORT
EQUIPMENT BLDG

CONC. PARKING PAD

CONC. PAVEMENT

CONC. RAMP

CONC. BUNKER

CONC. APRON

CONC. PATCH

A.C. ROADWAY

RUBBLE PILE

CONTAINER

GREASE TRAP

2-PANEL BOX

3-PANEL BOX

RISER

BFP

SEPTIC TANK

LEACH FIELD

HAZMAT STORAGE

YELLOW DASHED LINE

YELLOW LINE

TIE DOWN (TYP.)

C.L. FENCE, H=6'

EDGE PAVT.

EDGE ROADWAY

EDGE A.C. ROADWAY

EDGE NEW PAVT.

NOTE:

1. FOR 6-FT AND 8-FT HIGH FENCE, SEE DETAIL 1 / C-04 | C-05
2. PROVIDE "RESTRICTED AREA" SIGN ON OUTER FENCE SEGMENT (7), EVERY 100 FT, SEE DETAIL 1 / C-04 | C-06 AND 2 / C-04 | C-06

MATCH LINE – SEE SHEET C-03

SITE PLAN
SCALE: 1" = 20'

GRAPHIC SCALE:
20' 10' 0 20' 40'
SCALE: 1" = 20'

TCL
PM:
DPER:
DATE REV.
DATE: 12/17/14
SCALE:
FILE: 20130S3-410

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
FINAL

SUBMITTAL DATE 04/28/15

DES	ET	DRW	BTY	CHK	RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HILO, HAWAII

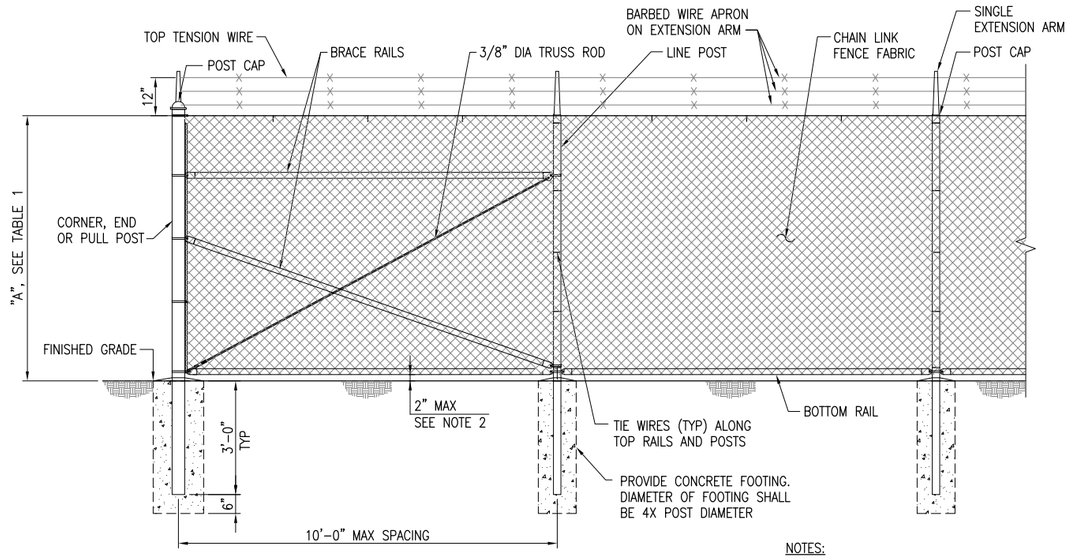
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

AASF #2
FENCE REPLACEMENT

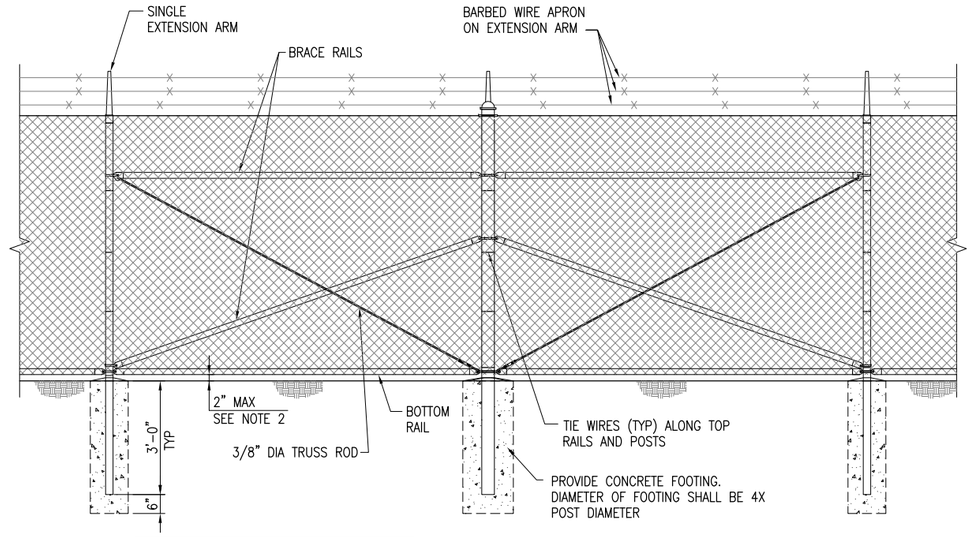
SITE PLAN, SHEET 2

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140024
SHEET 11 OF 14

C-04



CHAIN LINK FENCE — 1 / VAR | C-05
SCALE: 1/2"= 1'-0"

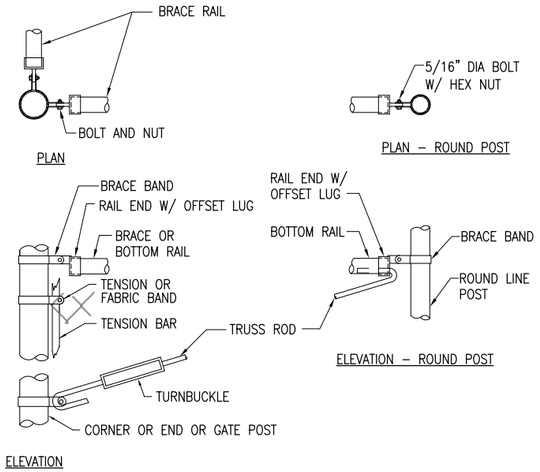


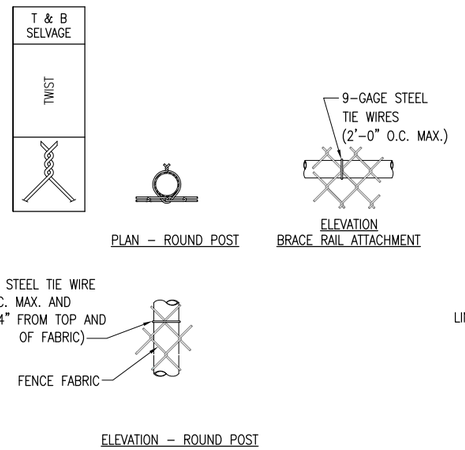
BRACED PANEL — 2 / C-05 | C-05
SCALE: 1/2"= 1'-0"

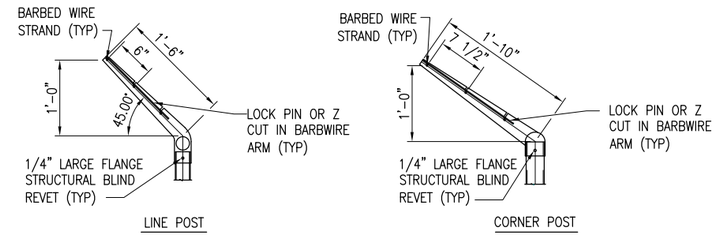
NOTES:

1. FOR SINGLE EXTENSION ARM, SEE DETAIL 5 / C-05 | C-05
2. FOR AREAS WITH SOIL EROSION, FINISHED GRADE TO BOTTOM OF FENCE SHALL BE NO MORE THAN 1 1/2".
3. PROVIDE BRACING FOR EACH END AND CORNER POST.
4. EXTENSION ARMS SHALL BE PERMANENTLY AFFIXED TO TOP FENCE POSTS TO INCREASE OVERALL HEIGHT OF THE FENCE BY AT LEAST 1 FOOT.

TABLE 1		
"A"	EXTENSION ARM TYPE	NO. STRANDS OF BARBED WIRE
6'-0"	SINGLE	3
8'-0"	SINGLE	3







SINGLE EXTENSION ARM — 5 / C-05 | C-05
SCALE: 1 1/2"= 1'-0"

CORNER OR END POSTS — 3 / C-05 | C-05
SCALE: 1 1/2"= 1'-0"

LINE POST — 4 / C-05 | C-05
SCALE: 1 1/2"= 1'-0"

GRAPHIC SCALES:

2' 0 2' 4'
SCALE: 1/2" = 1'-0"

6" 0 6" 1' 1'-6"
SCALE: 1-1/2" = 1'-0"

TCL BTY (CHKD) PM: DPEP: DATE: REV. 04/09/15
DATE: 12/17/14
SCALE:
FILE: 2013033-411

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU — LICENSED PROFESSIONAL ENGINEER — No. 9021-C — HAWAII, U.S.A. — SEAL

	APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/28/15
DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HILO, HAWAII

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

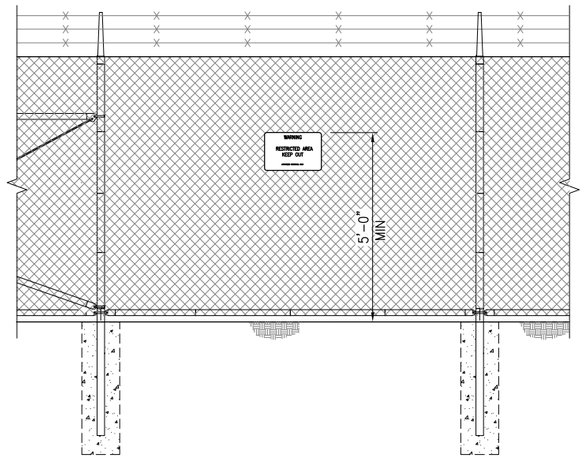
AASF #2
FENCE REPLACEMENT

CIVIL DETAILS, SHEET 1

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140024
SHEET 12 OF 14

C-05

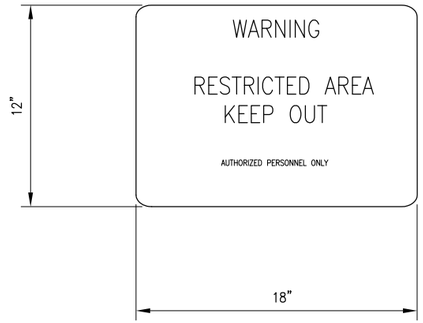


NOTES:

1. "RESTRICTED AREA" SIGN TO BE POSTED ON OUTER MOST FENCE APPROXIMATELY EVERY 100 FT.
2. "RESTRICTED AREA" SIGN TO BE TO FENCE WITH STANDARD LINK CLIP MOUNTING SYSTEM.
3. "RESTRICTED AREA" SIGN TO BE POSTED ON OUTSIDE FACING FENCE.
4. FOR "RESTRICTED AREA" SIGN, SEE DETAIL 2 / C-06 | C-06

PERIMETER RESTRICTED AREA SIGN POSTING 1 / VAR | C-06

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



(RED LETTERING ON WHITE BACKGROUND)

(BLACK LETTERING ON WHITE BACKGROUND)

PERIMETER RESTRICTED AREA SIGN 2 / VAR | C-06

NOT TO SCALE

GRAPHIC SCALE:

2' 0 2' 4'

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

OPER. DATE: BTY*TJ
REV. 03/10/15

FILE: 2013033-413b
DATE:

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.

SEAL

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DES	ET	DRW	BTY	CHK	RA

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HILO, HAWAII

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

AASF #2
FENCE REPLACEMENT

CIVIL DETAILS, SHEET 2

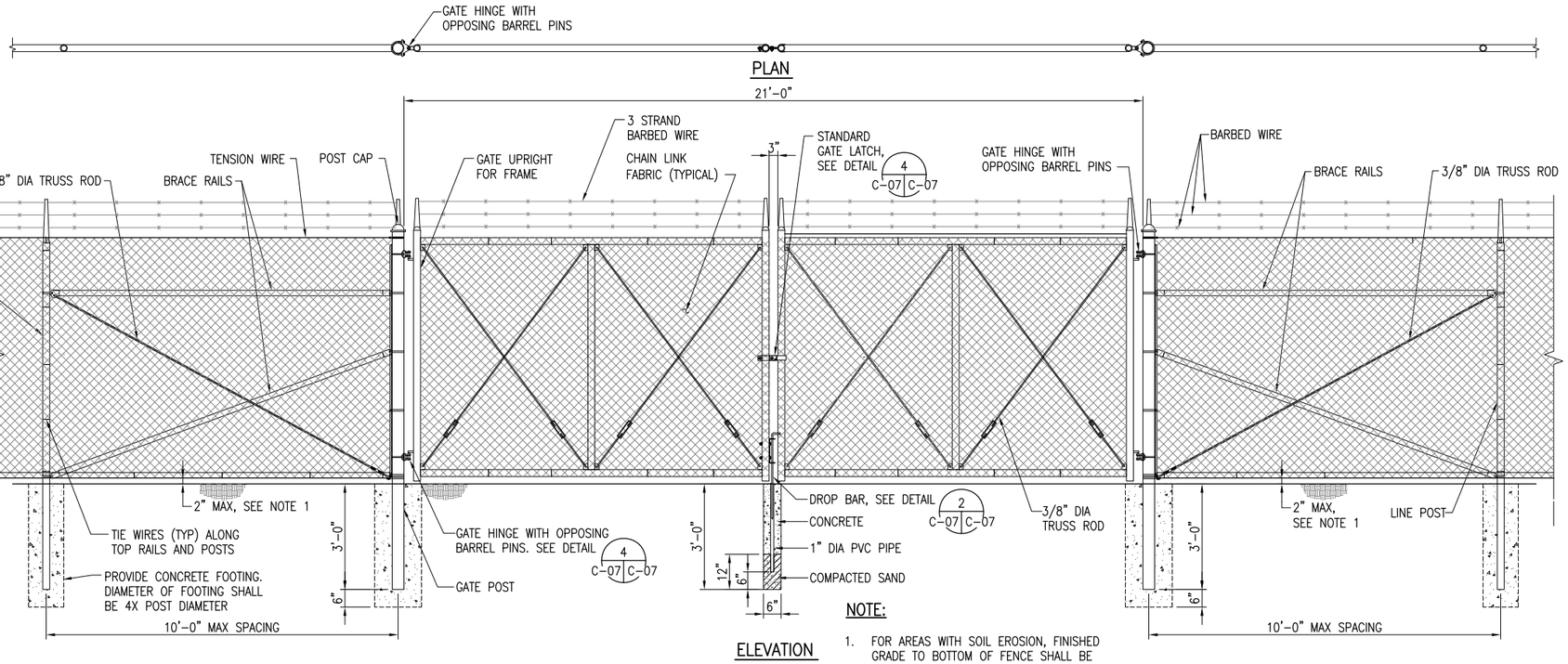
SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140024

SHEET 13 OF 14

C-06



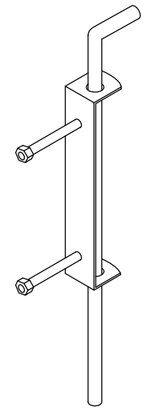
NOTE:

1. FOR AREAS WITH SOIL EROSION, FINISHED GRADE TO BOTTOM OF FENCE SHALL BE NO MORE THAN 1 1/2".

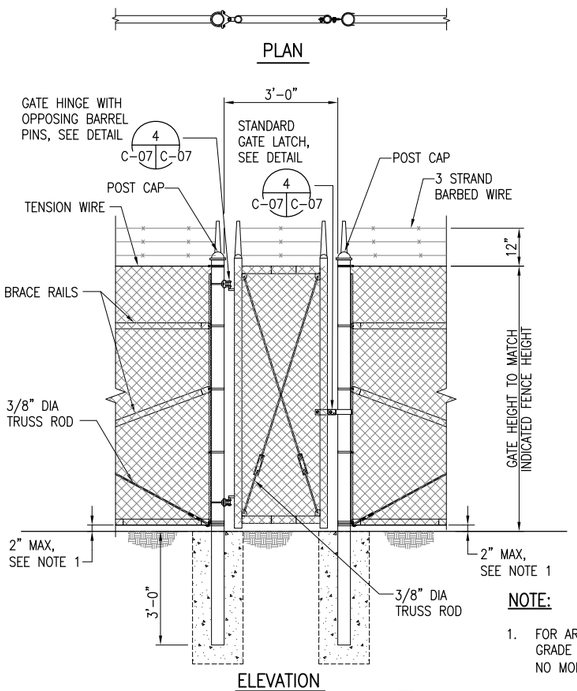
DOUBLE SWING GATE
SCALE: 1/2"= 1'-0"
1 C-03 C-07

DROP BAR NOTE:

PROVIDE ONE DROP BAR FOR EACH LEAF (TYP). ASSOCIATED GALV SLEEVES TO BE INSTALLED FLUSH WILL GRADE AT FULLY OPEN AND CLOSED POSITIONS. CONTRACTOR SHALL PROVIDE 6" LAYER OF #10 STONE BELOW BOTTOM OF SLEEVE TO ALLOW FOR DRAINAGE.



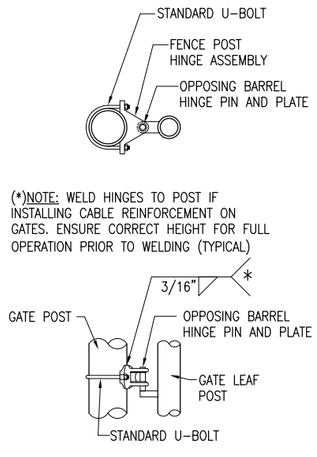
DROP BAR
SCALE: 1"= 1'-0"
2 C-07 C-07



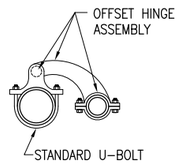
NOTE:

1. FOR AREAS WITH SOIL EROSION, FINISHED GRADE TO BOTTOM OF FENCE SHALL BE NO MORE THAN 1 1/2".

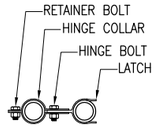
SINGLE SWING GATE
SCALE: 1/2"= 1'-0"
3 C-03 C-07



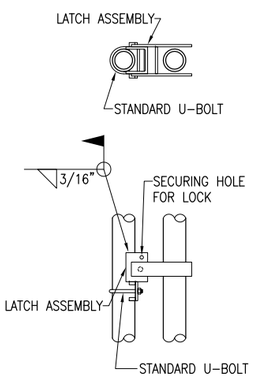
GATE HINGE



OFFSET HINGE



GATE LATCH



FULCRUM LATCH

SWING GATE DETAILS
SCALE: 1-1/2"= 1'-0"
4 C-07 C-07

GRAPHIC SCALES:

2' 0 2' 4'
SCALE: 1/2" = 1'-0"
6" 0 6" 1' 1'-6"
SCALE: 1-1/2" = 1'-0"

OPER: TJ DATE REV.: 04/27/15
FILE: 20130333-413 DATE: 04/09/15

HAWAII ARMY NATIONAL GUARD
HAWAII ARMY NATIONAL GUARD

HDR
A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

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DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HILO, HAWAII

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

AASF #2
FENCE REPLACEMENT

CIVIL DETAILS, SHEET 3

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140024
SHEET 14 OF 14

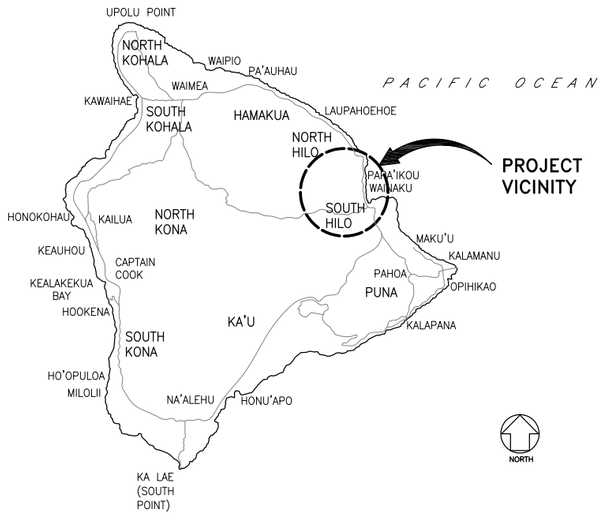
C-07

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

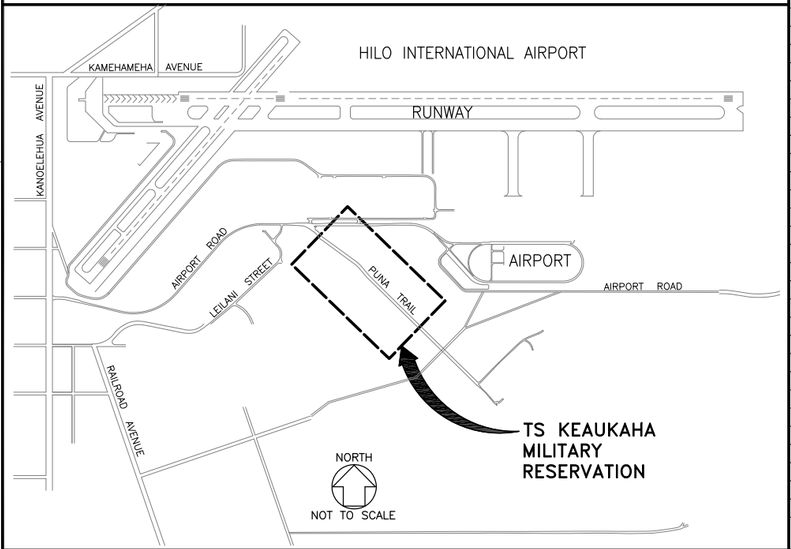
TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

HILO, HAWAII

VICINITY MAP



LOCATION MAP



PM: TCL
OPER: KS
DATE REV.: 03/16/15
DATE: 08/28/14
SCALE: 2:1:X033-300
FILE:

INDEX OF DRAWINGS

SHEET NO.	DWG NO.	DESCRIPTION
1	G-01	TITLE SHEET, LOCATION MAP, VICINITY MAP, AND INDEX OF DRAWINGS
2	G-02	SYMBOLS AND ABBREVIATIONS
3	G-03	GENERAL NOTES, SHEET 1
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5	G-05	GENERAL LOCATION PLAN
6	G-06	EXISTING CONDITIONS PLAN
7	C-01	GENERAL CIVIL LOCATION PLAN
8	C-02	DEMOLITION PLAN
9	C-03	CIVIL SITE PLAN
10	C-04	ENLARGED CIVIL SITE PLAN
11	C-05	SITE LAYOUT PLOT PLAN
12	C-06	GRADING PLAN
13	C-07	CIVIL DETAILS, SHEET 1
14	C-08	CIVIL DETAILS, SHEET 2
15	C-09	CIVIL DETAILS, SHEET 3
16	C-10	CIVIL DETAILS, SHEET 4
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19	PS-01	SECURITY SITE PLAN
20	PS-02	SECURITY SITE SIGNAGE AND STRIPING PLAN
21	PS-03	SECURITY DETAILS, SHEET 1
22	PS-04	SECURITY DETAILS, SHEET 2
23	PS-05	SECURITY DETAILS, SHEET 3
24	E-01	ELECTRICAL SYMBOLS AND ABBREVIATIONS
25	E-02	SITE ELECTRICAL PLAN
26	E-03	ENLARGED SECURITY ELECTRICAL PLAN
27	E-04	AREA LIGHT POLE DETAIL
28	E-05	MISCELLANEOUS DETAILS
29	E-06	GATE OPERATOR CONTROL WIRING DIAGRAM
30	E-07	PULLBOX DETAILS
31	E-08	DUCT SECTION DETAILS
32	E-09	ONE-LINE DIAGRAM, PANEL SCHEDULES AND GUARD SHACK DETAIL

A/E INFO

LICENSED PROFESSIONAL ENGINEER
No. 9021-C
TONY C.G. LAU
HAWAII, U.S.A.

SEAL

	APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE: FINAL
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DES ET | DRW BTY | CHK RA

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HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

TITLE SHEET, LOCATION MAP, VICINITY MAP, AND INDEX OF DRAWINGS

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 1 OF 32

G-01

LIST OF ABBREVIATIONS

AASF	ARMY AVIATION SUPPORT FACILITY
ABAND	ABANDONED
A.C., AC	ASPHALT CONCRETE
A/C	AIR CONDITIONING
ACP	ACCESS CONTROL POINT
APPROX	APPROXIMATE
ARV	AIR RELEASE VALVE
BC	BOTTOM CURB
BFP	BACK FLOW PREVENTER
BLDG	BUILDING
BOT., BOT	BOTTOM
BW	BOTTOM WALL
CATV	CABLE TELEVISION
C.B., CB	CATCH BASIN
C.L.	CHAIN LINK
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL.	COLUMN
COMM.	COMMUNICATION
CONC., CONC	CONCRETE
CRM	CONCRETE RUBBLE MASONRY
D	DIAMETER OR DRAIN
D.I.	DRAIN INLET
DS	DOWNSPOUT
DWY.	DRIVEWAY
E, ELEC	ELECTRIC
ELEV., EL., ELEV	ELEVATION
EXIST, E/	EXISTING
F.A. BOX	FIRE ALARM BOX
F.H., FH	FIRE HYDRANT
FM	FORCE MAIN
G, GAS	GAS
G.I.	GRATED INLET
GMH	GAS MANHOLE
GND., GND	GROUND
G.P.	GUARD POST/GUY POLE/GATE POST
G.W.	GUY WIRE
GV	GATE VALVE
H	HEIGHT
H.B., HB	HOSE BIBB
HH	HAND HOLE
HOA	HAND-OFF-AUTOMATIC
ICV	IRRIGATION CONTROL VALVE
INV., INV	INVERT
JTS	JOINT TRUNKING SYSTEM
LAT	LATERAL
L.P.	LIGHT POLE
MAX., MAX	MAXIMUM
MH	MANHOLE
MIN., MIN	MINIMUM
O/H	OVERHEAD
PAV'T., PAVT	PAVEMENT
P/N	PROJECT NUMBER
P.M.	PARKING METER
P.P.	POWER POLE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSL	PEDESTRIAN SIGNAL LIGHT
REQ'D	REQUIRED
S	SEWER OR SPREAD
SC	SIGNAL CORPS
SCMH	SIGNAL CORPS MANHOLE
SDMH	STORM DRAIN MANHOLE
S.L., SL	STREET LIGHT OR SEWER LINE
SLB	STREET LIGHT BOX
SMH	SEWER MANHOLE
SPR.	SPRINKLER
ST. NAME	STREET NAME
STA., STA	STATION
TC	TOP CURB
TDC	TOP DROP CURB
TEL., TEL	TELEPHONE
TP	TOP PIPE
TRC	TOP ROLLED CURB
TS	TOP STEM
TV	TOP VALVE
TW	TOP WALL
TYP., TYP	TYPICAL
U.P.	UTILITY POLE
U.P./S.L.	UTILITY POLE W/STREET LIGHT
W	WATER OR WIDTH
WL	WATER LINE
WM	WATER METER
WWF	WELDED WIRE FABRIC
WWH	WATER MANHOLE
WV	WATER VALVE
X-WALK	CROSS WALK

SYMBOLS

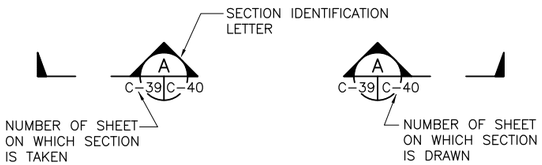
EXISTING		NEW	
PATCH	A.C. PATCH	PATCH	A.C. PATCH/SIDEWALK PATCH
BFP	BACKFLOW PREVENTER		CHAIN LINK FENCE
B-1	BORING LOCATION		CONCRETE BOLLARD
	BUILDING		PASSIVE VEHICLE BARRIER
	CHAIN LINK FENCE		CONCRETE PAVEMENT
	CONCRETE PAVEMENT	110	CONTOUR LINE
110	CONTOUR LINE	S 15	ABANDON IN PLACE
	CONTROL POINT	S 15	REMOVE
	DIRT ROAD	HH	HAND HOLE
D15	DRAIN LINE		TRAFFIC ARM GATE
E	ELECTRIC DUCT		VEHICLE DETECTION LOOP (VDL) PAVEMENT SAW-CUT
	ELEC MANHOLE	R 2	STANCHION MOUNTED CARD READER (NUMBER MODIFIER INDICATES NUMBER OF READERS ON STANCHION)
	ELEC PULLBOX	R	WALL MOUNTED CARD READER
FH #115	FIRE HYDRANT		ELECTRIC DOOR LOCK
G.V.	GATE VALVE	GCP	GRAPHIC CONTROL PANEL
G.P.	GUARD POST	TCU	TRAFFIC CONTROL UNIT IN EQUIPMENT CABINET
H.B.	HOSE BIBB	CPU	ACCESS CONTROL DATA WORK STATION (COMPUTER)
	LAMP POLE		
S8	SEWER LINE		
SMH	SEWER MANHOLE		
	SIGNS, VARIOUS TYPES		
107.7	SPOT ELEVATION		
	STORM DRAIN INLET		
SDMH	STORM DRAIN MANHOLE		
	TREES, VARIOUS TYPES		
UL	UNDERGROUND LIGHTING		
US			
UP	UNDERGROUND PRIMARY ELECTRICAL		
	UTILITY POLE		
W8	WATER LINE		
WV	WATER VALVE		
WM	WATER METER		

CONDUIT DESIGNATION

C 1

- CONDUIT SIZE
- SYSTEM "C" CARD ACCESS CONTROL
  "G" GATE ARM STATUS/CONTROL
  "V" VDL INPUT

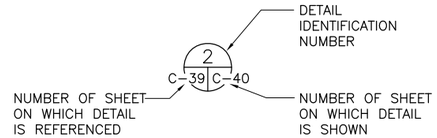
CROSS REFERENCING SYSTEM



SYMBOL WHERE SECTION IS TAKEN

SECTION A
SCALE: 1/4" = 1'-0" C-39 C-40

SUBTITLE FOR SECTION DRAWING

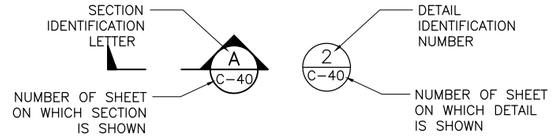


SYMBOL FOR CONDITION FOR WHICH THERE IS A DETAIL

DETAIL 2
SCALE: 1/4" = 1'-0" C-39 C-40

SUBTITLE FOR DETAIL DRAWING

OPTIONAL CROSS REFERENCING SYSTEM



SYMBOL FOR CONDITION FOR WHICH THERE IS A DETAIL OR SECTION

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

DETAIL 2
SCALE: 1/4" = 1'-0"

SUBTITLE FOR DETAIL OR SECTION DRAWING

TONY C.G. LAU LICENSED PROFESSIONAL ENGINEER No. 9021-C HAWAII, U.S.A.

TCL	03/16/15		
PM:			
DPER:			
DATE REV.			
DATE:	08/28/14		
SCALE:	1"=30'-0"		
FILE:	2013033-301		

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HI/ARNG
HILO, HAWAII
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY
SYMBOLS AND ABBREVIATIONS

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 2 OF 32
G-02

GENERAL NOTES:

1. ELEVATIONS SHOWN ARE BASED ON MEAN SEA LEVEL ELEVATION (ELEVATION = 0 FEET).
2. DIMENSIONS TAKE PRECEDENCE OVER SCALE.
3. THE TOPOGRAPHIC SURVEY WAS PREPARED BY CONTROLPOINT SURVEYING INC. DATED MARCH 2013 AND SUPPLEMENTARY INFORMATION FROM RECORD DRAWINGS AND FIELD INVESTIGATIONS BY HDR. THE DRAWINGS DO NOT REFLECT SITE CHANGES THAT HAVE OCCURRED SINCE THE TOPOGRAPHIC SURVEY WAS COMPLETED.
4. AZIMUTHS ARE REFERENCED FROM TRUE SOUTH = 0° 00' 00" AND INCREASE CLOCKWISE.
5. DURING NON-WORKING HOURS, ALL TRENCHES AND EXCAVATIONS SHALL BE BARRICADED, COVERED AND/OR MARKED.
6. THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES AS SHOWN ON THE PLANS ARE BASED ON THE AVAILABLE DATA. THE CONTRACTOR SHALL TONE THE PROJECT AREA, VERIFY THE LOCATIONS AND DEPTHS OF THE EXISTING UTILITIES SHOWN AND EXERCISE CARE WHEN EXCAVATING IN THE AREA.

   WHEREVER CONNECTIONS AND CROSSINGS OF PROPOSED UTILITIES TO EXISTING UTILITIES ARE SHOWN, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES. IF UTILITIES NOT SHOWN ARE ENCOUNTERED, OR IF POTENTIAL UTILITY CONFLICTS ARISE, NOTIFY THE PROJECT MANAGER IMMEDIATELY. THE CONTRACTOR SHALL PROVIDE STRUCTURAL SUPPORT FOR ALL EXISTING UTILITY LINES UNCOVERED IN THE TRENCHES.
7. IF EXISTING UTILITIES, WHETHER OR NOT SHOWN ON PLANS, ARE DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL REPAIR SUCH UTILITIES AT HIS OWN EXPENSE.
8. CONTRACTOR SHALL, AT HIS OWN EXPENSE, KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE AND WITHIN ALLOWABLE NOISE LEVELS. THE WORK SHALL BE IN CONFORMANCE WITH AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.
9. THE CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM HIS WORK DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS. THE COSTS INCURRED FOR ANY NECESSARY REMEDIAL ACTION SHALL BE PAYABLE BY THE CONTRACTOR.
10. EXISTING SITE DRAINAGE SYSTEMS SHALL BE FUNCTIONAL AT ALL TIMES.
11. PRIOR TO COMMENCING EXCAVATION, THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER. THE CONTRACTOR SHALL COORDINATE, BE HELD RESPONSIBLE AND PAY FOR ALL DAMAGE TO EXISTING UTILITIES AND STRUCTURES. PERSONAL INJURY RESULTING FROM CONTACT WITH THE EXISTING UTILITIES SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
12. EXISTING UTILITIES SHALL REMAIN IN-SERVICE AND IN PLACE. IF RELOCATION OF EXISTING UTILITIES, WHETHER OR NOT SHOWN ON PLANS, IS REQUIRED FOR THE CONTRACTOR'S CONVENIENCE, INTERRUPTION OF SERVICE SHALL BE KEPT TO A MINIMUM AND SHALL BE DONE AT THE CONTRACTOR'S EXPENSE AND ONLY WITH THE APPROVAL OF THE PROJECT MANAGER.
13. IF DEWATERING IS REQUIRED, DISPOSE DEWATERING EFFLUENT WITHOUT DISCHARGE TO WATERS OF THE STATE OF HAWAII, STORM DRAIN SYSTEMS, DRAINAGE SWALES, ETC. THE DEWATERING EFFLUENT WILL NOT BE ALLOWED TO POND, EXCEPT IN AREAS APPROVED BY THE PROJECT MANAGER. IF DISCHARGE OF DEWATERING EFFLUENT IS REQUIRED, CONTRACTOR IS RESPONSIBLE TO OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PRIOR TO DISCHARGING TO THE STORM DRAINAGE SYSTEM. DEWATERING INTO SANITARY SEWER SYSTEM IS PROHIBITED.
14. THE CONTRACTOR SHALL RESTORE TO THEIR ORIGINAL CONDITION, WHETHER OR NOT SHOWN ON PLANS, 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 AT CONTRACTOR'S EXPENSE.
15. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND LICENSES REQUIRED. PERMITS INCLUDE, BUT ARE NOT LIMITED TO COUNTY OF HAWAII BUILDING, ELECTRICAL, GRADING, GRUBBING, STOCKPILING AND SOLID WASTE DISPOSAL AND NPDES. THE CONTRACTOR SHALL CONDUCT ALL TESTS AS REQUIRED BY THE CONSTRUCTION MANAGER AND BE RESPONSIBLE FOR ALL EXPENSES INCURRED IN CONDUCTING THESE TESTS. (1)

GENERAL NOTES (CONTINUED):

16. THE CONTRACTOR SHALL VERIFY AND CHECK ALL DIMENSIONS, ELEVATIONS, AND DETAILS SHOWN ON THE DRAWINGS PRIOR TO START OF CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE PROJECT MANAGER OF ANY DISCREPANCY OR CONFLICT FOUND IN THE FIELD PRIOR TO OR DURING THE COURSE OF CONSTRUCTION AND SHALL NOT PROCEED WITH CONSTRUCTION UNTIL THE PROJECT MANAGER RESOLVES THE SAID DISCREPANCY OR CONFLICT. DIMENSIONS AND ELEVATIONS SHOWN ARE BASED ON LIMITED FIELD MEASUREMENTS AND ORIGINAL CONSTRUCTION DRAWINGS. DIMENSIONS AND ELEVATIONS FOR THE NEW WORK SHALL BE ADJUSTED AS REQUIRED BASED ON THE CONTRACTOR'S FIELD MEASUREMENTS WITH THE APPROVAL OF THE PROJECT MANAGER.
17. THE CONTRACTOR SHALL BEAR ALL COSTS ASSOCIATED WITH THE REMOVAL/AVOIDANCE OF ABANDONED UTILITIES, WHETHER OR NOT SHOWN ON PLANS.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFORMANCE WITH THE APPLICABLE PROVISIONS OF THE WATER QUALITY AND WATER POLLUTION CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS" AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL". BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING THE CONSTRUCTION PERIOD.
19. THE CONTRACTOR SHALL OBTAIN AND COMPLY WITH NPDES PERMIT REQUIREMENTS FOR ALL PROJECTS WHICH WILL DISTURB ONE (1) ACRE OR MORE OF LAND. THE CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL NOTICE OF GENERAL PERMIT COVERAGE IS RECEIVED FROM THE DEPARTMENT OF HEALTH, STATE OF HAWAII AND ANY OTHER APPLICABLE REQUIREMENTS OF THE NPDES PERMIT PROGRAM HAVE BEEN MET.
20. IF CAVITIES AND/OR VOIDS ARE ENCOUNTERED DURING EXCAVATION WORK, STOP WORK IMMEDIATELY AND NOTIFY THE PROJECT MANAGER.
21. CONFINE ACTIVITIES WITHIN THE PROJECT LIMITS.
22. PROJECT MANAGER IS THE COORDINATOR BETWEEN THE CONTRACTOR AND ACTIVITY. NOTIFY THE PROJECT MANAGER PRIOR TO CONTACTING THE ACTIVITY. COORDINATE ALL WORK WITH THE PROJECT MANAGER TO ENSURE THAT CONSTRUCTION ACTIVITIES DO NOT INTERFERE WITH BASE OPERATIONS.
23. THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, TATE AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH, SAFETY AND ENVIRONMENTAL QUALITY.
24. ALL WORK PERFORMED SHALL COMPLY WITH US ARMY CORPS OF ENGINEERS EM 385-1-1, SAFETY AND HEALTH REQUIREMENTS, AND WITH ALL APPLICABLE FEDERAL, SAFETY AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH, SAFETY AND ENVIRONMENTAL QUALITY. WHERE REQUIREMENTS VARY, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
25. THE CONTRACTOR SHALL PROVIDE SAFE ACCESS TO AND FROM ALL DRIVEWAYS AND STREETS.
26. THE CONTRACTOR SHALL PLAN OPERATIONS TO MINIMIZE THE AMOUNT OF EXCAVATED TRENCHES LEFT OPEN AT THE END OF EACH WORK DAY WITH THE TOTAL LENGTH OF OPEN TRENCHES NOT TO EXCEED 500 FEET. OPEN TRENCHES SHALL BE COVERED BY NON-SKID STEEL PLATES CAPABLE OF CARRYING H-20 VEHICLES IN TRAFFIC AREAS AND 100 POUNDS PER SQUARE FOOT IN NON-TRAFFIC AREAS. PROVIDE ANCHORING OF THE PLATES IN NON-TRAFFIC AREAS. PROVIDE FLASHING BARRICADES TO DELINEATE COVERED TRENCHES IN NON-TRAFFIC AREAS AND ALL STOCK/SPOIL PILES.
27. WHEREVER EXISTING FENCE IS REMOVED, REINSTALL CHAIN LINK FENCE AS NECESSARY TO SECURE PROTECTED AREAS PRIOR TO THE END OF EACH WORK DAY. TRENCHES CROSSING ANY FENCE, EXISTING OR PROVIDED, SHALL NOT BE LEFT OPEN DURING NON-WORK HOURS. BACKFILL A MINIMUM OF 10 FEET ON EACH SIDE OF FENCE AT THE END OF WORK DAY. OTHER MEASURES MAY BE UTILIZED AS APPROVED BY THE PROJECT MANAGER.

GENERAL NOTES (CONTINUED):

28. WHENEVER INSTRUCTED TO "ABANDON" EXISTING UTILITY STRUCTURE.
   A. REMOVE THE FRAME AND COVER, IF ANY. THE COVER AND FRAME SHALL BE CLEANED FREE OF CONCRETE. COORDINATE DELIVERY TO HIARNG FACILITIES THROUGH THE PROJECT MANAGER.
   B. DEMOLISH A MINIMUM OF THE TOP 3 FEET OF THE UTILITY STRUCTURE BELOW EXISTING GRADE.
   C. BREAK BASE OF STRUCTURE TO PERMIT FREE DRAINAGE OF WATER. ADEQUACY OF PENETRATION SHALL BE BASED SOLELY ON THE JUDGEMENT OF THE PROJECT MANAGER. CONTRACTOR SHALL FULLY DRAIN THE STRUCTURE PRIOR TO FILLING.
   D. CUT AND PLUG CONNECTING PIPES WITH MINIMUM OF 18 INCHES OF CONCRETE.
   E. FILL STRUCTURE WITH COMPACTED FILL. THE TOP OF THE CONTROLLED BACKFILL SHALL MATCH THE GRADE OF THE SURROUNDING AREA LESS THE THICKNESS OF THE TOP SOIL OR PAVEMENT STRUCTURE AS APPROPRIATE.
   F. IF THE SURROUNDING AREA IS GRASSED, PROVIDE A MINIMUM OF 6 INCHES OF TOPSOIL AND HYDROMULCH AND SEED WITH COMMON BERMUDA GRASS AT A RATE OF 12 Pa.
   G. WHEREVER AN EXISTING STRUCTURE IS WITHIN ASPHALTIC CONCRETE PAVEMENT, PROVIDE BASE COURSE AND ASPHALTIC CONCRETE PAVEMENT OF THICKNESS THAT MATCHES THE SURROUNDING PAVEMENT OR AS SPECIFIED BY THE CONTRACT DOCUMENTS.

ARCHAEOLOGICAL NOTES:

1. PURSUANT TO CHAPTER 6E OF THE HAWAII REVISED STATUTES, ALL CONTRACTORS SHALL ENSURE THAT IN THE EVENT THAT ANY HUMAN SKELETAL REMAINS ARE INADVERTENTLY DISCOVERED DURING CONSTRUCTION, THE REMAINS SHALL NOT BE MOVED AND ANY ACTIVITY IN THE IMMEDIATE AREA THAT COULD DAMAGE THE REMAINS OR THE POTENTIAL HISTORIC SITE SHALL CEASE AND THE DEPARTMENT OF LAND AND NATURAL RESOURCES' HISTORIC PRESERVATION DIVISION (TELEPHONE: 243-5119), THE APPROPRIATE MEDICAL EXAMINER OR CORONER, AND THE POLICE DEPARTMENT (TELEPHONE: 244-6400), SHALL BE CONTACTED. SEE SECTION 00710, "GENERAL CONDITIONS", PARAGRAPH 6.6, "UNAVOIDABLE DELAYS" IF ARCHAEOLOGICAL FINDINGS RESULT IN UNAVOIDABLE DELAYS TO THE PROJECT.
2. CAREFULLY PROTECT IN-PLACE AND REPORT IMMEDIATELY TO THE PROJECT MANAGER HISTORICAL AND ARCHAEOLOGICAL ITEMS, HUMAN SKELETAL REMAINS, STONE WALLS, STONE TOOLS, SHELL MIDDENS OR CHARCOAL DEPOSITS DISCOVERED IN THE COURSE OF WORK. STOP WORK IN THE IMMEDIATE AREA OF THE DISCOVERY UNTIL DIRECTED BY THE PROJECT MANAGER TO RESUME WORK. THE PROJECT MANAGER MAY REQUIRE THE CONTRACTOR TO RELOCATE TO OTHER PORTIONS OF THE PROJECT WHILE RECOVERY OPERATIONS, IF NECESSARY, ARE CONDUCTED. THE CONTRACTOR SHALL FOLLOW THE DIRECTIONS OF THE HIARNG ENVIRONMENTAL BRANCH SHOULD ARTIFACTS AND BURIALS BE DISCOVERED.
3. THE GOVERNMENT RETAINS OWNERSHIP AND CONTROL OVER HISTORICAL AND ARCHAEOLOGICAL RESOURCES.

TRAFFIC CONTROL NOTES:

1. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES, AND OTHER PROTECTIVE FACILITIES SHALL CONFORM WITH THE TRAFFIC REGULATIONS "ADMINISTRATIVE RULES OF HAWAII GOVERNING THE USE OF TRAFFIC CONTROL DEVICES AT WORK SITES ON OR ADJACENT TO PUBLIC STREETS AND HIGHWAYS", ADOPTED BY THE DIRECTOR OF TRANSPORTATION, AND THE CURRENT U.S. FEDERAL HIGHWAY ADMINISTRATION "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, PART VI – STANDARDS AND GUIDES FOR TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION, MAINTENANCE, UTILITY, AND INCIDENT MANAGEMENT OPERATIONS".
2. ALL LANES SHALL BE OPENED TO TRAFFIC DURING THE MORNING PEAK HOURS OF 6:30 A.M. TO 8:30 A.M. AND DURING THE AFTERNOON PEAK HOURS FROM 3:00 P.M. TO 5:00 P.M. DURING WORKING HOURS, TWO LANES OF TRAFFIC SHALL BE OPEN AT ALL TIMES. FOR STREETS WITH TWO LANES, ONLY ONE LANE OF TRAFFIC SHALL BE CLOSED AT ANY ONE TIME. THE CONTRACTOR SHALL PROVIDE AT LEAST TWO FLAGMEN TO DIRECT ALTERNATING TRAFFIC IN THE OPEN LANE. THE CONTRACTOR SHALL PROVIDE ONE LANE FOR TRAFFIC ACCESS TO ALL DRIVEWAYS, PARKING AREAS, ETC. AT ALL TIMES.
3. DURING NON-WORKING HOURS, ALL LANES SHALL BE OPEN TO TRAFFIC. ALL TRENCHES SHALL BE COVERED WITH NON-SKID BRIDGING MATERIAL WITH SUITABLE MATERIAL AT THE EDGES TO PROVIDE A SMOOTH TRANSITION.
4. WHEREVER PEDESTRIAN WALKWAYS EXIST, THEY SHALL BE MAINTAINED IN PASSABLE CONDITION OR OTHER FACILITIES FOR PEDESTRIANS SHALL BE PROVIDED. PASSAGE BETWEEN WALKWAYS AT INTERSECTIONS SHALL LIKEWISE BE PROVIDED.
5. THE CONTRACTOR SHALL REPLACE OR REPAIR ALL TRAFFIC SIGNS, POSTS, AND MARKINGS DISTURBED BY THE CONTRACTOR'S ACTIVITIES TO EXISTING CONDITIONS OR BETTER.
6. THE CONTRACTOR SHALL COORDINATE ALL TRAFFIC CONTROL PLANS WITH THE PROJECT MANAGER.

ACCESS TO PROJECT SITE AND MAINTAINING HAWAII NATIONAL GUARD AREA PERIMETER SECURITY NOTES:

1. THE PROJECT IS GENERALLY LOCATED WITHIN A SECURED PERIMETER AREA HOUSING THE HAWAII ARMY NATIONAL GUARD KMR COMPLEX. THE SECURED PERIMETER RUNS ALONG PUNA TRAIL. VEHICLE ACCESS IS CONTROLLED BY MAIN GATE. PORTABLE GUARD GATE HOUSES AND CONCRETE BARRICADES, AND SIGNS ARE LOCATED AT MAIN GATE.
2. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH THE PROJECT MANAGER IMPACTS AND DISRUPTION TO GATE FACILITIES AND OPERATION(S). TEMPORARY RELOCATION OF GATE SECURITY FACILITIES AND TEMPORARY ACCESS CONTROL MAY BE BY THE HAWAII NATIONAL GUARD OR BY THE CONTRACTOR AS DIRECTED. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS FOR TEMPORARY AND RESTORATION WORK, AND SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE CONTRACT. TEMPORARY ACCESS THROUGH THE GATE NEAR BUILDING 557 AT STORAGE AVENUE SHALL BE COORDINATED WITH THE PROJECT MANAGER AND SHALL BE PROVIDED FOR BY THE CONTRACTOR AS DIRECTED.
3. CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE ALL GATE FACILITIES AND OPERATIONS BACK TO ORIGINAL CONDITIONS AND AS DIRECTED AT NO ADDITIONAL COST TO THE CONTRACT.
4. CONTRACTOR SHALL COORDINATE ACCESS FOR ALL CONTRACTOR PERSONNEL, VEHICLES, EQUIPMENT, AND DELIVERIES, AND SHALL OBTAIN ALL PERMISSIONS, CLEARANCES, PASSES, ETC. AS REQUIRED FROM THE HAWAII ARMY NATIONAL GUARD. CONSTRUCTION VEHICULAR TRAFFIC SHALL BE ONLY VIA GATES AS DIRECTED BY THE HAWAII ARMY NATIONAL GUARD.
5. CONTRACTOR SHALL COORDINATE WITH THE PROJECT MANAGER DESIGNATION BY THE HAWAII NATIONAL GUARD OF SITE(S) WITHIN THE SECURED AREA FOR THE CONTRACTOR FIELD OFFICE AND BASE YARD.

PM: TCL
DESIGNER: AS
DATE REV.: 05/08/15
DATE: 08/28/14
SCALE:
FILE: 20130033-302-ADD1

HAWAII ARMY NATIONAL GUARD

HDR

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

DATE	DESCRIPTION	BY	APPR
5/8/15	ADDENDUM 1	1	

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HILO, HAWAII
HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

GENERAL NOTES, SHEET 1

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 3 OF 32

G-03

HAWAII ARMY NATIONAL GUARD ENVIRONMENTAL COMPLIANCE NOTES:

1. IN ORDER TO FACILITATE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA) REPORTING REQUIREMENTS, PRIOR TO PROJECT START AND WITHIN 30 DAYS OF COMPLETION OF THE PROJECT, CONTRACTOR SHALL SUBMIT TO HIARNG-ENV A HAZARDOUS MATERIAL INVENTORY LOG OF CHEMICAL PRODUCTS TO BE USED IN THE PROJECT, AND PROVIDE AN UPDATE NO LATER THAN 31 JANUARY OF EACH CALENDAR YEAR. THE LOG SHALL INCLUDE THE PRODUCT NAME AND MANUFACTURER ID NUMBER, CONTAINER SIZE, AMOUNT USED, AND MAXIMUM NUMBER OF CONTAINERS TO BE STORED ON SITE AT ANY GIVEN DAY DURING THE PROJECT. HIARNG-ENV MAY WAIVE THIS REQUIREMENT BASED UPON CONTRACTOR REQUEST. SAFETY DATA SHEETS (SDSs) SHALL BE PROVIDED OR MADE AVAILABLE TO THE PROJECT MANAGER AND HIARNG-ENV UPON REQUEST.

2. PRIOR TO PROJECT START, CONTRACTOR WILL PROVIDE TO HIARNG-ENV AND THE PROJECT MANAGER AN ESTIMATE OF THE MAXIMUM AMOUNT OF HAZARDOUS WASTE, UNIVERSAL WASTE, AND OTHER REGULATED WASTE (E.G., ASBESTOS, LEAD PAINT CHIPS, FLUORESCENT LAMPS, PCB BALLASTS) EXPECTED TO BE GENERATED PER MONTH, AND THE TOTAL AMOUNT ANTICIPATED TO BE STORED ON-SITE AT ANY GIVEN TIME. CONTRACTOR SHALL ALSO PROVIDE NAME OF DISPOSAL/RECYCLING FACILITIES AND TRANSPORTERS TO BE USED FOR HAZARDOUS WASTE, INCLUDING THEIR EPA ID NUMBERS; DISPOSAL/RECYCLING FACILITIES AND TRANSPORTERS USED MUST BE LISTED ON DRMS's LISTS OF QUALIFIED FACILITIES AND QUALIFIED TRANSPORTERS AT http://www.dispositionservices.dla.mil/newenv/hwdisposal.shtml. ALL WASTE WILL BE STORED IN A SECURED AREA PENDING REMOVAL FOR DISPOSAL, WITH SIGNAGE INDICATING CONTACT INFORMATION, AND SHALL BE MANAGED, PACKAGED, AND TRANSPORTED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS. MONTHLY WASTE GENERATION REPORTS SHALL BE PROVIDED TO HIARNG-ENV AND THE PROJECT MANAGER BY THE 5TH OF THE MONTH AFTER THE END OF THE MONTH BEING REPORTED. THE REPORTS SHALL INDICATE THE TYPE OF WASTE AND THE NUMBER OF POUNDS OF EACH TYPE GENERATED IN EACH CONTAINER EACH MONTH.

3. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS FOR DISPOSAL OF WASTE GENERATED FROM THIS PROJECT AND SHALL PROVIDE COPIES OF ALL WASTE DISPOSAL DOCUMENTATION (INCLUDING ANY REQUIRED LAB ANALYSES, WASTE PROFILES, AND ANY OTHER SUPPORTING DOCUMENTATION) TO THE HIARNG-ENV AND THE PROJECT MANAGER, ALONG WITH DRAFT COPIES OF THE WASTE MANIFESTS FOR REVIEW PRIOR TO WASTE SHIPMENT OFF-SITE FOR DISPOSAL. THE APPLICABLE HIARNG EPA ID NUMBER SHALL BE USED ON WASTE MANIFESTS, AND MANIFESTS WILL ONLY BE SIGNED BY INDIVIDUALS AUTHORIZED BY HIARNG-ENV.

4. ALL CONSTRUCTION SITES ARE SUBJECT TO THE REGULATIONS OF 40 CFR 112 OIL POLLUTION PREVENTION AND ARE REQUIRED TO PREPARE A SITE SPECIFIC SPILL PREVENTION, CONTROL AND COUNTERMEASURE (SPCC) PLAN IF STORING MORE THAN 1320 GALLONS (G) OF POL ON SITE. A COPY OF THE SPCC PLAN MUST BE SUBMITTED TO HIARNG-ENV BEFORE START OF THE PROJECT AND KEPT READILY AVAILABLE ON SITE. IF THE SITE IS STORING LESS THAN 1320 G OF POL NO SPCC PLAN IS REQUIRED, HOWEVER, THE CONTRACTOR SHALL IMPLEMENT THE APPLICABLE HIARNG SPCC PLAN.

5. CONTRACTOR, IN GENERAL, SHALL BE RESPONSIBLE FOR ASSESSING WHETHER THE PROJECT AND/OR PROJECT ACTIVITIES REQUIRE ENVIRONMENTAL PERMITS AND ARE RESPONSIBLE FOR OBTAINING, IMPLEMENTING AND MAINTAINING ALL APPLICABLE PERMIT REQUIREMENTS.

6. ALL PROJECTS THAT DISTURB MORE THAN 1 ACRE OF SOIL, INCLUDING PROJECTS THAT, CONSIDERED WITH OTHER RELATED PROJECTS (I.E., ARE PART OF A LARGER COMMON PLAN OF DEVELOPMENT OR SALE), CUMULATIVELY DISTURB MORE THAN 1 ACRE OF SOIL, ARE REQUIRED TO OBTAIN AN APPLICABLE POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGE PERMIT FROM THE HAWAII DEPARTMENT OF HEALTH (HDOH) AND IMPLEMENT ALL PERMIT REQUIREMENTS, PLANS, AND INSPECTIONS. SITES LESS THAN 1 ACRE ARE REQUIRED TO IMPLEMENT BEST MANAGEMENT PRACTICES (BMP'S) TO PREVENT CONTAMINATED STORMWATER FROM LEAVING THE SITE.

7. CONTRACTORS SHALL BE RESPONSIBLE FOR DETERMINING THE NEED FOR AND OBTAINING ANY ALL REQUIRED ENVIRONMENTAL PERMITS, E.G. NPDES PERMITS FOR CONSTRUCTION ACTIVITY, UNDERGROUND INJECTION CONTROL WELL (UIC), COUNT-REQUIRED INDUSTRIAL WASTEWATER DISCHARGE PERMITS, MINOR POLLUTION SOURCE AIR PERMITS, ETC. FOR ANY CONTRACT-RELATED WORK. THE HIARNG-ENV OFFICE SHALL BE COPIED ON ALL PERMIT CORRESPONDENCE, AND SHALL BE PROVIDED THE ORIGINAL COPY OF ALL PERMITS.

8. CONTRACTORS ARE REQUIRED TO INSTALL AND MAINTAIN STORMWATER BEST MANAGEMENT PRACTICES (BMPs) AND PROTECTIVE MEASURES (REGARDLESS OF PROJECT SIZE OR SCOPE) TO PREVENT THE POLLUTION OF STORMWATER TO THE MAXIMUM EXTENT PRACTICABLE (MEP).

9. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL EXISTING AND APPLICABLE HIARNG ENVIRONMENTAL PERMITS, E.G., NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS, UIC PERMITS, INDUSTRIAL WASTEWATER DISCHARGE PERMITS (IWDPs), INDIVIDUAL WASTEWATER SYSTEM (IWS) PERMITS, ETC.

10. CONTRACTOR SHALL POST EMERGENCY CONTACT SIGN INDICATING THE NAME AND PHONE NUMBER FOR THE PROJECT MANAGER, THE CONTRACTOR EMERGENCY CONTACT, POLICE/FIRE DEPARTMENT 911, AND HIARNG ENV 672-1013. CONTRACTOR SHALL REPORT SPILLS IMMEDIATELY TO THE PROJECT MANAGER AND HIARNG-ENV AND COMPLETE THE HIARNG SPILL INCIDENT REPORT FORM AS REQUIRED. CONTRACTOR SHALL IMMEDIATELY CLEAN UP ALL SPILLS IAW FEDERAL AND STATE GUIDELINES AND TO THE SATISFACTION OF HIARNG-ENV. CONTRACTOR SHALL MAINTAIN ADEQUATE SPILL SUPPLIES COMMENSURATE WITH THE POTENTIAL FOR SPILLS, AND WILL CONTRACT OUT SPILL CLEANUP BEYOND THEIR CAPABILITIES. CONTRACTOR SHALL ACCOMPLISH ALL REGULATORY VERBAL AND WRITTEN NOTIFICATIONS TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE (LEPC), NATIONAL RESPONSE CENTER (NRC), ENVIRONMENTAL PROTECTION AGENCY (EPA), AS APPLICABLE, AND PROVIDE HIARNG-ENV COPIES OF ALL SPILL REPORTS SUBMITTED.

HAWAII ARMY NATIONAL GUARD ENVIRONMENTAL COMPLIANCE NOTES (CONTINUED):

11. SEND TO HIARNG-ENV THE DATA FOR NON-HAZARDOUS RECYCLED/DIVERTED WASTE (I.E. WASTE THAT DOES NOT GO INTO THE LANDFILL OR H-POWER) AND NON-HAZARDOUS DISPOSED WASTE FOR ALL CONSTRUCTION PROJECTS. DATA CAN BE PROVIDED BY ANY MEANS (E.G. RECEIPT COPIES, EXCEL TABLE, EMAIL MESSAGE)

    DATA SHOULD INCLUDE:

    RECYCLED/DIVERTED WASTE

    - TYPE OF MATERIAL
    - NET WEIGHT
    - RECYCLE FACILITY (E.G. SCHNITZER, ISLAND RECYCLING, REFRIGERANT RECYCLING)
    - TICKET NUMBER (IF AVAILABLE)
    - COST/REVENUE (IF APPLICABLE)

    DISPOSED WASTE

    - NET WEIGHT
    - DISPOSAL FACILITY (E.G. PVT, SCHNITZER)
    - TICKET NUMBER (IF AVAILABLE)
    - COST (IF APPLICABLE)

HAWAII ARMY NATIONAL GUARD SOLID WASTE CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL SUBMIT SOLID WASTE REPORTS TO THE HIARNG PROJECT MANAGER FOR THE DURATION OF THE PROJECT. THE REPORTS SHALL ADDRESS:

    A. DIVERTED WASTE (I.E. WASTE THAT DOES NOT GO INTO LANDFILL)

    B. RECYCLED WASTE

    C. LANDFILL WASTE

    D. RECOVERED WASTE (I.E. FREON FROM AC EQUIPMENT AND REFRIGERATORS

2. THE CONTRACTOR SHALL SUBMIT LEGIBLE COPIES OF DUMP TICKET RECEIPT FROM VENDOR SHOWING THE TONNAGE OF WASTE TO THE HIARNG PROJECT MANAGER. IF WASTE PRODUCTS ARE COMBINED WITH OTHER PROJECTS, THE CONTRACTOR SHALL PROVIDE A BREAKDOWN PER PROJECT.

⚠1 3. THE CONTRACTOR SHALL OBTAIN AND SUBMIT ALL SOLID WASTE PERMITS AND PLANS REQUIRED BY COUNTY OF HAWAII, WHICH INCLUDE BUT ARE NOT LIMITED TO SOLID WASTE DISPOSAL PERMIT AND SOLID WASTE MANAGEMENT PLAN.

ACCESS CONTROL POINT SECURITY EQUIPMENT NOTES:

1. CONDUIT SIZES INDICATED ON DRAWINGS ARE MINIMUM ACCEPTABLE. ALL NEW CONDUIT SHALL BE SIZED TO PROVIDE SPARE CAPACITY IN ACCORDANCE WITH THE NEC.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING EXISTING CONDITIONS PRIOR TO BIDDING AND INSTALLATION.

3. THESE DRAWINGS ARE DIAGRAMMATIC AND REFLECT DESIGN INTENT ONLY. ALL UNDERGROUND CONDUITS, SLEEVES, FEEDS TO EQUIPMENT INSTALLATION AND PLACEMENT OF THAT EQUIPMENT SHALL BE VERIFIED IN FIELD AND WITH OTHER TRADES PRIOR TO INSTALLATION. SECURITY CONTRACTOR SHALL VISIT SITE PRIOR TO SUBMITTING BID AND NOTE ALL APPARENT FEATURES WHICH MAY AFFECT THE WORK OF THIS CONTRACT. NO SUBSEQUENT ALLOWANCES WILL BE MADE FOR FAILURE TO VISIT SITE PRIOR TO BID OR FOR LACK OF FIELD COORDINATION WITH THE WORK OF THE OTHER TRADES.

4. COORDINATE ELECTRICAL ROUGH-IN REQUIREMENTS WITH THE ELECTRICAL CONTRACTOR/TRADES AT ALL LOCATIONS OF 120 V AND HIGHER ELECTRICAL POWERED EQUIPMENT.

5. WHERE ROUTING OF CONDUIT IS SHOWN ON PLANS TO PASS THROUGH STRUCTURES, CORE DRILL PENETRATIONS UNLESS SPECIFICALLY NOTED OTHERWISE. SIMILAR CUTTING AND PATCHING TO MATCH EXISTING SURFACES MAY BE UTILIZED WHERE CONDITIONS PERMIT.

6. ALL INTERIOR AND EXTERIOR CONDUIT SHALL BE A MINIMUM OF 1" UNLESS OTHERWISE NOTED. CONDUIT SIZES INDICATED SHALL BE THE MINIMUM SIZES UTILIZED.

7. ALL CONDUIT AND WIRING SHALL BE CONCEALED UNLESS OTHERWISE NOTED ON THE DRAWINGS AND/OR LOCATED IN ELECTRICAL, MECHANICAL OR STORAGE ROOMS OR SIMILAR UNFINISHED SPACES.

8. CONDUIT RUNS INDICATED REFLECT DESIGN INTENT ONLY. ALL PULL BOXES AND JUNCTION BOXES SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. AND TIA-569-B. CONTRACTOR SHALL VERIFY QUANTITY AND LOCATION OF PULL BOXES AND JUNCTION BOXES IN ACCORDANCE WITH CABLE MANUFACTURERS RECOMMENDATIONS.

ACCESS CONTROL POINT SECURITY EQUIPMENT NOTES (CONTINUED):

9. CONTRACTOR SHALL HAVE THE OPTION TO COMBINE HOMERUN CONDUCTORS OF REMOTE DEVICES OF SAME TYPE AND VOLTAGE CLASS AS PER THE N.E.C. SIZE CONDUIT AND INSTALL CONDUCTORS IN ACCORDANCE WITH THE N.E.C., N.F.P.A. AND DIVISION 26 OF THE SPECIFICATIONS.

10. ROUTE ALL HOMERUNS FROM ALL SECURITY DEVICES TO TRAFFIC CONTROL EQUIPMENT CABINET AS INDICATED ON PLANS.

11. ALL SECURITY EQUIPMENT AT EXTERIOR LOCATIONS SHALL BE WEATHERPROOF RATED.

12. ALL CONDUIT BENDS SHALL BE LONG AND SWEEPING WITH A MINIMUM RADIUS OF 6 TIMES THE DIAMETER FOR CONDUITS UP TO 2" OR 10 TIMES FOR LARGER CONDUITS.

13. ALL SECURITY DEVICE WIRING AND INTERCONNECTIONS BETWEEN EQUIPMENT MUST BE IN CONDUIT AND INACCESSIBLE TO PHYSICAL TAMPERING. AT LOCATIONS WHERE JUNCTION BOXES OR ELECTRICAL FITTINGS WOULD PROVIDE ACCESS, COVERS MUST BE SECURED WITH TAMPER RESISTIVE HARDWARE TIGHTENED TO MANUFACTURER'S SPECIFICATIONS.

14. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, ALL SECURITY DEVICES ARE TO BE MONITORED AND CONTROLLED FROM THE GUARD BOOTH.

15. ALL EQUIPMENT NOTED AS GOVERNMENT FURNISHED GOVERNMENT INSTALLED IS TO BE CONSIDERED MATERIALS, EQUIPMENTS AND ANCILLARY HARDWARE WHICH IS ACQUIRED DIRECTLY BY THE GOVERNMENT AND INSTALLED BY THE SAME.

16. COORDINATE ALL CONDUIT, CABLE AND EQUIPMENT REQUIRED FOR THE GUARD BOOTH WITH THE APPROPRIATE TRADE PRIOR TO GUARD BOOTH INSTALLATION.

MINIMUM BEST MANAGEMENT PRACTICES NOTES:

1. DURING CONSTRUCTION, PREVENTIVE MEASURES SHALL BE USED TO CONTROL FORESEEABLE DUST, EROSION OR SEDIMENTATION PROBLEMS WHICH MAY ARISE AS WORK PROGRESSES.

2. FUGITIVE DUST AND SOLID WASTE DISPOSAL DURING GRUBBING AND GRADING ACTIVITIES SHALL MEET THE REQUIREMENTS OF STATE OF HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 60, AIR POLLUTION CONTROL AND CHAPTER 56, SOLID WASTE MANAGEMENT CONTROL.

3. ALL AREAS WHICH ARE AT FINAL GRADE SHALL BE IMMEDIATELY HYDROMULCHED AND SEEDED WITH COMMON BERMUDA GRASS AT A RATE OF 5 POUNDS PER 1000 SQUARE FEET OR PERMANENTLY LANDSCAPED.

4. ALL EXPOSED AREAS WHICH ARE NOT AT FINAL GRADE AND WHICH ARE TO BE LEFT EXPOSED LONGER THAN 6 WEEKS SHALL BE HYDROMULCHED AND SEEDED WITH COMMON BERMUDA GRASS.

5. REGRASS ALL EXPOSED AREAS.

6. CONTROL DUST EMISSIONS TO THE MAXIMUM EXTENT PRACTICABLE THROUGH BMPS SUCH AS WATER SPRINKLING, DUST FENCES, LIMITING AREA OF DISTURBANCE.

7. SEDIMENT TRAPPING DEVICES SUCH AS FENCES, TRAPS OR BARRIERS SHALL BE USED DOWN SLOPE OF ALL DISTURBED AREAS AND AROUND THE BASE OF ALL MATERIAL STOCKPILES. COVER STOCKPILES WITH PLASTIC.

8. HANDLE DRAINAGE TO CONTROL EROSION, PREVENT DAMAGE TO DOWNSTREAM PROPERTIES AND RETURN WATERS TO THE NATURAL DRAINAGE COURSE IN A MANNER WHICH MINIMIZES SEDIMENTATION OR OTHER POLLUTION TO THE MAXIMUM EXTENT PRACTICABLE.

9. STABILIZE ALL DISTURBED AREAS WITH EROSION CONTROL MEASURES, SUCH AS VEGETATION, RUNOFF DIVERSION, MULCHING, BLANKETS, BONDED FIBER MATRICES AND VEHICLE WHEEL WASH FACILITIES.

10. CAPTURE SEDIMENT TRANSPORTED IN RUNOFF TO MINIMIZE THE SEDIMENT FROM LEAVING THE SITE WITH METHODS SUCH AS SEDIMENT BASINS, SEDIMENT TRAPS, SILT FENCES, SAND BAGS AND VEGETATED FILTER STRIPS.

PM: TCL
DESIGN: KT
DATE REV.: 05/08/15

DATE: 08/28/14
SCALE:
FILE: 2013033-303-A001

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.

SEAL

	DATE	APPR
⚠1 ADDENDUM 1	5/8/15	

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES: ET | DRW: BTY | CHK: RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

GENERAL NOTES, SHEET 2

SCALE: AS NOTED

STATE JOB NO.: CA-1328-D

FEDERAL PROJECT NO.: 15140022

SHEET 4 OF 32

G-04

HORIZ/VERT CONTROL POINT DATA				
STA	DESCRIPTION	ELEVATION	AZIMUTH	DISTANCE
D	BRONZE DISK	52.21		
			174° 57' 20"	343.15
A	BRONZE DISK	50.26		
			264° 57' 20"	990.74
B	2 3/8" PIPE	–		
			23° 59' 14"	1028.99
C	BRONZE DISK	52.03		
			133° 30' 50"	742.63
D	BRONZE DISK	52.21		

TRUE NORTH

NOTES:

1. COORDINATES AND AZIMUTHS REFERRED TO HAWAII STATE PLANE COORDINATES SYSTEM NAD 83, ZONE 1, U.S. FEET.

   TO CONVERT FROM HAWAII STATE PLANE COORDINATES SYSTEM TO GOVERNMENT TRIANGULATION STATION "HALAI ", ADD (+)0° 08' 10".

BENCH MARK:

ELEVATIONS REFERRED TO C&GS BENCH MARK
DISK "A 100" TOP OF BRASS
ELEV.+11.42 U.S. FT., MSL.

PROPERTY LINE

STA B
2 3/8" PIPE

AIRPORT ACCESS ROAD

PROJECT SITE

STA A
BRONZE DISK
ELEV=50.26

BLDG 661

BLDG 643D

BLDG 630

BLDG 629

BLDG 628

BLDG 600

BLDG 501

BLDG 502

BLDG 505

BLDG 643D

PUNA TRAIL

BLDG 625

BLDG 557

PROPERTY LINE

STORAGE AVENUE

STA D
BRONZE DISK
ELEV=52.21

STA C
BRONZE DISK
ELEV=52.03

GRAPHIC SCALE:
60' 30' 0 60' 120'
SCALE: 1" = 60'

GENERAL LOCATION PLAN
SCALE: 1" = 60'

DATE: 08/28/14
SCALE:
FILE: 20130133-304
PM:
DFPE:
DATE REV. TCL #1 03/16/15

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

	APPR	DATE	DESCRIPTION

SUBMITTAL PHASE
FINAL

SUBMITTAL DATE 04/17/15

DES	ET	DRW	BTY	CHK	RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HI/ARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR) PHYSICAL SECURITY

GENERAL LOCATION PLAN

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 5 OF 32

G-05

TRUE NORTH

PROPERTY LINE

(SECTION OF TONED WATERLINE BY OTHERS)

EDGE OF PAVEMENT

PUNA TRAIL

ASPHALT PAVEMENT

CONC. SLAB

Bronze Disk (Found)

UP (ABAND.)

GW

UP

MB

O/H

UP #147562

UP #147563

UTIL. BOX
TOP=53.16

UP #144672

WM#04138792
TOP=53.71
TP=52.86

FH

SPEED BUMP

PATCH

GATE

YIELD SIGN

SIGN
"SPEED LIMIT 15"

WV
TS=49.90

CESSPOOL
TOP=53.99

CHAIN LINK FENCE

CONC. SWALE

Access Easement

TONED WATERLINE
LOCATION (BY OTHERS)

BUILDING 660
(WASHRACK)

BUILDING 501

SHED

BUILDING

D.I.
TOP=52.88
INV.=51.87(4")

BFP

EAVE

RISER

PANEL BOX

WV
TOP=53.70
THV=52.61

WV
TOP=53.70
THV=52.70

ASPHALT PAVEMENT

UP #147565

SIGN
STOP
LINE

GATE

POST

CONC. SLAB

T 57.86
B 57.36

T 59.66
B 59.16

T 57.82
B 57.32

T 59.56
B 59.06

DS

T
D
(TYP.)

EXISTING CONDITIONS PLAN

SCALE: 1" = 20'

GRAPHIC SCALE:

20' 10' 0 20' 40'

SCALE: 1" = 20'

TCL
PM:
OPER:
DATE: 12/18/14
SCALE: 1" = 20'
FILE: 20100333-305
DATE REV. 05/16/15

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HILO, HAWAII
HIARNG

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

EXISTING CONDITIONS PLAN

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

APPR | DATE | DESCRIPTION | SYM

SUBMITAL PHASE: FINAL
SUBMITAL DATE: 04/17/15
DES ET | DRW BTY | CHK RA

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 6 OF 32

G-06

TRUE NORTH

AIRPORT ACCESS ROAD

PROPERTY LINE

PROJECT SITE

PUNA TRAIL

STORAGE AVENUE

BUILDING 630
BUILDING 628
BUILDING 660
BUILDING 501
BUILDING 502
BUILDING 557
BUILDING 625
BUILDING 643B
BUILDING 643D

GENERAL CIVIL LOCATION PLAN

SCALE: 1" = 60'

GRAPHIC SCALE:

60' 30' 0 60' 120'

SCALE: 1" = 60'

PM: TCL
DRAWER: KT
DATE REV.: 03/16/15

DATE: 08/28/14
SCALE:
FILE: 20130313-320

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.

SEAL

APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES	ET	DRW	BTY	CHK	RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HILO, HAWAII

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

GENERAL CIVIL LOCATION PLAN

SCALE: AS NOTED

STATE JOB NO.
CA-1328-D

FEDERAL PROJECT NO.
15140022

SHEET 7 OF 32

C-01

PROPERTY LINE
TRUE NORTH
REMOVE EXIST FENCE (APPROX 109 LF)
EXIST FENCE TO REMAIN
REMOVE EXIST CONC BARRIERS (TYP OF 13)
Bronze Disk (Found)
EXIST UTILITY POLE TO REMAIN
EXIST FIRE HYDRANT TO REMAIN
SEE ELECTRICAL DRAWINGS FOR EXIST UTILITY BOX ABANDONMENT
EXIST UTILITY POLE TO REMAIN
EXIST WATER METER TO REMAIN
BUILDING 501
EAVE
CESSPOOL TOP=53.99
PANEL BOX
UP #147565
FH
O/H
SIGN STOP LINE
GATE
CHAIN LINK FENCE
CONC. SWALE
UP (ABAND.)
GW
UP
MB
UP #147562
UP #147563
UTIL. BOX TOP=53.16
WM#04138792 TOP=53.71 TP=52.86
UP #144672
REMOVE EXIST GUARD SHACK
EDGE OF PAVEMENT
PUNA TRAIL
(SECTION OF TONED WATERLINE BY OTHERS)
EXIST ROLLING GATE TO REMAIN
SPEED BUMP
Access Easement
TONED WATERLINE LOCATION (BY OTHERS)
W 8"
ASPHALT PAVEMENT
YIELD SIGN
REMOVE EXIST FENCE (APPROX 40 LF)
WV TS=49.90
EXIST LIGHT POLE TO REMAIN
LP
EXIST WATER VALVE TO REMAIN
EXIST YIELD SIGN TO REMAIN
55.36'±
343.15
EXIST FENCE TO REMAIN
SIGN "SPEED LIMIT 15"
REMOVE EXIST SPEED BUMP
REMOVE EXIST SPEED LIMIT SIGN
REMOVE EXIST AC PAVEMENT (APPROX 710 SY)
T 57.86 B 57.36
T 59.66 B 59.16
T 57.82 B 57.32
T 59.56 B 59.06
CONC. SLAB
POST
TEMPORARY ENTRY GATE DURING CONSTRUCTION SEE NOTE 4
CHAIN LINK FENCE
WV TOP=51.59 TS=50.97 F.H. #2-240
GATE
LOOSE ROCK WALLS
8" STORAGE AVENUE
PROPERTY LINE
Bronze Disk (Found)
LP
1.5 H=20 COCONUT TREES D=1.5 H=40
BUILDING 557
(METAL)
VENTS
GAS RISER
ELEC PANELS
TREE D=1 H
T R E D=1 F (TYPICAL

NOTES:

1. THE CONTRACTOR SHALL PROVIDE SECURE FENCING FOR KMR HIARNG SITE AT ALL TIMES. TEMPORARY FENCING IS REQUIRED IF THE NEW FENCE IS NOT INSTALLED PRIOR TO DEMOLITION OF THE EXISTING FENCE.
2. THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT MANAGER FOR REMOVAL AND RELOCATION OF EXISTING CONCRETE BARRIERS.
3. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES IN PLACE.
4. THE CONTRACTOR SHALL COORDINATE WITH PROJECT MANAGER FOR TEMPORARY ENTRY GATE AND ACCESS TO KMR HIARNG SITE PRIOR TO THE START OF CONSTRUCTION. THE EXISTING GATE NEAR BUILDING 557 AT STORAGE AVENUE SHALL BE USED AS THE TEMPORARY ENTRY DURING CONSTRUCTION.

DEMOLITION PLAN

SCALE: 1" = 20'

GRAPHIC SCALE:

20' 10' 0 20' 40'

SCALE: 1" = 20'

TCL 04/17/15
PM: DES
DPER: ET
DATE REV.
DATE: 12/18/14
SCALE:
FILE: 20130303-308

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

NO.	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR) PHYSICAL SECURITY

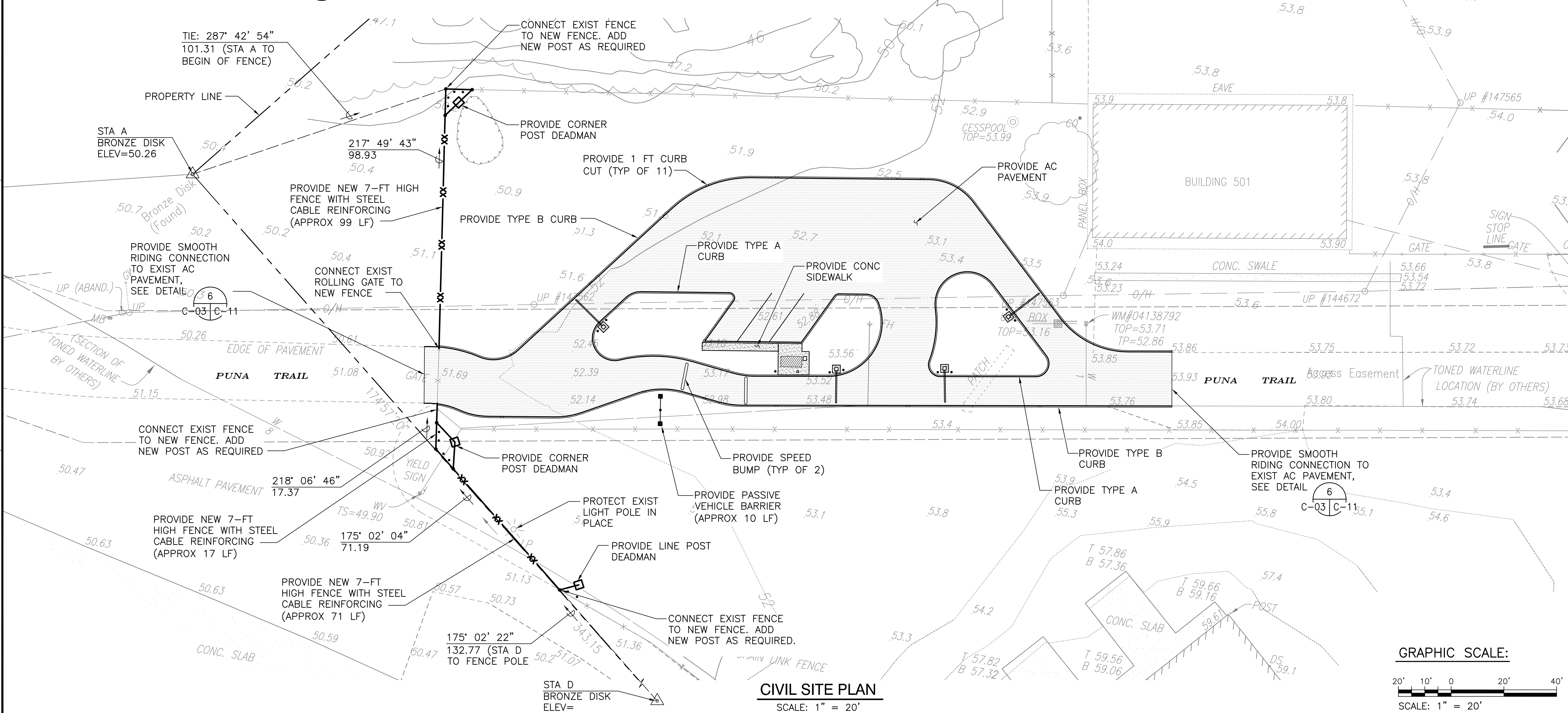
DEMOLITION PLAN

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 8 OF 32

C-02

NOTES:

1. FOR TYPE 2 FENCE, SEE DETAIL 1 C-03 | C-07
2. FOR STEEL CABLE REINFORCING, SEE DETAIL 1 C-03 | C-08 AND 3 C-03 | C-08
3. FOR GUARD SHACK, GATE ARM AND CARD READER CONCRETE PAD, SEE DETAIL 2 C-03 | C-12 AND 3 C-03 | C-12
4. FOR GUARD SHACK, GATE ARM, CARD READER CONCRETE BOLLARD, SEE DETAIL 1 C-03 | C-11
5. FOR CONCRETE CURB, TYPE A AND B, SEE DETAIL 2 C-03 | C-11 AND 3 C-03 | C-11
6. FOR AC PAVEMENT, SEE DETAIL 5 C-03 | C-11
7. FOR PASSIVE VEHICLE BARRIER, SEE DETAIL 1 C-03 | C-10
8. FOR CONCRETE CURB CUT, SEE DETAIL 4 C-03 | C-11
9. FOR SPEED BUMP, SEE DETAIL 1 C-03 | C-12
10. FOR CONCRETE SIDEWALK, SEE DETAIL 4 C-03 | C-12
11. FOR GATE ARM, CARD READER, STRIPING AND SIGNS, SEE SHEETS PS-01 AND PS-02.
12. FOR ELECTRICAL AND COMMUNICATION DUCTLINE AND LIGHT POLE, SEE SHEETS E-02 AND E-03.
13. FOR FENCE ALIGNMENT AND ROAD AND CURB DATA, SEE SHEET C-05.
14. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES IN PLACE.



CIVIL SITE PLAN

SCALE: 1" = 20'

DATE: 08/28/14
SCALE: 1" = 1'
FILE: 2013033-321

HDR

TONY C.G. LAU LICENSED PROFESSIONAL ENGINEER No. 9021-C HAWAII, U.S.A.

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES: ET | DRW: BTY | CHK: RA

DEPARTMENT OF DEFENSE, DESIGN AND PROJECT MANAGEMENT BRANCH — HILO, HAWAII

HAWAII ARMY NATIONAL GUARD PHYSICAL SECURITY AND IMPROVEMENTS

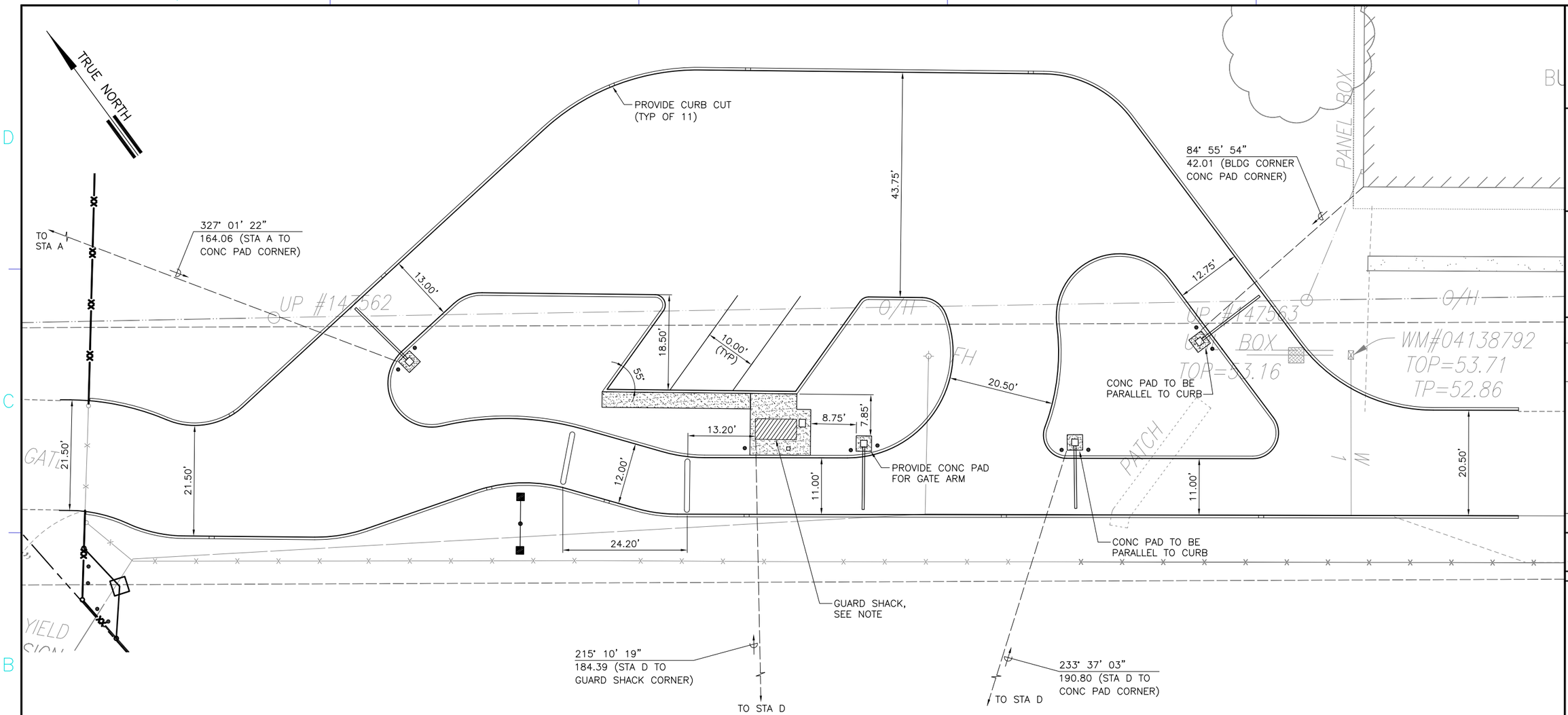
TS KEAUKAHA MILITARY RESERVATION (KMR) PHYSICAL SECURITY

CIVIL SITE PLAN

STATE OF HAWAII — FACILITY MANAGEMENT OFFICE — HIARNG

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 9 OF 32

C-03



ENLARGED CIVIL SITE PLAN

SCALE: 1" = 10'

NOTE:

FOR CONCRETE PAD FOR GATE ARM, GUARD SHACK AND CARD READER, SEE DETAIL 2 C-04 | C-12 AND 3 C-04 | C-12

GRAPHIC SCALE:

10' 0 10' 20'

SCALE: 1" = 10'

DATE: 1/6/15
SCALE: 1" = 10'
FILE: 20130333-330

PM: TCL
DFPER: YRS-FTI
DATE REV. 04/17/15

A/E INFO

LICENSED PROFESSIONAL ENGINEER
TONY C.G. LAU
No. 9021-C
HAWAII, U.S.A.

SEAL

DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

ENLARGED CIVIL SITE PLAN

SCALE: AS NOTED

STATE JOB NO. CA-1328-D

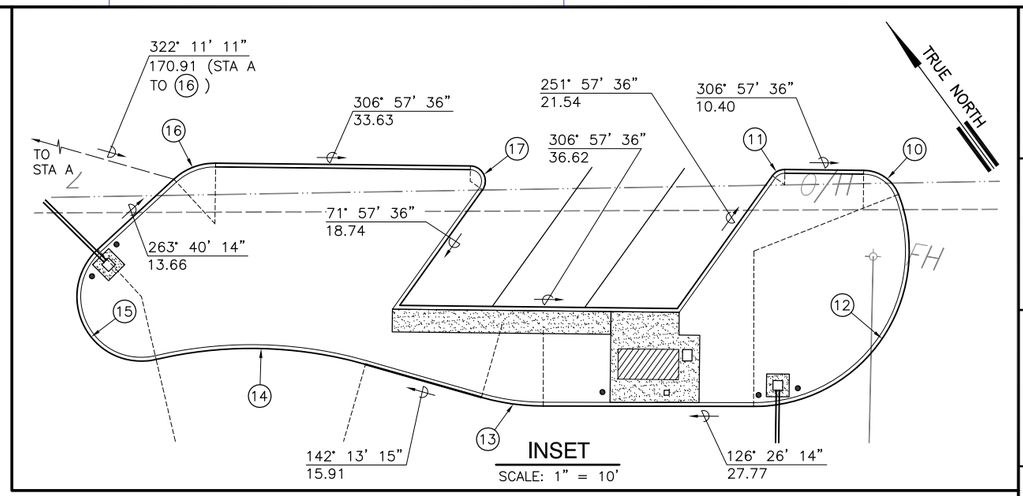
FEDERAL PROJECT NO. 15140022

SHEET 10 OF 32

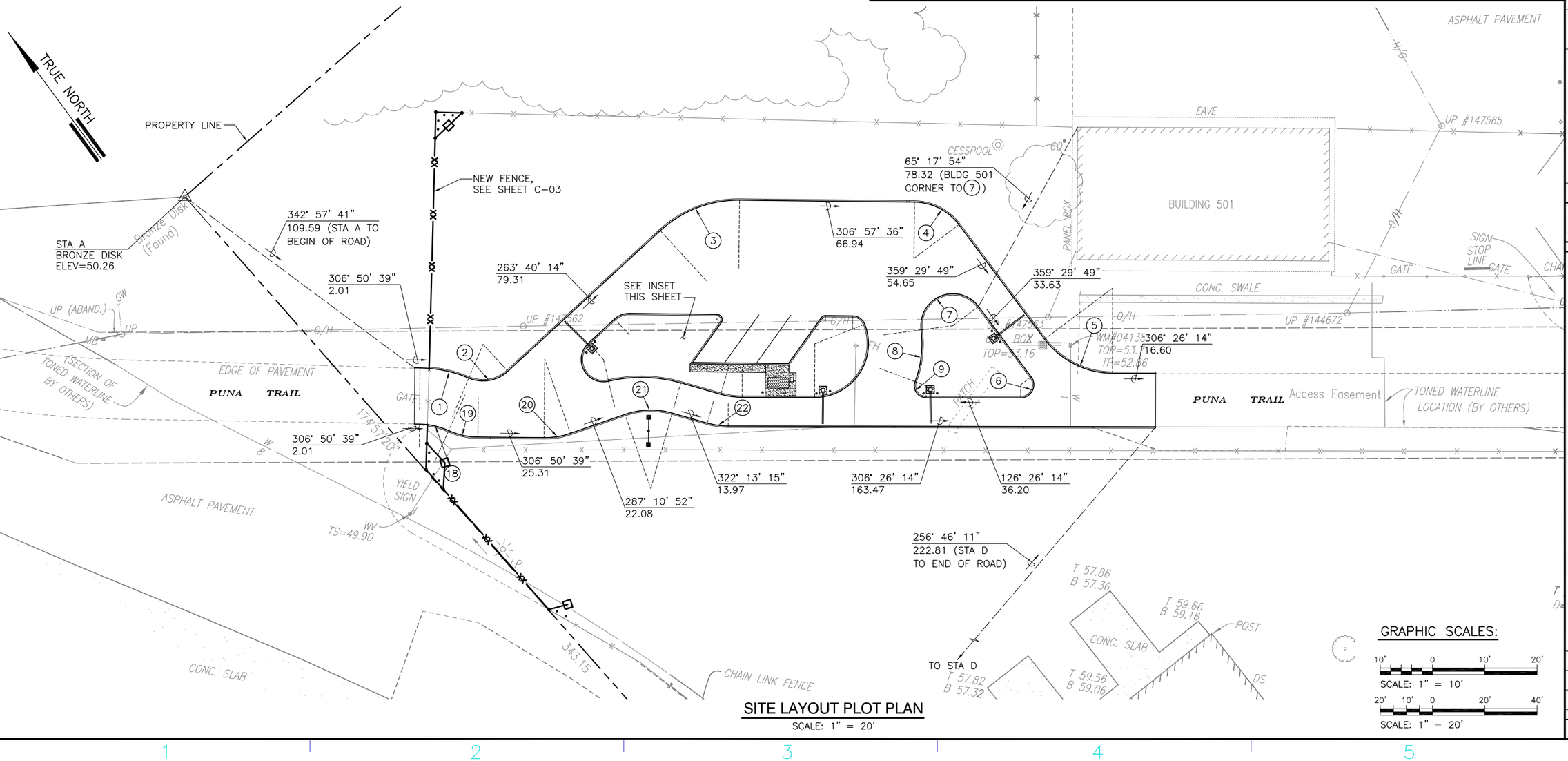
C-04

CURVE DATA											
CURVE	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
Δ	22° 24' 43"	65° 35' 08"	43° 17' 21"	52° 32' 14"	53° 03' 35"	126° 56' 25"	150° 38' 10"	28° 09' 52"	110° 35' 18"	67° 57' 14"	55° 00' 00"
Δ/2	11° 12' 21.5"	32° 47' 34"	21° 38' 40.5"	26° 16' 07"	26° 31' 47.5"	63° 28' 12.5"	75° 19' 05"	14° 04' 56"	55° 17' 39.5"	33° 58' 37"	27° 30' 00"
R	49.00	14.00	44.00	21.50	32.50	5.00	12.25	41.00	4.50	5.00	2.00
T	9.71	9.02	17.46	10.61	16.23	10.02	46.75	10.29	6.50	3.37	1.04
Ch	19.05	15.17	32.46	19.03	29.03	8.95	23.70	19.95	7.40	5.59	1.85
Lc	19.17	16.03	33.24	19.71	30.10	11.08	32.21	20.15	8.69	5.93	1.92

CURVE DATA											
CURVE	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑	㉒
Δ	111° 31' 25"	15° 47' 01"	29° 06' 28"	150° 33' 26"	43° 17' 21"	12° 00' 00"	23° 59' 14"	23° 59' 14"	19° 39' 47"	35° 02' 23"	15° 47' 01"
Δ/2	55° 45' 42.5"	7° 43' 30.5"	14° 33' 14"	75° 16' 43"	21° 38' 40.5"	6° 00' 00"	11° 59' 37"	11° 59' 37"	9° 34' 53.5"	17° 31' 11.5"	7° 53' 30.5"
R	20.50	30.00	55.00	8.50	8.00	2.00	27.50	27.50	30.00	30.00	29.50
T	30.12	4.16	14.28	32.35	3.18	3.84	5.84	5.84	5.20	9.47	4.09
Ch	33.90	8.24	27.64	16.44	5.90	3.55	11.43	11.43	10.25	18.06	8.10
Lc	39.90	8.26	27.94	22.34	6.04	4.36	11.51	11.51	10.30	18.35	8.13



INSET
SCALE: 1" = 10'



SITE LAYOUT PLOT PLAN
SCALE: 1" = 20'

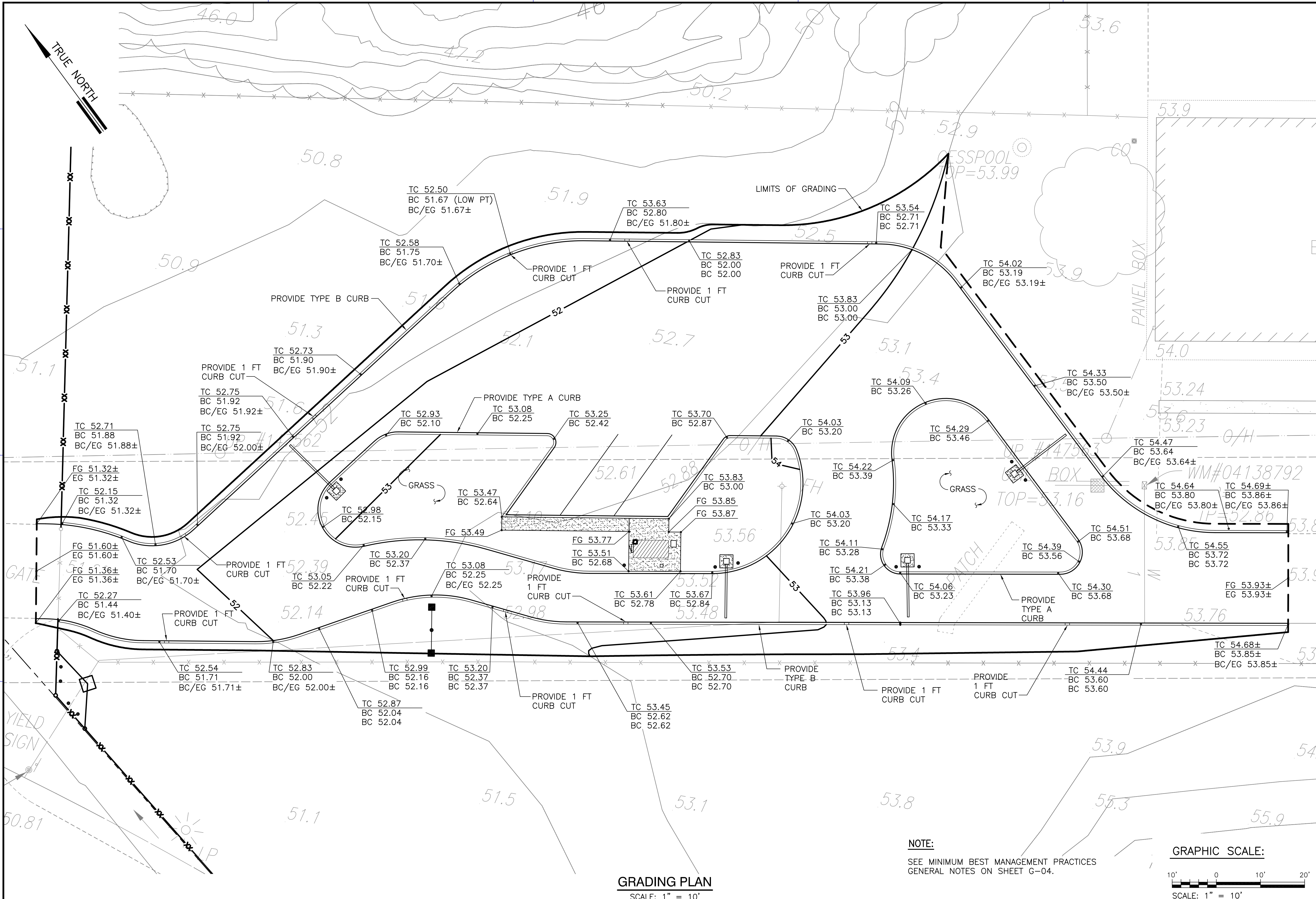
PM: TCL
OPER: RT/RB/BTY
DATE REV. 05/14/15
DATE: 08/28/14
SCALE: AS NOTED
FILE: 2013033-322

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
HILO, HAWAII
TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY
SITE LAYOUT PLOT PLAN
DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.

APPR	DATE	DESCRIPTION
		SYM

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES ET | DRW BTY | CHK RA
SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 11 OF 32
C-05



GRADING PLAN

SCALE: 1" = 10'

HAWAII ARMY NATIONAL GUARD

HDR

A/E INFO

TONY C. G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.

SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES: ET | DRW: BTY | CHK: RA

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

HIARNG
HILO, HAWAII

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

GRADING PLAN

SCALE: AS NOTED

STATE JOB NO. CA-1328-D

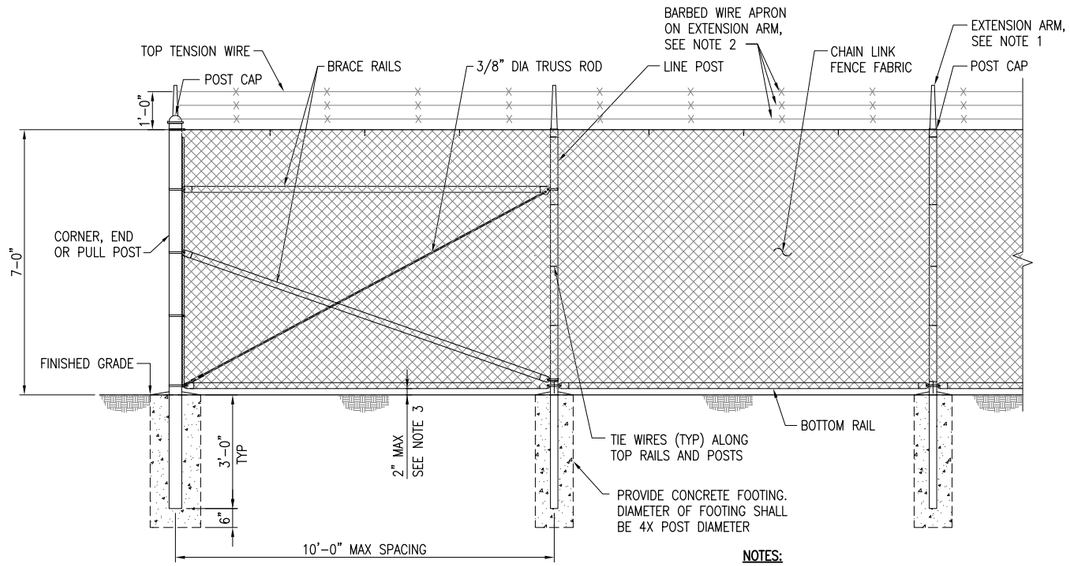
FEDERAL PROJECT NO. 15140022

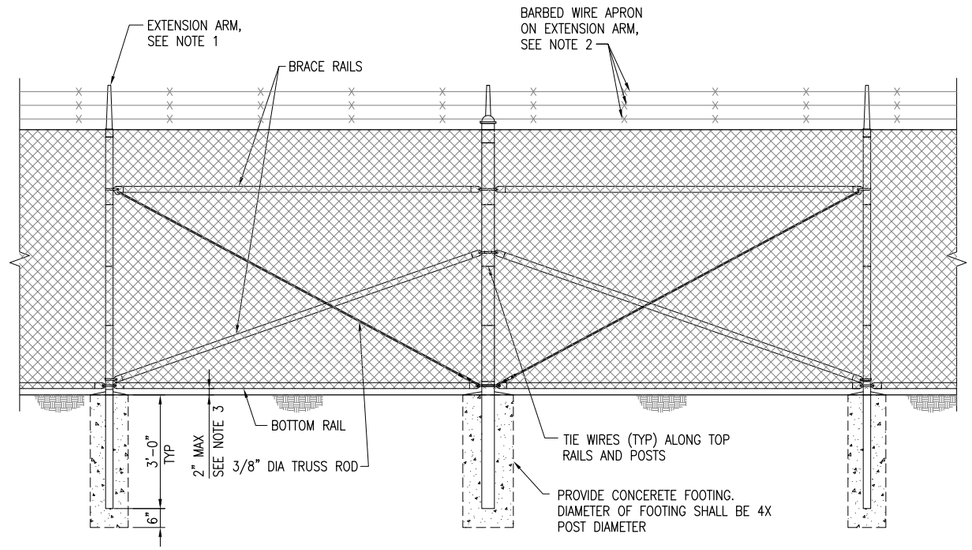
SHEET 12 OF 32

C-06

DATE: 12/23/14
SCALE: 1" = 1'
FILE: 2013033-329

TCL: YRB•FAI
PM:
OPER:
DATE REV. 03/16/15



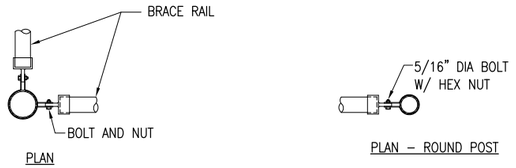


NOTES:

1. FOR SINGLE EXTENSION ARM, SEE DETAIL 5 (C-07 | C-07)
2. FENCE SHALL HAVE A SINGLE EXTENSION ARM WITH 3 STRAND BARBED WIRE.
3. FOR AREAS WITH SOIL EROSION, FINISHED GRADE TO BOTTOM OF FENCE SHALL BE NO MORE THAN 1 1/2 INCHES.
4. PROVIDE BRACING AT EACH CORNER AND END POST.
5. EXTENSION ARMS SHALL BE PERMANENTLY AFFIXED TO TOP FENCE POSTS TO INCREASE THE OVERALL HEIGHT OF THE FENCE BY AT LEAST 1 FOOT.

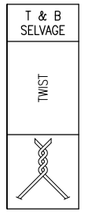
CHAIN LINK FENCE
SCALE: 1/2"= 1'-0"
1 | C-03 | C-07

BRACED PANEL
SCALE: 1/2"= 1'-0"
2 | C-07 | C-07

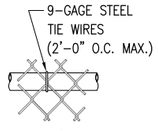


PLAN

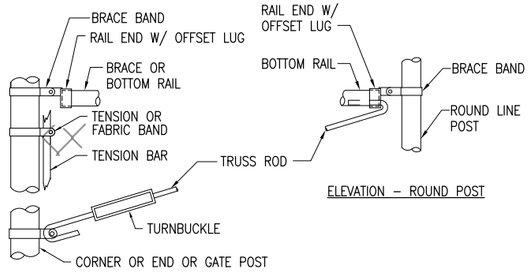
PLAN – ROUND POST



PLAN – ROUND POST

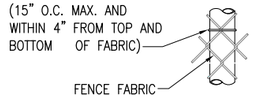


ELEVATION
BRACE RAIL ATTACHMENT

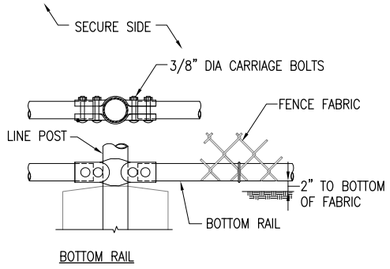


ELEVATION

ELEVATION – ROUND POST

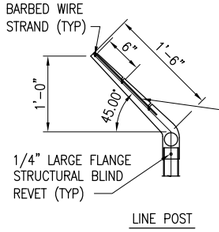


ELEVATION – ROUND POST

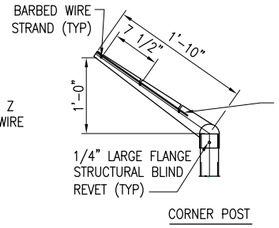


BOTTOM RAIL

LINE POST
SCALE: 1 1/2"= 1'-0"
4 | C-07 | C-07



LINE POST



CORNER POST

SINGLE EXTENSION ARM
SCALE: 1 1/2"= 1'-0"
5 | C-07 | C-07

CORNER OR END POSTS
SCALE: 1 1/2"= 1'-0"
3 | C-07 | C-07

GRAPHIC SCALES:

2' 0 2' 4'
SCALE: 1/2" = 1'-0"

6" 0 6" 1' 1'-6"
SCALE: 1-1/2" = 1'-0"

TCL BTY KH 05/16/15
PM: DPEP DATE: REV.
DATE: 12/05/14
SCALE: AS NOTED
FILE: 20130303-323

HAWAII ARMY NATIONAL GUARD
HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
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SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HILO, HAWAII
HI/ARNG

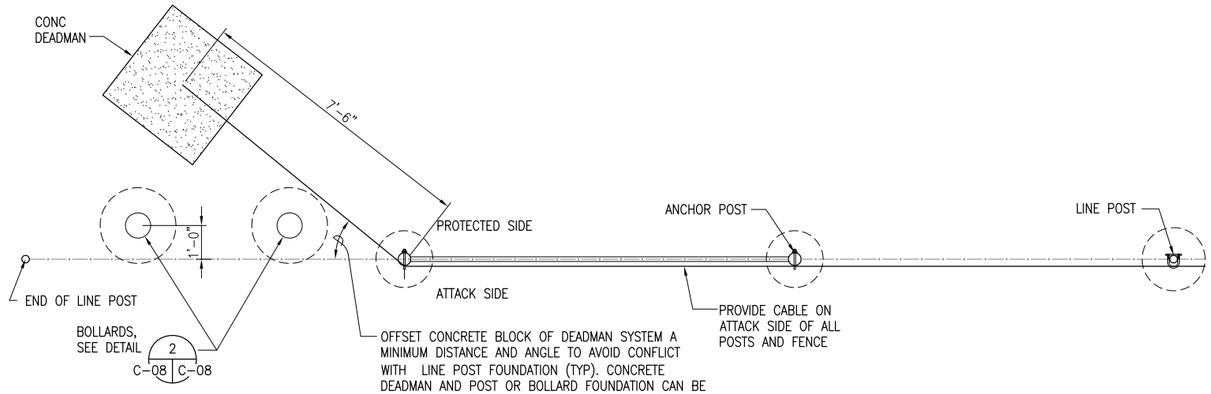
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

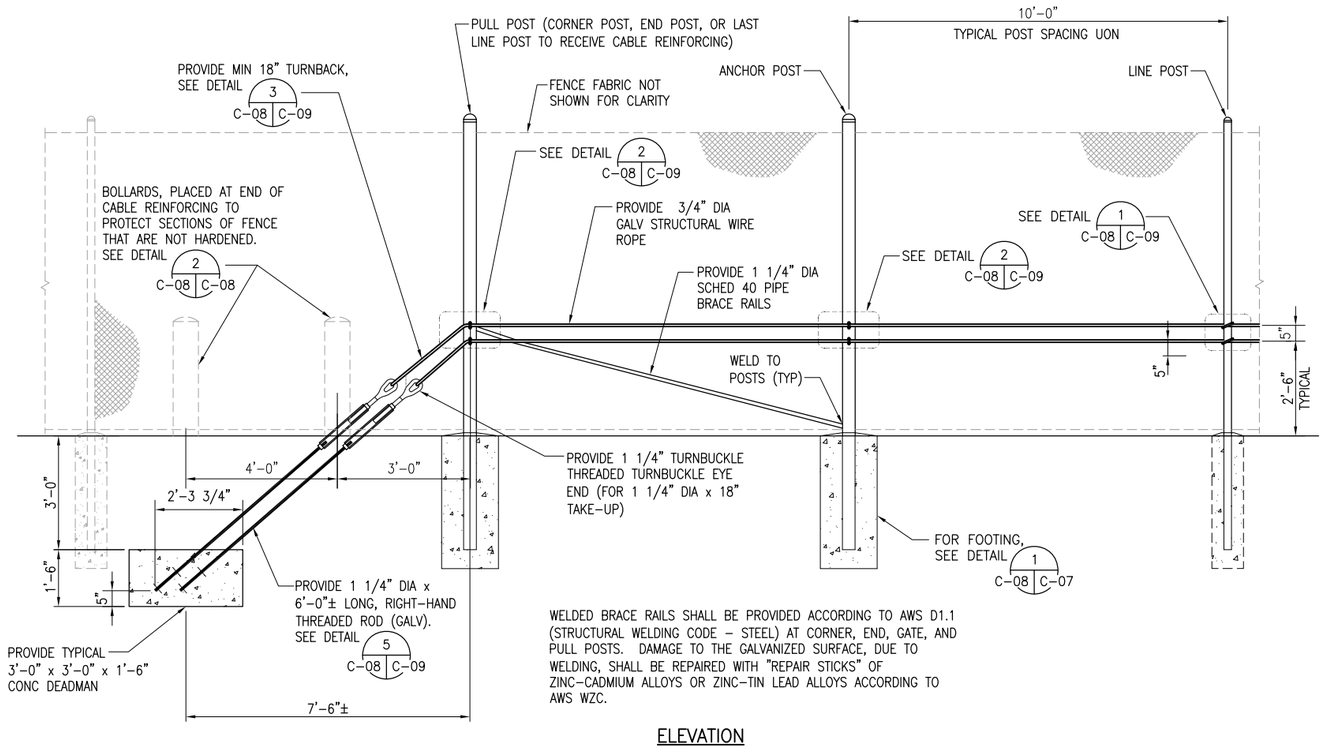
CIVIL DETAILS, SHEET 1

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 13 OF 32

C-07



PLAN



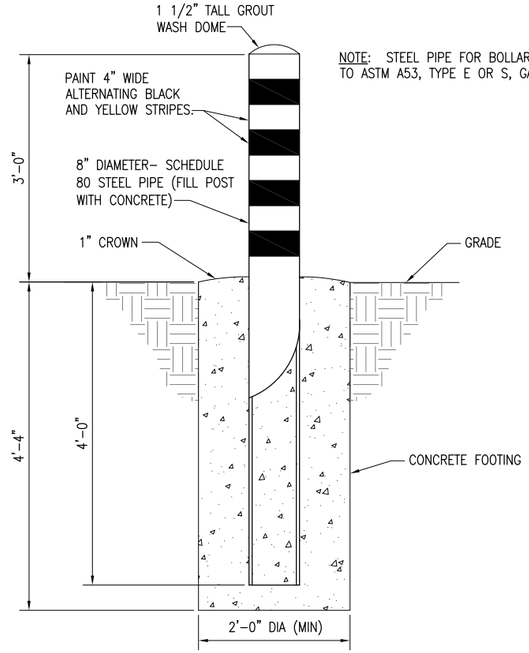
WELDED BRACE RAILS SHALL BE PROVIDED ACCORDING TO AWS D1.1 (STRUCTURAL WELDING CODE – STEEL) AT CORNER, END, GATE, AND PULL POSTS. DAMAGE TO THE GALVANIZED SURFACE, DUE TO WELDING, SHALL BE REPAIRED WITH "REPAIR STICKS" OF ZINC–CADMIUM ALLOYS OR ZINC–TIN LEAD ALLOYS ACCORDING TO AWS WZC.

ELEVATION

STEEL CABLE REINFORCING - END AND CORNER POST DEADMAN AND LINE POST LAYOUT

SCALE: 1/2"= 1'–0"

1 C-03 C-08

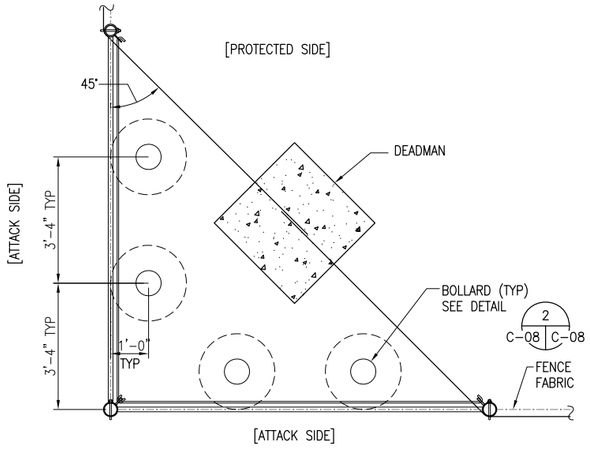


NOTE: STEEL PIPE FOR BOLLARDS SHALL CONFORM TO ASTM A53, TYPE E OR S, GALVANIZED.

CONCRETE FILLED BOLLARD FOR CABLE REINFORCING

SCALE: 1"= 1'–0"

2 C-08 C-08



PLAN OF TURNING POINT POST LAYOUT

SCALE: 1/2"= 1'–0"

3 C-03 C-08

GRAPHIC SCALES:

2' 0 2' 4'
SCALE: 1/2" = 1'–0"

1' 0 1' 2'
SCALE: 1" = 1'–0"

TGL 04/16/15
PM: JPEP
DATE REV.
DATE: 12/05/14
SCALE:
FILE: 20130133-324

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR) PHYSICAL SECURITY

CIVIL DETAILS, SHEET 2

A/E INFO

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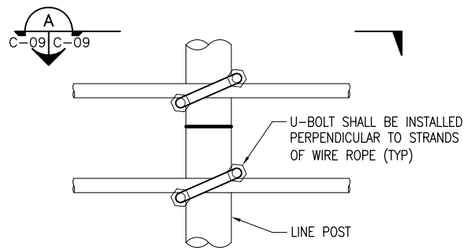
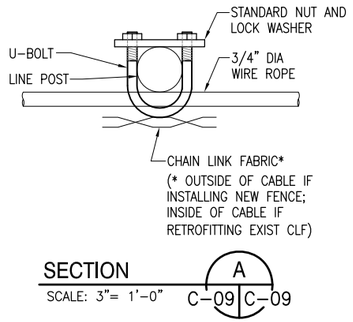
	APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES: ET DRW: BTY CHK: RA
SCALE: AS NOTED
STATE JOB NO. CA–1328–D
FEDERAL PROJECT NO. 15140022
SHEET 14 OF 32

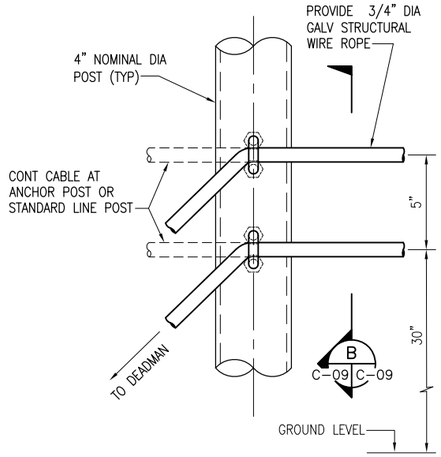
C-08



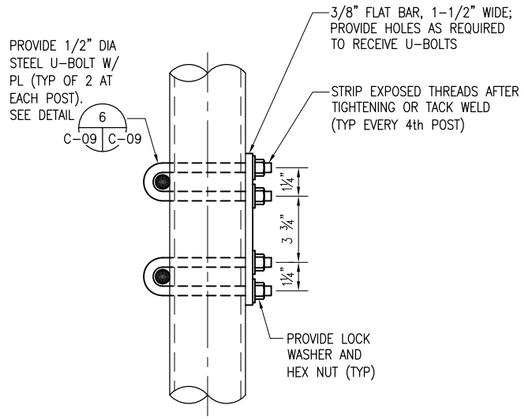
LINE POST
SCALE: 3"= 1'-0"
1 VAR C-09



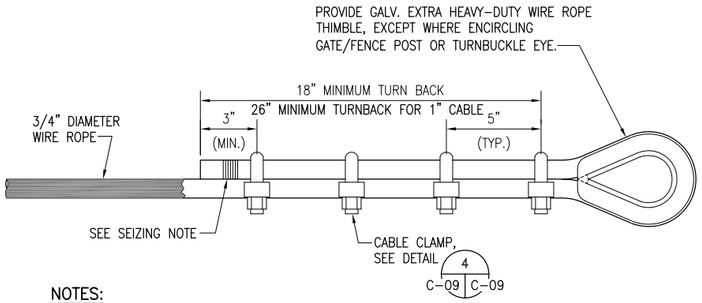
SECTION
SCALE: 3"= 1'-0"
A C-09 C-09



CABLE ANCHORAGE AT PULL AND ANCHOR POST
SCALE: 3"= 1'-0"
2 C-08 C-09



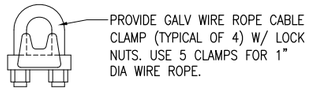
SECTION
SCALE: 3"= 1'-0"
B C-09 C-09



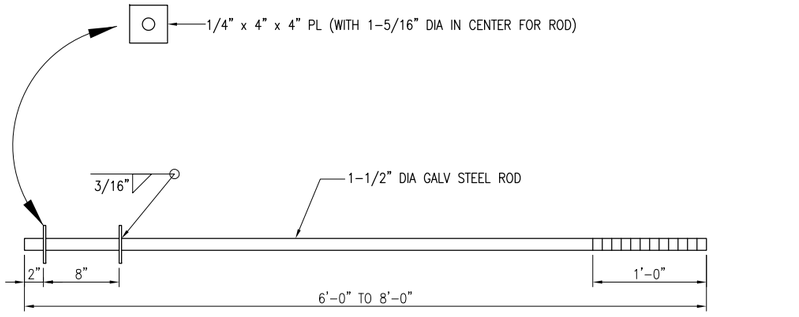
NOTES:

1. INSTALL SADDLE OF CLIPS ON LIVE SIDE (AS SHOWN), SEIZE CUT END OF WIRE ROPE, AND TORQUE NUTS PER MANUFACTURER'S RECOMMENDATIONS.
2. WIND SEIZING WIRE IN A TIGHT SPIRAL AROUND THE ROPE END TO A 1" LENGTH OF SEIZING. TWIST THE TWO ENDS OF THE SEIZING WIRE AT THE CENTER OF THE SEIZING LENGTH. USE ZINC COATED STEEL WIRE.

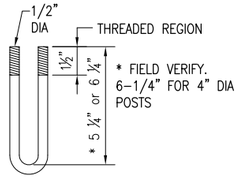
TYPICAL TURNBACK AND CLAMP
SCALE: 3"= 1'-0"
3 VAR C-09



CLAMP
NOT TO SCALE
4 C-09 C-09



DEADMAN ANCHOR ROD
SCALE: 1 1/2"= 1'-0"
5 VAR C-09



FENCE U-BOLT
SCALE: 3"= 1'-0"
6 C-09 C-09

GRAPHIC SCALES:

6" 0 6" 1' 1'-6"
SCALE: 1-1/2" = 1'-0"

4" 0 4" 8"
SCALE: 3" = 1'-0"

TCL #1 03/16/15
PM: DPE: DATE REV.
DATE: 12/05/14
SCALE: AS NOTED
FILE: 20130133-325

HAWAII ARMY NATIONAL GUARD

A/E INFO

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DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
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HIARNG

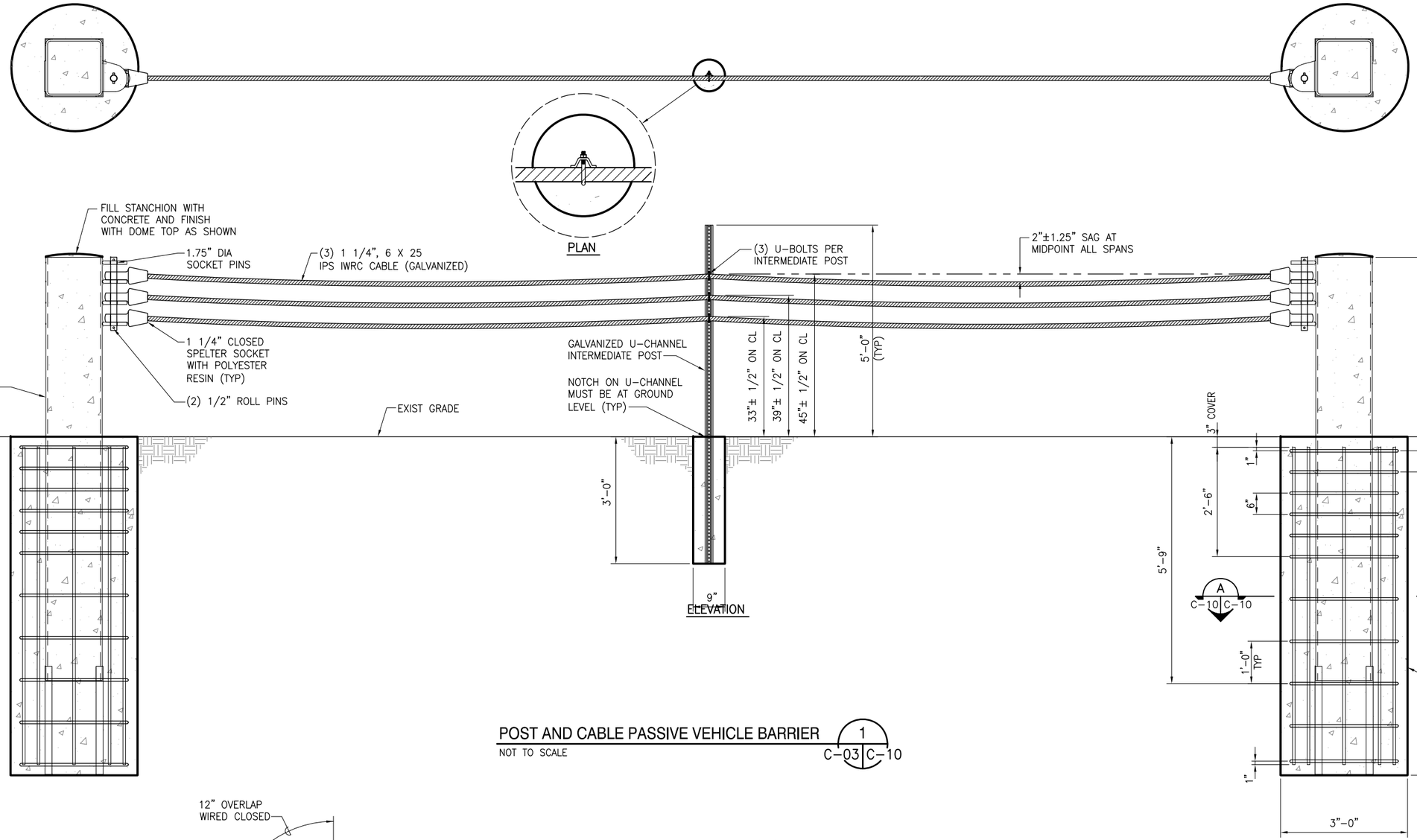
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

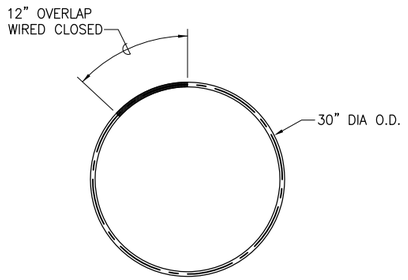
CIVIL DETAILS, SHEET 3

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 15 OF 32

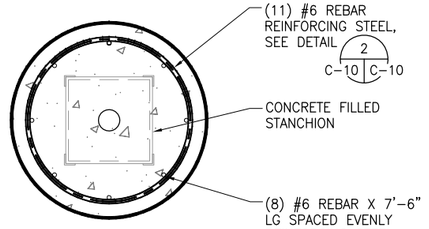
C-09



POST AND CABLE PASSIVE VEHICLE BARRIER — 1 / C-03 C-10
NOT TO SCALE



REBAR DETAIL — 2 / C-10 C-10
NOT TO SCALE



SECTION — A / C-10 C-10
NOT TO SCALE

NOTE:

THIS DETAIL DRAWING REPRESENTS A TYPE OF VEHICLE BARRIER APPROPRIATE FOR THIS APPLICATION AND IS FOR REFERENCE ONLY. DETAILS INCLUDING BUT NOT LIMITED TO FOUNDATION TYPE, SIZE AND REINFORCEMENT WILL BE PROVIDED BY BARRIER SUPPLIER AND SUBMITTED FOR APPROVAL IN ACCORDANCE WITH THE SPECIFICATIONS.

DATE: 12/05/14
SCALE: 1" = 10'-0"
FILE: 20130033-326

PM: TCL
DESIGNER: KP
DATE REV.: 04/17/15

HAWAII ARMY NATIONAL GUARD

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	APPR	DATE	DESCRIPTION	SYM

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES SW | DRW MH | CHK DR

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HILO, HAWAII
HIARNG

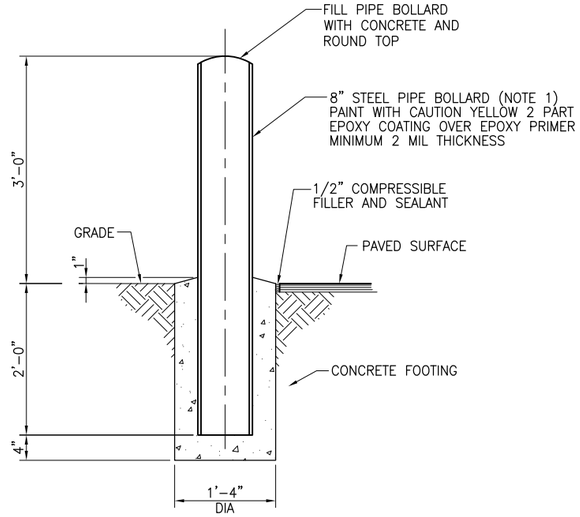
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

CIVIL DETAILS, SHEET 4

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 16 OF 32

C-10

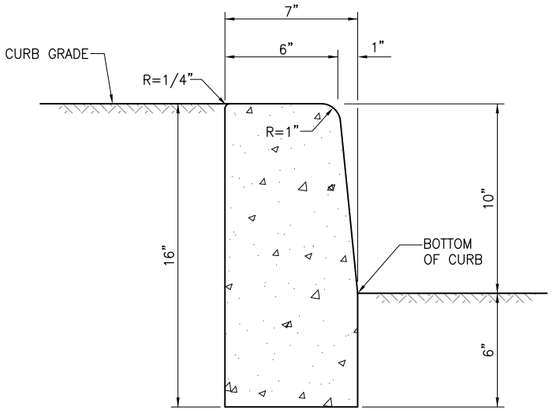


NOTE:

REMOVE ALL SHARP CORNERS AND ROUGH SURFACES INCLUDING SURFACE SPLATTER, OIL AND GREASE.

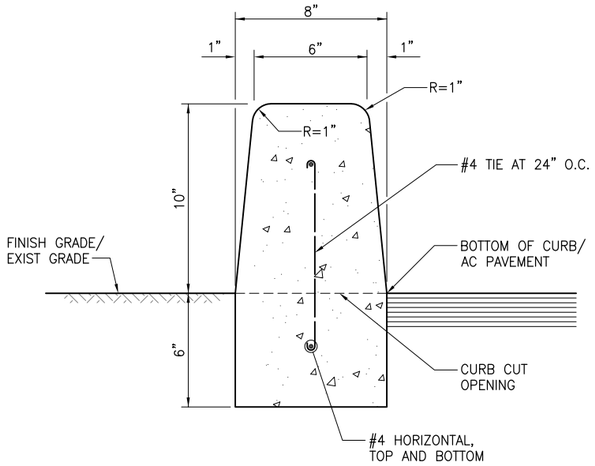
CONCRETE BOLLARD FOR GUARD SHACK, CARD READER, AND GATE ARM — 1 — C-03 | C-11

SCALE: 1"= 1'-0"



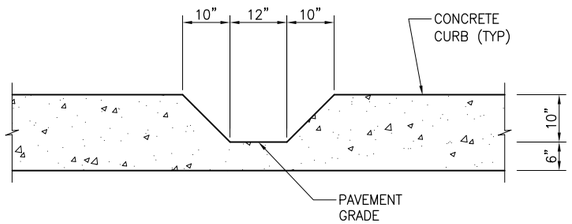
CONCRETE CURB - TYPE A — 2 — C-03 | C-11

SCALE: 3"= 1'-0"



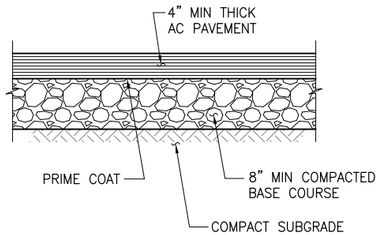
CONCRETE CURB - TYPE B — 3 — C-03 | C-11

SCALE: 3"= 1'-0"



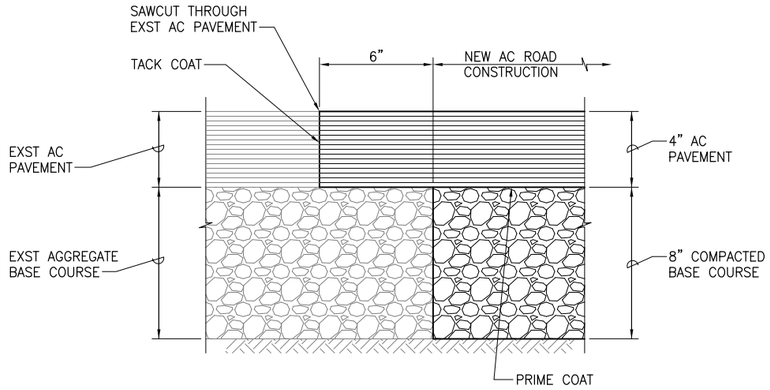
SIDE ELEVATION - CONCRETE CURB CUT — 4 — C-03 | C-11

SCALE: 3/4" = 1'-0"



ASPHALT CONCRETE PAVEMENT — 5 — C-03 | C-11

SCALE: 1"= 1'-0"



SMOOTH RIDING CONNECTION TO EXISTING PAVEMENT — 6 — C-03 | C-11

NOT TO SCALE

GRAPHIC SCALES:

1' 0 1' 2' 3'

SCALE: 3/4" = 1'-0"

1' 0 1' 2'

SCALE: 1" = 1'-0"

4" 0 4" 8"

SCALE: 3" = 1'-0"

DATE: 12/09/14
SCALE: 1" = 1'-0"
FILE: 20130333-327

PM: TCL
DESIGNER: RA
DATE REV.: 04/17/15

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

STATE OF HAWAII
DEPARTMENT OF DEFENSE
FACILITY MANAGEMENT OFFICE
DESIGN AND PROJECT MANAGEMENT BRANCH
HIARNG

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

HILO, HAWAII

CIVIL DETAILS, SHEET 5

A/E INFO

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SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES ET | DRW BTY | CHK RA

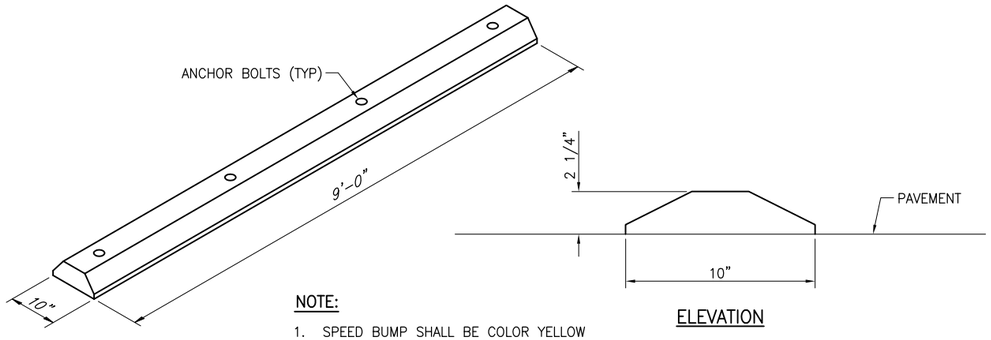
SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140022

SHEET 17 OF 32

C-11

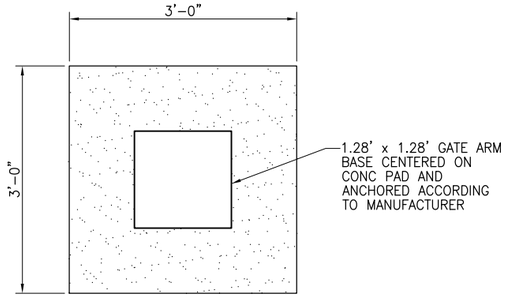


ELEVATION

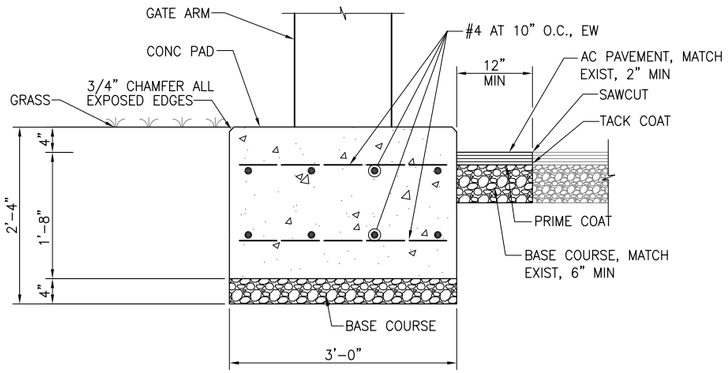
NOTE:

1. SPEED BUMP SHALL BE COLOR YELLOW AND 100% RECYCLED SOLID PLASTIC.
2. SPEED BUMP SHALL BE INSTALLED TO MANUFACTURER'S INSTRUCTIONS.

SPEED BUMP 1
NOT TO SCALE C-03 | C-12

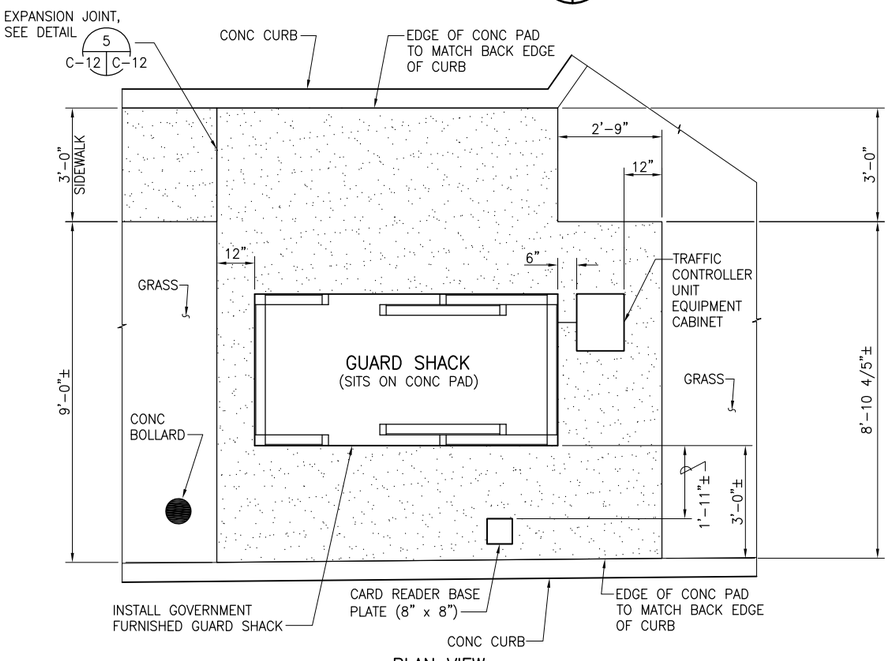


PLAN VIEW

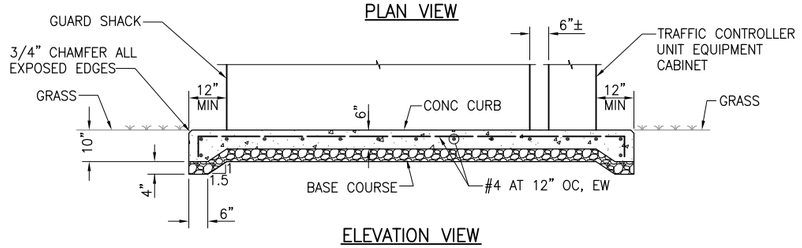


ELEVATION VIEW

GATE ARM CONCRETE PAD 2
SCALE: 1" = 1'-0" VAR | C-12

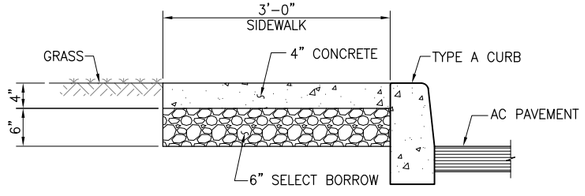


PLAN VIEW

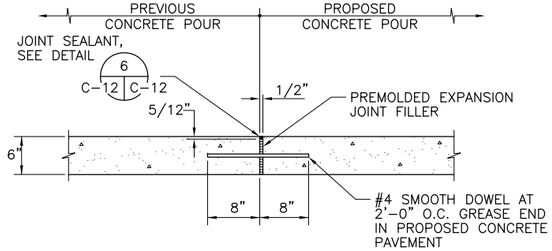


ELEVATION VIEW

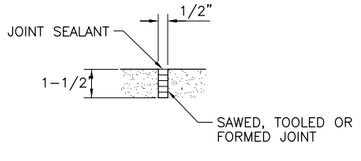
GUARD SHACK CONCRETE PAD 3
SCALE: 1/2" = 1'-0" VAR | C-12



CONCRETE SIDEWALK 4
SCALE: 1" = 1'-0" C-03 | C-12

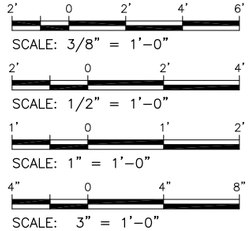


TYPICAL EXPANSION JOINT 5
SCALE: 1" = 1'-0" C-12 | C-12



JOINT SEALANT DETAIL 6
SCALE: 3" = 1'-0" C-12 | C-12

GRAPHIC SCALES:



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PM:
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DATE: 12/24/14
SCALE:
FILE: 20130033-328
DATE REV. 04/17/15

HAWAII ARMY NATIONAL GUARD

A/E INFO

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

DATE	DESCRIPTION	SYM

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES ET | DRW BTY | CHK RA

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HI/ARNG

HILO, HAWAII

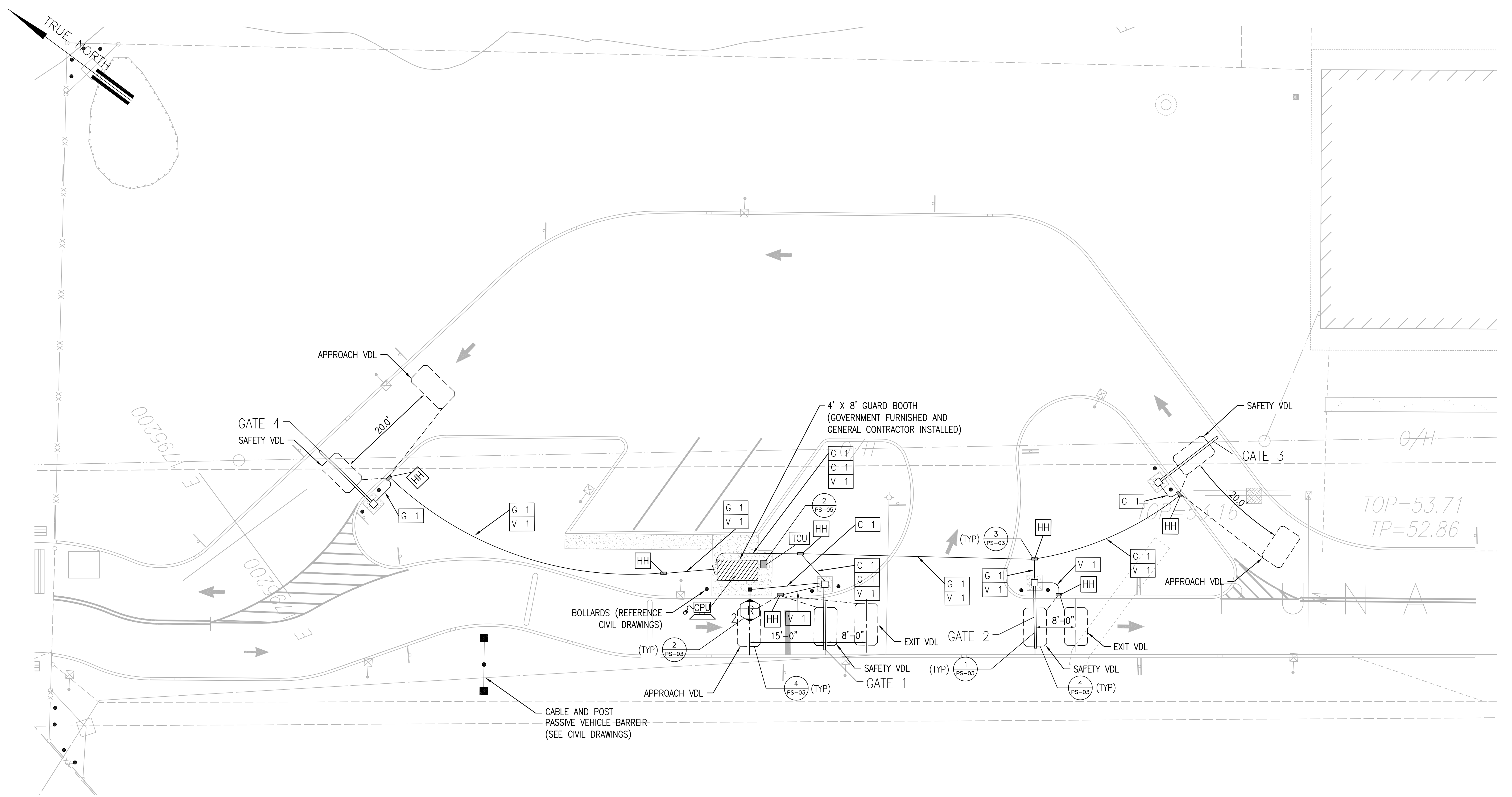
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

CIVIL DETAILS, SHEET 6

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 18 OF 32

C-12



SECURITY SITE PLAN

SCALE: 1" = 10'

GRAPHIC SCALE:

10' 5' 0 10' 20'

SCALE: 1" = 10'

FILE: C:\pwworking\sac\d0527587\2013033-309.dwg
DATE: 11/12/2014

HAWAII ARMY NATIONAL GUARD

HDR

A/E INFO

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LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.

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PHYSICAL SECURITY

SECURITY SITE PLAN

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

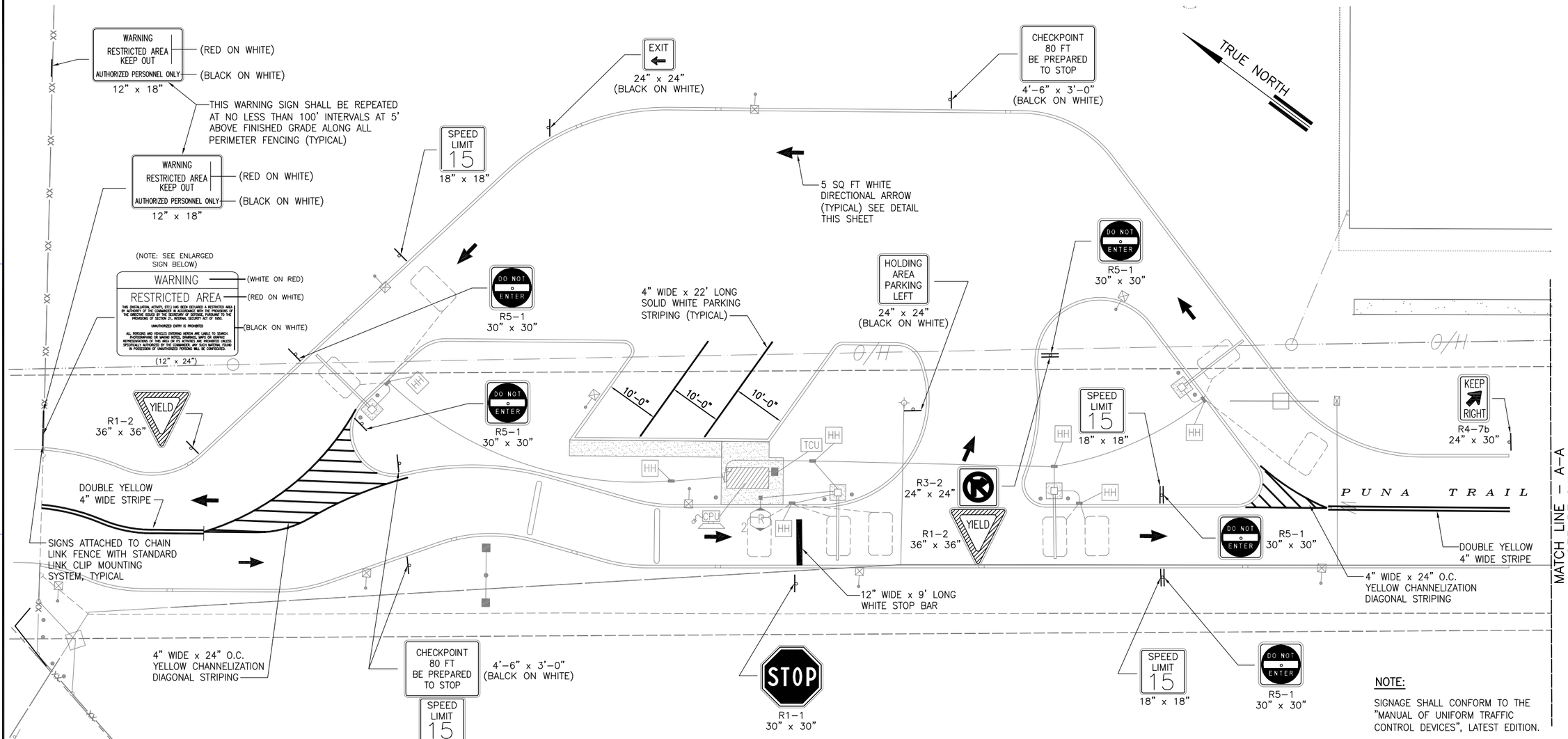
SCALE: 1"=10'

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140022

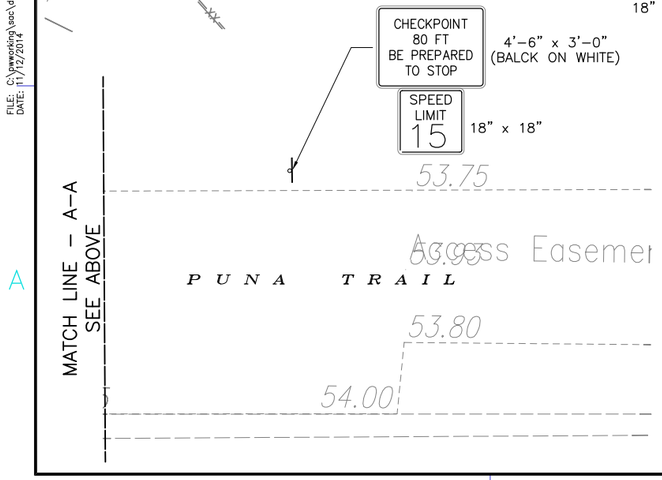
SHEET 19 OF 32

PS-01



SECURITY SITE SIGNAGE AND STRIPING PLAN

SCALE: 1" = 10'



(NOTE: THIS SIGN ENLARGED FOR CLARITY)

WARNING — (WHITE ON RED)

RESTRICTED AREA — (RED ON WHITE)

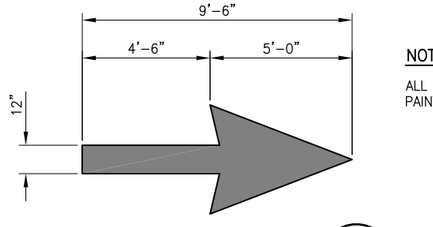
THIS (INSTALLATION, ACTIVITY, ETC.) HAS BEEN DECLARED A RESTRICTED AREA BY AUTHORITY OF THE COMMANDER IN ACCORDANCE WITH THE PROVISIONS OF THE DIRECTIVE ISSUED BY THE SECRETARY OF DEFENSE, PURSUANT TO THE PROVISIONS OF SECTION 21, INTERNAL SECURITY ACT OF 1950.

UNAUTHORIZED ENTRY IS PROHIBITED

ALL PERSONS AND VEHICLES ENTERING HEREIN ARE LIABLE TO SEARCH. PHOTOGRAPHING OR MAKING NOTES, DRAWINGS, MAPS OR GRAPHIC REPRESENTATIONS OF THIS AREA OR ITS ACTIVITIES ARE PROHIBITED UNLESS SPECIFICALLY AUTHORIZED BY THE COMMANDER. ANY SUCH MATERIAL FOUND IN POSSESSION OF UNAUTHORIZED PERSONS WILL BE CONFISCATED. — (BLACK ON WHITE)

ENLARGED RESTRICTED AREA SIGN

SCALE: NTS



PAVEMENT MARKING ARROW

SCALE: 3/8" = 1'-0"

PS-02 | 1 | PS-02

NOTE:

ALL ARROWS SHALL BE PAINTED SOLID WHITE.

NOTE:

SIGNAGE SHALL CONFORM TO THE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.

GRAPHIC SCALES:

2' 0 2' 4' 6'

SCALE: 3/8" = 1'-0"

10' 5' 0 10' 20'

SCALE: 1" = 10'

FILE: C:\prworking\scan\d0527587\20130133-310.dwg
DATE: 11/12/2014

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG
HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

SECURITY SITE SIGNAGE AND STRIPING PLAN

TONY C.G. LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
SEAL

APPR | DATE | DESCRIPTION | SYM

SUBMITTAL PHASE: FINAL
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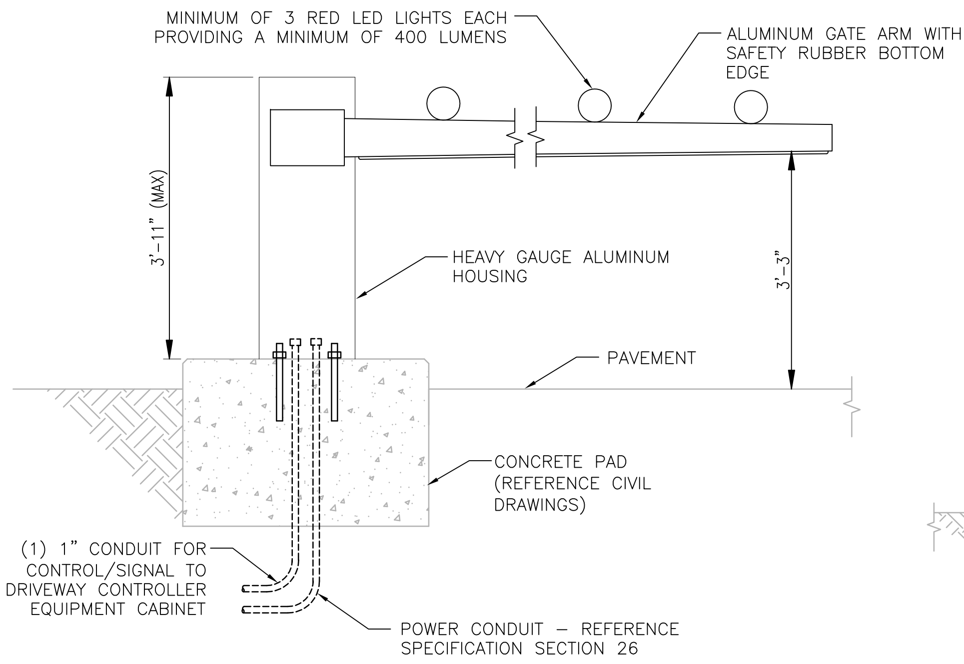
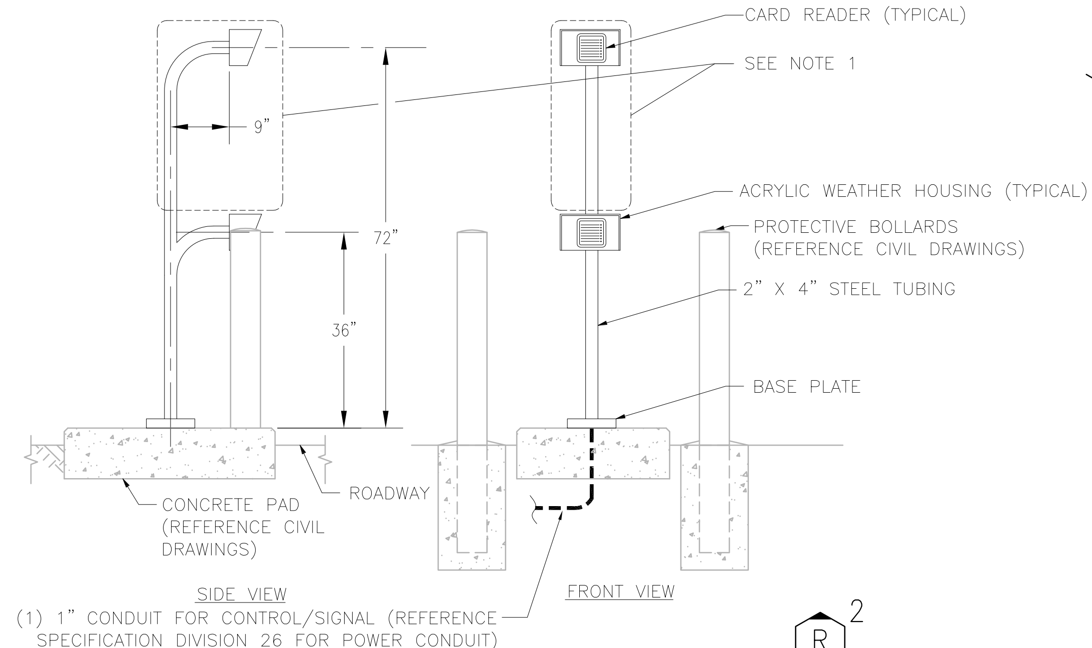
DES SW | DRW MH | CHK DR

SCALE: 1"=10'
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 20 OF 32

PS-02

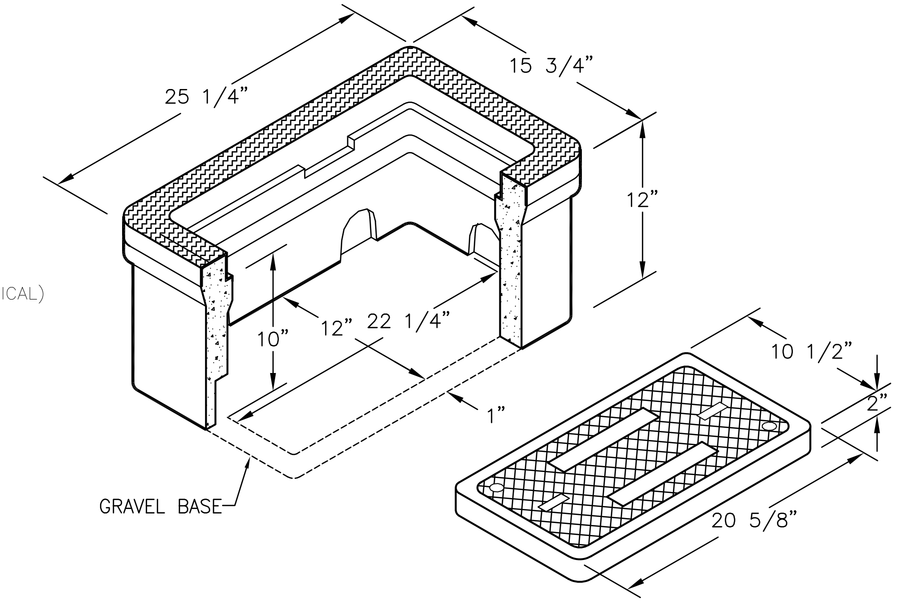


1 GATE ARM VEHICLE BARRIER DETAIL
NTS



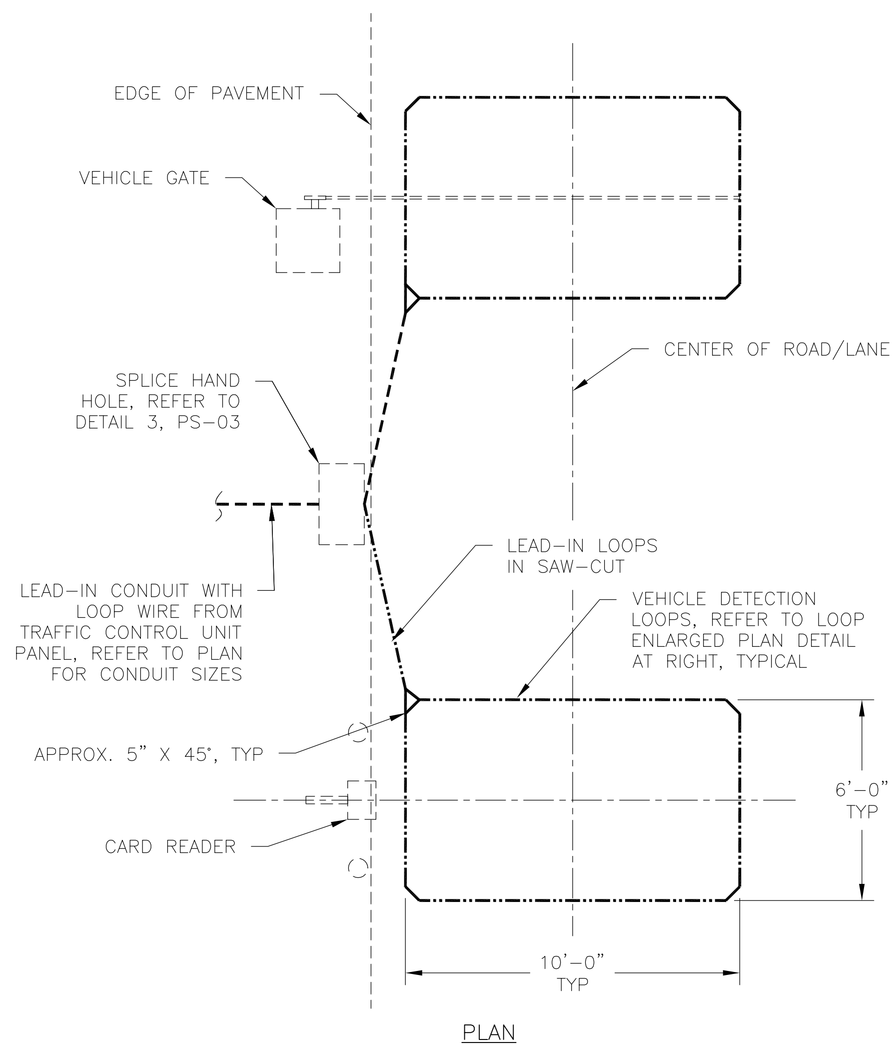
NOTE:
1. DUAL CARD READER STANCHION IS INDICATED ON PLANS AS .

2 EXTERIOR STANCION MOUNTED CARD READER DETAIL
NTS

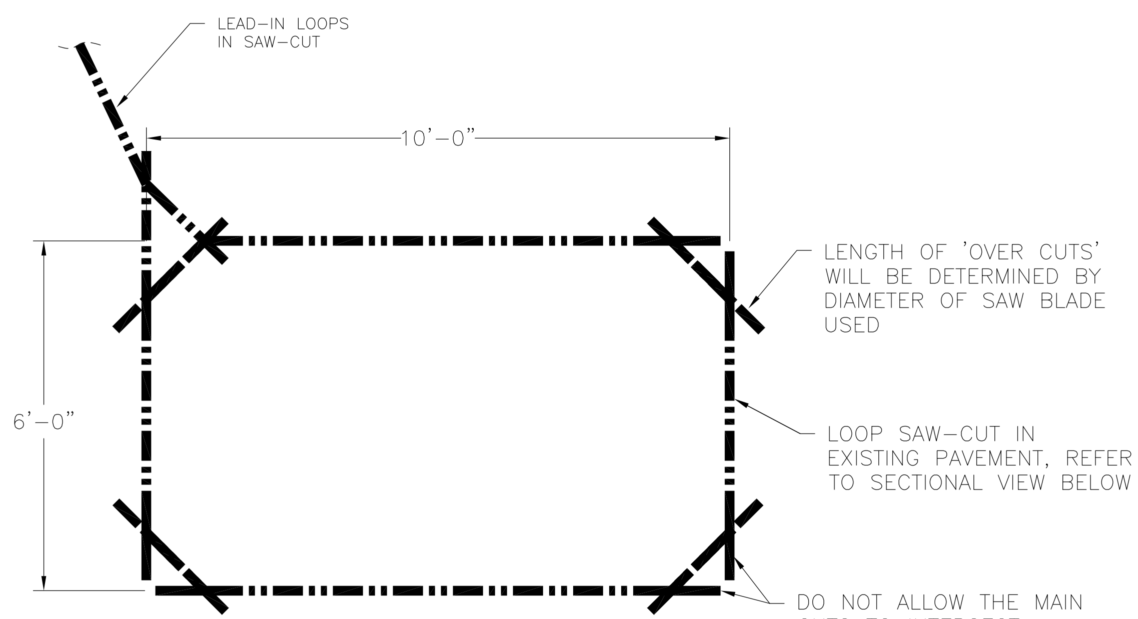


NOTES:
1. A HIGH DENSITY REINFORCED CONCRETE PULL AND JUNCTION BOX WITH SIDE KNOCKOUTS. USE TAMPER RESISTIVE HARDWARE ON COVER.
2. DIMENSIONS SHOWN ARE MINIMUM. SIZE ACCORDING TO CONDUIT SIZES AND QUANTITIES.

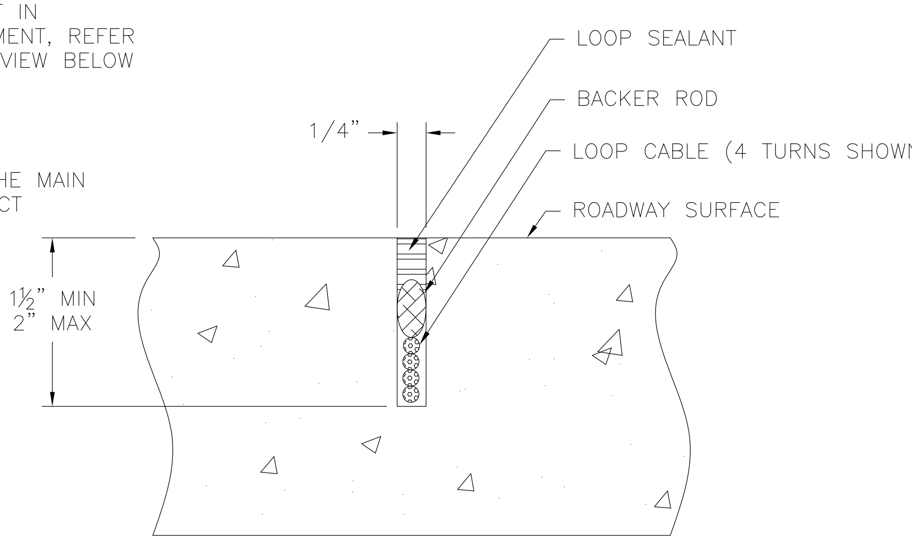
3 HAND HOLE DETAIL
NTS



PLAN



VEHICLE DETECTION LOOP ENLARGED PLAN DETAIL



SECTIONAL VIEW – SAW-CUT AND WIRE PLACEMENT IN AC PAVEMENT

4 VEHICLE DETECTION LOOP DETAIL
NTS

FILE: C:\pwworking\sac\d0527587\2013033-313.dwg
DATE: 11/12/2014

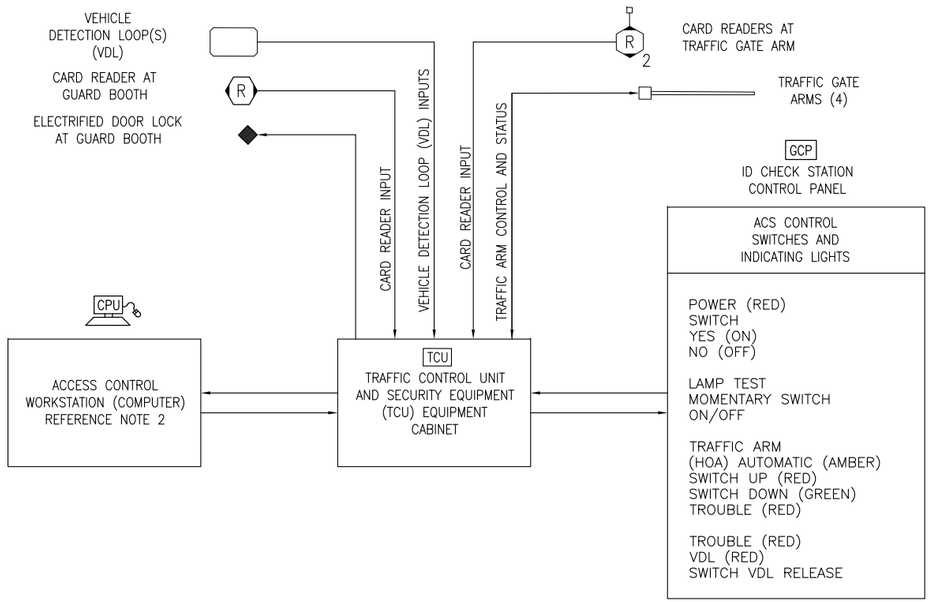
HDR

LICENSED PROFESSIONAL ENGINEER No. 9021-C TONY C.G. LAU HAWAII, U.S.A.

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES SW | DRW MH | CHK DR

STATE OF HAWAII, DEPARTMENT OF DEFENSE, DESIGN AND PROJECT MANAGEMENT BRANCH, FACILITY MANAGEMENT OFFICE
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
HIARNG HILO, HAWAII
TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY
SECURITY DETAILS, SHEET 1

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 21 OF 32
PS-03



NOTE:
1. THIS DRAWING SHOWS THE MAJOR COMPONENTS OF THE ACCESS CONTROL SYSTEM (ACS) AND A REPRESENTATION OF THE COMMUNICATIONS LINKS BETWEEN COMPONENTS.
2. THIS COMPUTER IS A LAPTOP OR DESKTOP PC BASED WORKSTATION FOR INPUTTING AND TRACKING BASE PERSONNEL CREDENTIALS IN A DATABASE FOR AUTHENTICATION THEREBY GRANTING OR DENYING ACCESS TO THE FACILITY.

1 ACP OPERATION SINGLE LINE DIAGRAM
NTS

GUARD BOOTH CONTROL PANEL OPERATION

1. THE "POWER SOURCE" INDICATOR LIGHT SHALL ILLUMINATE RED UNDER NORMAL CONDITIONS AND SHALL FLASH IF A/C POWER FAILS TO THE STANDBY BATTERIES. THE RED LIGHT SHALL REMAIN FLASHING UNTIL A/C POWER IS RESTORED. OPERATING THE 'POWER' SWITCH TO THE 'NO' POSITION SHALL CAUSE THE LIGHT TO EXTINGUISH, AND ALL POWER TO BE REMOVED FROM THE PANEL.

2. THE HAND OFF AUTOMATIC (HOA) SWITCH WILL REMAIN IN 'AUTO' UNDER NORMAL CONDITIONS, WHICH DISABLES THE 'UP' AND 'DOWN' PUSHBUTTONS, BUT ENABLES USE BY THE CARD READER AND EXIT VDL. FOR TEST, MAINTENANCE OR MANUAL OPERATION, THE SWITCH MAY BE PLACED IN 'MANUAL' MODE TO ENABLE THE OPERATION OF THE PUSHBUTTONS. PLACING THE SWITCH IN THE 'OFF' POSITION WILL DISABLE ALL OPERATION OF THE GATE ARM.

3. PRESSING THE 'UP' GATE ARM PUSHBUTTON SHALL CAUSE THE GATE ARM TO RAISE. ADDITIONALLY, THE 'DOWN' GATE ARM BUTTON LIGHT SHALL EXTINGUISH. WHEN THE GATE ARM REACHES ITS' FULLY RAISED POSITION, THE 'UP' GATE ARM BUTTON LIGHT SHALL ILLUMINATE.

4. PRESSING THE 'DOWN' GATE ARM PUSHBUTTON SHALL CAUSE THE CORRESPONDING GATE ARM TO LOWER. ADDITIONALLY, THE 'UP' GATE ARM BUTTON LIGHT SHALL EXTINGUISH. WHEN THE GATE ARM REACHES ITS' FULLY LOWERED POSITION, THE 'DOWN' GATE ARM BUTTON LIGHT SHALL ILLUMINATE.

5. DEPRESSING THE "LAMP TEST" BUTTON SHALL CAUSE ALL LIGHTS ON THE CONTROL PANEL TO ILLUMINATE UNTIL THE BUTTON IS RELEASED. PRESSING THE PUSHBUTTON SHALL NOT AFFECT OPERATION OF THE PANEL AND GATE ARM.

6. THE 'TROUBLE LIGHT' SHALL ILLUMINATE FOR ANY TROUBLE CONDITION, SUCH AS LOW VOLTAGE, IMPROPER GATE OPERATION, ETC. THE 'VDL ON' LIGHT SHALL ILLUMINATE WHEN ANY VDL DETECTS THE PRESENCE OF A VEHICLE FOR LONGER THAN 15 SECONDS.

7. PRESSING THE 'LOOP RELEASE' BUTTON SHALL ALLOW THE GATE ARM TO LOWER REGARDLESS OF THE STATUS OF THE VDL'S.

8. WHEN A DEVICE OR GATE ARM IS RAISED OR LOWERED MANUALLY, THE DEVICE SHALL REMAIN AT THAT POSITION UNTIL THE POSITION IS MANUALLY CHANGED, AND THE PRESENCE OF A VEHICLE IS NO LONGER DETECTED BY THE VEHICLE DETECTION LOOPS.

CARD READER OPERATION

1. DETECTION OF A VEHICLE AT THE APPROACH VEHICLE DETECTION LOOP LOCATED AT THE ENTRANCE CARD READER PEDESTAL SHALL ENABLE CARDS TO BE READ AT THE READER. PRESENTING A VALID CARD WITHOUT A VEHICLE PRESENT SHALL INHIBIT THE GATE FROM OPENING.

2. PRESENTING A VALID CARD WITH A VEHICLE PRESENT SHALL ACTIVATE THE RED LED LIGHTS ON TOP OF THE GATE ARMS AND CAUSE THE GATE ARM TO RAISE. THE GATE ARM SHALL REMAIN RAISED UNTIL THE VEHICLE DETECTION SAFETY LOOP HAS DETECTED THAT THE VEHICLE IS NO LONGER PRESENT IN THE TRAVEL PATH, AND SHALL THEN LOWER.

3. PRESENCE OF A VEHICLE DETECTED AT LOOPS IN PROXIMITY TO THE GATE ARM WHILE THE GATE ARM IS RAISED SHALL INHIBIT THE ARM FROM LOWERING. THE GATE ARM SHALL REMAIN RAISED UNTIL THE VEHICLE LOOPS AT THE GATE ARM LOCATION NO LONGER DETECT THE PRESENCE OF A VEHICLE, AT WHICH TIME THE ARM SHALL LOWER.

4. CARDS SHALL BE PROGRAMMED FROM THE ACCESS CONTROL WORKSTATION HOUSED IN THE GUARD BOOTH.

VEHICLE NEEDING INSPECTION OR VERIFICATION

1. A DRIVER PRESENTING AN INVALID CARD OR OTHERWISE BEING A VISITOR OR DELIVERY SERVICE SHALL INHIBIT GATE ARMS 1 AND 2 FROM OPENING.

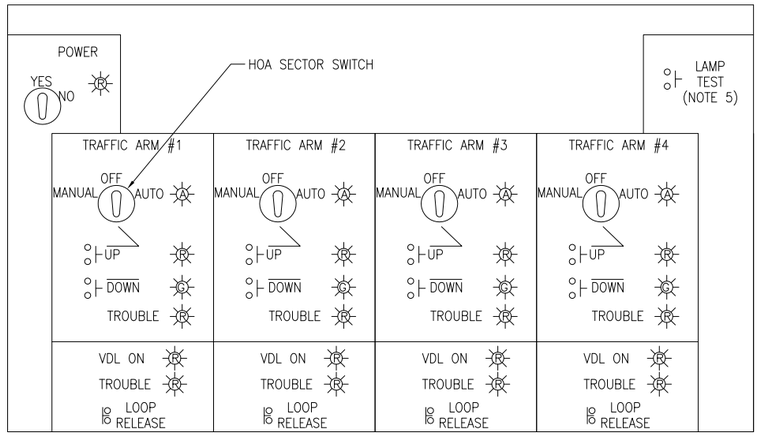
2. THE GUARD WILL VERIFY THE BUSINESS AND IDENTITY OF THE VISITOR PRIOR TO SWITCHING GATE 1 POSITION SWITCH TO 'MANUAL' AND DEPRESSING THE 'UP' GATE ARM BUTTON RAISING GATE 1.

3. GATE 2 WILL REMAIN CLOSED AND THE VEHICLE WILL BE DIRECTED TO THE VEHICLE INSPECTION AREA FOR INSPECTION OR AWAIT VERIFICATION.

4. THE GUARD WILL RETURN THE GATE 1 POSITION SWITCH TO 'AUTO' ALLOWING INCOMING AUTHORIZED TRAFFIC TO CONTINUE INTO THE FACILITY.

5. UPON CLEARING OR REJECTING THE VEHICLE WAITING IN THE INSPECTION AREA THE DRIVER WILL BE DIRECTED TO GATE 4.

3 GATE ARM CONTROL AND NARRATIVE
NTS



LEGEND

- (G) – GREEN INDICATING LIGHT
- (R) – RED INDICATING LIGHT
- (A) – AMBER INDICATING LIGHT
- –CONTROL SWITCHES
- – MANUAL–OFF–AUTOMATIC (HOA) CONTROL SWITCH

GUARD BOOTH CONTROL PANEL
GATES AND SIGNALS
SAFETY SYSTEMS
NOT TO SCALE

NOTES:

1. REFER TO THE GATE ARM OPERATION NARRATIVE FOR CONTROL PANEL OPERATION DETAILS.

2 GUARD BOOTH DRIVEWAY CONTROL PANEL
NTS

6. GATE 4 WILL RAISE AS THE VEHICLE PASSES OVER THE VDL ALLOWING THE VEHICLE TO REENTER THE ACP OR EXIT.

OFF–PEAK TRAFFIC PERIODS – VEHICLES EXITING THE FACILITY

1. DURING OFF–PEAK PERIODS, POSITION SWITCH FOR GATES 3 AND 4 SHALL BE SET TO 'AUTO' ALLOWING OUTGOING TRAFFIC TO CONTINUE OUT OF THE FACILITY.

2. VEHICLES – DIRECTED BY SIGNAGE TO MOVE SLOWLY – PASSING OVER THE APPROACH VDL WILL ACTIVATE THE RED LED LIGHTS ON TOP OF THE GATE ARMS THEN TRIGGER AND RAISE GATE 3 ALLOWING THE VEHICLE TO PASS BY THE INSPECTION AREA TO GATE 4.

3. VEHICLES – DIRECTED BY SIGNAGE TO CONTINUE MOVING CAUTIOUSLY TOWARD GATE 4 AND PASSING OVER THE APPROACH VDL WILL ACTIVATE THE RED LED LIGHTS ON TOP OF THE GATE ARMS THEN TRIGGER AND RAISE GATE 4 ALLOWING THE VEHICLE TO REENTER THE ACP OR EXIT.

PEAK TRAFFIC PERIODS – VEHICLES EXITING THE FACILITY

1. DURING PEAK PERIODS, GATES 3 AND 4 POSITION SWITCH WILL BE SET TO 'MANUAL' AND THE 'UP' GATE ARM BUTTON DEPRESSED AND LATCHED ALLOWING THE GATE ARM TO REMAIN RAISED AND ALLOWING OUTGOING TRAFFIC TO FLOW SMOOTHLY FROM THE FACILITY.

A/E INFO
TONY C.G LAU
LICENSED PROFESSIONAL ENGINEER
No. 9021-C
HAWAII, U.S.A.
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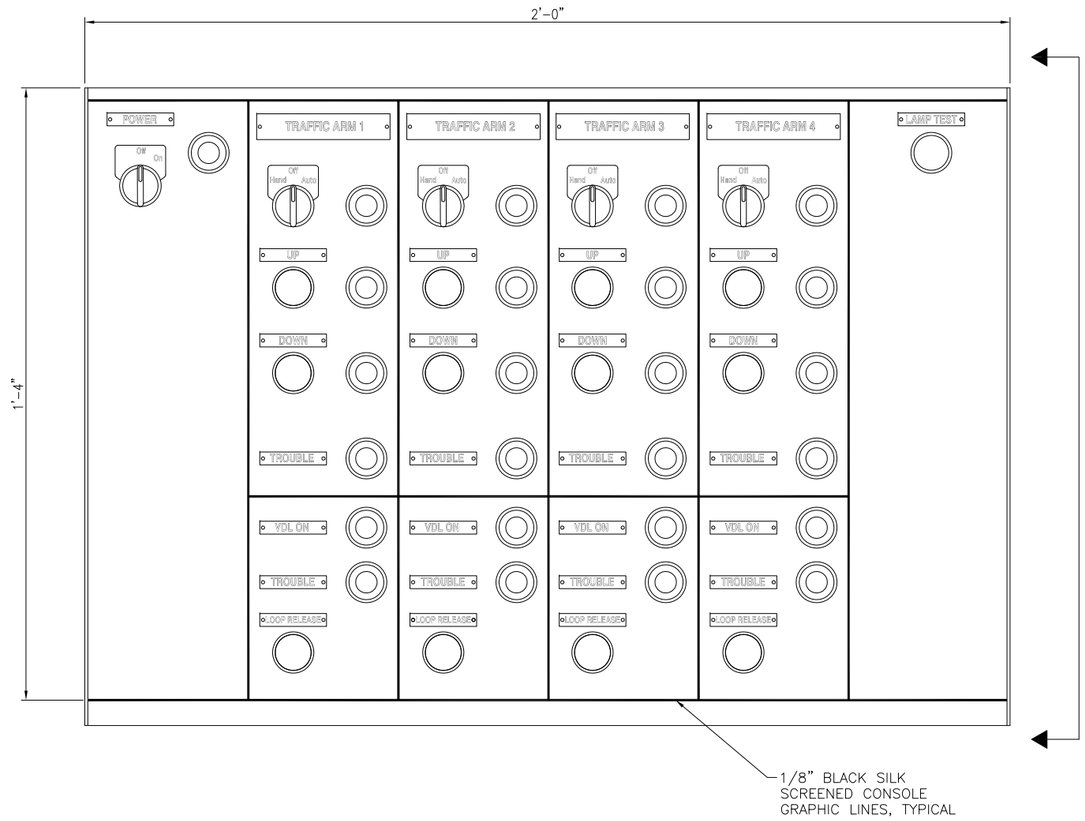
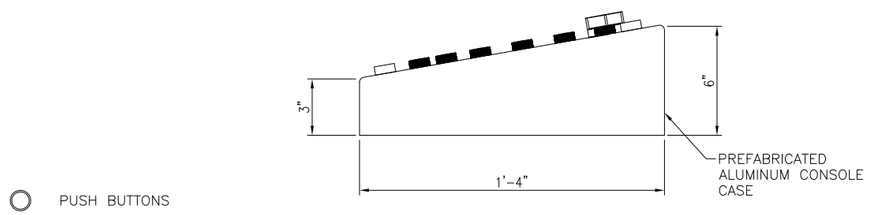
SECURITY DETAILS, SHEET 2

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 22 OF 32

PS-04

FILE: C:\pwworking\sacr\d0527587\2013033-314.dwg
DATE: 11/12/2014



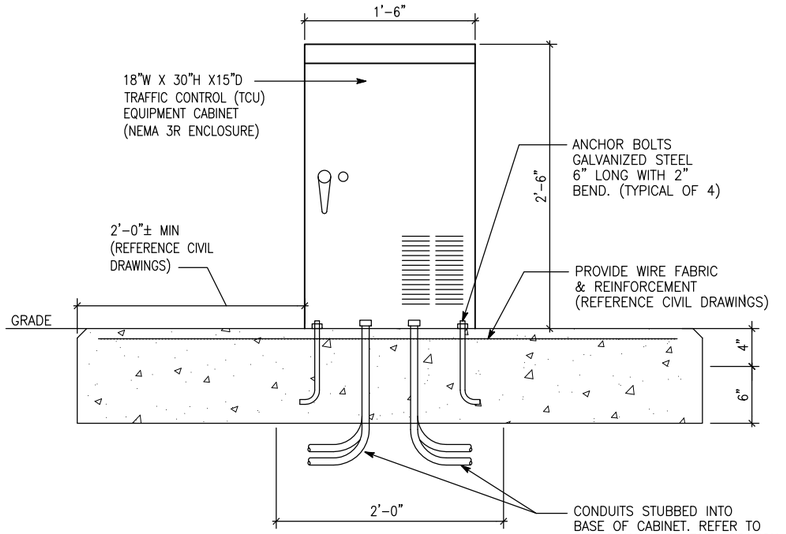


SECTIONAL ELEVATION VIEW

- PUSH BUTTONS
- INDICATOR LAMPS
- 2 AND 3 WAY SELECTOR SWITCHES
- 2 WAY KEYED SELECTOR SWITCHES
- SWITCH AND LAMP PLASTIC LAMINATE ENGRAVED LABEL PLATES

1 ACP GUARD BOOTH DESK TOP CONTROL CONSOLE DETAIL
NTS

NOTES:
1. ALL PUSH BUTTONS, INDICATOR LAMPS AND SELECTOR SWITCHES ARE 22mm HEAVY DUTY INDUSTRIAL QUALITY.
2. REFERENCE DETAILS 1, PS-04 AND 2, PS-04 FOR INDICATOR LAMP LENS COLORS.



NOTES
1. FOR EQUIPMENT LOCATED WITHIN CABINETS REFER TO CONTENTS SCHEDULE AT RIGHT.

SECURITY EQUIPMENT CABINET CONTENTS SCHEDULE
VDL INTERFACES
ACCESS CONTROL PANEL
POWER BOARD
POWER SUPPLY
FAN
LIGHT
TERMINAL STRIPS
UPS POWER
CONVENIENCE OULET

2 TRAFFIC CONTROLLER UNIT (TCU) EQUIPMENT CABINET
NTS

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HIARNG
SECURITY DETAILS, SHEET 3

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 23 OF 32
PS-05

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DATE: 11/12/2014

GENERAL NOTES

1. THE DRAWINGS DO NOT REFLECT ALL THE EXISTING CONDITIONS THAT MAY BE ENCOUNTERED DURING CONSTRUCTION. VISIT THE PROJECT SITE AND BECOME FAMILIAR WITH THE EXISTING CONDITIONS, THE EXTENT OF ANY DEMOLITION WORK, AND THE NEW WORK PRIOR TO THE START OF ON-SITE CONSTRUCTION ACTIVITIES. REPORT ANY DISCREPANCIES AND/OR DIFFERENCES BETWEEN THE EXISTING CONDITIONS AND THE CONSTRUCTION DOCUMENTS TO THE CONTRACTING OFFICER PRIOR TO COMMENCING CONSTRUCTION. RESOLVE ALL DISCREPANCIES AND QUESTIONS PRIOR TO THE START OF WORK.
2. EXISTING DEVICE 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.
3. 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.
4. 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. CORRECT ALL DISCREPANCIES SO AS TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM. RECORD CHANGES ON THE AS-BUILT DRAWINGS.
5. CONCEAL ALL CONDUIT WHEREVER REASONABLE; 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.
6. PROVIDE NYLON PULLSTRINGS IN ALL EMPTY CONDUITS UNLESS OTHERWISE INDICATED.
7. THE TELECOMMUNICATIONS RACEWAY SYSTEM INSTALLATION SHALL COMPLY WITH TIA/EIA-569-C UNLESS OTHERWISE NOTED.
8. 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.
9. PROVIDE INSULATED BUSHINGS AT ALL TELECOMMUNICATIONS CONDUIT TERMINATIONS AT ALL BOXES, BACKBOARDS, AND CONDUIT STUBS.
10. ALL SURFACE MOUNTED DEVICES SHALL BE INSTALLED UTILIZING FACTORY PAINTED SURFACE MOUNTING ACCESSORIES AND MATCHING DEVICE BOXES FOR THE MOST AESTHETICALLY PLEASING INSTALLATION.
11. PAINTING OF ELECTRICAL EQUIPMENT:
    - A. 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.
    - B. 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.
12. INSTALLATION OF NEW DEVICES AND CONDUITS SHALL NOT INTERFERE WITH THE OPENING OF DOORS AND/OR WINDOWS. ACCESS AND/OR VISIBILITY OF DEVICES SHALL NOT BE BLOCKED BY DOORS IN THE OPEN POSITION.
13. PENETRATIONS THROUGH FIRE-RATED WALLS AND FLOORS SHALL BE SEALED TO MAINTAIN FIRE RATINGS. UTILIZE 3M CP25, PUTTY 303 OR EQUIVALENT.
14. SHOULD PROJECT CONDITIONS REQUIRE DEVIATIONS FROM THE CONSTRUCTION DRAWINGS, MARK SUCH CHANGES ON THE AS-BUILT DRAWINGS. IF THESE CHANGES REQUIRE ALTERNATE METHODS TO THOSE SPECIFIED IN THE CONTRACT DOCUMENTS, SUBMIT DRAWINGS SHOWING THE PROPOSED ALTERNATE METHODS TO THE CONTRACTING OFFICER FOR REVIEW AND APPROVAL. DO NOT PROCEED UNTIL APPROVAL IS OBTAINED FROM THE CONTRACTING OFFICER.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE COUNTY OF HAWAII DPW ELECTRICAL PERMIT. THIS INCLUDES THE PERMIT APPLICATION AND ANY ASSOCIATED FEES.

A1

HANDHOLE SCHEDULE

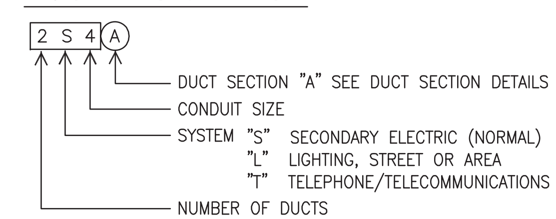
22	17" x 30" ELECTRIC HANDHOLE
65	30" x 48" TELECOMMUNICATIONS HANDHOLE
201	13" x 24" AREA LIGHTING PULLBOX

ELECTRICAL SYMBOLS

	STREET LIGHT
Ā	BARRED LETTER IN OR ADJACENT TO LTG FIXTURE SYMBOL INDICATES FIXTURE TYPE
	PANELBOARD, 6'-6" TO TOP
	TELECOMM BACKBOARD, 4'W x 8'H x 3/4" THK TERMITE TREATED PLYWOOD, PAINT WITH TWO COATS WHITE FIRE-RETARDANT PAINT
	TELECOMM CABINET
	DUPLEX RECEPTACLE w/ GFCI PROTECTION, NEMA 5-20R, 125V, +18" AFF UON
J	LARGE JUNCTION BOX, SIZE AS INDICATED
J	LARGE JUNCTION BOX, WALL MOUNTED, SIZE AS INDICATED
J	SMALL JUNCTION (OUTLET) BOX
J	SMALL JUNCTION (OUTLET) BOX, WALL MOUNTED
	DISCONNECT SWITCH, HEAVY DUTY, HP-RATED, SIZE AS INDICATED, +5'-6" TO TOP UON
E	EQUIPMENT CONNECTION
C	TELECOMMUNICATION SYSTEM OUTLET BOX, 4-11/16"SQ. x 2-1/8"D WITH SINGLE GANG PLASTER RING, BLANK DEVICE PLATE COVER, +18"AFF UON
$	SINGLE POLE SWITCH, 20A, 120/277V – 3=3 WAY, 4=4 WAY, D=DIMMER, FD=FLUOR DIMMER, M=MANUAL MOTOR SWITCH, P=PILOT, F=FAN CONTROLLER, K=KEY OPERATED, +48" AFF
WP	WEATHERPROOF
CO	CONDUIT ONLY
NL	NIGHT LIGHT
CT	MOUNTED 6" ABOVE COUNTERTOP BACKSPLASH
UON	UNLESS OTHERWISE NOTED
	CONDUIT UP
	CONDUIT DOWN
	CONDUIT & WIRING IN WALL OR CEILING
	CONDUIT & WIRING BELOW REFERENCED PLANE
	CONDUIT & WIRING EXPOSED
	HOMERUN TO APPLICABLE PANEL
	CONDUIT STUB
	FLEXIBLE CONDUIT
C	TELECOMMUNICATION SYSTEM CONDUIT, 1"C MIN WITH PULLSTRING UON
	SHADED AREA DESIGNATES THE REQUIRED WORKING SPACE CLEARANCE PER NEC 110-16. COORDINATE CLEARANCE WITH ALL OTHER TRADES. ENSURE THAT NO OTHER EQUIPMENT, STRUCTURE, OR PERMANENT APPURTENANCE ENCROACHES INTO THIS ZONE.

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

DUCT DESIGNATION



14002-KMR

HDR

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

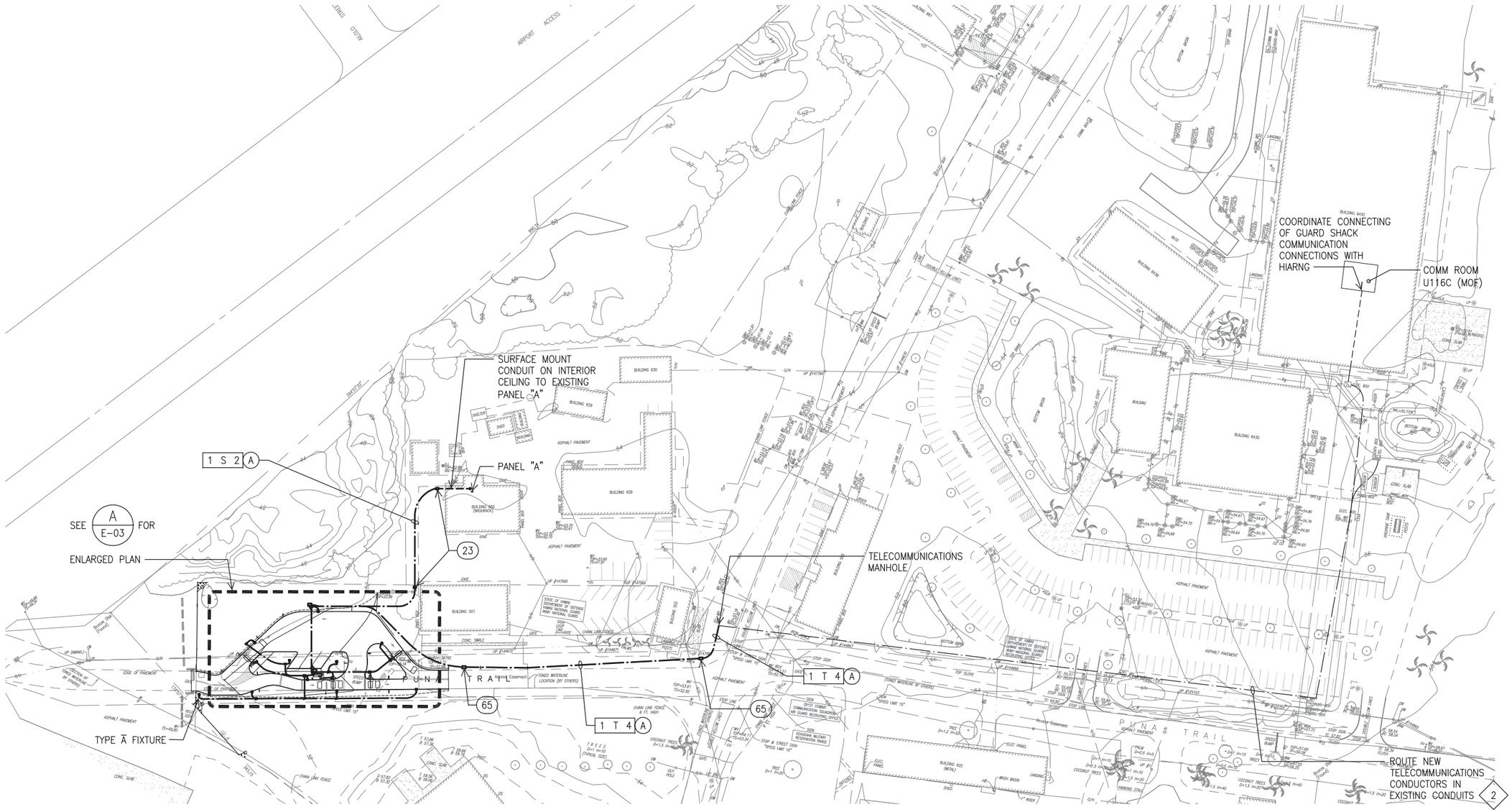
MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/16

SYM	DESCRIPTION	DATE	APPR
A1	ADDENDUM 1	05/04/2015	

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES PKU | DRW MKE | CHK PKU

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HIARNG
TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY
HILO, HAWAII
ELECTRICAL SYMBOLS AND NOTES

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 24 OF 32
E-01



SITE ELECTRICAL PLAN

SCALE: 1" = 60'-0"

NOTES:

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

2 PROVIDE 12 PR TSP CAT 6.

0' 60' 120' 180'

1" = 60'-0"

14002-KMR

A/E INFO

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

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

SEAL

NO	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES	DRW	CHK
PKU	MKE	PKU

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

SITE ELECTRICAL PLAN

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140022

SHEET 25 OF 32

E-02

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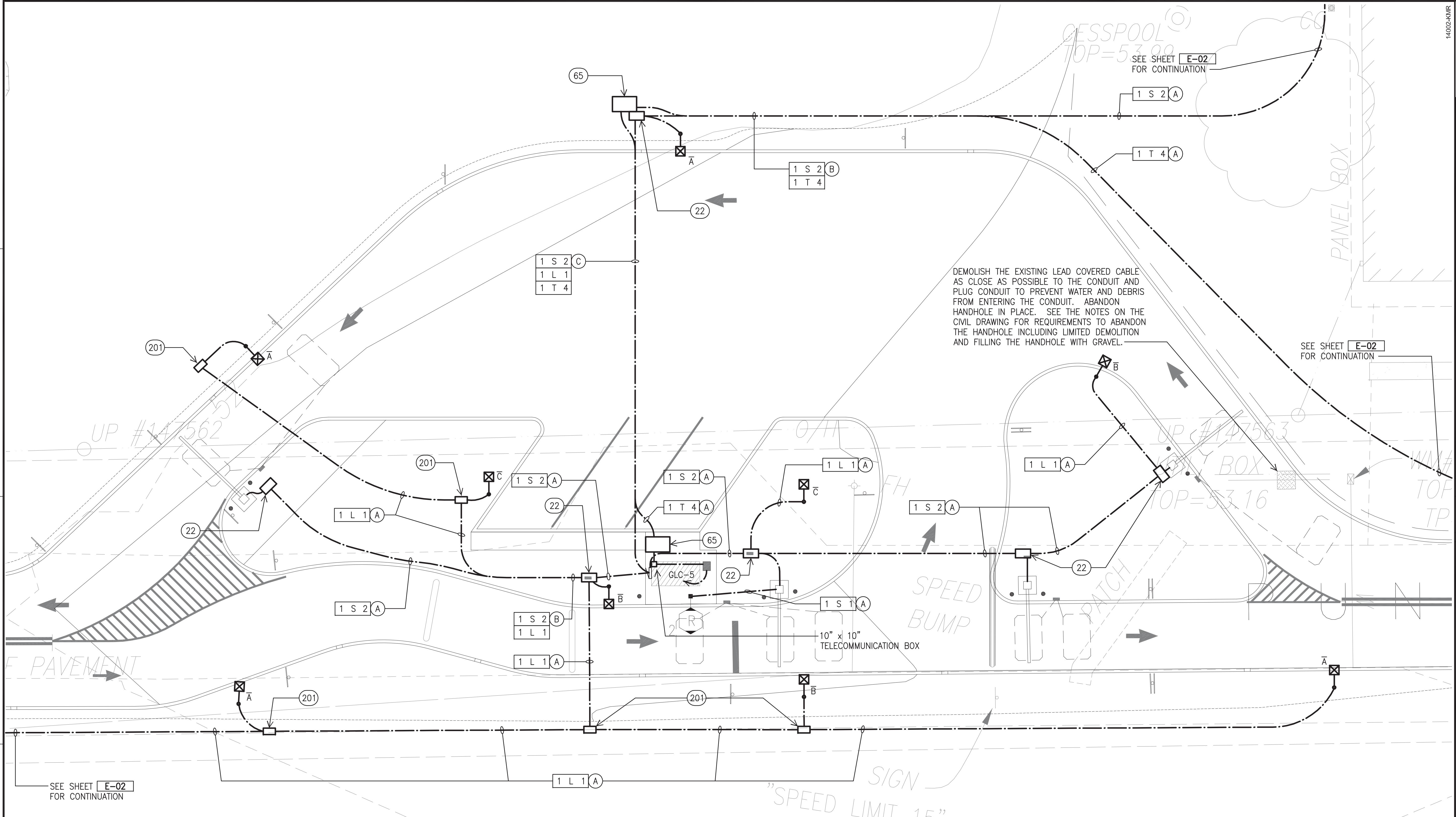


ENLARGED SECURITY ELECTRICAL PLAN

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

NOTES:

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

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

14002-KMR

HDR

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

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES PKU | DRW MKE | CHK PKU

STATE OF HAWAII
DEPARTMENT OF DEFENSE
FACILITY MANAGEMENT OFFICE
DESIGN AND PROJECT MANAGEMENT BRANCH
HIARNG
HILO, HAWAII

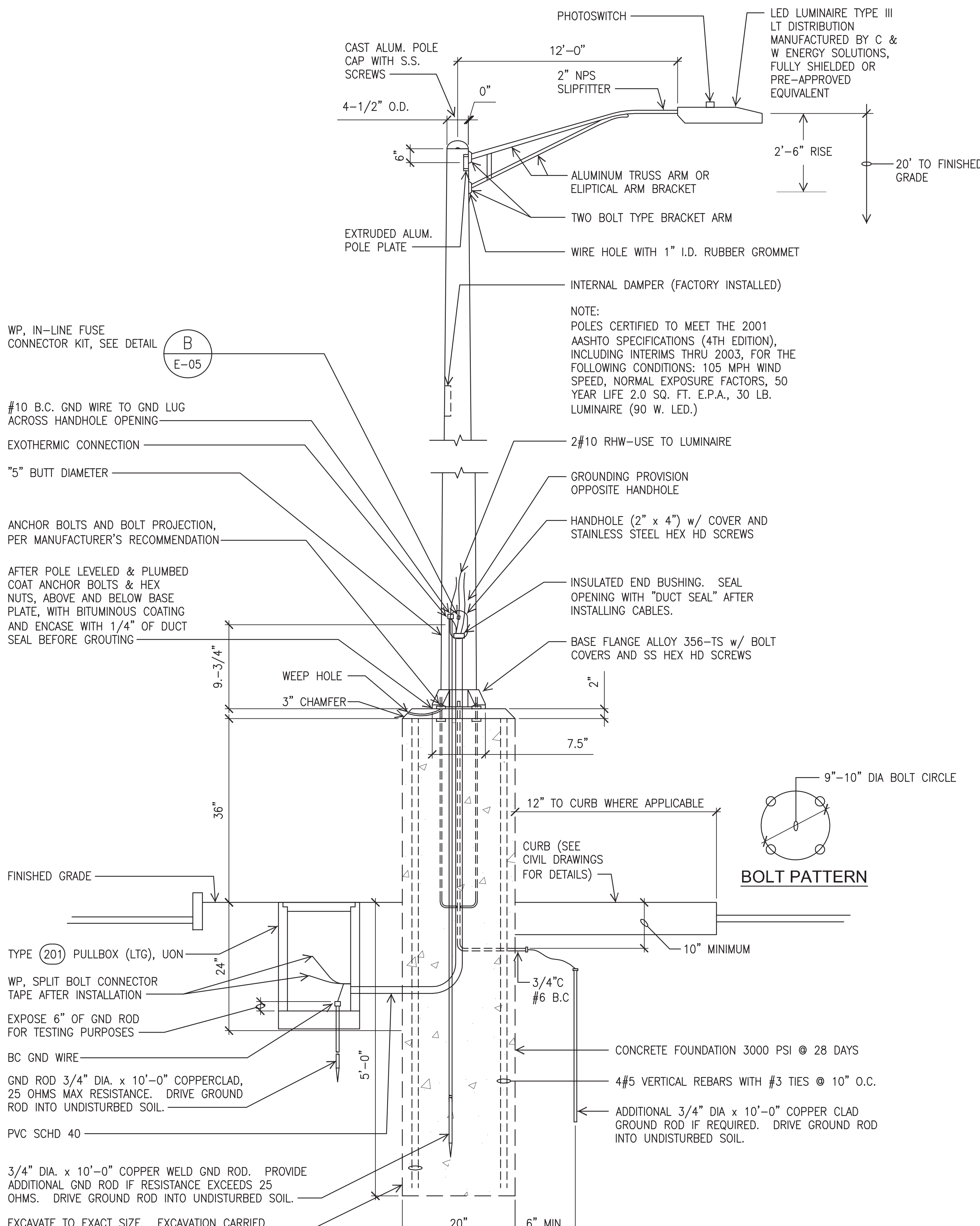
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

ENLARGED SECURITY ELECTRICAL PLAN

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 26 OF 32

E-03



A E-04 **AREA LIGHT POLE DETAIL**

NOT TO SCALE

TYPE	$\overline{A}$
MOUNT	POLE MOUNTED, +20' AFG
HOUSING	DIE CAST ALUMINUM, GREY FINISH
LENS	10,935 INITIAL LUMENS, 108 WATTS, COUNTY OF HAWAII OUTDOOR LIGHTING COMPLIANT
PHOTOMETRICS	TYPE III
NOTES	1. 120V OPERATION 2. INTEGRAL PHOTOCELL 3. INTEGRAL FUSING

TYPE	$\overline{B}$
MOUNT	POLE MOUNTED, +20' AFG
HOUSING	DIE CAST ALUMINUM, GREY FINISH
LENS	18,224 INITIAL LUMENS, 180 WATTS, COUNTY OF HAWAII OUTDOOR LIGHTING COMPLIANT
PHOTOMETRICS	TYPE III
NOTES	1. 120V OPERATION 2. INTEGRAL PHOTOCELL 3. INTEGRAL FUSING

TYPE	$\overline{C}$
MOUNT	POLE MOUNTED, +20' AFG
HOUSING	DIE CAST ALUMINUM, GREY FINISH
LENS	21,870 INITIAL LUMENS, 216 WATTS, COUNTY OF HAWAII OUTDOOR LIGHTING COMPLIANT
PHOTOMETRICS	TYPE III
NOTES	1. 120V OPERATION 2. INTEGRAL PHOTOCELL 3. INTEGRAL FUSING

14002-KMR

HDR

A/E INFO

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

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

SEAL

SYM | DESCRIPTION | DATE | APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES PKU | DRW MKE | CHK PKU

STATE OF HAWAII — DEPARTMENT OF DEFENSE — FACILITY MANAGEMENT OFFICE — DESIGN AND PROJECT MANAGEMENT BRANCH

HIARNG — HILO, HAWAII

HAWAII ARMY NATIONAL GUARD PHYSICAL SECURITY AND IMPROVEMENTS

TS KEAUKAHA MILITARY RESERVATION (KMR) PHYSICAL SECURITY

AREA LIGHT POLE DETAIL

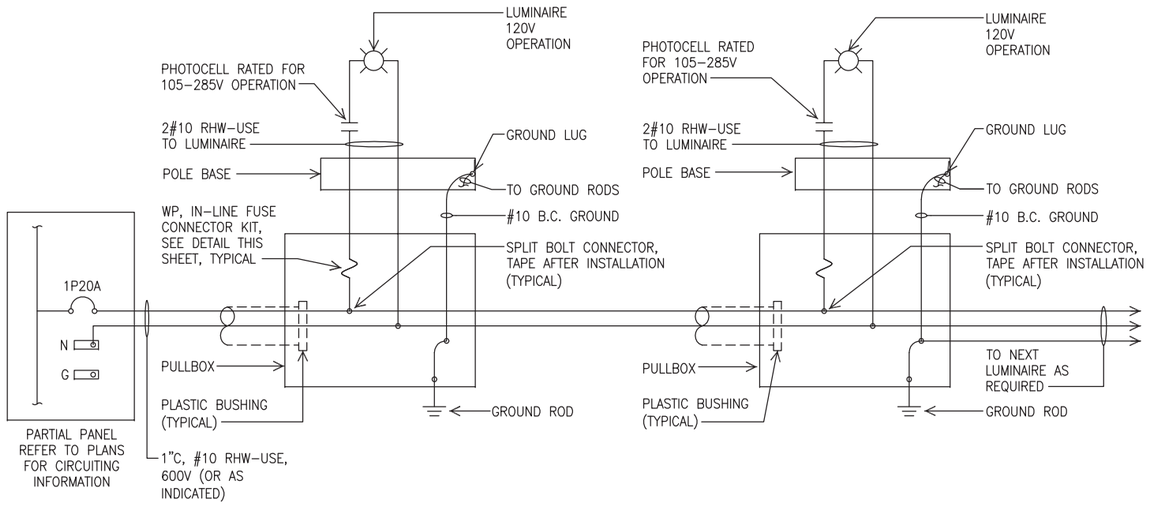
SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140022

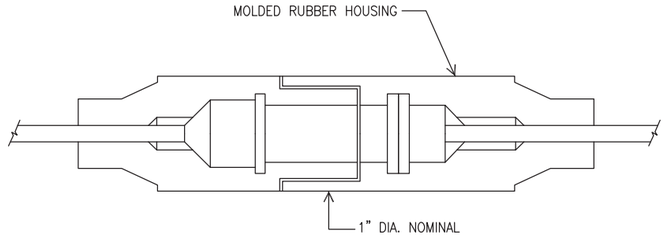
SHEET 27 OF 32

E-04



A E-05 TYPICAL AREA ROADWAY/AREA/WALKWAY LIGHTING WIRING DIAGRAM

NOT TO SCALE



B E-05 POLE LIGHT INSULATED FUSED CONNECTOR

NOT TO SCALE

NOTES:

1. FUSE HOLDERS SHALL BE INSTALLED IN EACH UNGROUNDED CONDUCTOR AT POLE HANDHOLE.
2. FUSE HOLDER TO BE FURNISHED WITH:
   3A FUSE FOR SINGLE HEAD

140024MR

HAWAII ARMY NATIONAL GUARD

HDR

A/E INFO

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

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

SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES PKU | DRW MKE | CHK PKU

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE

HIARNG

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

MISCELLANEOUS DETAILS

SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140022

SHEET 28 OF 32

E-05

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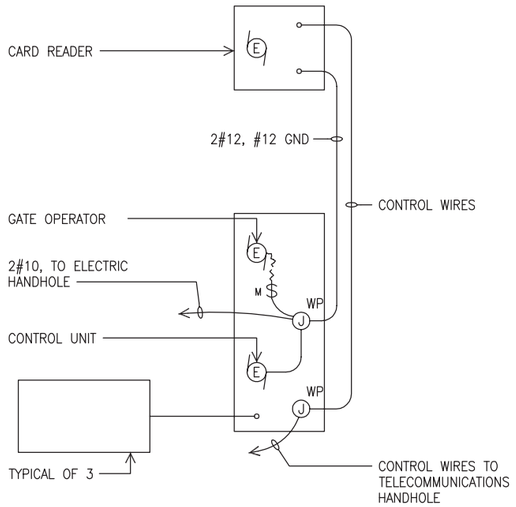

A / E-06 GATE OPERATOR CONTROL WIRING DIAGRAM

NO SCALE

140024MR

HAWAII ARMY NATIONAL GUARD

HDR

A/E INFO

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

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

SEAL

SYM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES	DRW	CHK
PKU	MKE	PKU

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH

HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS

HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY

GATE OPERATOR CONTROL WIRING DIAGRAM

SCALE: AS NOTED

STATE JOB NO. CA-1328-D

FEDERAL PROJECT NO. 15140022

SHEET 29 OF 32

E-06

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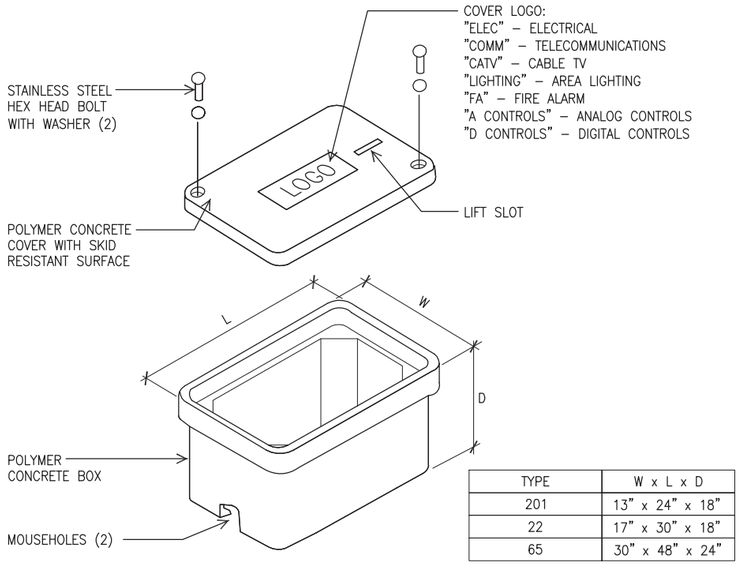


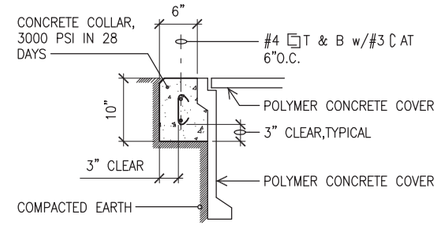
TYPE	W x L x D
201	13" x 24" x 18"
22	17" x 30" x 18"
65	30" x 48" x 24"

A E-07 POLYMER CONCRETE PULLBOX DETAIL

NOT TO SCALE

NOTES:

1. PULLBOX ASSEMBLY SHALL HAVE A [10,400 LB. DESIGN LOAD (8,000 LB. WHEEL LOAD TIMES 1.3 IMPACT FACTOR) RATING IN ACCORDANCE WITH ASTM C857 A–8 VEHICLE AND PEDESTRIAN LOADING.] [20,800 LB. DESIGN LOAD (16,000 LB. WHEEL LOAD TIMES 1.3 IMPACT FACTOR) RATING IN ACCORDANCE WITH ASTM C857 A–16 VEHICLE AND PEDESTRIAN LOADING.]
2. BOX AND BASE SHALL NOT CONTAIN STEEL REINFORCING.
3. PULLBOX SHALL BE SET ON COMPACTED GRANULAR FILL. PROVIDE BUILD–UP BRICKS WITH MORTAR AS NECESSARY TO ACCOMMODATE DUCTLINE ENTRIES.
4. PROVIDE CONCRETE COLLAR RING SURROUNDING PULLBOX, SEE B / E-07.
5. BOXES SHALL BE MANUFACTURED BY ARMORCAST OR EQUIVALENT. EQUIVALENT MUST BE SUBMITTED FOR APPROVAL PRIOR TO BIDDING.



B E-07 CONCRETE COLLAR RING

NOT TO SCALE

14002-KMR

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

NO.	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES PKU | DRW MKE | CHK PKU

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
HILO, HAWAII
TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY
PULLBOX DETAILS

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 30 OF 32
E-07

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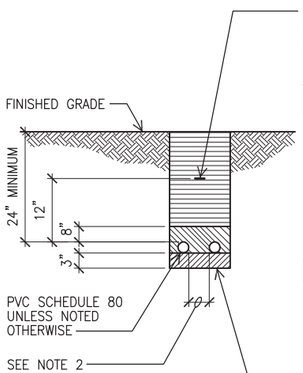


TRACEABLE WARNING TAPE WITH "CAUTION–ELECTRIC/COMMUNICATIONS CABLE BELOW" IMPRINTED ON TAPE. WARNING TAPE SHALL BE PLACE OVER ENTIRE LENGTH OF DUCTLINE [TRACEABLE ELECTRICAL WARNING MARKER TAPE IN ACCORDANCE WITH HECo SPEC. M0302]

BACKFILL:

TYPE "A" : [EITHER MATERIAL CONFORMING TO THE REQUIREMENTS OF THE CITY AND COUNTY OF HONOLULU STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION, DATED SEPTEMBER 1986, SECTION 16 – "BORROW", OR] 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 3 INCHES IN LARGEST DIMENSION, HIGHLY PLASTIC CLAY, POORLY–GRADED SAND AND GRAVEL (CLASSIFIED AS SP AND GP USING THE UNITED SOIL CLASSIFICATION SYSTEM), ORGANICS, DEBRIS, OR OTHER UNSUITABLE OR DELETERIOUS MATERIALS.

TYPE "B" : SELECT GRANULAR MATERIAL PASSING A ONE (1) INCH SIEVE SUCH AS THREE–QUARTER (3/4) INCH AGGREGATE BASE COURSE GRAVEL, S4C OR MATERIAL THAT IS FREE OF ORGANICS, DEBRIS OR HIGHLY–PLASTIC CLAY AND MEETS THE FOLLOWING GRADATION:

SLEEVE SIZE	PERCENT PASSING BY WEIGHT
1"	100
3/4"	90 – 100
No. 4	35 – 100
No. 40	10 – 30
No. 200	3 – 15

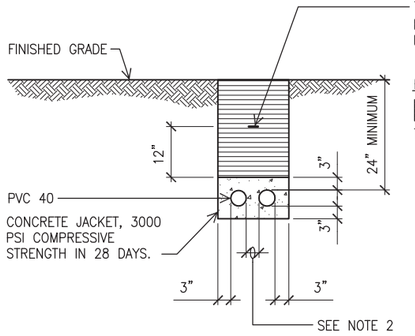
NOTE: IF THE NORMAL MATERIAL IN BOTTOM OF TRENCH IS NOT TYPE "B" AN ADDITIONAL 3" SHALL BE EXCAVATED AND TYPE "B" BACKFILL SHALL BE PROVIDED.

A E–08 TYPICAL DUCT SECTION (DIRECT BURIED)

NOT TO SCALE

NOTES:

1. WHERE TRENCH ENCOUNTERS EXISTING CONCRETE OR ASPHALT CONCRETE, SURFACE SHALL BE SAWCUT. BACKFILL, COMPACT AND PATCH SURFACE TO MATCH ADJACENT AREA. SEE TRENCH RESTORATION DETAIL.
2. PROVIDE 3" SEPARATION BETWEEN DUCTS OF SAME SYSTEM AND 12" SEPARATION BETWEEN ELECTRICAL DUCTS AND DUCTS OF DIFFERENT SYSTEMS.



TRACEABLE WARNING TAPE WITH "CAUTION–ELECTRIC/COMMUNICATIONS CABLE BELOW" IMPRINTED ON TAPE. WARNING TAPE SHALL BE PLACED OVER ENTIRE LENGTH OF DUCTLINE

BACKFILL:

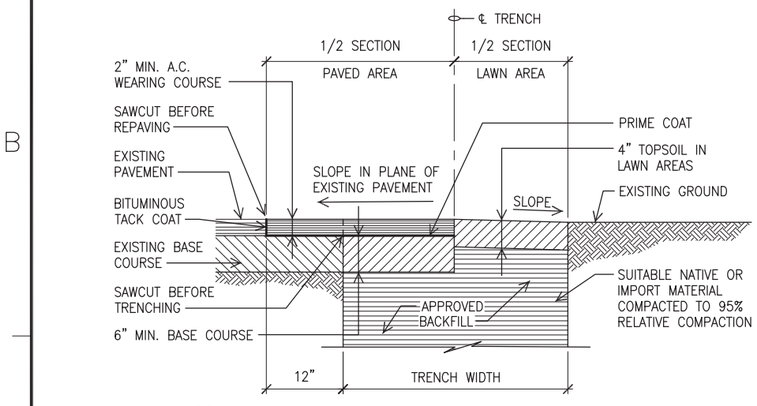
TYPE "A" : NON–CONTAMINATED NATIVE SOIL MATERIAL WHICH DOES NOT CONTAIN MORE THAN 50% GRAVEL, AND ALSO, DOES NOT CONTAIN HARD LUMPS OF EARTH 3 INCHES IN GREATEST DIMENSION, ROCKS LARGER THAN 3 INCHES IN LARGEST DIMENSION, HIGHLY PLASTIC CLAY, POORLY–GRADED SAND AND GRAVEL (CLASSIFIED AS SP AND GP USING THE UNITED SOIL CLASSIFICATION SYSTEM), ORGANICS, DEBRIS, OR OTHER UNSUITABLE OR DELETERIOUS MATERIALS.

B E–08 TYPICAL DUCT SECTION (CONCRETE ENCASED)

NOT TO SCALE

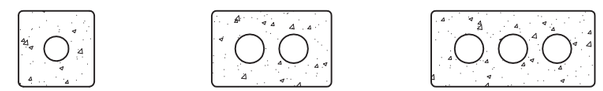
NOTES:

1. ELECTRICAL AND TELEPHONE DUCTS SIMILAR.
2. PROVIDE 2" SEPARATION BETWEEN DUCTS OF SAME SYSTEM AND 3" BETWEEN DUCTS OF DIFFERENT SYSTEMS.
3. WHERE TRENCH ENCOUNTERS EXISTING CONCRETE OR ASPHALT CONCRETE, SURFACE SHALL BE SAWCUT. BACKFILL, COMPACT AND PATCH SURFACE TO MATCH ADJACENT AREA. SEE TRENCH RESTORATION DETAIL.
4. SEE DUCT SECTION DETAILS FOR CONDUIT ARRANGEMENT.



C E–08 TRENCH RESTORATION DETAIL

NOT TO SCALE



SECTION A SECTION B SECTION C

DUCT SECTION DETAILS

NOT TO SCALE

140024MR

A/E INFO

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

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

SEAL

STM	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL

SUBMITTAL DATE: 04/17/15

DES	DRW	CHK
PKU	MKE	PKU

DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
HIARNG
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
HILO, HAWAII
TS KEAUKAHA MILITARY RESERVATION (KMR)
PHYSICAL SECURITY
DUCT SECTION DETAILS

SCALE: AS NOTED

STATE JOB NO. CA–1328–D

FEDERAL PROJECT NO. 15140022

SHEET 31 OF 32

E-08

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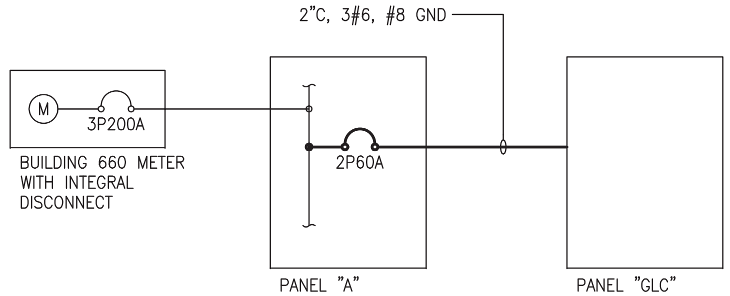
14002-KMR

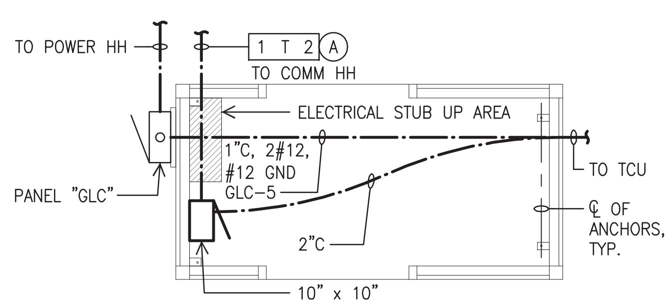


ONE-LINE DIAGRAM

NO SCALE

NOTES:

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



A / E-09

GUARD SHACK DETAIL

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

NOTES:

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

KMR PANEL A

VOLTAGE: 208Y/120V, 3 PH, 4W — MAIN BKR: LUGS ONLY — EQUIPMENT GROUND BUS: YES
TYPE: BOLT-ON
BUS RATING: 225A — MOUNT: SURFACE
AIC: 22,000 — ENCLOSURE: NEMA 1

KVA A	KVA B	KVA C	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	CKT BKR	CKT NO	CKT NO	CKT BKR	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	KVA A	KVA B	KVA C
6.6			PANEL P	3P70A	1	2	1P20A	L	1.0		
	6.6		PART OF 1	---------	3	4	1P20A	L		1.0	
		6.6	PART OF 1	---------	5	6	1P20A	L			1.0
0.2			R	1P20A	7	8	1P20A	L	1.0		
	0.2		R	1P20A	9	10	1P20A	L		1.0	
		0.2	R	1P20A	11	12	1P20A	R-RECEPTACLE, S-SPARE			0.2
0.2			R	1P20A	13	14	1P20A	R-RECEPTACLE, S-SPARE	0.2		
	0.2		220V BATT RM	2P20A	15	16	3P20A	220V VEHICLE WASH		1.0	
		0.2	PART OF 13	---------	17	18	------	PART OF 16			1.0
1.0			L	1P20A	19	20	--------	PART OF 16	1.0		
	0.2		S	1P20A	21	22	1P20A	L		1.0	
		0.2	S	1P20A	23	24	1P20A	EXISTING LOAD			1.0
2.8			EXISTING LOAD	3P30	25	26	2P40A	AIR COMPRESSOR	3.8		
	2.8		PART OF 25	-------	27	28	-------	PART OF 26		3.8	
		2.8	PART OF 25	--------	29	30	1P20A	EXISTING LOAD			1.0
			PFB	1P	31	32	1P	PFB			
	1.8		PANEL "GLC" **(NEW)**	2P60A*	33	34	1P	PFB			
		1.8	PART OF 33 **(NEW)**	--------	35	36	1P	PFB			
			PFB	1P	37	38	1P	PFB			
			PFB	1P	39	40	1P	PFB			
			PFB	1P	41	42	1P	PFB			
10.8	11.8	11.8	SUBTOTALS						7.0	7.8	4.2

53.5 TOTAL KVA
0.8 DEMAND FACTOR
42.8 DEMAND KVA
119 DEMAND AMPS 208 volts

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

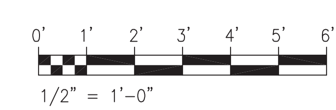
PANEL "GLC" GE CAT NUMBER TLM1212RCU

VOLTAGE: 208/120V, 1 PH, 3W — MAIN BKR: 2P40A — EQUIPMENT GROUND BUS: YES
BUS: COPPER — TYPE: PLUG-IN — ISOLATED GROUND BUS: NO
BUS RATING: 125A — MOUNT: SURFACE — FEED THRU LUGS: NO
AIC: 10,000 — ENCLOSURE: NEMA 3R — U.L. LISTED AS SERVICE ENTRANCE EQUIPMENT: NO

KVA A	KVA B	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	CKT BKR	CKT NO	CKT NO	CKT BKR	DESCRIPTION: L-LIGHTS R-RECEPTACLE, S-SPARE PFB-PROV FOR FUTURE CB	KVA A	KVA B
1.6		HVAC	1P20A	1	2	1P20A	R-GFCI	0.2	
	1.2	L-GUARD SHACK	1P20A	3	4	1P20A	R-GUARD SHACK		0.2
0.5		TCU **(NEW)**	1P20A*	5	6	1P20A*	GATE ARMS **(NEW)**	1.2	
	1.0	L- ROADWAY **(NEW)**	1P20A*	7	8	1P20A*	L- ROADWAY **(NEW)**		1.0
2.1	2.2	SUBTOTALS						1.4	1.2

6.9 TOTAL KVA
0.8 DEMAND FACTOR
5.5 DEMAND KVA
27 DEMAND AMPS 208 volts

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



A/E INFO

PAUL K. UYEDA
LICENSED PROFESSIONAL ENGINEER
No. 7646-E
HAWAII, U.S.A.
4/17/15
MK ENGINEERS, LTD.
LICENSE EXPIRATION DATE: 4/30/16
SEAL

APPR | DATE | DESCRIPTION | SYM

SUBMITTAL PHASE: FINAL
SUBMITTAL DATE: 04/17/15
DES PKU | DRW MKE | CHK PKU

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
DEPARTMENT OF DEFENSE
DESIGN AND PROJECT MANAGEMENT BRANCH
HAWAII ARMY NATIONAL GUARD
PHYSICAL SECURITY AND IMPROVEMENTS
HIARNG
HILO, HAWAII

TS KEAUKAHA MILITARY RESERVATION (KMR) PHYSICAL SECURITY

ONE-LINE DIAGRAM, PANEL SCHEDULES AND GUARD SHACK DETAIL

SCALE: AS NOTED
STATE JOB NO. CA-1328-D
FEDERAL PROJECT NO. 15140022
SHEET 32 OF 32

E-09