

BID DOCUMENTS & SPECIFICATIONS FOR:

Phase 2-Construction for Building 19, Interior and Exterior Site
Improvements, Kalaeloa, State of Hawaii, Department of Defense
Hawai'i Army National Guard, Job No. CA-1514-C

ISSUED BY:
STATE OF HAWAII
DEPARTMENT OF DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAI'I 96816-4495
TELEPHONE: 808.369.3567

AUGUST 2022

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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, ***"PHASE 2-CONSTRUCTION FOR BUILDING 19 INTERIOR AND EXTERIOR SITE IMPROVEMENTS, KALAELOA, STATE OF HAWAII, DEPARTMENT OF DEFENSE, HAWAII ARMY NATIONAL GUARD, JOB NO. CA-1514-C"***, will be received in the Engineering Office, State of Hawaii, Department of Defense, located in Building 306-A, Room 228, 3949 Diamond Head Road, Honolulu, Hawaii, up to **2:00 PM, Wednesday, August 31, 2022**, 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: Theasius Allen, HIENG, Room 228**. Bids must be received in the Engineering Office, Room 228, prior to the time and date fixed for opening to be considered. All bids received in the Engineering Office after the time and date fixed for opening will not be considered.

Bidders are advised that the Department of Defense facility at 3949 Diamond Head Road is a secure facility. In order to access the property, Bidders and/or their authorized personnel shall present a current driver's license or other form of official identification (with photograph) to the security personnel at the entry gate and shall inform the security personnel of the building and room number they require access to (State Contracting Section 369-3467). Lack of official identification or knowledge of the building and room to which access is needed are grounds for denial of access onto the property. Bidders should be aware and allow for security screening and random vehicle inspections. The state will not be responsible for late bids due to the afore mentioned reasons.

Proposed work consists of, but not limited to the following: Construction of interior, renovations and landscaping features, or improvements within the HIARNG Building 19, as programmed and designed several years ago.

The estimated cost is between \$1,000,000.00 to \$2,500,000.00

A site visit will be held at the 91-1227 Enterprise Avenue, Kalaeloa, Kapolei, Hawaii 96707 on **Thursday, August 18, 2022, at 10:00 AM**. Base pass is not required, however, bidders and/or their authorized personnel shall present a current driver's license or other form of official identification (with photograph) to the gate guard. Contractors are to meet HIARNG FMO-Project Manager (PM) K Y M In front of main parking lot, underneath the exterior covered canopy - mid-section of covered canopy prior to 9:50 AM. Please call K Y M, FMO-PM at 808-672-1538 before 4:30 PM on Tuesday, August 16, 2022, to register for the site visit. If no response, please leave message giving information of company name, name of all individuals that will attend, and contact phone number. After the call, you may assume you have been registered for the site visit. All interested bidders and subcontractors are welcome. Site visit is recommended but not mandatory.

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 email to theasius.a.allen@hawaii.gov.

All requests for substitution, clarification of bidding documents and/or specifications must be received in the office listed above, via email, prior to 4:30 PM on **August 23, 2022**. Questions shall be emailed to theasius.a.allen@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/>

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 e-mail to theasius.a.allen@hawaii.gov prior to 4:30 PM, fifteen (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://hawaii.gov/spo>.

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

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

REQUIREMENT FOR CONTRACTORS LICENSING CLASSIFICATIONS

Due to the nature of the work contemplated bidder must possess a valid State of Hawaii Contractor's license classification(s) B

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.

Kenneth S. Hara
Major General
Adjutant General

Posted: August 12, 2022

**PHASE 2-CONSTRUCTION FOR BUILDING 19 INTERIOR AND EXTERIOR SITE
IMPROVEMENTS, KALAELOA, STATE OF HAWAII, DEPARTMENT OF DEFENSE,
HAWAII ARMY NATIONAL GUARD, JOB NO. CA-1514-C**

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

Dear Sir:

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

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

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

Offeror is:

- ☐ Sole Proprietor ☐ Partnership ☐ Corporation ☐ Joint Venture
☐ Other _____

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

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

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

Respectfully submitted:

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

Date: _____

Telephone No.: _____

Name and Title (Please Type or Print)

* _____
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:

1. Total Base Bid Cost:

_____ Dollars (\$_____)

Deductive Alternates for Items 1, 2, and 3 are referenced on Plan Sheets T0.4, A0.1, A0.9, A1.1, A1.2, and A2.2.

- 2. Total Deductive Alternate 1 – YCA Doors:** Remove all scope of work related to the demolition of existing doors and frames and the installation of new doors and frames (2 each)

_____ Dollars (\$_____)

- 3. Total Deductive Alternate 2 – YCA Windows:** Remove all scope of work related to the demolition of existing windows and frames and the installation of new windows and frames (4 each “W-1” Windows and 1 each “W-3” Window)

_____ Dollars (\$_____)

- 4. Total Deductive Alternate 3 – YCA Related Painting:** Remove all scope of work related to the preparation and painting of areas related to YCA (~2,250 SF total)

_____ Dollars (\$_____)

- 5. Total Deductive Alternate 1 - Entry Canopy:** Remove indicated metal framed canopy, gutter and downspout, exterior painting, and all related items.

_____ Dollars (\$_____)

- 6. Total Deductive Alternate 2 - Pavement and Landscaping:** Remove indicated paving, striping, signage, grading, landscaping, irrigation, and all related items.

_____ Dollars (\$_____)

- 7. Total Deductive Alternate 3 – Pavement and Landscaping:** Remove indicated paving, grading, landscaping, irrigation, and all related items.

_____ Dollars (\$_____)

- 8. Total Deductive Alternate 4 – Regrading and Landscaping:** Remove indicated grading, landscaping, irrigation, and all related items.

_____ Dollars (\$_____)

Total Lump Sum:

Dollars (\$_____)

[BIDDER'S INSTRUCTIONS: Fill in the total lump sum bid price in numbers and write out the total lump sum bid price in words. Prices shall be written in ink or typed.]

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

NOTE:

1. This project falls under the requirement of the "Buy American Act".
2. Davis-Bacon Act prevailing wage rate or State wage rates apply to this contract.
3. Contract will be awarded based on the total lump sum bid.
4. A pre-bid meeting/site visit will be held at the 91-1227 Enterprise Avenue, Kalaeloa, Kapolei, Hawaii 96707 on **Thursday, August 18, 2022, at 10:00 AM**. Base pass is not required, however, bidders and/or their authorized personnel shall present a current driver's license or other form of official identification (with photograph) to the gate guard. Contractors are to meet HIARNG FMO-Project Manager (PM) K Y M in front of main parking lot, underneath the exterior covered canopy - mid-section of covered canopy prior to 9:50 AM. Please call K Y M, FMO-PM at 808-672-1538 before 4:30 PM on Tuesday, August 16, 2022, to register for the site visit. If no response, please leave message giving information of company name, name of all individuals that will attend, and contact phone number. After the call, you may assume you have been registered for the site visit. All interested bidders and subcontractors are welcome. Site visit is recommended, but not mandatory.

All requests for substitution, clarification of bidding documents and/or specifications must be received by email at theasius.a.allen@hawaii.gov prior to 4:30 PM on **August 23, 2022**.

5. 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.
6. **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.
7. The Surety shall not be held liable beyond two (2) years of the project acceptance date.

HAWAII PRODUCTS PREFERENCE

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

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

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

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

Change in Availability of Hawaii Product

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

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

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

Hawaii Products available for this project are as follows:

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

APPRENTICESHIP AGREEMENT PREFERENCE

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

1. If applicable to this project, any bidder seeking the preference must be a party to an apprenticeship agreement registered with the State Department of Labor and Industrial Relations (DLIR) at the time the bid is submitted for each apprenticeable trade the bidder will employ to construct the project. "Employ" means the employment of a person in an employer-employee relationship.
 - a. The apprenticeship agreement shall be registered with the DLIR and conform to the requirements of Hawaii Revised Statutes Chapter 372.
 - b. Subcontractors do not have to be a party to an apprenticeship agreement for the bidder to obtain the preference.
 - c. The bidder is not required to have apprentices in its employ at the time the bid is submitted to qualify for the preference.
2. A bidder seeking the preference must state the apprenticeable trade the bidder will employ for each trade to be employed to perform the work by submitting a completed **signed original** *Certification of Bidder's Participation – Form 1* verifying participation in an apprenticeship program registered with the DLIR. "Apprenticeable trade" shall have the same meaning as "apprenticeable occupation" pursuant to Hawaii Administrative Rules (HAR) §12-30-5.

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

CHARACTER OF WORKERS OR EQUIPMENT

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

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

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

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

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

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

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

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

LICENSE

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

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

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.

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

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

Enclosed herewith as required by law:

Surety Bond

Certificate of Deposit

Certified Check

Cashier's Check

Share Certificate

Legal Tender

(Cross Out Those Not Applicable)

_____ DOLLARS (\$ _____).

*Signature

HAWAII GENERAL EXCISE TAX

Title _____

I.D. NO. _____

Name of Company

Address

LICENSE CLASSIFICATION
AND/OR SUBCLASSIFICATION
NO.

Telephone

Date

(CORPORATE SEAL)

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

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

FORM 1

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

I. Bidder's Identifying Information			
A. Legal Business Name: _____			
B. Project Bid Title & Reference No.: _____			
C. Contact Person's Name: _____			
1. Phone No.: _____		2. E-Mail: _____	
II. Apprenticeable Trades To Be Employed*	B. Apprenticeship Sponsor*	C. No. Enrolled	D. No. Completed
A. (List)	(One Sponsor Per Form)	(# of apprentices currently enrolled as of bidder's request date)	(# of apprentices who completed the apprenticeship program in the 12 months prior to request date)
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
III. Bidder's Certification			
I certify that the above information is accurate to the best of my knowledge. I understand that my willful misstatement of facts may cause forfeiture of the preference under Act 17 and may result in criminal action. I give permission for outside sources to be contacted and for them to disclose any information necessary to verify the bidder's preference.			
A. Name (Type) _____		B. Title _____	
C. Signature (original signature required) _____		D. Date _____	
IV. Apprenticeship Sponsor's Contact Information			
A. Training Coordinator's Name: _____			
B. Address: _____			
C. Phone No.: _____		D. E-Mail: _____	E. Fax No: _____
V. Apprenticeship Program Sponsor's Certification			
I certify that the above information is accurate to the best of my knowledge. I understand that my willful misstatement of facts may cause forfeiture of the bidder's preference and may result in criminal action. I give permission for outside sources to be contacted and for them to disclose any information necessary to verify the bidder's preference under Act 17.			
A. Name of Authorized Official _____		B. Title _____	
C. Signature (original signature required) _____		D. Date _____	

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

(Name of Corporation)
Corporate Resolution

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

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

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

Secretary

(Names and Address of:)

President:

Vice President:

Secretary:

Treasurer:

SPECIAL NOTICE TO BIDDERS - CONSTRUCTION

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

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

If two (2) or more prospective bidders desire to bid jointly as a joint venture on a single project, they must file an affidavit of joint venture with their notice of intention to bid or if no intent to bid is required, shall submit an affidavit of joint venture prior to bid opening. Such affidavit of joint venture will be valid only for the specific project for which it is filed. No further license is required when all parties to the joint venture possess current and appropriate contractor's licenses. Joint venture are required to be licensed in accordance with Chapter 444 of the 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 and/or scope of work.

CONTENTS OF CONTRACT FORMS – The Statement of Work will provide the location, description, and the contract time of the work contemplated for which a lump sum bid price is asked or containing a schedule of items, together with estimated quantities of work to be performed and materials to be furnished, for which unit bid prices and/or lump sum bid prices are asked.

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

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

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

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

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

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

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

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

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

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

The Contractor shall repair the damaged or disturbed utilities to the existing condition at no cost to the Department or the project. Any damage claims due to the disruption of service caused by the utilities being damaged shall be paid by the Contractor who shall save harmless the Department from all suits, actions, or claims of any character brought on account of such damages.

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

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

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

ADDENDA AND INTERPRETATIONS - Discrepancies, omissions, or doubts as to the meaning of drawings and specifications should be communicated via email as directed in the Notice to Bidders and must be received by the Engineering Office, Department of Defense, no later than the date stated in the Notice to Bidders for submittal of questions. Any interpretation, if made, and any supplemental instructions will be in the form of written addenda. All addenda will be posted on the State Procurement Office website <http://spo.hawaii.gov>. Failure of any bidder to receive any such addendum or interpretations shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.

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

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

Pursuant to the requirements of Section 103D-302, 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 \$25,000 or more will be considered unless accompanied by one of the following forms of bidder's security:

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

B. Legal Tender.

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

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

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

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

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

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

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

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

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

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

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

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

- A. Non-compliance with "QUALIFICATION OF BIDDERS".
- B. Evidence of collusion among bidders.
- C. Lack of responsibility and cooperation as shown by past work.
- D. Being in arrears on existing contracts with the State of 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 may be returned after a satisfactory contract bond has been furnished and the contract has been executed.

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

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

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

B. Legal Tender; or

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

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

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

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

EXECUTION OF THE CONTRACT - The contract shall be signed by the successful bidder and returned, together with a satisfactory performance and payment bonds, within ten (10) consecutive calendar days, after the bidder has received his contract for execution or within such further time as the Adjutant General or his designated representative may allow. No proposal or contract shall be considered binding upon the State until the contract has been fully and properly executed by all parties thereto and the Adjutant General or his designated representative has endorsed therein his certificate, as required by Section 103D-309, 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 and to include automotive liability, workers compensation and employers liability.

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

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

BID PREPARATION

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

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

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

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

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

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

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

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

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

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

AWARD OF CONTRACT

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The Certificate of Vendor Compliance should be applied for as soon as possible. If a valid certificate is not submitted on a timely basis for award of a contract, an offer otherwise responsive and responsible may not receive the award.

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

SPECIAL PROVISIONS for Act 68, SLH 2010, CONSTRUCTION CONTRACTS

DEFINITIONS FOR TERMS USED IN ACT 68, SLH 2010:

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

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

- a. A Contractor awarded a contract shall ensure that Hawaii residents compose not less than eighty percent of the workforce employed to perform the contract work on the project. The eighty percent requirement shall be determined by dividing the total number of hours worked on the contract by Hawaii residents, by the total number of hours worked on the contract by all employees of the contractor in the performance of the contract. The hours worked by any Subcontractor of the Contractor shall count towards the calculation for this section. The hours worked by employees within shortage trades, as determined by the Department of Labor and Industrial Relations (DLIR), shall not be included in the calculation for this section.
- b. Prior to starting any construction work, the Contractor shall submit the subcontract dollar amount for each of its Subcontractors.
- c. The requirements of this section shall apply to any subcontract of \$50,000 or more in connection with the Contractor, that is, such Subcontractors must also ensure that Hawaii residents compose not less than eighty percent of the Subcontractors workforce used to perform the subcontract.

- d. The Contractor and any Subcontractor whose subcontract is \$50,000 or more shall comply with the requirements of Act 68 for the entire duration of the contract.
 - 1. Certification of Compliance for Employment of State Residents (attached) shall be made prior to submittal of the final invoice.
 - 2. The Certification of Compliance for Employment of State Residents shall be made under oath by an officer of the company by completing a Certification of Compliance for Employment of State Residents form and executing the Certificate before a licensed notary public.
 - 3. In addition to the certification as required above, the Contractor and Subcontractors shall maintain records such as certified payrolls for laborers and mechanics who performed work at the site and time sheets for all other employees who performed work on the project. These records shall include the names, addresses and number of hours worked on the project by all employees of the Contractor and Subcontractor who performed work on the project to validate compliance with Act 68. The Contractor and Subcontractors shall retain these records and provide access to the State for a minimum period of four (4) years after the final payment, except that if any litigation, claim, negotiation, investigation, audit or other action involving the records has been started before the expiration of the four (4) year period, the Contractor and Subcontractors shall retain the records until completion of the action and resolution of all issues that arise from it, or until the end of the four (4) year period, whichever occurs later. Furthermore, it shall be the Contractor's responsibility to enforce compliance with this provision by any Subcontractor.
- e. A Contractor who fails to comply with this section shall be subject to any of the following sanctions:
 - 1. Temporary suspension of work on the project until the Contractor or its Subcontractor complies with Act 68.
 - 2. Withholding of payment on the contract until the Contractor or its Subcontractor complies with Act 68.
 - 3. Permanent termination of the Contractor or Subcontractor from any further work on the project.
 - 4. Recovery by the State, as applicable, of any moneys expended on the contract or subcontract as applicable; or
 - 5. Proceedings for debarment or suspension of the Contractor or Subcontractor under Hawaii Revised Statutes §103D-702.

Conflict with Federal Law:

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

Davis-Bacon Act:

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

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

Project Title: _____

Agency Project No: _____

Contract No.: _____

As required by Hawai'i Revised Statutes Chapter 103B, as amended by Act 192, Session Laws of Hawai'i 2011-Employment of State Residents on Construction Procurement Contracts, I hereby certify under oath, that I am an officer of _____ and

(Name of Contractor or Subcontractor Company)

for the Project Contract indicated above, _____ was in

(Name of Contractor or Subcontractor Company)

compliance with HRS Chapter 103B, as amended by Act 192, SLH 2011, by employing a workforce of which not less than eighty percent are Hawai'i residents, as calculated according to the formula in the solicitation, to perform this Contract.

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

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

CORPORATE SEAL

(Name of Company)

(Signature)

(Print Name)

(Print Title)

Subscribed and sworn to me before this
_____ day of _____, 2011.

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

Notary Name: _____

Doc. Description: _____

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

Notary Signature
NOTARY CERTIFICATION

Date

SURETY BID BOND

Bond No. _____

KNOW TO ALL BY THESE PRESENTS:

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

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

WHEREAS:

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

NOW, THEREFORE:

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

Signed this _____ day of _____, 20____.

(Seal)

Name of Principal

Signature

Title _____

(Seal)

Name of Surety

Signature

Title _____

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SAMPLE FORMS

Request for Substitution
Name of Corporation
Weekly Quality Control Report Form

ARTICLE 1 - Definitions

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

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

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

- 1.35_ HAZARDOUS MATERIALS - Any and all radioactive materials, asbestos, polychlorinated biphenyls, petroleum, crude oil, chemicals known to cause cancer or reproductive toxicity, pollutants, contaminants, toxic substances or materials cited in Hazardous Material Laws. Abandoned motor vehicles or parts thereof are not hazardous material.
- 1.36_ HOLIDAYS - The days of each year which are set apart and established as State holidays pursuant to Chapter 8, Hawaii Revised Statutes.
- 1.37_ INSPECTOR - The person assigned by the Engineer to make detailed inspections of contract performance and materials supplied for the work.
- 1.38_ LAWS - All Federal, State, City and County Laws, ordinances, rules and regulations, and standard specifications including any amendments thereto effective as of the date of the call for sealed bids.
- 1.39_ PERFORMANCE LIQUIDATED DAMAGES - The amount prescribed in the General Conditions, Section 7.26 FAILURE TO COMPLETE THE WORK ON TIME to be paid to the State or to be deducted from any payments due or to become due the Contractor for each working day or calendar day (as applicable) delay in completing the whole or any specified portion of the work beyond the Contract Time.
- 1.40_ LETTER OF AWARD - A written notice from the Engineer to the successful bidder(s) stating that its proposal has been accepted by the State.
- 1.41_ MAJOR UNIT PRICE ITEM - A unit price item which, when extended on its estimated quantities in the proposal form, exceeds five percent (5%) of the total base bid proposal less any allowance and contingent items included in the proposal.
- 1.42_ NON-CONFORMING WORK - Work that does not fulfill the requirements of the Contract Documents.
- 1.43_ NOTICE TO CONTRACTORS - See Solicitation.
- 1.44_ NOTICE TO PROCEED - A written notice from the Contracting Officer to the Contractor advising it of the date on which it is to begin the prosecution of the Work, which date shall also be the beginning of Contract Time.
- 1.45_ POST CONTRACT DRAWINGS - Drawings issued after the award of the contract for the purpose of clarification and / or changes to the work indicated in the original drawings and which may be made a part of the contract.
- 1.46_ PROJECT ACCEPTANCE DATE - The calendar day on which the Engineer accepts the project as sufficiently completed in compliance with the contract so that the State can occupy or utilize the Work for its intended use. See SUBSTANTIAL COMPLETION.
- 1.47_ PROJECT CONTRACT LIMITS (or Contract Zone) - The portion of the site as delineated on the drawings which define the Contractor's primary area of operation for the prosecution of the work. It does not define the exact limits of all construction that may be required under the contract.
- 1.48_ PROJECT GUARANTEE - A guarantee issued by the Contractor to the State. See GUARANTEE.
- 1.49_ PROPOSAL (Bid) - See Offer (or Bid).
- 1.50_ PROPOSAL FORM - See Offer Form (or Bid Form).
- 1.51_ PUNCH LIST - A list compiled by the Engineer (or Contractor) stating work yet to be completed or corrected by the Contractor in order to substantially complete or finally complete the contract requirements.
- 1.52_ QUESTIONNAIRE - The specified forms on which the bidder shall furnish required information as to its ability to perform and finance the work.
- 1.53_ SHOP DRAWINGS - All drawings, diagrams illustrations, schedules and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
- 1.54_ SPECIAL CONDITIONS - Supplements or modifies the standard clauses of the GENERAL CONDITIONS setting forth conditions or requirements peculiar to the individual project under consideration, which are not thoroughly or satisfactorily covered, described or explained in these GENERAL CONDITIONS.
- 1.55_ SPECIFICATIONS - That portion of the Contract Documents consisting of written descriptions for materials, equipment, construction systems, standards, workmanship, directions, provisions and requirements that

- pertain to the method and manner of performing the work and certain administrative requirements applicable thereto.
- 1.56_ STATE - The State of Hawaii acting through its authorized representative.
- 1.57_ SUBCONTRACT - Any written agreement between the Contractor and its subcontractors which contains the conditions under which the subcontractor is to perform a portion of the work for the Contractor.
- 1.58_ SUBCONTRACTOR - An individual, partnership, firm, corporation, joint venture or other legal entity, as covered in Chapter 444, Hawaii Revised Statutes, which enters into an agreement with the Contractor to perform a portion of the work for the Contractor.
- 1.59_ SUBSTANTIAL COMPLETION - The status of the project when the Contractor has completed all the work and 1) all utilities and services are connected and working, 2) all equipment is in acceptable working condition, 3) additional activity by the Contractor to correct punch list items as described herein will not prevent or disrupt use of the work or the facility in which the work is located, and 4) the building, structure, improvement or facility can be used for its intended purpose.
- 1.60_ SUPERINTENDENT - The employee of the Contractor who is charged with the responsibility of all the Work.
- 1.61_ SURETY - The qualified individual, firm or corporation other than the Contractor, which executes a bond with and for the Contractor to insure its acceptable performance of the contract.
- 1.62_ UNUSUALLY SEVERE WEATHER - Uncommonly harsh weather including but not limited to hurricanes, tornados, tropical storms and tropical depressions, or as otherwise defined in the SPECIAL CONDITIONS.
- 1.63_ WORK - The furnishing of all labor, materials, equipment, and other incidentals necessary or convenient for the successful completion of the project and the execution of all the duties and obligations imposed by the contract.
- 1.64_ WORKING DAY - A calendar day, exclusive of Saturdays, Sundays and State-recognized legal holidays for the month in question.
- 1.65_ OFFER (or Bid) – The executed document submitted by an Offeror in response to a solicitation request, to perform the work required by the proposed contract documents, for the price quoted and within the time allotted.
- 1.66_ OFFEROR (or BIDDER) – Any individual, partnership, firm, corporation, joint venture or other legal entity submitting directly or through a duly authorized representative or agent, an Offer for the work or construction contemplated.
- 1.67_ OFFER FORM (or BID FORM) – The form prepared by the Department on which the Offeror submits the written offer or bid. By submitting an offer or bid, the Offeror adopt the language on the form as its own.
- 1.68_ PROJECT START DATE – The date established in the Notice to Proceed when the Contractor shall begin prosecution of the work and the start of contract time.
- 1.69_ SOLICITATION – An Invitation to Bid or Request for Proposals or any other document issued by the Department to solicit bids or offers to perform a contract. The solicitation may indicate the time and place to receive the bids or offers and the location, nature and character of the work, construction or materials to be provided.

ABBREVIATIONS

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

BIDDING AND EXECUTION OF CONTRACT REQUIREMENTS

ARTICLE 2 - Proposal Requirements and Conditions

- 2.1 QUALIFICATION OF BIDDERS**
Prospective bidders must be capable of performing the

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

2.1.1 Notice of Intention to Bid

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

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

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

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

the Bidder's proposal will be received. All information contained in the answers to the questionnaire shall be kept confidential. The questionnaire will be returned to the Bidder after it has served its purpose.

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

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

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

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

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

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

2.1.2.4 Tax clearance certificates are valid for six (6) months. The six-month period will begin with the later approval date stamped on the tax clearance. An original copy of a tax clearance that bears an original green certified copy stamp will be accepted by the Department for final payment. The period of validity is two months.

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

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

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

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

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

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

2.2 INTERPRETATION OF QUANTITIES IN BID SCHEDULE

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

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

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

2.3 CONTENTS OF PROPOSAL FORMS

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

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

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

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

2.4 THE SITE AND PROPOSED CONTRACT DOCUMENTS

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

2.5 ADDENDA AND BID CLARIFICATIONS

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

2.5.2 The Department may alter, increase or decrease the scope of the work or the contract time, provisions and

conditions by issuing a written addendum which sets forth such alterations, increase or decrease.

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

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

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

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

2.6 SUBSTITUTION OF MATERIALS AND EQUIPMENT BEFORE BID OPENING

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

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

2.6.3 Statement of Variances - The statement of variances must list all features of the proposed

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

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

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

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

2.7 PREPARATION OF PROPOSAL

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

2.7.2 If the proposal is made by an individual, the person's name and post office address must be shown in the space provided. If made by a partnership the name and post office address of each member of the partnership must be shown and the proposal signed by all partners or evidence in the form of a partnership agreement must be submitted showing the authority of the partner to enter, on behalf of said partnership, into contract with the State. If made by a corporation the proposal must show the name, titles, and business address of the president, secretary and treasurer and also evidence in the form of a corporate resolution must be submitted showing the authority of the particular corporate representative to enter on behalf of said corporation into contract with the State. If made by a joint venture the name and post office address of each member of the individual firm, partnership or corporation

comprising the joint-venture must be shown with other pertinent information required of individuals, partnerships or corporations as the case may be. The proposal must be signed by all parties to the joint-venture or evidence in the form of a Joint-Venture Agreement must be submitted showing the authority of the joint-venture's representative to enter on behalf of said joint-venture into contract with the State.

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

2.8 BID SECURITY §3-122-223(d) HAR

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

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

2.8.1.2 Legal Tender; or

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

- (a) These instruments may be utilized only to a maximum of \$100,000.
- (b) If the required security or bond amount totals over \$100,000, more than one instrument not exceeding \$100,000 each and issued by different financial institutions shall be accepted.
- (c) **CAUTION** - Bidders are cautioned that certificates of deposit or share certificates with an early withdrawal penalty must have a face value

sufficient to cover the maximum penalty amount in addition to the proposal guaranty requirement. If the certificate is made out to two names, the certificate must be assigned unconditionally to the Department of Defense.

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

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

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

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

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

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

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

2.10.1 Withdrawal of Proposals:

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

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

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

2.10.2 Modification of Proposals:

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

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

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

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

2.12.1 Non-compliance with Section 2.1
QUALIFICATION OF BIDDERS.

2.12.2 Evidence of collusion among bidders.

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

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

2.12.5 Lack of proper equipment and/or sufficient experience to perform the work contemplated, as revealed

by the Standard Questionnaire and Financial Statement for Bidders.

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

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

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

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

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

2.13 PROTEST

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

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

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

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

ARTICLE 3 - Award and Execution of Contract

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

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

3.2.1 If the proposal is unsigned.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.3.3 Correction or withdrawal of bids after award is not permissible except in response to a written withdrawal or correction request by the Contractor, and the Engineer makes a written determination that the Department's procurement practices and policies would not be materially affected by such correction or withdrawal.

3.4 AWARD OF CONTRACT

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

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

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

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

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

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

3.7 REQUIREMENT OF PERFORMANCE AND PAYMENT BONDS

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

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

3.7.1.3 A certificate of deposit; credit union share certificate; or cashier's, treasurer's, teller's or official check drawn by, or a certified check accepted by, and payable on demand to the State by a bank, a savings

institution, or credit union insured by the Federal Deposit Insurance Corporation or the National Credit Union Administration.

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

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

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

3.8 CAMPAIGN CONTRIBUTIONS BY STATE AND COUNTY CONTRACTORS

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

3.9 EXECUTION OF THE CONTRACT

3.9.1 Upon acceptance of the successful bidder's offer by the Contracting Officer, the Contractor shall provide satisfactory performance and payments bonds within ten (10) calendar days after the award of the contract or within such further time as granted by the Contracting Officer. No proposal or contract shall be considered binding upon the State until the contract has been fully and properly executed by all parties thereto and the Comptroller has endorsed thereon its certificate, as required by Section 103D-309, HRS, that there is an available unexpended appropriation or balance of an appropriation over and above all outstanding contracts sufficient to cover the State's amount required by such contract.

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

3.10 FAILURE TO EXECUTE THE CONTRACT

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

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

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

3.11 NOTICE TO PROCEED

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

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

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

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

GENERAL CONDITIONS

ARTICLE 4 - Scope of Work

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

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

4.2.1 Minor Changes - Minor changes in the work may be directed by the Engineer with no change in contract price or time of performance. Minor changes are consistent with the intent of the Contract Documents and do not substantially alter the type of work to be performed or involve any adjustment to the contract sum or extension of the contract time.

4.2.2 Oral Orders

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

the filing of any claim by the Contractor. Unless the Contractor acts in accordance with this procedure, any such oral order shall not be treated as a change for which the Contractor may make a claim for an increase in the contract time or contract price related to such work.

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

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

4.2.4 Change Orders

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

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

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

4.2.4.4 If the Contractor signs or executes the change order, this constitutes an agreement on the part of the Contractor with the terms and conditions of the change

order. A change order that is mutually agreed to and signed by the parties of the contract constitutes a contract modification.

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

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

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

4.3 DUTY OF CONTRACTOR TO PROVIDE PROPOSAL FOR CHANGES

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

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

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

performance liquidated damages will be assessed in accordance with Section 7.26 FAILURE TO COMPLETE THE WORK ON TIME.

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

4.4 PRICE ADJUSTMENT HRS 103D-501

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

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

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

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

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

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

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

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

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

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

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

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

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

4.5 ALLOWANCES FOR OVERHEAD AND PROFIT HRS103D-501

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

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

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

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

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

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

4.6 PAYMENT FOR DELETED MATERIAL

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

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

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

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

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

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

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

4.8 VARIATIONS IN BOTTOM ELEVATIONS

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

4.9 DIFFERING SITE CONDITIONS

§3-125-11 HAR

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

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

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

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

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

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

4.10 UTILITIES AND SERVICES

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

4.10.1.1 Reviewing and checking all such information and data,

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

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

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

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

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

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

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

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

ARTICLE 5 - Control of Work

5.1 AUTHORITY OF THE ENGINEER

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

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

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

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

5.2 AUTHORITY OF THE INSPECTOR

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

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

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

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

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

5.4 SHOP DRAWINGS AND OTHER SUBMITTALS

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

5.4.1.1 Shop Drawings

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.5.3 Specifications shall govern over drawings.

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

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

5.5.5 Drawings:

5.5.5.1 Schedules shall govern over all other notes and drawings.

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

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

5.5.5.4 Larger scale drawings shall govern over smaller scale drawings.

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

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

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

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

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

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

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

5.7 EXAMINATION OF DRAWINGS, SPECIFICATIONS, PROJECT SITE

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

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

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

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

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

5.8 COOPERATION BETWEEN THE CONTRACTOR AND THE DEPARTMENT

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

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

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

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

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

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

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

5.8.3.1 The Engineer shall furnish the requisite bench elevations.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.10 REMOVAL OF DEFECTIVE, NON-CONFORMING AND UNAUTHORIZED WORK

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

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

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

5.11 VALUE ENGINEERING INCENTIVE

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

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

5.11.2 Value Engineering Change Proposal - All VECP must:

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

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

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

5.11.3 VECF Required Information - The VECF 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 VECF, 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 VECF 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 VECF 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 VECF 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 VECF 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 VECF, 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 VECF 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 VECF 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 VECF.

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

5.11.6 Acceptance of VECF - The Engineer may accept in whole or in part any VECF 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 VECF on which it is based.

5.11.7 VECF Price Adjustments - When a VECF 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 VECF 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 VECF. 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 VECF is accepted by the Department by issuance of a change order after the use of this data or information or both in such an evaluation, the Department shall have the right to duplicate, use and disclose any data or information or

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

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

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

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

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

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

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

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

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

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

5.12.1.2 Becomes insolvent; or

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

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

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

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

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

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

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

ARTICLE 6 - Control of Materials and Equipment

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

6.2 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

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

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

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

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

6.3 SUBSTITUTION AFTER CONTRACT AWARD

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

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

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

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

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

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

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

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

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

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

6.4 ASBESTOS CONTAINING MATERIALS -

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

6.5 TEST SAMPLES

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

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

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

6.6 MATERIAL SAMPLES

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

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

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

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

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

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

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

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

6.10 PROPERTY RIGHTS IN MATERIALS -

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

6.11 ASSIGNMENT OF ANTITRUST CLAIMS FOR OVERCHARGES FOR GOODS PURCHASED

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

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

7.1 PROSECUTION OF THE WORK

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.3 INSURANCE REQUIREMENTS

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

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

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

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

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

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

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

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

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

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

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

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

7.3.7.4 Property Insurance (Builders Risk)

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

7.4 PERMITS AND LICENSES

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

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

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

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

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

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

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

7.7 PREVAILING WAGES - (§ 104-2 HRS)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.10 OVERTIME AND NIGHT WORK

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

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

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

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

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

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

7.11 OVERTIME AND NIGHT PAYMENT FOR STATE INSPECTION SERVICE

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

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

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

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

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

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

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

7.12 LIMITATIONS OF OPERATIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.14 LAWS TO BE OBSERVED

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

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

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

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

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

7.16 SANITARY, HEALTH AND SAFETY PROVISIONS

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

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

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

7.17 PROTECTION OF PERSONS AND PROPERTY

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

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

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

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

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

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

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

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

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

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

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

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

7.18 ARCHAEOLOGICAL SITES

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

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

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

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

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

7.19 RESPONSIBILITY FOR DAMAGE CLAIMS; INDEMNITY

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

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

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

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

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

7.20 CHARACTER OF WORKERS OR EQUIPMENT

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

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

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

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

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

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

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

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

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

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

7.21 CONTRACT TIME

7.21.1 Time is of the essence for this contract.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7.22 CONSTRUCTION SCHEDULE

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

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

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

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

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

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

7.24 SUSPENSION OF WORK §3-125-7 HAR

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

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

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

7.24.1.3 Failure of the Contractor to:

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

(2) Carry out orders given by the Engineer;

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

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

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

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

7.24.1.6 The convenience of the State.

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

7.24.3 Payment §3-125-7 HAR

7.24.3.1 In the event that the Contractor is ordered by the Engineer in writing as provided herein to suspend all work under the contract in accordance with paragraphs 7.24.1.4 or 7.24.1.6, the Contractor may be reimbursed for actual direct costs incurred on work at the jobsite, as authorized in writing by the Engineer, including costs expended for the protection of the work. Payment for equipment which must standby during such suspension of work shall be made as described in clause 8.3.4.5. (e). No payment will be made for profit on any suspension costs. An allowance of five percent (5%) will be paid on any reimbursed actual costs for indirect categories of delay costs, including extended branch and home-office overhead and delay impact costs.

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

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

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

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

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

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

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

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

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

7.25 DISPUTES AND CLAIMS §3-126-31 HAR

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

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

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

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

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

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

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

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

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

7.25.4.1 Date of the protested order, decision or action;

7.25.4.2 The nature and circumstances which caused the claim;

7.25.4.3 The contract provision that support the claim;

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

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

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

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

the Project Acceptance Date or the date of termination of the Contractor, whichever comes first.

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

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

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

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

7.25.10 Decision on Claim / Appeal - The Contracting Officer shall decide all controversies between the State and the contractor which arise under, or are by virtue of, this contract and which are not resolved by mutual agreement. The decision of the Contracting Officer on the claim shall be final and conclusive, unless fraudulent or unless the contractor delivers to the Adjutant General a written appeal of the Contracting Officer's decision no later than 30 days after the date of the Contracting 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 liquidated damages as set forth below.

7.26.1.1 When the Contractor fails to complete the Work or any portion of the Work within the time or times fixed in the contract or any extension thereof, it is agreed the Contractor shall pay liquidated damages to the Department based upon the amount stated in the Offer form.

7.26.1.2 If the Contractor fails to correct Punch list deficiencies as required by Section 7.32 PROJECT ACCEPTANCE DATE, the State will be inconvenienced and damaged, therefore, it is agreed that the Contractor shall pay liquidated damages to the Department based upon the amount stated in the Offer Form. Liquidated damages shall accrue for all days after the Contract Completion Date or any extension thereof until the date the Punchlist items are corrected and accepted by the Engineer.

7.26.1.3 If the Contractor fails to submit final documents as required by Section 7.33 FINAL SETTLEMENT OF THE CONTRACT, the State will be inconvenienced and damaged, therefore, it is agreed that the Contractor shall pay liquidated damages to the Department based upon the amount stated in the Offer Form. Liquidated damages shall accrue for all days after the Contract Completion Date or any extension thereof, until the date the final documents are received by the Engineer.

7.26.1.4 The Engineer shall assess the total amount of liquidated damages in accordance with the amount stated in the Offer Form and provide written notice of such assessment to the Contractor.

7.26.2 Acceptance of Liquidated Damages -The assessment of liquidated damages by the Engineer shall be accepted by the parties hereto as final, unless the Contractor delivers a written appeal of the Engineer's decision in accordance with subsection 7.25.10 requirements. Any allowance of time or remission of charges or liquidated damages shall in no other manner affect the rights or obligations of the parties under this contract nor be construed to prevent action under Section 7.27 TERMINATION OF CONTRACT FOR CAUSE. If the Department terminates the Contractor's right to proceed, the resulting damage will include such liquidated damages for such time as may be required for final completion of the work after the required contract completion date.

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

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

7.27.1 Default - If the Contractor refuses or fails to perform the work, or any separable part thereof, with such diligence as will assure its completion within the time specified in this contract, or any extension thereof, fails to complete the work within such time, or commits any other material breach of this contract, and further fails within seven (7) days after receipt of written notice from the Engineer to commence and continue correction of the refusal or failure with diligence and promptness, the Engineer may, by written notice to the Contractor, declare the Contractor in breach and terminate the Contractor's right to proceed with the work or the part of the work as to which there has been delay or other breach of contract.

In such event, the Department may take over the work and perform the same to completion, by contract or otherwise, and may take possession of, and utilize in completing the work, the materials, appliances, and plant as may be on the site of the work and necessary therefore.

Whether or not the Contractor's right to proceed with the work is terminated, the Contractor and the Contractor's sureties shall be liable for any damage to the Department resulting from the Contractor's refusal or failure to complete the work within the specified time.

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

7.27.3 Costs and Charges

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

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

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

7.28 TERMINATION FOR CONVENIENCE

§3-125-22 HAR

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

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

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

7.28.3.1 Any completed work; and

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

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

7.28.4 Compensation

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

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

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

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

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

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

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

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

7.30 FINAL CLEANING - Before final inspection of the work, the Contractor shall clean all ground occupied by the Contractor in connection with the Work of all rubbish, excess materials, temporary structures and equipment, and all parts of the work must be left in a neat and presentable condition to the satisfaction of the Engineer. However, the Contractor shall not remove any

warning and directional signs prior to the formal acceptance by the Engineer. Full compensation for final cleaning will be included in the prices paid for the various items of work or lump sum bid, as the case may be, and no separate payment will be made therefore.

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

7.31.1 Substantial Completion:

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

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

(b) If the Project is not Substantially Complete, the Engineer shall inform the Contractor. The Contractor shall identify deficiencies which must be corrected, update its Punch list, make the necessary corrections and repeat the previous step. After completing the necessary work, the Contractor shall notify the Engineer in writing that Punch list deficiencies have been corrected and the project is ready for a Final Inspection.

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

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

(1) Field-Posted As-Built Drawings.

(2) Maintenance Service Contract and two (2) copies of a list of all equipment.

- (3) Operating and maintenance manuals.
- (4) Air conditioning test and balance reports.
- (5) Any other final submittal required by the technical sections of the contract.

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

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

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

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

7.32 PROJECT ACCEPTANCE DATE

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

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

7.32.3 The date of Project Acceptance shall determine:

7.32.3.1 End of Contract Time.

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

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

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

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

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

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

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

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

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

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

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

7.33.1.1 All written guarantees required by the contract.

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

7.33.1.3 Certificate of Plumbing and Electrical Inspection.

7.33.1.4 Certificate of Building Occupancy.

7.33.1.5 Certificates for Soil Treatment and Wood Treatment.

7.33.1.6 Certificate of Water System Chlorination.

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

7.33.1.8 All other documents required by the Contract.

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

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

7.34 CONTRACTOR'S RESPONSIBILITY FOR WORK; RISK OF LOSS

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

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

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

7.35 GUARANTEE OF WORK

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

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

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

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

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

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

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

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

7.36 WORK OF AND CHARGES BY UTILITIES

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

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

7.37 RIGHT TO AUDIT RECORDS

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

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

7.37.3 Additionally, Sections 231-7, 235-108, 237-39 and other HRS chapters through reference, authorizes the Department of Taxation to audit all taxpayers conducting business within the State. Contractors must make

available to the Department of Taxation all books and records necessary to verify compliance with the tax laws.

7.38 RECORDS MAINTENANCE, RETENTION AND ACCESS

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

7.38.2 The representative of the Department, the Adjutant General of the State of Hawaii, the Attorney General, (the Federal granting agency, the Comptroller General of the United States, and any of their authorized representatives when federal funds are utilized), and the Legislative Auditor of the State of Hawaii shall have the right of access to any book, document, paper, file, or other record of the Contractor and any subcontractor that is related to the performance of services under this Agreement in order to conduct an audit or other examination and / or to make copies, excerpts and transcripts for the purposes of monitoring and evaluating the Contractor and subcontractor's performance of services and the Contractor and subcontractor's program, management, and fiscal practices to assure the proper and effective expenditure of funds and to verify all costs associated with any claims made under this Agreement.

7.38.3 The right of access shall not be limited to the required retention period but shall last as long as the records are retained. The Contractor and subcontractor shall retain all records related to the Contractor and subcontractor's performance of services under this Agreement for four (4) years from the date of final payment, except that if any litigation, claim, negotiation, investigation, audit or other action involving the records has been started before the expiration of the four (4) year period, the Contractor and subcontractors shall retain the records until completion of the action and resolution of all issues that arise from it, or until the end of the four (4) year retention period, whichever occurs later. Furthermore, it shall be the Contractor's responsibility to enforce compliance with this provision by any subcontractor.

ARTICLE 8 - Measurement and Payment

8.1 MEASUREMENT OF QUANTITIES

8.1.1 All work completed under the Contract shall be measured by the Engineer according to United States standard measures, or as stated in this Contract. The method of measurement and computations to be used in

determination of quantities of material furnished and of work performed under the contract shall conform to good engineering practice. These measurements shall be considered correct and final unless the Contractor has protested same to the Engineer and has demonstrated the existence of an error by actual physical measurement before the work has progressed in a manner which would prohibit a proper check.

8.1.2 All measurements of the area of the various surface, pavement and base courses will be made in the horizontal projection of the actual surface and no deductions will be made for fixtures or structures having an area of nine (9) square feet or less. All measurements of headers, curbs, fences and any other type of construction which is to be paid for by its length, will be made in the horizontal projection of the actual driven length from toe to top of cutoff, except where slope exceeds ten percent (10%) and for piles, which will be by actual length. All materials which are specified for measurement by the cubic yard "Loose Measurement" or "Measured in the Vehicle" shall be hauled in approved vehicles and measured therein at the point of delivery. Approved vehicles for this purpose may be of any type or size satisfactory to the Engineer, provided that the body is of such type that the actual contents may be readily and accurately determined. Unless all approved vehicles on a job are of a uniform capacity each approved vehicle must bear a plainly legible identification mark indicating the specific approved capacity. The Inspector may reject all loads not hauled in such approved vehicles.

8.2 NO WAIVER OF LEGAL RIGHTS - The Engineer shall not be precluded or estopped by any measurements, estimate or certificate made either before or after the completion and acceptance of the work and payment therefore, from showing the true amount and character of the work performed and materials furnished by the Contractor, or from showing that any such measurement estimate or certificate is untrue or incorrectly made, or rejecting the work or materials that do not conform in fact to the contract. The Engineer shall not be precluded or estopped, notwithstanding any such measurement, estimate, or certificate and payment in accordance therewith, from recovering from the Contractor and its sureties such damages as the Department may sustain by reason of the Contractor's failure to comply with the terms of the contract. Neither the acceptance by the Engineer or any representative of the Engineer, nor any payment for or acceptance of the whole or any part of the work, nor any extension of time, or any possession taken by the Engineer, shall operate as a waiver of any portion of the contract, or of any power herein reserved, or any right to damage herein provided. A waiver of any notice requirement or breach of the contract shall not be held to be a waiver of any other notice requirement or subsequent breach.

8.3 PAYMENT FOR ADDITIONAL WORK

8.3.1 Payment for Changed Conditions – A contract modification or change order complying with section 4.4 PRICE ADJUSTMENT and section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT shall be issued for all changes that are directed under Section 4.2 CHANGES. No payment for any change including work performed under the force account provisions will be made until a change order is issued or contract modification is executed.

8.3.1.1 At the completion of the force account work or at an intermediate interval approved by the Engineer, the contractor shall submit its force account cost proposal, including; approved daily force account records with any attached invoices or receipt, to the Engineer for processing a contract modification or change order.

8.3.2 On credit proposals and proposals covering both increases and decreases, the application of overhead and profit shall be on the net change in direct costs for the performance of the work.

8.3.3 When payment is to be made for additional work directed by a field order, the total price adjustment as specified in the field order or if not specified therein for the work contained in the related change order shall be considered full compensation for all materials, labor, insurance, taxes, equipment use or rental and overheads, both field and home office including extended home and branch office overhead and other related delay impact costs.

8.3.4 Force Account Method - When, for the convenience of the Department, payment is to be made by the Force Account method, all work performed or labor and materials and equipment furnished shall be paid for as described below. Payment by the Force Account method will not alter any rights, duties and obligations under the contract.

8.3.4.1 Labor - For all hourly workers, the Contractor will receive the rate of wage including fringe benefits when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work, which shall be agreed upon in writing before beginning work for each and every hour that said labor is actually engaged in said work.

(a) All markups for overhead and profit shall be added subject to limitations established in Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

(b) No allowance for overtime compensation will be given without the written approval of the Engineer prior to performance of such work.

8.3.4.2 Insurance and Taxes - The Contractor and subcontractor(s) will also receive the actual additional costs paid for property damage, liability, workers compensation insurance premiums, State unemployment contributions, Federal unemployment taxes, social security and Medicare taxes to which a markup of up to six percent (6%) may be added.

8.3.4.3 Materials - For materials accepted by the Engineer and used, the Contractor and subcontractor(s) shall receive the actual cost of such materials delivered and incorporated into work, plus a markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

8.3.4.4 Subcontractors - Subcontractor costs shall be the actual costs of the subcontractor marked up as defined in this Section 8.3 plus a markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.

8.3.4.5 Equipment

(1) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5.(h) owned or leased by the Contractor or a related entity, the use of which has been authorized by the Engineer:

(a.) The Contractor will be paid at the per-hour rental rates based on the monthly rate established for said machinery or equipment in the then-current edition of the Rental Rate Blue Book for Construction Equipment including the estimated operating cost per hour and regional correction provided therein.

(b.) If no rate is listed for a particular kind, type or size of machinery or equipment, then the monthly, hourly rates shall be as agreed upon in writing by the Contractor and the Engineer prior to the use of said machinery or equipment. If there is no agreement, the Engineer will set a rate. The Contractor may contest the rate pursuant to Section 7.25 DISPUTES AND CLAIMS.

(c.) Rental rates which are higher than those specified in the aforesaid Rental Rate Blue Book publication may be allowed where such higher rates can be justified by job conditions such as work in water and work on lava, etc. Request for such higher rates shall be submitted in writing to the Engineer for approval prior to the use of the machinery or equipment in question.

(2) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5.(h) rented by the Contractor or a related entity specifically for the

Force Account work, the use of which has been authorized by the Engineer; The Contractor will be paid the actual rental cost for the machinery or equipment, including mobilization and demobilization costs. A receipt from the equipment supplier shall be submitted to the Engineer.

(3) For machinery or special equipment (other than small tools as herein defined in clause 8.3.4.5. (h) rented by the Contractor or a related entity for use in the project, but which will also be used for the Force Account work, the use of which has been authorized by the Engineer; The Contractor will be paid the actual rental cost for the machinery or equipment. No additional mobilization and demobilization costs will be paid. A receipt from the equipment supplier shall be submitted to the Engineer.

(4) The rental rate for trucks not owned by the Contractor shall be those as established under the Hawaii State Public Utilities Commission, which will be paid for as an equipment item pursuant to paragraph 8.3.4.5. Rental rates for Contractor-owned trucks not listed in the Rental Rate Blue Book shall be agreed upon in writing by the Contractor and Engineer prior to the use of said trucks. If there is no agreement, the Engineer shall set the rate. The Contractor may contest the rate pursuant to Section 7.25 DISPUTES AND CLAIMS.

(5) The rental period shall begin at the time equipment reaches the site of work, shall include each day that the machinery or equipment is at the site of the work and shall terminate at the end of the day on which the equipment is no longer needed. In the event the equipment must standby due to work being delayed or halted by reason of design, traffic, or other related problems uncontrollable by the Contractor, excluding Saturdays, Sundays and Legal Holidays, unless the equipment is used to perform work on such days, the rental shall be two hours per day until the equipment is no longer needed.

(5.1) The rental time to be paid will be for the time actually used. Any hours or operation in excess of 8 hours in any one day must be approved by the Engineer prior to the performance of such work.

(5.2) Rental time will not be allowed or credited for any day on which machinery or equipment is inoperative due to its breakdown. On such days, the Contractor will be paid only for the actual hours, if any, that the machinery or equipment was in operation.

(5.3) In the event the Force Account work is completed in less than 8 hours, equipment

- rental shall nevertheless be paid for a minimum 8 hours.
- (5.4) For the purpose of determining the rental period the continuous and consecutive days shall be the normal 8-hour shift work day, Monday through Friday excluding legal holidays. Any work day to be paid less than 8 hours shall not be considered as continuous, except for equipment removed from rental for fuel and lubrication.
- (5.5) No additional premium beyond the normal rates used will be paid for equipment over 8 hours per day or 40 hours per week.
- (6) All rental rates for machinery and equipment shall include the cost of fuel, oil, lubricants, supplies, small tools, necessary attachments, repairs, maintenance, tire wear, depreciation, storage, and all other incidentals.
- (7) All machinery and equipment shall be in good working condition and suitable for the purpose for which the machinery and equipment is to be used.
- (8) Individual pieces of equipment or tools having a replacement value of one thousand dollars (\$1,000) or less, whether or not consumed by use, shall be considered to be small tools and included in the allowed markup for overhead and profit and no separate payment will be made therefore.
- (9) The total of all Force Account rental charges accrued over the duration of the contract for a specific item of equipment shall not exceed the replacement cost of that equipment.
- (9.1) The Contractor shall provide the cost of replacement to the Engineer prior to using the equipment. If the Engineer does not agree with the replacement cost, the Engineer shall set the replacement cost. The Contractor may contest the replacement cost pursuant to Section 7.25 DISPUTES AND CLAIMS.
- (10) Should the item of equipment be rented from an unrelated entity, the rental cost will be treated as an equipment cost under paragraph 8.3.4.5.
- (11) Transportation and/or Mobilization: The following provisions shall govern in determining the compensation to be paid to the Contractor for use of equipment or machinery on the Force Account method:
- (11.1) The location from which the equipment is to be moved or transported shall be approved by the Engineer.
- (11.2) Where the equipment must be transported to the site of the force account work, the Department will pay the reasonable cost of mobilizing and transporting the equipment, including its loading and unloading, from its original location to the site of force account work. Upon completion of the work the Department will pay the reasonable cost of mobilizing and transporting the equipment back to its original location or to another location, whichever cost is less.
- (11.3) The cost of transporting the equipment shall not exceed the rates established by the Hawaii State Public Utilities Commission. If such rates are nonexistent, then the rates will be determined by the Engineer based upon the prevailing rates charged by established haulers within the locale.
- (11.4) Where the equipment is self-propelled, the Department will pay the cost of moving the equipment by its own power from its original location to the site of the force account work. Upon completion of the work the Department will pay the reasonable cost of moving of the Equipment back to its original or another location, whichever cost is less.
- (11.5) At the discretion of the Engineer, when the Contractor desires to use such equipment for other than Force Account work, the costs of mobilization and transportation shall be prorated between the Force Account and non Force Account work.
- (12) Pickup trucks, vans, storage trailers, unless specifically rented for the Force Account work, shall be considered incidental to the Force Account work and the costs therefore are included in the markup allowed under Section 4.5 ALLOWANCES FOR OVERHEAD AND PROFIT.
- 8.3.4.6 State Excise (Gross Income) Tax and Bond - A sum equal to the current percentage rate for the State excise (Gross Income) tax on the total sum determined in paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3 and 8.3.4.4 above, and the bond premium shall be added as compensation to the Contractor. The actual bond premium not to exceed one percent (1%) shall be added to items covered by paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3 and 8.3.4.4 when applicable.

- (1) The compensation as determined in paragraphs 8.3.4.1, 8.3.4.2, 8.3.4.3, 8.3.4.4 and 8.3.4.5 above shall be deemed to be payment in full for work paid on a force account basis.

8.3.4.7 Records - The Contractor and the Engineer shall compare records of the labor, materials and equipment rentals paid by the Force Account basis at the end of each day. These daily records, if signed by both parties, shall thereafter be the basis for the quantities to be paid for by the Force Account method. The Contractor shall not be entitled to payment for Force Account records not signed by the Engineer.

8.3.4.8 Statements - No payment will be made for work on a Force Account basis until the Contractor has submitted to the Engineer, duplicate itemized statements of the cost of such Force Account work detailed as follows:

- (a) Laborers - Name, classification, date, daily hours, total hours, rate, and extension for each laborer and foreman and also the amount of fringe benefits payable if any.
- (b) Equipment - Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.
- (c) Materials
 - (c.1) Quantities of materials, prices and extensions
 - (c.2) Costs of transporting materials, if such cost is not reflected in the prices of the materials.
 - (c.3) Statements shall be accompanied and supported by receipted invoices for all materials used and transportation charges. However, if materials used on the Force Account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices the Contractors shall submit an affidavit certifying that such materials were taken from stock and that the amount claimed represents the actual cost to the Contractor.
- (d) Insurance - Cost of property damage, liability and worker's compensation insurance premiums, unemployment insurance contributions, and social security tax.

8.4 PROGRESS AND / OR PARTIAL PAYMENTS

8.4.1 Progress Payments - The Contractor will be allowed progress payments on a monthly basis upon

preparing the Monthly Payment Application forms and submitting them to the Engineer. The monthly payment shall be based on the items of work satisfactorily completed and the value thereof at unit prices and/or lump sum prices set forth in the contract as determined by the Engineer and will be subject to compliance with Section 7.9 PAYROLLS AND PAYROLL RECORDS.

8.4.2 In the event the Contractor or any Subcontractor fails to submit certified copies of payrolls in accordance with the requirements of Section 7.9 PAYROLLS AND PAYROLL RECORDS, the Engineer may retain the amount due for items of work for which payroll affidavits have not been submitted on a timely basis notwithstanding satisfactory completion of the work until such records have been duly submitted. The Contractor shall not be due any interest payment for any amount thus withheld.

8.4.3 Payment for Materials - The Contractor will also be allowed payments of the manufacturer's, supplier's, distributor's or fabricator's invoice cost of accepted materials to be incorporated in the work on the following conditions:

8.4.3.1 The materials are delivered and properly stored at the site of Work; or

8.4.3.2 For special items of materials accepted by the Engineer, the materials are delivered to the Contractor or subcontractor(s) and properly stored in an acceptable location within a reasonable distance to the site of Work.

8.4.4 Partial payments shall be made only if the Engineer finds that:

8.4.4.1 The Contractor has submitted bills of sale for the materials or otherwise demonstrates clear title to such materials.

8.4.4.2 The materials are insured for their full replacement value to the benefit of the Department against theft, fire, damages incurred in transportation to the site, and other hazards.

8.4.4.3 The materials are not subject to deterioration.

8.4.4.4 In case of materials stored off the project site, the materials are not commingled with other materials not to be incorporated into the project.

8.5 PROMPT PAYMENT §3-125-23 HAR

8.5.1 Any money paid to a Contractor for work performed by a subcontractor shall be disbursed to such subcontractor within ten (10) days after receipt of the money in accordance with the terms of the subcontract; provided that the subcontractor has met all the terms and

conditions of the subcontract and there are no bona fide disputes on which the Engineer has withheld payment.

8.5.2 Upon final payment to the Contractor, full payment to all subcontractors shall be made within ten (10) days after receipt of the money, provided there are no bona fide disputes over the subcontractor's performance under the subcontract.

8.5.3 All sums retained or withheld from a subcontractor and otherwise due to the subcontractor for satisfactory performance under the subcontract shall be paid by the contracting officer to the contractor and subsequently, upon receipt from the contracting officer, by the contractor to the subcontractor within the applicable time periods specified in subsection 8.5.2 and section 103-10 HRS.

8.5.3.1 Where a subcontractor has provided evidence to the contractor of satisfactorily completing all work under their subcontract and has provided a properly documented final payment request as described in subsection (8.5.5) of this section, and;

8.5.3.1.a Has provided to the contractor an acceptable performance and payment bond for the project executed by a surety company authorized to do business in the State, as provided in section 8.6 RETAINAGE; or

8.5.3.1.b The following has occurred:

8.5.3.1.b.1 A period of ninety days after the day on which the last of the labor was done or performed and the last of the material was furnished or supplied has elapsed without written notice of a claim given to contractor and the surety, as provided for in section 103D-324 HRS; and

8.5.3.1.b.2 The subcontractor has provided to the contractor:

8.5.3.1.b.2.1 An acceptable release of retainage bond, executed by a surety company authorized to do business in the State, in an amount of not more than two times the amount being retained or withheld by the contractor.

8.5.3.1.b.2.2 Any other bond acceptable to the contractor; or

8.5.3.1.b.2.3 Any other form of mutually acceptable collateral.

8.5.4 If the contracting officer or the contractor fails to pay in accordance with this section, a penalty of one and one-half per cent per month shall be imposed upon the outstanding amounts due that were not timely paid by the responsible party. The penalty may be withheld from future payment due to the contractor, if the contractor was the responsible party. If a contractor has violated subsection 8.5.2 three or more times within two years of the first violation, the contractor shall be referred by the

contracting officer to the contractor license board for action under section 444-17(14) HRS.

8.5.5 Final Payment Request. A properly documented final payment request from a subcontractor, as required by subsection 8.5.3, shall include:

8.5.5.1 Substantiation of the amounts requested;

8.5.5.2 A certification by the subcontractor, to the best of the subcontractor's knowledge and belief, that:

8.5.5.2.a The amounts requested are only for performance in accordance with the specification, terms, and conditions of the subcontract;

8.5.5.2.b The subcontractor has made payments due to its subcontractors and suppliers from previous payments received under the subcontract and will make timely payments from the proceeds of the payment covered by the certification, in accordance with their subcontract agreements and the requirements of this section; and

8.5.5.2.c The payment request does not include any amounts that the subcontractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of their subcontract; and

8.5.5.2.d The submission of documentation confirming that all other terms and conditions required under the subcontract agreement have been fully satisfied.

8.5.6 The Engineer shall return any final payment request that is defective to the contractor within seven days after receipt, with a statement identifying the defect.

8.5.7 A payment request made by a contractor to the Engineer that includes a request for sums that were withheld or retained from a subcontractor and are due to a subcontractor may not be approved under subsection 8.5.3 unless the payment request includes:

8.5.7.1 Substantiation of the amounts requested; and

8.5.7.2 A certification by the contractor, to the best of the contractor's knowledge and belief, that:

8.5.7.2.a The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;

8.5.7.2.b The subcontractor has made payments due to its subcontractors and suppliers from previous payments received under the contract and will make timely payments from the proceeds of the payment covered by the certification, in accordance with their subcontract agreements and the requirements of this section; and

8.5.7.2.c The payment request does not include any amounts that the contractor intends to withhold or retain

from a subcontractor or supplier in accordance with the terms and conditions of their subcontract.

8.5.8 The Engineer shall return any final payment request that is defective to the contractor within seven days after receipt, with a statement identifying the defect.

8.5.9 This section shall not be construed to impair the right of a contractor or a subcontractor at any tier to negotiate and to include in their respective subcontracts provisions that provide for additional terms and conditions that are requested to be met before the subcontractor shall be entitled to receive final payment under subsection 8.5.3 of this section; provided that any such payments withheld shall be withheld by the Engineer.

8.6 RETAINAGE – The Department will retain a portion of the amount due under the contract to the contractor, to ensure the proper performance of the contract.

8.6.1 The sum withheld by the Department from the contractor shall not exceed five percent (5%) of the total amount due the contractor and that after fifty percent (50%) of the contract is completed and progress is satisfactory, no additional sum shall be withheld; provided further that if progress is not satisfactory, the Engineer may continue to withhold as retainage, sums not exceeding five percent (5%) of the amount due the contractor.

8.6.2 The retainage shall not include sums deducted as liquidated damages from moneys due or that may become due the contractor under the contract.

8.6.3 General Obligation Bonds – The contractor may withdraw retainage monies in whole or in part by providing a general obligation bond of the State or its political subdivisions suitable to the Department. The contractor shall endorse over to the Department and deposit with the Department any general obligation bond suitable to the Department, but in no case with a face value less than the value established by law, of the amount to be withdrawn. The Department may sell the bond and use the proceeds in the same way as it may use monies directly retained from progress payments or the final payment.

8.6.4 Any retainage provided for in this section or requested to be withheld by the contractor shall be held by the Engineer.

8.6.5 A dispute between a contractor and subcontractor of any tier shall not constitute a dispute to which the State or any county is a party, and there is no right of action against the State or any county. The State and a county may not be interpleaded in any judicial or administrative proceeding involving such a dispute.

8.6.6 The retention amount withheld by the contractor from its subcontractor shall be not more than the same percentage of retainage as that of the contractor (also applies to subcontractors who subcontract work to other subcontractors) where a subcontractor has provided evidence to the contractor of:

8.6.6.1 A valid performance and a payment bond for the project that is acceptable to the contractor and executed by a surety company authorized to do business in this State;

8.6.6.2 Any other bond acceptable to the contractor; or

8.6.6.3 Any other form of collateral acceptable to the contractor.

8.6.7 A written notice of any withholding shall be issued to a subcontractor, with a copy to the procurement officer, specifying the following:

8.6.7.1 The amount to be withheld;

8.6.7.2 The specific causes for the withholding under the terms of the subcontract; and

8.6.7.3 The remedial actions to be taken by the subcontractor to receive payment of the amounts withheld.

8.6.8 The provisions of this section shall not be construed to require payment to subcontractors of retainage released to a contractor pursuant to an agreement entered into with the contracting officer meeting the requirements of subsection 8.6.3.

8.7 WARRANTY OF CLEAR TITLE - The Contractor warrants and guarantees that all work and materials covered by progress payments made thereon shall be free and clear of all liens, claims, security interests or encumbrances, and shall become the sole property of the Department. This provision shall not, however, be construed as an acceptance of the work nor shall it be construed as relieving the Contractor from the sole responsibility for all materials and work upon which payments have been made or the restoration of any damaged work, or as waiving the right of the Department to require the fulfillment of all the items of the contract.

8.8 FINAL PAYMENT

8.8.1 Upon final settlement, the final payment amount, less all previous payments and less any sums that may have been deducted in accordance with the provisions of the contract, will be paid to the Contractor, provided the Contractor has submitted a Tax Clearance Certificate from the Department of Taxation and the Internal Revenue Service to the effect that all taxes levied or

accrued under Federal and State Statutes against the contractor have been paid.

8.8.2 Sums necessary to meet any claims of any kind by the State may be retained from the sums due the Contractor until said claims have been fully and completely discharged or otherwise satisfied.

8.9 CLAIMS ARISING OUT OF PAYMENT FOR REQUIRED WORK - If the Contractor disputes any determination made by the Engineer regarding the amount of work satisfactorily completed, or the value thereof, or the manner in which payment therefore is made or calculated, it shall notify the Engineer in writing of the specific facts supporting the Contractor's position. Such notice shall be delivered to the Engineer no later than thirty (30) days after the Contractor has been tendered payment for the subject work, or, if no payment has been tendered, not later than fifty (50) days after it has submitted the Monthly Payment Application required under Section 8.4 PROGRESS PAYMENTS herein to the Engineer for the work that is the subject of the dispute. The delivery of the written notice cannot be waived and shall be a condition precedent to the filing of the claim. No claim for additional compensation for extra work or change work shall be allowed under this provision, unless the notice requirements of Article 4 SCOPE OF WORK have been followed. Acceptance of partial payment of a Monthly Payment Application amount shall not be deemed a waiver of the right to make a claim described herein provided the notice provisions are followed. The existence of or filing of a payment claim herein shall not relieve the Contractor of its duty to continue with the performance of the contract in full compliance with the directions of the Engineer. Any notice of claim disputing the final payment made pursuant to Section 8.8 FINAL PAYMENT must be submitted in writing not later than thirty (30) days after final payment that is identified as such has been tendered to the Contractor.

ARTICLE 9 - CONFIDENTIALITY OF PERSONAL INFORMATION

9.1 Definitions. "Personal information" means an individual's first name or first initial and last name in combination with any one or more of the following data elements, when either name or data elements are not encrypted:

1. Social Security number,
2. Driver's license number or Hawaii identification card number; or
3. Account number, credit or debit card number, access code, or password that would permit access to an individual's financial information.

Personal information does not include publicly available information that is lawfully made available to the general public from federal, state or local government records.

"Technological safeguards" means the technology and the policy and procedures for use of the technology to protect and control access to personal information.

9.2 Confidentiality of Material.

- (1) All material given to or made available to the CONTRACTOR by the STATE by virtue of this Contract which is identified as personal information shall be safeguarded by the CONTRACTOR and shall not be disclosed without the prior written approval of the STATE.
- (2) CONTRACTOR agrees not to retain, use, or disclose personal information for any purpose other than as permitted or required by this Contract.
- (3) CONTRACTOR agrees to implement appropriate "technological safeguards" that are acceptable to the STATE to reduce the risk of unauthorized access to personal information.
- (4) CONTRACTOR shall report to the STATE in a prompt and complete manner any security breaches involving personal information.
- (5) CONTRACTOR agrees to mitigate, to the extent practicable, any harmful effect that is known to CONTRACTOR because of a use or disclosure of personal information by CONTRACTOR in violation of the requirements of this paragraph.
- (6) CONTRACTOR shall complete and retain a log of all disclosures made of personal information received from the STATE, or personal information created or received by CONTRACTOR on behalf of the STATE.

9.3 Security Awareness Training and Confidentiality Agreements.

- (1) CONTRACTOR certifies that all of its employees who will have access to the personal information have completed training on security awareness topics relating to protecting personal information.
- (2) CONTRACTOR certifies that confidentiality agreements have been signed by all of its employees who will have access to the personal information acknowledging that:
 - (a) The personal information collected, used or maintained by the CONTRACTOR will be treated as confidential;

- (b) Access to the personal information will be allowed only as necessary to perform the Contract; and
- (c) Use of the personal information will be restricted to uses consistent with the services subject to this Contract.

9.4 Termination for Cause. In addition to any other remedies provided for by this Contract, if the STATE learns of a material breach by CONTRACTOR of this paragraph by CONTRACTOR, the State may at its sole discretion:

- (1) Provide an opportunity for the CONTRACTOR to cure the breach or end the violation; or
- (2) Immediately terminate this Contract.

9.5 Records Retention.

- (1) Upon any termination of this Contract, CONTRACTOR shall pursuant to chapter 487R, HRS, destroy all copies (paper or electronic form) of personal information received from the STATE.
- (2) The CONTRACTOR and any subcontractors shall maintain the files, books, and records that relate to the Contract, including any personal information created or received by the CONTRACTOR on behalf of the STATE, and any cost or pricing data, for three (3) years after the date of final payment under the Contract. The personal information shall continue to be confidential and shall not be disclosed without the prior written approval of the STATE. After the three (3) year retention period has ended, the files, books, and records that contain personal information shall be destroyed pursuant to chapter 487R, HRS.

ADDITIONAL GENERAL CONDITIONS FOR CONSTRUCTION CONTRACTS

The following sections of the Hawaii Administrative Rules, Chapter §3-125 are hereby incorporated and made a part of the General Conditions.

CHANGES FOR CONSTRUCTION CONTRACTS - §HAR 3-125-4

1. Change Order. The procurement officer, at any time, and without notice to any surety in a signed writing designated or indicated to be a change order, may make changes in the work within the scope of the contract as may be found to be necessary or desirable. Such changes shall not invalidate the contract or release the sureties, and the contractor will perform the work as changed, as though it had been part of the original contract. Minor changes in the work may be directed by the procurement officer with no change in contract price or time or performance.
2. Adjustments of price or time for performance. If any change order increases or decreases the contractor's cost of, or the time required for performance of any part of the work under this contract, whether or not changed by the order, an adjustment may be made and the contract modified in writing accordingly. Any adjustment in contract price made pursuant to this clause shall be determined in accordance with the price adjustment clause of this contract. Failure of the parties to agree to an adjustment shall not excuse a contractor from proceeding with the contract as changed, provided that the State promptly and duly makes such provisional adjustments in payments or time for the direct costs of the work as changed as the State deems reasonable. The right of the contractor to dispute the contract price or time required for performance or both shall not be waived by its performing the work, provided however, that it follows the notice requirements for disputes and claims established by the contract or these rules.
3. Time Period for Claim. Within thirty days after receipt of a written change order under paragraph (1), unless such period is extended by the procurement officer in writing, the contractor shall file a notice of intent to assert claim for an adjustment. The requirement for timely written notice cannot be waived and shall be a condition precedent to the assertion of a claim.
4. Claim barred after final payment. No claim by the contractor for an adjustment hereunder shall be allowed if written notice is not given prior to final payment under this contract.
5. Claims not barred. In the absence of such a change order, nothing in this clause shall restrict the contractor's right to pursue a claim under the contract or for breach of contract.

PRICE ADJUSTMENT FOR CONSTRUCTION CONTRACTS - §HAR 3-125-13.

1. Price adjustment. Any adjustment in contract price pursuant to a clause in this contract shall be made in one or more of the following ways;
 - a. By agreement on a fixed price adjustment before commencement of the pertinent performance or as soon thereafter as practicable;
 - b. By unit prices specified in the contract or subsequently agree upon;
 - c. Whenever there is a variation in quantity for any work covered by any line item in breakdown costs provided by the contractor pursuant to contractual pre-work submittal requirements, by the procurement officer, at the procurement officer's discretion, adjusting the lump sum price proportionately;
 - d. In such other manner as the parties may mutually agree;
 - e. At the sole option of the procurement officer, by the costs attributable to the event or situation covered by the change, plus appropriate profit or fee; or
 - f. In the absence of agreement between the parties, by a unilateral determination by the procurement officer of the costs attributable to the event or situation covered by the clause, plus appropriate profit or fee, all as computed by the procurement officer in accordance with generally accepted accounting principles and applicable sections of chapters 3-123 and 3-126 (of the Hawaii Administrative Rules).
2. Determining the cost or credit. In determining the cost or credit to the State resulting from a change, the allowances for all overhead, extended overhead resulting from adjustments to contract time (including home office and field overhead) and profit combined, shall not exceed the percentages set forth below:
 - a. For the contractor, for any work performed by its own labor forces, fifteen per cent of the cost;
 - b. For each subcontractor involved, for any work performed by its own forces, fifteen per cent of the cost;
 - c. For the contractor or any subcontractor, for work performed by their subcontractors, ten per cent of the amount due the performing subcontractor.
3. Percentages for fee and overhead. Not more than three line item percentages for fee and overhead, not to exceed the maximum percentages shown above, will be allowed regardless of the number of tier subcontractors.

PROMPT PAYMENT BY CONTRACTORS TO SUBCONTRACTORS – §HAR 3-125-23

1. Prompt payment clause. Any money, other than retainage, paid to a contractor shall be dispersed to subcontractors within ten days after receipt of the money in accordance with the terms of the subcontract; provided that the subcontractor has met all the terms and conditions of the subcontract and there are no bona fide disputes; and, upon final payment to the contractor, full payment to the subcontractor, including retainage, shall be

made within ten days after receipt of the money; provided that there are no bona fide disputes over the subcontractor's performance under the subcontract.

CHANGES TO THE GENERAL CONDITIONS

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

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

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

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

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

2.6.3 Offerors shall prepare their Offer forms based on the performance requirements of the materials, equipment, articles or systems noted on the drawings and specifications. If trade names, makes, catalog numbers or brand names are specified, Offerors shall infer that these items indicate the quality, style, appearance or performance of the material, equipment, article, or systems to be used in the project. The products and equipment of manufacturers listed throughout the specifications and other manufacturers are acceptable provided they meet or exceed the materials and construction requirements specified and are installed as specified.”

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

(S A M P L E)

Date: _____

Engineering Officer
Department of Defense
State of Hawaii
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Sir:

Subject: REQUEST FOR SUBSTITUTION

PROJECT TITLE & JOB NO.: _____

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

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

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

Phase 2-Construction for Building 19, Interior and Exterior Site Improvements, Kalaeloa, State of Hawaii, Department of Defense, Hawai'i Army National Guard, Job No. CA-1514-C

In essence, this project is Phase II of the Kalaeloa B19 Improvements project. The project consists of both interior and landscaping features or improvements, as programmed and designed several years ago. However, the main purpose of this project's work shall be to focus on the interior aspects, renovations or improvements within the HIARNG B19. The work items on project vary widely and include the following:

General

- Repainting of entire exterior of building

Front Corridor

- Remove and replace damaged downspouts
- New lighting along entire length of front corridor
- Install roof hatches, three (3) total, to access crawl space
- Remove water line exposed on building and provide new hose bibs
- Install guardrail at areas where elevation difference exceeds 30 inches

Locker Room

- Removal of acoustical ceiling tiles
- Repainting of ceiling, structural supports, conduit and upper portion of walls

Gym

- New electrical panels and power system (remove exist. panels walls to be patched and repaired)
- Repair tile wainscot where separating from existing concrete wall & piers
- Remove two (2) existing crash pads and install new crash pads on structural supports
- Install new exhaust fans at upper windows
- Painting of regulation basketball lines on existing concrete floor
- Install three (3) new ADA ramps at access doors to accommodate level changes

And, an array of other miscellaneous project work (removal of abandoned equipment, new lighting and electrical conduits, installation of conduits, data and power cables access control system and security cameras, some hazardous abatement required, the painting of building interiors and other project work.



Kalaeloaloa B19, Phase II - Improvements Kalaeloaloa Kapolei, Hawaii

Department of Defense – FMO Ruger

HIARNG PROJECT – CA-1514C/PN15130011

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SECTION 01 11 00 - SUMMARY OF WORK

08/15, CHG 2: 08/21

PART 1 - GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Utility Outage Requests; G

Utility Connection Requests Borrow Permits; G

Excavation Permits Welding Permits Burning Permits; G

Salvage Plan; G

1.2 WORK COVERED BY CONTRACT DOCUMENTS

1.2.1 Project Description

A general description of the Site Improvements planned for this project includes but is not limited to: the removal of abandoned grease interceptors located in the front of the building; the removal of landscaping; the removal of all abandoned equipments; the replenishment of top soil for a new landscaping, and the installation of an irrigation system; the removal and replacement of existing walkways, ramps, and stairs including the removal and replacements of handrails, and guardrails; the repaving of the Service Courtyard; the installation of new Crawl Space covers and the installation of miscellaneous elements such as bollards, concrete curbs, and etc. Miscellaneous Building Improvements encompasses both exterior and interior. Exterior improvements includes the removal and replacement of damaged downspouts; the removal of abandoned elements on the exterior of the building, the installation of new guardrails along the Covered Walkway where the change in level exceeds 30-inches in height; the removal of abandoned elements including electrical conduits, light fixtures, communication lines, etc.; the installation of new electrical system including power, lighting, switches, outlets and any other requirement needed to satisfy the code at exterior circulations and exterior building access and exits; the installation of a new sliding gate at the Loading Dock along Enterprise Avenue; and the painting of the building exteriors. Interior improvements includes the removal of the ceiling tiles in the Gymnasium and Locker Room (Rm 105); the removal replacement and upgrading of the existing electrical system at the Gymnasium to meet current code requirements, upgrading includes new panel box to accommodate new circuits, new outlets, light switches, new lighting system and new power distribution; the installation of new exhaust fans at the Gymnasium; the painting of the Gymnasium floor with basketball lines; the painting of the Gymnasium interior and

painting of Locker Room (Rm 105); convert State Maintenance Storage Room 143 into an office space for a maximum of 11-occupants; an option to convert the Boiler Room into a storage; and Hazardous Material (HAZMAT) abatement as required to meet the occupant's program and incidental related work.

1.2.2 Location

The work is located at Kapolei, Oahu, Hawaii, approximately as indicated. The exact location will be shown by the Contracting Officer.

1.3 CONTRACT DRAWINGS

The following drawings accompany this specification and are a part thereof.

Drawings No. T0.0 to E601.
Sheets 1 through 78.

Zero sets of full size contract drawings, maps, and specifications will be furnished to the Contractor without charge. Reference publications will not be furnished. Immediately check furnished drawings and notify the Government of any discrepancies.

1.4 WORK RESCHEDULING

Allow for a maximum of 180 calendar days in the construction schedule for approval of the NPDES Permitting. Government will provide 24 hour notification each time the restrictions are invoked.

Normal duty hours for work are from 7 a.m. to 5 p.m., Monday through Friday. Requests for additional work requires written approval from the Contracting Officer 15 days in advance of the proposed work period.

1.5 OCCUPANCY OF PREMISES

Auxiliary facilities such as the adjacent parking lot, and, administrative areas will be occupied during performance of work under this Contract in Kapolei. Coordinate with tenants should their areas be impacted by construction or required to be vacated.

Before work is started, arrange with the Contracting Officer a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways.

1.6 EXISTING WORK

In addition to FAR 52.236-9 Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements:

- a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

- b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work must be in a condition equal to or better than that which existed before new work started.

1.7 ON-SITE PERMITS

1.7.1 Utility Outage Requests and Utility Connection Requests

Schedule work to minimize outages. For utility outages and connections required during the execution of work that affect existing systems, schedule outside the regular working hours or on weekends, as approved by the Contracting Officer. Schedule utility outages and connections to minimize disruptions to the Government. No additional payment will be provided for utility outages and connections required to be performed outside the regular work hours.

Submit requests for utility outages and connections in writing to the Contracting Officer for approval at least 20 calendar days in advance of the time required. In each request, state the system involved, area involved, approximate duration of outage, and the nature of work involved.

1.7.2 Borrow, Excavation, Welding, and Burning Permits

<u>ACTIVITY</u>	<u>SUBMISSION DATE</u>	<u>SUBMISSION FORM</u>
Burning Permits	20 calendar days prior to work	Authority Having Jurisdiction
Excavation Permits	30 calendar days prior to work	Authority Having Jurisdiction

Post permits at a conspicuous location in the construction area.

Burning of trash or rubbish is not permitted at Kalaeloa.

1.8 LOCATION OF UNDERGROUND UTILITIES

Obtain digging permits prior to start of excavation, and comply with Installation requirements for locating and marking underground utilities. Contact local utility locating service a minimum of 48 hours prior to excavating, to mark utilities, and within sufficient time required if work occurs on a Monday or after a Holiday. Verify existing utility locations indicated on contract drawings, within area of work.

Identify and mark all other utilities not managed and located by the local utility companies. Scan the construction site with Ground Penetrating Radar (GPR), electromagnetic, or sonic equipment, and mark the surface of the ground or paved surface where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and any type of underground or encased obstruction not indicated, or specified to be removed, that is indicated or discovered during scanning, in locations to be traversed by piping, ducts, and other work to be

conducted or installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.8.1 Notification Prior to Excavation

Notify the Contracting Officer at least 48 hours prior to starting excavation work.

1.9 GOVERNMENT-FURNISHED MATERIAL AND EQUIPMENT

Pursuant to Contract Clause FAR 52.245-1 Government Property, the Government will furnish the following materials and equipment for installation by the Contractor:

None.

1.10 GOVERNMENT-INSTALLED WORK

The Contractor shall carefully examine the existing conditions for Government-installed work performed subsequent to the development of the design drawings. Do not include recently Government-installed work in your bid.

1.11 SALVAGE MATERIAL AND EQUIPMENT

Items designated by the Contracting Officer to be salvaged remain the property of the Government. Segregate, itemize, deliver and off-load the salvaged property at the [Government designated] storage area located within 2 miles of the construction site.

Provide a salvage plan, listing material and equipment to be salvaged, and their storage location. Maintain property control records for material or equipment designated as salvage. Provide a system for property control in the salvage plan. Store and protect salvaged materials and equipment until disposition by the Contracting Officer.

PART 2 - PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01230 – ALTERNATES (DEDUCTIVE)

1.01 GENERAL PROVISIONS: The General Instructions to Bidders, the General Conditions of Construction Contracts, and Special Provisions preceding these specifications shall govern this section of work.

1.02 GENERAL REQUIREMENTS

- A. The Award of Contract is conditioned upon the amount of funds available for the Contract. Should the lowest basic lump sum bid price be more than available funds, the Director reserves the right to remove it from this Contract, in the numerical order listed in the Proposal, any or all of the Deductive Alternates, provided the funds allocated for this Contract, including any contingency amount, are not exceeded. The awarded price for this Contract will then be the total of the basic lump sum bid price and the bid price for each Deductive Alternate removed from this Contract.
- B. A bidder must enter in the Proposal, a bid for each and every Deductive Alternate listed therein setting forth the amount to be added to his basic lump bid price should such Alternate(s) be removed from the Contract. Provide all materials. Labor, equipment, etc. to accomplish each Deductive Alternate.
1. Deductive Alternate No. 1 – YCA Doors: Remove all scope of work related to the demolition of existing doors and frames and the installation of new doors and frames (2 each).
 2. Deductive Alternate No. 2 YCA Windows: Remove all scope of work related to the demolition of existing windows and frames and the installation of new windows and frames (4 each “W-1” Windows and 1 each “W-3” Window”).
 3. Deductive Alternate No. 3 YCA Related Painting: Remove all scope of work related to the preparation and painting of areas related to YCA (~2,250 SF total).
 4. Deductive Alternate No. 4 – Entry Canopy: Remove indicated metal framed canopy, gutter and downspout, exterior painting and all related items.
 5. Deductive Alternate No. 5 – Pavement and Landscaping: Remove indicated paving, striping, signage, grading, landscaping, irrigation and all related items.
 6. Deductive Alternate No. 6 – Pavement and Landscaping: Remove indicated paving, grading, landscaping, irrigation and all related items.
 7. Deductive Alternate No. 7 – Regrading and Landscaping: Remove indicated grading, landscaping, irrigation and all related items.

--End of Section--

SECTION 01 14 00 - WORK RESTRICTIONS

11/11, CHG 14: 02/22

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.

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

ANSI/AHRI 210/240	(2008; Add 1 2011; Add 2 2012) Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) ASCE 7-16	(2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

FLORIDA ADMINISTRATIVE CODE (FAC)

FAC Chapter 15C-1	Department of Highway Safety and Motor Vehicles

INSTRUCTIONS AND STANDARDS FOR NAVBASE GUANTANAMO BAY CUBA (COMNAVBASEGTMOINST)

11300.3	Base Energy Conservation Regulations

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

NFPA 90A	(2021) Standard for the Installation of Air Conditioning and Ventilating Systems

NFPA 101	(2021) Life Safety Code

NAVAL FACILITIES ENGINEERING AND EXPEDITIONARY WARFARE CENTER (NAVFAC EXWC)

NFESC UG-2029-ENV	(1998) Cross-Connection Control and Backflow Prevention Program Implementation at Shore

Facilities, User's Guide

U.S. Code (USC)

8 USC 1101 Definitions

10 USC 6011 Navy Regulations

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01 (2019, with Change 1, 2022) Structural Engineering

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

24 CFR 3280 (2019) Manufactured Home Construction and Safety Standards

1.2 DEFINITIONS

"State" when used in reference to states of the United States also includes the Territory of Guam.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of Contact Personnel
Personnel List
Entry Approval for Employees; G

SD-07 Certificates

None

1.4 CONTRACTOR ACCESS AND USE OF PREMISES

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear appropriate personal protective equipment (PPE) in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such

entry. Ensure all Contractor equipment, include delivery vehicles, are clearly identified with their company name.

1.5 Employee List

The Contractor must provide to the Contracting officer, in writing, the names of two designated representatives authorized to request personnel and vehicle passes for employees and subcontractor's employees prior to commencement of work under this contract. The Contractor must adhere to the requirements identified by the HIARNG Security Officer. A copy of these requirements will be provided at the preconstruction meeting.

1.6 No Smoking Policy

Smoking is prohibited within and outside of all buildings on installation, except in designated smoking areas. This applies to existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

1.7 Radioactive Materials and Equipment

All testing equipment, containing a radioactive source, must be operated in accordance with an approved radioactive equipment plan. This plan must be submitted to the Contracting Officer and approved by the Radiation Officer (Code 105.5), prior to bringing the equipment into the shipyard. This plan must include:

- a. The name and type of equipment.
- b. The type and size of radiation source.
- c. The dates and locations of the equipment's usage.
- d. The radiological controls that the Contractor will use while operating the equipment.

A different radioactive equipment plan will be required for each different type of equipment, type of radioactive source, or size of radioactive source. A data sheet of for each piece of new radioactive equipment must be submitted to the Contracting Officer to forward to the shipyard's Radiation Safety Officer. The data sheet must contain the following information:

- a. Name of equipment.
- b. Name and address of equipment manufacturer.
- c. Type and size of radiation source.
- d. The location of the installed radioactive equipment (i.e. building no., floor, code/shop area).

1.8 Working Hours

Regular working hours must consist of a period established by the Contractor Officer, between Monday through Friday, excluding Government holidays.

1.8.1 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work must be lighted in a manner approved by the Contracting Officer. Make utility cutovers after normal working hours or on Saturdays, Sundays, and Government holidays unless directed otherwise.

1.9 Occupied and Existing Building[s]

Coordinate with occupants impacted by construction activities.

1.10 Utility Cutovers and Interruptions

- a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in the paragraph "Work Outside Regular Hours."
- b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.
- c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, and are considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours."

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

-- End of Section --

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

11/20, CHG 2: 05/22

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.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

15 CFR 772	Definition of Terms

15 CFR 773	Special Licensing Procedures

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.] [for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

View Location Map

Progress and Completion Pictures

Design Submittal Packaging

Performance Assessment Plan (PAP)

SD-04 Samples

Color Boards; G

1.3 COLOR BOARDS

Not used.

1.4 VIEW LOCATION MAP

Submit, prior to or with the first digital photograph submittals, a sketch or drawing indicating the required photographic locations. Update as required if the locations are moved.

1.5 PROGRESS AND COMPLETION PICTURES

Photographically document site conditions prior to start of construction operations. [Include aerial photographs.] Provide monthly, and within one month of the completion of work, digital photographs, 1600x1200x24 bit true color minimum resolution in JPEG file format showing the sequence and progress of work. Take a minimum of 20 digital photographs each week throughout the entire project from a minimum of ten different viewpoints selected by the Contractor unless otherwise directed by the Contracting Officer. Submit with the monthly invoice two sets of digital photographs, each set on a separate compact disc (CD) or data versatile disc (DVD), cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Provide photographs for each month in a separate monthly directory and name each file to indicate its location on the view location sketch. Also provide the view location sketch on the CD or DVD as a digital file. Include a date designator in file names. Photographs provided are for unrestricted use by the Government.

1.6 MINIMUM INSURANCE REQUIREMENTS

Provide the minimum insurance coverage required by FAR 28.307-2 Liability, during the entire period of performance under this contract. Provide other insurance coverage as required by State of Hawaii and federal law.

1.7 SUPERVISION

1.7.1 Superintendent Qualifications

Provide project superintendent with a minimum of 10 years experience in construction with at least 5 of those years as a superintendent on projects similar in size and complexity. The individual must be familiar with the requirements of EM 385-1-1 and have experience in the areas of hazard identification and safety compliance. The individual must be capable of interpreting a critical path schedule and construction drawings. The qualification requirements for the alternate superintendent are the same as for the project superintendent. The Contracting Officer may request proof of the superintendent's qualifications at any point in the project if the performance of the superintendent is in question.

For projects where the superintendent is permitted to also serve as the Quality Control (QC) Manager as established in Section 01 45 00.00 10 01 45 00.00 20 01 45 00.00 40 QUALITY CONTROL, the superintendent must have qualifications in accordance with that section.

1.7.2 Minimum Communication Requirements

Have at least one qualified superintendent, or competent alternate, capable of reading, writing, and conversing fluently in the English language, on the job-site at all times during the performance of Contract work. In addition, if a Quality Control

(QC) representative is required on the Contract, then that individual must also have fluent English communication skills.

1.7.3 Duties

The project superintendent is primarily responsible for managing subcontractors and coordinating day-to-day production and schedule adherence on the project. The superintendent is required to attend Red Zone meetings, partnering meetings, and quality control meetings. The superintendent or qualified alternative must be on-site at all times during the performance of this contract until the work is completed and accepted.

1.7.4 Non-Compliance Actions

The Project Superintendent is subject to removal by the Contracting Officer for non-compliance with requirements specified in the contract and for failure to manage the project to ensure timely completion. Furthermore, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders is acceptable as the subject of claim for extension of time for excess costs or damages by the Contractor.

1.8 PRECONSTRUCTION MEETING CONFERENCE

Immediately after award, prior to commencing any work at the site, coordinate with the Contracting Officer a time and place to meet for the Preconstruction Meeting Conference. The meeting conference must take place within 35 calendar days after award of the contract, but prior to commencement of any work at the site. The purpose of this meeting conference is to discuss and develop a mutual understanding of the administrative requirements of the Contract including but not limited to: daily reporting, invoicing, value engineering, safety, base-access, outage requests, hot work permits, schedule requirements, quality control, schedule of prices or earned value report, shop drawings, submittals, cybersecurity, prosecution of the work, government acceptance, final inspections and contract close-out. Contractor must present and discuss their basic approach to scheduling the construction work and any required phasing.

1.8.1 Attendees

Contractor attendees must include the Project Manager, Superintendent, Site Safety and Health Officer (SSHO), Quality Control Manager and major subcontractors.

1.9 POST AWARD KICKOFF (PAK) MEETING

Not used.

1.10 DESIGN PRESENTATION/DEVELOPMENT (DP/D)

Not used.

1.11 FACILITY TURNOVER PLANNING MEETINGS (Red Zone Meetings)

Meet with the Government to identify strategies to ensure the project is carried to expeditious closure and turnover to the Client. Start planning the turnover process at the Pre-Construction Conference meeting with a discussion of the Red Zone process and convene at regularly scheduled NRZ Meetings beginning at approximately 75 percent of project completion. Include the following in the facility Turnover effort:

1.11.1 Red Zone Checklist

- a. Contracting Officer's Technical Representative (COTR) will provide the Contractor a copy of the Red Zone Checklist template.
- b. Prior to 75 percent completion, modify the Red Zone Checklist template by adding or deleting critical activities applicable to the project and assign planned completion dates for each activity. Submit the modified Red Zone Checklist to the Contracting Officer. The Contracting Officer may request additional activities be added to the Red Zone Checklist at any time as necessary.

1.11.2 Meetings

- a. Conduct regular Red Zone Meetings beginning at approximately 75 percent project completion, or three to six months prior to Beneficial Occupancy Date (BOD), whichever comes first.
- b. The Contracting Officer will establish the frequency of the meetings, which is expected to increase as the project completion draws nearer. At the beginning, Red Zone meetings may be every two weeks then increase to weekly towards the final month of the project.
- c. Using the Red Zone Checklist as a Plan of Action and Milestones (POAM) and basis for discussion, review upcoming critical activities and strategies to ensure work is completed on time.
- d. During the Red Zone Meetings discuss with the COTR any upcoming activities that require Government involvement.
- e. Maintain the Red Zone Checklist by documenting the actual completion dates as work is completed and update the Red Zone Checklist with revised planned completion dates as necessary to match progress. Distribute copies of the current Red Zone Checklist to attendees at each Red Zone Meeting.

1.12 EXPORT LICENSES FOR OVERSEAS PROJECTS

Not used.

1.13 WAIVER FOR WORKER'S COMPENSATION

Not used.

1.14 PARTNERING

Not used.

1.15 PERFORMANCE ASSESSMENT PLAN (PAP)

Not used.

1.16 MOBILIZATION

Contractor shall mobilize to the jobsite within 60 calendar days after contract award. Mobilize is defined as having equipment AND having a physical presence of at least one person from the contractor's team on the jobsite.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

-- End of Section --

SECTION 01 32 01.00 10 PROJECT SCHEDULE

02/15

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.

AACE INTERNATIONAL (AACE)

AACE 29R-03 (2011) Forensic Schedule Analysis

AACE 52R-06 (2006) Time Impact Analysis - As Applied in Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11 (2017) Administration -- Project Schedules

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Project Scheduler Qualifications; G Preliminary

Project Schedule; G

Initial Project Schedule; G

Periodic Schedule Update; G

1.3 PROJECT SCHEDULER QUALIFICATIONS

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating and production of reports. The authorized representative must have a minimum of 2-years experience scheduling construction projects similar in size and nature to this project with scheduling software that meets the requirements of this specification. Representative must have a comprehensive knowledge of CPM scheduling principles and application.

PART 2 - PRODUCTS

2.1 SOFTWARE

The scheduling software utilized to produce and update the schedules required herein must be capable of meeting all requirements of this specification.

2.1.1 Government Default Software

The Government intends to use Primavera P6.

2.1.2 Contractor Software

Scheduling software used by the contractor must be commercially available from the software vendor for purchase with vendor software support agreements available. The software routine used to create the required sdef file must be created and supported by the software manufacturer.

2.1.2.1 Primavera

If Primavera P6 is selected for use, provide the "xer" export file in a version of P6 importable by the Government system.

2.1.2.2 Other Than Primavera

If the contractor chooses software other than Primavera P6, that is compliant with this specification, provide for the Government's use two licenses, two computers, and training for two Government employees in the use of the software. These computers will be stand-alone and not connected to Government network. Computers and licenses will be returned at project completion.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to FAR Clause 52.236-15 Schedules for Construction Contracts. Show in the schedule the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities. The scheduling of the entire project is required. The scheduling of design and construction is the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Designers, Subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool. Use the Critical Path Method (CPM) of network calculation to generate all Project Schedules. Prepare each Project Schedule using the Precedence Diagram Method (PDM).

3.2 BASIS FOR PAYMENT AND COST LOADING

The schedule is the basis for determining contract earnings during each update

period and therefore the amount of each progress payment. The aggregate value of all activities coded to a contract CLIN must equal the value of the CLIN.

3.2.1 Activity Cost Loading

Activity cost loading must be reasonable and without front-end loading. Provide additional documentation to demonstrate reasonableness if requested by the Contracting Officer.

3.2.2 Withholdings / Payment Rejection

Failure to meet the requirements of this specification may result in the disapproval of the preliminary, initial or periodic schedule updates and subsequent rejection of payment requests until compliance is met.

In the event that the Contracting Officer directs schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the Contracting Officer may withhold 10 percent of pay request amount from each payment period until such revisions to the project schedule have been made.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

3.3.1 Level of Detail Required

Develop the Project Schedule to the appropriate level of detail to address major milestones and to allow for satisfactory project planning and execution. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities may have Original Durations (OD) greater than 20 work days or 30 calendar days.

3.3.3 Design and Permit Activities

Include design and permit activities with the necessary conferences and follow-up actions and design package submission dates. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. Provide at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Also include review and correction periods associated with each item.

3.3.4 Procurement Activities

Include activities associated with the critical submittals and their approvals,

procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

3.3.5 Mandatory Tasks

Include the following activities/tasks in the initial project schedule and all updates.

- a. Submission, review and acceptance of SD-01 Preconstruction Submittals (individual activity for each).
- b. Submission, review and acceptance of features require design completion
Submission, review and acceptance of design packages.
- c. Submission of mechanical/electrical/information systems layout drawings.
- d. Long procurement activities
- e. Submission and approval of O & M manuals.
- f. Submission and approval of as-built drawings.
- g. Submission and approval of DD1354 data and installed equipment lists.
- h. Submission and approval of testing and air balance (TAB).
- i. Submission of TAB specialist design review report.
- j. Submission and approval of fire protection specialist.
- k. Submission and approval of Building Commissioning Plan, test data, and reports:
Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with the contract commissioning requirements. All tasks associated with all building testing and commissioning will be completed prior to submission of building commissioning report and subsequent contract completion.
- l. Air and water balancing.
- m. Building commissioning - Functional Performance Testing.
- n. Controls testing plan submission.
- o. Controls testing.
- p. Performance Verification testing.
- q. Other systems testing, if required.
- r. Contractor's pre-final inspection.

- s. Correction of punch list from Contractor's pre-final inspection.
- t. Government's pre-final inspection.
- u. Correction of punch list from Government's pre-final inspection.
- v. Final inspection.

3.3.6 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: approvals, acceptance, design reviews, environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

3.3.7 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11. This exact structure is mandatory. Develop and assign all Activity Codes to activities as detailed herein. A template SDEF compatible schedule backup file is available on the QCS web site: <http://rms.usace.army.mil>.

The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per day
2	RESP	4	Responsible party
3	AREA	4	Area of work
4	MODF	6	Modification Number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of work
7	CATW	1	Category of work
8	FOW	20	Feature of work*
*Some systems require that FEATURE OF WORK values be placed in several activity code fields. The notation shown is for Primavera P6. Refer to the specific software guidelines with respect to the FEATURE OF WORK field requirements.			

3.3.7.1 Workers Per Day (WRKP)

Assign Workers per Day for all field construction or direct work activities, if directed

by the Contracting Officer. Workers per day is based on the average number of workers expected each day to perform a task for the duration of that activity.

3.3.7.2 Responsible Party Coding (RESP)

Assign responsibility code for all activities to the Prime Contractor, Subcontractor(s) or Government agency(ies) responsible for performing the activity.

- a. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Property/Equipment (GFP) and Notice to Proceed (NTP) for phasing requirements.
- b. Activities cannot have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE).

3.3.7.3 Area of Work Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities cannot have more than one Work Area Code.

Not all activities are required to be Work Area coded. A lack of Work Area coding indicates the activity is not resource or space constrained.

3.3.7.4 Modification Number (MODF)

Assign a Modification Number Code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer. Key all Code values to the Government's modification numbering system. An activity can have only one Modification Number Code.

3.3.7.5 Bid Item Coding (BIDI)

Assign a Bid Item Code to all activities using the Contract Line Item Schedule (CLIN) to which the activity belongs, even when an activity is not cost loaded. An activity can have only one BIDI Code.

3.3.7.6 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities. Examples of phase of work are design phase, procurement phase and construction phase. Each activity can have only one Phase of Work code.

- a. Code proposed fast track design and construction phases proposed to allow filtering and organizing the schedule by fast track design and construction

packages.

- b. If the contract specifies phasing with separately defined performance periods, identify a Phase Code to allow filtering and organizing the schedule accordingly.

3.3.7.7 Category of Work Coding (CATW)

Assign a Category of Work Code to all activities. Category of Work Codes include, but are not limited to design, design submittal, design reviews, review conferences, permits, construction submittal, procurement, fabrication, weather sensitive installation, non-weather sensitive installation, start-up, and testing activities. Each activity can have no more than one Category of Work Code.

3.3.7.8 Feature of Work Coding (FOW)

Assign a Feature of Work Code to appropriate activities based on the Definable Feature of Work to which the activity belongs based on the approved QC plan.

Definable Feature of Work is defined in Section 01 45 00.00 10 QUALITY CONTROL. An activity can have only one Feature of Work Code.

3.3.8 Contract Milestones and Constraints

Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.

Mandatory constraints that ignore or effect network logic are prohibited. No constrained dates are allowed in the schedule other than those specified herein. Submit additional constraints to the Contracting Officer for approval on a case by case basis.

3.3.8.1 Project Start Date Milestone and Constraint

The first activity in the project schedule must be a start milestone titled "NTP Acknowledged," which must have a "Start On" constraint date equal to the date that the NTP is acknowledged.

3.3.8.2 End Project Finish Milestone and Constraint

The last activity in the schedule must be a finish milestone titled "End Project."

Constrain the project schedule to the Contract Completion Date in such a way that if the schedule calculates an early finish, then the float calculation for "End Project" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "End Project" milestone float calculation reflects negative float on the longest path. The Government is under no obligation to accelerate Government activities to support a Contractor's early completion.

3.3.8.3 Interim Completion Dates and Constraints

Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.

3.3.8.3.1 Start Phase

Use a start milestone as the first activity for a project phase. Call the start milestone "Start Phase X" where "X" refers to the phase of work.

3.3.8.3.2 End Phase

Use a finish milestone as the last activity for a project phase. Call the finish milestone "End Phase X" where "X" refers to the phase of work.

3.3.9 Calendars

Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a 7-day calendar for Government Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop Seasonal Calendar(s) and assign to seasonally affected activities as applicable.

If an activity is weather sensitive it should be assigned to a calendar showing non-work days on a monthly basis, with the non-work days selected at random across the weeks of the calendar, using the anticipated adverse weather delay work days provided in the Special Contract [Clauses] [Requirements]. Assign non-work days over a seven-day week as weather records are compiled on seven-day weeks, which may cause some of the weather related non-work days to fall on weekends.

3.3.10 Open Ended Logic

Only two open ended activities are allowed: the first activity "NTP Acknowledged" may have no predecessor logic, and the last activity "-End Project" may have no successor logic.

Predecessor open ended logic may be allowed in a time impact analyses upon the Contracting Officer's approval.

3.3.11 Default Progress Data Disallowed

Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. Disable program features that calculate one of these parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Contractor Quality Control Reports. Failure to document the AS and AF dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.

3.3.12 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative Report and in the periodic schedule update meetings.

3.3.13 Added and Deleted Activities

Do not delete activities from the project schedule or add new activities to the schedule without approval from the Contracting Officer. Activity ID and description changes are considered new activities and cannot be changed without Contracting Officer approval.

3.3.14 Original Durations

Activity Original Durations (OD) must be reasonable to perform the work item. OD changes are prohibited unless justification is provided and approved by the Contracting Officer.

3.3.15 Leads, Lags, and Start to Finish Relationships

Lags must be reasonable as determined by the Government and not used in place of realistic original durations, must not be in place to artificially absorb float, or to replace proper schedule logic.

- a. Leads (negative lags) are prohibited.
- b. Start to Finish (SF) relationships are prohibited.

3.3.16 Retained Logic

Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not be allowed.

3.3.17 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

3.3.18 Remaining Duration

Update the remaining duration for each activity based on the number of

estimated work days it will take to complete the activity. Remaining duration may not mathematically correlate with percentage found under paragraph entitled Percent Complete.

3.3.19 Cost Loading of Closeout Activities

Cost load the "Correction of punch list from Government pre-final inspection" activity(ies) not less than 1 percent of the present contract value. Activity(ies) may be declared 100 percent complete upon the Government's verification of completion and correction of all punch list work identified during Government pre-final inspection(s).

3.3.19.1 As-Built Drawings

If there is no separate contract line item (CLIN) for as-built drawings, cost load the "Submission and approval of as-built drawings" activity not less than \$35,000 or 1 percent of the present contract value, which ever is greater, up to \$200,000. Activity will be declared 100 percent complete upon the Government's approval.

3.3.19.2 O & M Manuals

Cost load the "Submission and approval of O & M manuals" activity not less than \$20,000. Activity will be declared 100 percent complete upon the Government's approval of all O & M manuals.

3.3.20 Early Completion Schedule and the Right to Finish Early

An Early Completion Schedule is an Initial Project Schedule (IPS) that indicates all scope of the required contract work will be completed before the contractually required completion date.

- a. No IPS indicating an Early Completion will be accepted without being fully resource-loaded (including crew sizes and manhours) and the Government agreeing that the schedule is reasonable and achievable.
- b. The Government is under no obligation to accelerate work items it is responsible for to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the contractor's accelerated work.

3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD/DVD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, then the Contractor will be deemed not to have provided an estimate upon which a progress payment can be made.

Review comments made by the Government on the schedule(s) do not relieve the Contractor from compliance with requirements of the Contract Documents.

3.4.1 Preliminary Project Schedule Submission

Within 15 calendar days after the NTP is acknowledged submit the Preliminary Project Schedule defining the planned operations detailed for the first 90 calendar days for approval. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, planned submissions of all early design packages, permitting activities, design review conference activities, and other non-construction activities intended to occur within the first 90 calendar days. Government acceptance of the associated design package(s) and all other specified Program and Plan approvals must occur prior to any planned construction activities. Activity code any activities that are summary in nature after the first 90 calendar days with Bid Item (CLIN) code (BIDI), Responsibility Code (RESP) and Feature of Work code (FOW).

3.4.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after notice to proceed is issued. The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. Include in the design-build schedule detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead item acquisition prior to design completion. Also cover in the initial design-build schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion milestones, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone. No payment will be made for work items not fully detailed in the Project Schedule.

3.4.2.1 Design Package Schedule Submission

Not used.

3.4.3 Periodic Schedule Updates

Update the Project Schedule on a regular basis, monthly at a minimum. Provide a draft Periodic Schedule Update for review at the schedule update meetings as prescribed in the paragraph PERIODIC SCHEDULE UPDATE MEETINGS. These updates will enable the Government to assess Contractor's progress. Update the

schedule to include detailed construction activities as the design progresses, but not later than the submission of the final un-reviewed design submission for each separate design package.

The Contracting Officer may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission if such activity is authorized.

- a. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of the Government at the meeting.
- b. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for an activity start or finish.

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1 Data CD/DVDs

Provide two sets of data CD/DVDs containing the current project schedule and all previously submitted schedules in the format of the scheduling software (e.g. .xer). Also include on the data CD/DVDs the Narrative Report and all required Schedule Reports. Label each CD/DVD indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file name. Each schedule must have a unique file name and use project specific settings.

3.5.2 Narrative Report

Provide a Narrative Report with each schedule submission. The Narrative Report is expected to communicate to the Government the thorough analysis of the schedule output and the plans to compensate for any problems, either current or potential, which are revealed through that analysis. Include the following information as minimum in the Narrative Report:

- a. Identify and discuss the work scheduled to start in the next update period.
- b. A description of activities along the two most critical paths where the total float is less than or equal to 20 work days.
- c. A description of current and anticipated problem areas or delaying factors and their impact and an explanation of corrective actions taken or required to be taken.
- d. Identify and explain why activities based on their calculated late dates should have either started or finished during the update period but did not.
- e. Identify and discuss all schedule changes by activity ID and activity name including what specifically was changed and why the change was needed. Include at a minimum new and deleted activities, logic changes, duration changes, calendar changes, lag changes, resource changes, and actual start and finish date changes.

- f. Identify and discuss out-of-sequence work.

3.5.3 Schedule Reports

The format, filtering, organizing and sorting for each schedule report will be as directed by the Contracting Officer. Typically, reports contain Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. Provide the reports electronically in .pdf format. Provide 2 set(s) of hardcopy reports. The following lists typical reports that will be requested:

3.5.3.1 Activity Report

List of all activities sorted according to activity number.

3.5.3.2 Logic Report

List of detailed predecessor and successor activities for every activity in ascending order by activity number.

3.5.3.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.3.4 Earnings Report by CLIN

A compilation of the Total Earnings on the project from the NTP to the data date, which reflects the earnings of activities based on the agreements made in the schedule update meeting defined herein. Provided a complete schedule update has been furnished, this report serves as the basis of determining progress payments. Group activities by CLIN number and sort by activity number. Provide a total CLIN percent earned value, CLIN percent complete, and project percent complete. The printed report must contain the following for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Earnings to Date, Earnings this period, Total Quantity, Quantity to Date, and Percent Complete (based on cost).

3.5.3.5 Schedule Log

Provide a Scheduling/Leveling Report generated from the current project schedule being submitted.

3.5.4 Network Diagram

The Network Diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.4.1 Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.4.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.4.3 Critical Path

Show all activities on the critical path. The critical path is defined as the longest path.

3.5.4.4 Banding

Organize activities using the WBS or as otherwise directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by major elements of work, category of work, work area and/or responsibility.

3.5.4.5 Cash Flow / Schedule Variance Control (SVC) Diagram

With each schedule submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates, and 2) Earned Value to-date.

3.6 PERIODIC SCHEDULE UPDATE

3.6.1 Periodic Schedule Update Meetings

Conduct periodic schedule update meetings for the purpose of reviewing the proposed Periodic Schedule Update, Narrative Report, Schedule Reports, and progress payment. Conduct meetings at least monthly within five days of the proposed schedule data date. Provide a computer with the scheduling software loaded and a projector which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must organize, group, sort, filter, perform schedule revisions as needed and review functions as requested by the Contractor and/or Government. The meeting is a working interactive exchange which allows the Government and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting will last no longer than 8 hours. Provide a draft of the proposed narrative report and schedule data file to the Government a minimum of two workdays in advance of the meeting. The Contractor's Project Manager and scheduler must attend the meeting with the authorized representative of the Contracting Officer. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make corrections to the draft submission. Include only those changes approved by the Government in the submission and invoice for payment.

3.6.2 Update Submission Following Progress Meeting

Submit the complete Periodic Schedule Update of the Project Schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 work days after the periodic schedule update meeting.

3.7 WEEKLY PROGRESS MEETINGS

Conduct a weekly meeting with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph entitled PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. Use the current approved schedule update for the purposes of this meeting and for the production and review of reports. At the weekly progress meeting, address the status of RFIs, RFPs and Submittals.

3.8 REQUESTS FOR TIME EXTENSIONS

Provide a justification of delay to the Contracting Officer in accordance with the contract provisions and clauses for approval within 10 days of a delay occurring. Also prepare a time impact analysis for each Government request for proposal (RFP) to justify time extensions.

3.8.1 Justification of Delay

Provide a description of the event(s) that caused the delay and/or impact to the work.

As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Government.

Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Contracting Officer.

3.8.2 Time Impact Analysis (Prospective Analysis)

Prepare a time impact analysis for approval by the Contracting Officer based on industry standard AACE 52R-06. Utilize a copy of the last approved schedule prior to the first day of the impact or delay for the time impact analysis. If Contracting Officer determines the time frame between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Contracting Officer, no other changes may be incorporated into the schedule being used to justify the time impact.

3.8.3 Forensic Schedule Analysis (Retrospective Analysis)

Prepare an analysis for approval by the Contracting Officer based on industry standard AACE 29R-03.

3.8.4 Fragmentary Network (Fragnet)

Prepare a proposed fragnet for time impact analysis consisting of a sequence of new

activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Contracting Officer prior to incorporation into the project schedule.

3.8.5 Time Extension

The Contracting Officer must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.8.6 Impact to Early Completion Schedule

No extended overhead will be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact.

3.9 FAILURE TO ACHIEVE PROGRESS

Should the progress fall behind the approved project schedule for reasons other than those that are excusable within the terms of the contract, the Contracting Officer may require provision of a written recovery plan for approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra work days, etc.

3.9.1 Artificially Improving Progress

Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic, constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

3.9.2 Failure to Perform

Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in an interim and final unsatisfactory performance rating and may result in corrective action directed by the Contracting Officer pursuant to FAR 52.236-15 Schedules for Construction Contracts, FAR 52.249-10 Default (Fixed-Price Construction), and other contract provisions.

3.9.3 Recovery Schedule

Should the Contracting Officer find it necessary, submit a recovery schedule pursuant to FAR 52.236-15 Schedules for Construction Contracts.

3.10 OWNERSHIP OF FLOAT

Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, may not be considered for the exclusive use of either the Government or the Contractor including activity and/or project float. Activity float is the number of work days that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of work days between the projected early finish and the contract completion date milestone.

3.11 TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Not used.

3.12 PRIMAVERA P6 MANDATORY REQUIREMENTS

If Primavera P6 is being used, request a backup file template (.xer) from the Government, if one is available, prior to building the schedule. The following settings are mandatory and required in all schedule submissions to the Government:

- a. Activity Codes must be Project Level, not Global or EPS level.
- b. Calendars must be Project Level, not Global or Resource level.
- c. Activity Duration Types must be set to "Fixed Duration & Units".
- d. Percent Complete Types must be set to "Physical".
- e. Time Period Admin Preferences must remain the default "8.0 hr/day, 40 hr/week, 172 hr/month, 2000 hr/year". Set Calendar Work Hours/Day to 8.0 Hour days.
- f. Set Schedule Option for defining Critical Activities to "Longest Path".
- g. Set Schedule Option for defining progressed activities to "Retained Logic".
- h. Set up cost loading using a single lump sum labor resource. The Price/Unit must be \$1/hr, Default Units/Time must be "8h/d", and settings "Auto Compute Actuals" and "Calculate costs from units" selected.
- i. Activity ID's must not exceed 10 characters.
- j. Activity Names must have the most defining and detailed description within the first 30 characters.

-- End of Section --

SECTION 01 33 00 SUBMITTAL PROCEDURES

08/18, CHG 4: 02/21

PART 1 - GENERAL

1.1 SUMMARY

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Safety Data Sheets (SDS) and in compliance with existing laws and regulations.

A submittal register showing items of equipment and materials for when submittals are required by the specifications is provided as "Appendix A - Submittal Register."

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittal requirements are specified in the technical sections. Examples and descriptions of submittals identified by the Submittal Description (SD) numbers and titles follow:

SD-01 Preconstruction Submittals

Submittals that are required prior to or commencing with the start of work on site.
Submittals that are required prior to or at the start of construction (work) or the next major phase of the construction on a multiphase contract.

For Government approved division 01 preconstruction submittals that are required prior to or commencing with the start of work shall be submitted within 30 calendar

days of contract award unless specified elsewhere in the specifications. For contractor approved division 01 submittals that are required prior to or commencing with the start of work shall be submitted within 45 calendar days of contract award unless specified elsewhere in the specifications.

Preconstruction Submittals include schedules and a tabular list of locations, features, and other pertinent information regarding products, materials, equipment, or components to be used in the work.

Certificates Of Insurance

Surety Bonds

List Of Proposed Subcontractors

List Of Proposed Products

Baseline Network Analysis Schedule (NAS)

Submittal Register

Schedule Of Prices Or Earned Value Report Accident

Prevention Plan Health And Safety Plan Work Plan

Quality Control (QC) plan

Environmental Protection Plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those that will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. Unless specified in another section, testing must have been within three years of date of contract award for the project.

Report that includes findings of a test required to be performed on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report that includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports

Daily logs and checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that the product, system, or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures,

acceptability of methods, or personnel qualifications.

Confined space entry permits

Text of posted operating instructions

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (SDS) concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

SD-10 Operation and Maintenance Data

Data provided by the manufacturer, or the system provider, including manufacturer's help and product line documentation, necessary to maintain and install equipment, for operating and maintenance use by facility personnel.

Data required by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

Data incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.2.2 Approving Authority

Office or designated person authorized to approve the submittal.

1.2.3 Work

As used in this section, on-site and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction. In exception, excludes work to produce SD-01 submittals.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Submittal Register; G

1.4 SUBMITTAL CLASSIFICATION

1.4.1 Government Approved (G)

Government approval is required for extensions of design, critical materials, variations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Government.

Government approval is required for any variations from the Solicitation or the Accepted Proposal and for other items as designated by the Government.

Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, submittals are considered to be "shop drawings."

1.4.2 Design-Build Submittal Classifications

Not used.

1.4.2.1 Designer of Record Approved (DA)

Designer of Record (DOR) approval is required for extensions of design; critical materials; any variations from the Solicitation, the Accepted Proposal, or the completed design; equipment whose compatibility with the entire system must be checked; and other items as designated by the Contracting Officer. Provide the Government with the number of copies designated hereinafter of all DOR approved submittals. The Government may review any or all Designer of Record approved submittals for conformance with the Solicitation, the Accepted Proposal, and the completed design. The Government will review all submittals designated as varying from the Solicitation or Accepted Proposal, as described below. Provide design submittals in accordance with

Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD). Generally, list design submittals under SD-05 Design Data.

1.4.2.2 Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the Solicitation. Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD) covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards, and contract requirements. Design data includes the design documents described in Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD).

1.4.2.3 Designer of Record Approved/Government Conformance Review (DA/CR)

1.4.2.3.1 Variations from the Accepted Design

DOR approval and the Government's concurrence are required for any proposed variation from the accepted design that still complies with the contract before the Contractor is authorized to proceed with material acquisition or installation. If necessary to facilitate the project schedule, before official submission to the Government, the Contractor and the DOR may discuss with the Contracting Officer's Representative a submittal proposing a variation. However, the Government reserves the right to review the submittal before providing an opinion. In any case, the Government will not formally agree to or provide a preliminary opinion on any variation without the DOR's approval or recommended approval. The Government reserves the right to reject any design, variation that may affect furniture, furnishings, equipment selections, or operational decisions that were made, based on the reviewed and concurred design.

1.4.2.3.2 Substitutions

Unless prohibited or otherwise provided for elsewhere in the contract, where the Accepted Proposal named products, systems, materials or equipment by manufacturer, brand name, model number, or other specific identification, and the Contractor desires to substitute a manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, through identifying information and the DOR's approval, that the substitute meets the contract requirements and that it is equal in function, performance, quality, and salient features to that in the accepted contract proposal. If the contract otherwise prohibits substitutions of equal named products, systems, materials or equipment by manufacturer, brand name, model number or other specific identification, the request is considered a "variation" to the contract. Variations are discussed below in paragraphs: "DESIGNER OF RECORD APPROVED/GOVERNMENT APPROVED" and VARIATIONS. The Contractor is responsible for any contract impacts.

1.4.2.4 Designer of Record Approved/Government Approved (DA/GA)

In addition to the above-stated requirements for proposed variations to the accepted design, both DOR and Government Approval and, where applicable, a contract modification are required before the Contractor is authorized to proceed with material acquisition or installation for any proposed variation to the contract (the Solicitation or

the Accepted Proposal), that constitutes a change to the contract terms. The Government reserves the right to accept or reject any such proposed variation.

1.4.3 For Information Only

Submittals not requiring Government approval will be for information only. For Design-build construction all submittals not requiring DOR or Government approval will be for information only. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are not considered to be "shop drawings."

1.4.4 Sustainability Reporting Submittals (S)

Submittals for Guiding Principle Validation (GPV) or Third Party Certification (TPC) are indicated with an "S" designation. These submittals are for information only and for use as specified in Section 01 33 29 SUSTAINABILITY REPORTING.

Schedule submittals for these items throughout the course of construction as provided; do not wait until closeout.

1.5 FORWARDING SUBMITTALS REQUIRING GOVERNMENT APPROVAL

As soon as practicable after award of contract, and before procurement or fabrication, forward to the HIARNG Project manager. In addition, forward a copy of the submittals to the Contracting Officer.

1.5.1 O&M Data

Submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

In the event the Contractor fails to deliver O&M data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the items to which such O&M data apply.

Send submittals via overnight express mail service. All costs associated with the overnight express mail service are borne by the Contractor. Costs associated with the overnight express mail of submittals related to proposed submittal variances of resubmittals necessary as a result of noncompliant or incomplete Contractor submittals are the responsibility of the Contractor.

1.6 PREPARATION

1.6.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels to the office of the approving authority using the transmittal form prescribed by the Contracting Officer. Include all information prescribed by the transmittal form and required in paragraph IDENTIFYING SUBMITTALS. Use the submittal transmittal forms to record actions regarding samples.

Use the ENG Form 4025-R transmittal form or approved equal for submitting both Government-approved and information-only submittals. Submit in accordance with the instructions on the reverse side of the form. These forms or similar forms will be furnished to the Contractor. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.

1.6.2 Identifying Submittals

The Contractor's [Quality Control Manager] [approving authority] must prepare, review and stamp submittals, including those provided by a subcontractor, before submittal to the Government.

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

- a. Project title and location
- b. Construction contract number
- c. Dates of the drawings and revisions
- d. Name, address, and telephone number of Subcontractor, supplier, manufacturer, and any other Subcontractor associated with the submittal.
- e. Section number of the specification by which submittal is required
- f. Submittal description (SD) number of each component of submittal
- g. For a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission
- h. Product identification and location in project.

1.6.3 Submittal Format

1.6.3.1 Format of SD-01 Preconstruction Submittals

When the submittal includes a document that is to be used in the project, or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document.

Provide data in the unit of measure used in the contract documents.

1.6.3.2 Format for SD-02 Shop Drawings

Provide shop drawings not less than 210 by 297 mm 8 1/2 by 11 inches nor more than 1189 by 841 mm 30 by 42 inches, except for full-size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless another form is required. Ensure drawings are suitable for reproduction and of a quality to produce clear, distinct lines and letters, with dark lines on a white background.

- a. Include the nameplate data, size, and capacity on drawings. Also include applicable federal, military, industry, and technical society publication references.
- b. Dimension drawings, except diagrams and schematic drawings. Prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

Present 210 by 297 mm shop drawings sized 8 1/2 by 11 inches as part of the bound volume for submittals. Present larger drawings in sets. Submit an electronic copy of drawings in PDF format.

1.6.3.2.1 Drawing Identification

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph IDENTIFYING SUBMITTALS.

Number drawings in a logical sequence. Each drawing is to bear the number of the submittal in a uniform location next to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

Reserve a blank space, no smaller than [] millimeter inches on the right-hand side of each sheet for the Government disposition stamp.

1.6.3.3 Format of SD-03 Product Data

Present product data submittals for each section as a complete, bound volume. Include a table of contents, listing the page and catalog item numbers for product data.

Indicate, by prominent notation, each product that is being submitted; indicate the specification section number and paragraph number to which it pertains.

1.6.3.3.1 Product Information

Supplement product data with material prepared for the project to satisfy the submittal requirements where product data does not exist. Identify this material as developed specifically for the project, with information and format as required for submission of SD-07 Certificates.

Provide product data in metric dimensions. Where product data are included in preprinted catalogs with English units only, submit metric dimensions on separate sheet.

Provide product data in units used in the Contract documents. Where product data are

included in preprinted catalogs with another unit, submit the dimensions in contract document units, on a separate sheet.

1.6.3.3.2 Standards

Where equipment or materials are specified to conform to industry or technical-society reference standards of such organizations as the American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), or Association of Edison Illuminating Companies (AEIC), 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 Contracting Officer. State on the certificate 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.

1.6.3.3.3 Data Submission

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal that is marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will [not] be accepted for expedition of the construction effort.

Submit the manufacturer's instructions before installation.

1.6.3.4 Format of SD-04 Samples

1.6.3.4.1 Sample Characteristics

Furnish samples in the following sizes, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately the same size as specified:

- a. Sample of Equipment or Device: Full size.
- b. Sample of Materials Less Than 50 by 75 mm 2 by 3 inches: Built up to 210 by 297 mm 8 1/2 by 11 inches.
- c. Sample of Materials Exceeding 210 by 297 mm 8 1/2 by 11 inches: Cut down to 210 by 297 mm 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.
- d. Sample of Linear Devices or Materials: 250 mm 10 inch length or length to be supplied, if less than 250 mm 10 inches. Examples of linear devices or materials are conduit and handrails.
- e. Sample Volume of Nonsolid Materials: 750 ml Pint. Examples of nonsolid materials are sand and paint.
- f. Color Selection Samples: 50 by 100 mm 2 by 4 inches. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices

for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.

- g. Sample Panel: 1200 by 1200 mm 4 by 4 feet.
- h. Sample Installation: 10 square meters 100 square feet.

1.6.3.4.2 Sample Incorporation

Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples are to be in undamaged condition at the time of use.

Recording of Sample Installation: Note and preserve the notation of any area constituting a sample installation, but remove the notation at the final clean-up of the project.

1.6.3.4.3 Comparison Sample

Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.6.3.5 Format of SD-05 Design Data

Provide design data and certificates on 210 by 297 mm 8 1/2 by 11 inch paper. Provide a bound volume for submittals containing numerous pages.

1.6.3.6 Format of SD-06 Test Reports

Provide reports on 210 by 297 mm 8 1/2 by 11 inch paper in a complete bound volume.

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.6.3.7 Format of SD-07 Certificates

Provide design data and certificates on 210 by 297 mm 8 1/2 by 11 inch paper. Provide a bound volume for submittals containing numerous pages.

1.6.3.8 Format of SD-08 Manufacturer's Instructions

Present manufacturer's instructions submittals for each section as a complete, bound volume. Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry, and technical-society publication references. If supplemental information is needed to clarify the manufacturer's data, submit it as specified for SD-07 Certificates.

Submit the manufacturer's instructions before installation.

1.6.3.8.1 Standards

Where equipment or materials are specified to conform to industry or technical-society reference standards of such organizations as the American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), or Association of Edison Illuminating Companies (AEIC), 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 Contracting Officer. State on the certificate 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.

1.6.3.9 Format of SD-09 Manufacturer's Field Reports

Provide reports on 210 by 297 mm 8 1/2 by 11 inch paper in a complete bound volume.

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.6.3.10 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

1.6.3.11 Format of SD-11 Closeout Submittals

When the submittal includes a document that is to be used in the project or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document.

Provide data in the unit of measure used in the contract documents.

Provide all dimensions in administrative submittals in metric. Where data are included in preprinted material with English units only, submit metric dimensions on separate sheet.

1.6.4 Source Drawings for Shop Drawings

1.6.4.1 Source Drawings

The entire set of source drawing files (DWG) will not be provided to the Contractor. Request the specific Drawing Number for the preparation of shop drawings. Only those drawings requested to prepare shop drawings will be provided. These drawings are provided only after award.

1.6.4.2 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse is at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim, and waives to the fullest extent permitted by law any claim or cause of action of any nature against the Government, its agents, or its subconsultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities, or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic source drawing files are not construction documents. Differences may exist between the source drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic source drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. The Contractor is responsible for determining if any conflict exists. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished source drawing files, the signed and sealed construction documents govern. Use of these source drawing files does not relieve the Contractor of the duty to fully comply with the contract documents, including and without limitation the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction data related to this contract, remove all previous indication of ownership (seals, logos, signatures, initials and dates).

1.6.5 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. In addition to the electronic submittal, provide three hard copies of the submittals. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, and coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is searchable and can be copied. If documents are scanned, optical character resolution (OCR) routines are required. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature or a scan of a signature.

E-mail electronic submittal documents smaller than 10MB to an e-mail address as directed by the Contracting Officer. Provide electronic documents over 10 MB on an optical disc or through an electronic file sharing system such as the AMRDEC SAFE Web Application located at the following website: <https://safe.amrdec.army.mil/safe/>.

1.7 QUANTITY OF SUBMITTALS

1.7.1 Number of SD-01 Preconstruction Submittal Copies

Unless otherwise specified, submit [two][three] sets of administrative submittals.

1.7.2 Number of SD-02 Shop Drawing Copies

Submit six copies of submittals of shop drawings requiring review and approval by a QC organization. Submit seven copies of shop drawings requiring review and approval by the Contracting Officer.

1.7.3 Number of SD-03 Product Data Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.7.4 Number of SD-04 Samples

- a. Submit two samples, or two sets of samples showing the range of variation, of each required item. One approved sample or set of samples will be retained by the approving authority and one will be returned to the Contractor.
- b. Submit one sample panel or provide one sample installation where directed. Include components listed in the technical section or as directed.
- c. Submit one sample installation, where directed.
- d. Submit one sample of nonsolid materials.

1.7.5 Number of SD-05 Design Data Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.7.6 Number of SD-06 Test Report Copies

Submit in compliance with quantity and quality requirements specified for shop drawings, other than field test results that will be submitted with QC reports.

1.7.7 Number of SD-07 Certificate Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.7.8 Number of SD-08 Manufacturer's Instructions Copies

Submit in compliance with quantity requirements specified for shop drawings.

1.7.9 Number of SD-09 Manufacturer's Field Report Copies

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.7.10 Number of SD-10 Operation and Maintenance Data Copies

Submit five copies of O&M data to the Contracting Officer for review and approval.

1.7.11 Number of SD-11 Closeout Submittals Copies

Unless otherwise specified, submit [two][three] sets of administrative submittals.

1.8 INFORMATION ONLY SUBMITTALS

Submittals without a "G" designation must be certified by the QC manager and submitted to the Contracting Officer for information-only. Provide information-only submittals to the Contracting Officer a minimum of 14 calendar days prior to the Preparatory Meeting for the associated Definable Feature of Work (DFOW). Approval of the Contracting Officer is not required on information only submittals. The Contracting Officer will mark "receipt acknowledged" on submittals for information and will return only the transmittal cover sheet to the Contractor. Normally, submittals for information only will not be returned. However, the Government reserves the right to return unsatisfactory submittals and require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. For Design-Build construction, the Government will retain all but one of the copies of information-only submittals.

1.9 PROJECT SUBMITTAL REGISTER AND DATABASE

A sample Project Submittal Register showing items of equipment and materials for when submittals are required by the specifications is provided as "Appendix A - Submittal Register."

1.9.1 Submittal Management

Prepare and maintain a submittal register, as the work progresses. Use an electronic submittal register program furnished by the Government. Do not change data that is output in columns (c), (d), (e), and (f) as delivered by Government; retain data that is output in columns (a), (g), (h), and (i) as approved. As an attachment, provide a submittal register showing items of equipment and materials for which submittals are required by the specifications. This list may not be all-inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE(RMS CM).[The Government will provide the initial submittal register][in electronic format][with the following fields completed, to the extent that will be required by the Government during subsequent usage.]

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD Number. and type, e.g., SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in each specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting the project requirements.

Column (f): Lists the approving authority for each submittal.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns and all dates on which submittals are received by and returned by the Government.

1.9.2 Design-Build Submittal Register

Not used.

1.9.3 Preconstruction Use of Submittal Register

Submit the submittal register as an electronic database, using the submittal management program furnished to Contractor. Include the QC plan and the project schedule. Verify that all submittals required for the project are listed and add missing submittals. Coordinate and complete the following fields on the register database submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for the approving authority to receive submittals.

Column (h) Contractor Approval Date: Date that Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.9.4 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in the program used by the Contractor with each submittal throughout the contract.

Column (b) Transmittal Number: List of consecutive, Contractor-assigned numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) Date submittal transmitted.

Column (q) Date approval was received.

1.9.5 Approving Authority Use of Submittal Register

Update the following fields:

Column (b) Transmittal Number: List of consecutive, Contractor-assigned numbers.

Column (l) Date submittal was received.

Column (m) through (p) Dates of review actions.

Column (q) Date of return to Contractor.

1.9.6 Action Codes

Entries for columns (j) and (o) are to be used as follows (others may be prescribed by the Transmittal Form):

1.9.6.1 Government Review Action Codes

"A" - "Approved as submitted"; "Completed"

"B" - "Approved, except as noted on drawings"; "Completed"

"C" - "Approved, except as noted on drawings; resubmission required";
"Resubmit"

"D" - "Returned by separate correspondence"; "Completed"

"E" - "Disapproved (See attached)"; "Resubmit"

"F" - "Receipt acknowledged"; "Completed"

"G" - "Other (Specify)"; "Resubmit"

"X" - "Receipt acknowledged, does not comply with contract requirements";
"Resubmit"

1.9.6.2 Government Review Action Codes

"A" - "Approved as submitted"

"AN" - "Approved as noted"

"RR" - "Disapproved as submitted"; "Completed"

"NR" - "Not Reviewed"

"RA" - "Receipt Acknowledged"

1.9.6.3 Contractor Action Codes

DESIGN BID BUILD SUBMITTALS			
Submittal Classifications shown in UFGS Sections	Submittal Classification	Corresponding SpecsIntact Submittal Register Code which is populated in the SI Submittal Register. Software Limitations: (The software shows one character delineation in the SpecsIntact Submittal Register)	RMS – The following Submittal Classifications are populated in RMS when the SpecsIntact Submittal Data File is pulled into RMS)
G	Submittal requires Government Approval	G	GA
BLANK	Submittal is For Information Only (FIO)	BLANK	FIO
S	Submittal is for documentation of Sustainable requirements	S	S/FIO

1.9.6.4 Contractor Action Codes

DESIGN BUILD SUBMITTALS

Submittal Classifications shown in UFGS Sections	Submittal Classification	Corresponding SpecsIntact Submittal Register Code which is populated in the SI Submittal Register. Software Limitations: (The software shows one character delineation in the SpecsIntact Submittal Register)	RMS – The following Submittal Classifications are populated in RMS when the SpecsIntact Submittal Data File is pulled into RMS)

DESIGN BUILD SUBMITTALS			
G	Submittal requires Government Approval	G	GA
BLANK	Submittal is For Information Only(FIO)	BLANK	FIO
DA	Submittal requires Designer of Record Approval	D	DA
CR	Submittal requires Government Conformance Review	C	CR
DA/CR	Submittal requires Designer of Record Approval and Government Conformance Review	R	DA/CR
DA/GA	Submittal requires Designer of Record Approval and Government Approval	A	DA/GA

1.9.7 Delivery of Copies

Submit an updated electronic copy of the submittal register to the Contracting Officer with each invoice request , unless a paper copy is requested by the Contracting Officer.

Provide an updated Submittal Register monthly regardless of whether an invoice is submitted.

1.10 VARIATIONS

Variations from contract requirements require Contracting Officer approval pursuant to contract Clause FAR 52.236-21 Specifications and Drawings for Construction, and will be considered where advantageous to the Government.

1.10.1 Considering Variations

Discussion of variations with the Contracting Officer before submission [of a variation submittal] will help ensure that functional and quality requirements are met and minimize rejections and resubmittals. For variations that include design changes or some material or product substitutions, the Government may require an evaluation and analysis by a licensed professional engineer hired by the contractor.

Specifically point out variations from contract requirements in a [transmittal letter] [variation submittal]. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

1.10.2 Proposing Variations

When proposing variation, deliver a submittal, clearly marked as a "VARIATION" to the Contracting Officer, with documentation illustrating the nature and features of the variation including any necessary technical submittals and why the variation is desirable and beneficial to Government. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

The Contracting Officer will indicate an approval or disapproval of the variation request; and if not approved as submitted, will indicate the Government's reasons therefore. Any work done before such approval is received is performed at the Contractor's risk."

Specifically point out variations from contract requirements in a [transmittal letter] [variation submittal]. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

Check the column "variation" of ENG Form 4025 for submittals that include variations proposed by the Contractor. Set forth in writing the reason for any variations and note such variations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted variations.

1.10.3 Warranting that Variations are Compatible

When delivering a variation for approval, the Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.10.4 Review Schedule Extension

In addition to the normal submittal review period, a period of 14 ___calendar working days will be allowed for the Government to consider submittals with variations.

1.11 SCHEDULING

Schedule and submit concurrently product data and shop drawings covering component items forming a system or items that are interrelated. Submit pertinent certifications at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. [Allow an additional 15 working days for review and approval of submittals for [food service equipment] [and] [refrigeration and HVAC control systems]].

- a. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. The Contractor is responsible for additional time required for Government reviews resulting from required resubmittals. The review period for each resubmittal is the same as for the initial submittal.
- b. Submittals required by the contract documents are listed on the submittal register. If a submittal is listed in the submittal register but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but that have been omitted from the register or marked "N/A."
- c. Resubmit the submittal register and annotate it monthly with actual submission and approval dates. When all items on the register have been fully approved, no further resubmittal is required.

Contracting Officer review will be completed within 30 calendar working days after the date of submission.

- d. Except as specified otherwise, allow a review period, beginning with receipt by the approving authority, that includes at least 30 working days for submittals for QC manager approval and 30 working days for submittals where the Contracting Officer is the approving authority. The period of review for submittals with Contracting Officer approval begins when the Government receives the submittal from the QC organization.
- e. For submittals requiring review by a Government fire protection engineer, allow a review period, beginning when the Government receives the submittal from the QC organization, of 30 working days for return of the submittal to the Contractor.

Within 30 calendar days of Notice To Proceed, provide the following schedule of submittals for approval by the Contracting Officer:

- f. A schedule of shop drawings and technical submittals required by the specifications and drawings. Indicate the specification or drawing reference requiring the submittal; the material, item, or process for which the submittal is required; the "SD" number and

identifying title of the submittal; the anticipated submission date, and the approval need date.

- g. A separate schedule of other submittals required under the contract but not listed in the specifications or drawings. Indicate the contract requirement reference, the type or title of the submittal, the anticipated submission date, and the approval need date (if approval is required).

1.11.1 Reviewing, Certifying, and Approving Authority

The QC Manager is responsible for reviewing all submittals and certifying that they are in compliance with contract requirements. The approving authority on submittals is the QC Manager unless otherwise specified. At each "Submittal" paragraph in individual specification sections, a notation "G" following a submittal item indicates that the Contracting Officer is the approving authority for that submittal item. Provide an additional copy of the submittal to the Government Approving authority

1.11.2 Constraints

Conform to provisions of this section, unless explicitly stated otherwise for submittals listed or specified in this contract.

Submit complete submittals for each definable feature of the work. At the same time, submit components of definable features that are interrelated as a system.

When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, the submittal will be returned without review.

Approval of a separate material, product, or component does not imply approval of the assembly in which the item functions.

1.11.3 QC Organization Responsibilities

- a. Review submittals for conformance with project design concepts and compliance with contract documents.
- b. Process submittals based on the approving authority indicated in the submittal register.
 - (1) When the QC manager is the approving authority, take appropriate action on the submittal from the possible actions defined in paragraph APPROVED SUBMITTALS.
 - (2) When the Contracting Officer is the approving authority or when variation has been proposed, forward the submittal to the Government, along with a certifying statement, or return the submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of the submittal determines the appropriate action.
- c. Ensure that material is clearly legible.

- d. Stamp each sheet of each submittal with a QC certifying statement or an approving statement, except that data submitted in a bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

- (1) When the approving authority is the Contracting Officer, the QC organization will certify submittals forwarded to the Contracting Officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with Contract Number [] is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"
(Signature)

- (2) When approving authority is the QC manager, the QC manager will use the following approval statement when returning submittals to the Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with Contract Number [] is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC Manager (Signature) _____, Date _____

- e. Sign the certifying statement or approval statement. The QC organization member designated in the approved QC plan is the person signing certifying statements. The use of original ink for signatures is required. Stamped signatures are not acceptable.
- f. Update the submittal register as submittal actions occur, and maintain the submittal register at the project site until final acceptance of all work by the Contracting Officer.
- g. Retain a copy of approved submittals and approved samples at the project site.
- h. For "S" submittals, provide a copy of the approved submittal to the Government Approving authority.

1.11.4 Government Reviewed Design

The Government will review design submittals for conformance with the technical

requirements of the Solicitation. Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD) covers the design submittal and review process in detail. Government review is required for variations from the completed design. Review will be only for conformance with the contract requirements. Included are only those construction submittals for which the DOR's design documents do not include enough detail to ascertain contract compliance. The Government may, but is not required to, review extensions of design such as structural steel or reinforcement shop drawings.

1.12 GOVERNMENT APPROVING AUTHORITY

When the approving authority is the Contracting Officer, the Government will:

- a. Note the date on which the submittal was received from the QC manager.
- b. Review submittals for approval within the scheduling period specified and only for conformance with project design concepts and compliance with contract documents.
- c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with comments and markings appropriate for the action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. [] copies of the submittal will be retained by the Contracting Officer and [] copies of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be identified and returned, as described above.

1.12.1 Review Notations

Submittals will be returned to the Contractor with the following notations:

- a. Submittals marked "approved" or "accepted" authorize proceeding with the work covered.
- b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize proceeding with the work covered provided that the Contractor takes no exception to the corrections.
- c. Submittals marked "not approved," "disapproved," or "revise and resubmit" indicate incomplete submittal or noncompliance with the contract requirements or design concept. Resubmit with appropriate changes. Do not proceed with work for this item until the resubmittal is approved.
- d. Submittals marked "not reviewed" indicate that the submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

- e. Submittals marked "receipt acknowledged" indicate that submittals have been received by the Government. This applies only to "information-only submittals" as previously defined.

1.13 DISAPPROVED SUBMITTALS

Make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications, give notice to the Contracting Officer as required under the FAR clause titled CHANGES. The Contractor is responsible for the dimensions and design of connection details and the construction of work. Failure to point out variations may cause the Government to require rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and resubmit in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.14 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory. The design, general method of construction, materials, detailing, and other information appear to meet the Solicitation and Accepted Proposal.

Approval or acceptance by the Government for a submittal does not relieve the Contractor of the responsibility for meeting the contract requirements or for any error that may exist, because under the Quality Control (QC) requirements of this contract, the Contractor is responsible for ensuring information contained within each submittal accurately conforms with the requirements of the contract documents.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.15 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, provide assurance that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those that may be damaged in testing, will be returned to the Contractor, at its expense, upon completion of the contract. Unapproved samples will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to

consider, under this contract, any further samples of the same brand or make as that material. The Government reserves the right to disapprove any material or equipment that has previously proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Replace such materials or equipment to meet contract requirements.

1.16 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment for materials incorporated in the work will be made unless all required DOR approvals or required Government approvals have been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information-only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.17 CERTIFICATION OF SUBMITTAL DATA

Certify the submittal data as follows on Form ENG 4025: "I certify that the above submitted items had been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

NAME OF CONTRACTOR

SIGNATURE OF CONTRACTOR

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

-- End of Section --

SECTION 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS

11/20, CHG 3: 02/22

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 MECHANICAL ENGINEERS (ASME)

ASME B30.3	(2020) Tower Cranes
ASME B30.5	(2021) Mobile and Locomotive Cranes
ASME B30.7	(2021) Winches
ASME B30.8	(2020) Floating Cranes and Floating Derricks
ASME B30.9	(2018) Slings
ASME B30.20	(2018) Below-the-Hook Lifting Devices
ASME B30.22	(2016) Articulating Boom Cranes
ASME B30.23	(2016) Personnel Lifting Systems Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks and Slings
ASME B30.26	(2015; R 2020) Rigging Hardware

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.22	(2007; R 2017) Safety Requirements for Rope-Guided and Non-Guided Workers' Hoists
ASSP A10.34	(2021) Protection of the Public on or Adjacent to Construction Sites
ASSP A10.44	(2020) Control of Energy Sources (Lockout/Tagout) for Construction and Demolition Operations
ASSP Z244.1	(2016) The Control of Hazardous Energy Lockout, Tagout and Alternative Methods

ASSP Z359.0	(2018) Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ASSP Z359.1	(2020) The Fall Protection Code
ASSP Z359.2	(2017) Minimum Requirements for a Comprehensive Managed Fall Protection Program
ASSP Z359.3	(2019) Safety Requirements for Lanyards and Positioning Lanyards
ASSP Z359.4	(2013) Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components
ASSP Z359.6	(2016) Specifications and Design Requirements for Active Fall Protection Systems
ASSP Z359.7	(2019) Qualification and Verification Testing of Fall Protection Products
ASSP Z359.11	(2014) Safety Requirements for Full Body Harnesses
ASSP Z359.12	(2019) Connecting Components for Personal Fall Arrest Systems
ASSP Z359.13	(2013) Personal Energy Absorbers and Energy Absorbing Lanyards
ASSP Z359.14	(2014) Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
ASSP Z359.15	(2014) Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems
ASSP Z359.16	(2016) Safety Requirements for Climbing Ladder Fall Arrest Systems
ASSP Z359.18	(2017) Safety Requirements for Anchorage Connectors for Active Fall Protection Systems
ASSP Z490.1	(2016) Criteria for Accepted Practices in Safety, Health, and Environmental Training

ASTM INTERNATIONAL (ASTM)

ASTM F855	(2019) Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1048	(2016) Guide for Protective Grounding of Power Lines
IEEE C2	(2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA NPR 8621.1	(2020d) NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
NASA NPR 8715.3	(2017d; Change 1) NASA General Safety Program Requirements
NASA-STD 8719.12	(2021a; Change 2) Safety Standard for Explosives, Propellants, and Pyrotechnics

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA Z535.2	(2011; R 2017) Environmental and Facility Safety Signs

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2022; ERTA 1 2021) Standard for Portable Fire Extinguishers
NFPA 51B	(2019; TIA 20-1) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 70E	(2021) Standard for Electrical Safety in the Workplace
NFPA 241	(2022) Standard for Safeguarding Construction, Alteration, and Demolition

Operations

NFPA 306

(2019) Standard for the Control of Gas
Hazards on Vessels

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-222

(2018H; Add 1 2019) Structural Standard for
Antenna Supporting Structures and
Antennas and Small Wind Turbine Support
Structures

TIA-1019

(2012; R 2016) Standard for Installation,
Alteration and Maintenance of Antenna
Supporting Structures and Antennas

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1

(2014) Safety -- Safety and Health
Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

10 CFR 20

Standards for Protection Against Radiation

29 CFR 1910

Occupational Safety and Health Standards

29 CFR 1910.146

Permit-required Confined Spaces

29 CFR 1910.147

The Control of Hazardous Energy (Lock Out/Tag Out)

29 CFR 1910.333

Selection and Use of Work Practices

29 CFR 1915

Confined and Enclosed Spaces and Other Dangerous
Atmospheres in Shipyard Employment

29 CFR 1915.89

Control of Hazardous Energy Lockout/Tags-Plus)

29 CFR 1919

Gear Certification

29 CFR 1926

Safety and Health Regulations for Construction

29 CFR 1626.16

Rules of Construction

29 CFR 1926.450

Scaffolds

29 CFR 1926.500

Fall Protection

29 CFR 1926.552

Material Hoists, Personal Hoists, and Elevators

29 CFR 1926.553

Base-Mounted Drum Hoists

29 CFR 1926.1400	Cranes and Derricks in Construction
49 CFR 173	Shippers – General Requirements for Shipments and Packagings
CPL 02-01-056	(2014) Inspection Procedures for Accessing Communication Towers by Hoist
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA's Confined Space Standard, 29 CFR 1910.146, and designated in writing to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.3 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person requirements, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.4 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of

identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.5 Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance with ASSP Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.6 Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q, and designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and also has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented including experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

1.2.7 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the training material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

1.2.8 High Risk Activities

High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

1.2.9 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

1.2.10 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or horizontally move a load).

1.2.11 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even when provided by a physician or registered personnel.

1.2.12 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

1.2.13 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

1.2.14 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

1.2.15 Qualified Person, Fall Protection (QP for FP)

A QP for FP is a person meeting the definition requirements of EM 385-1-1 Appendix Q, and ASSP Z359.2 standard, having a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

1.2.16 Recordable Injuries or Illnesses

Recordable Injuries or Illnesses are any work-related injury or illness that results in:

- a. Death, regardless of the time between the injury and death, or the length of the illness;
- b. Days away from work (any time lost after day of injury/illness onset);

- c. Restricted work;
- d. Transfer to another job;
- e. Medical treatment beyond first aid;
- f. Loss of consciousness; or
- g. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (a) through (f) above

1.2.17 Government Property and Equipment

Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

1.2.18 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE accident occurs when any one or more of the eight elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents, even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, or roll over). Document an LHE mishap or accident using the NAVFAC prescribed Navy Crane Center (NCC) accident form. Document an LHE mishap using the Crane High Hazard working group mishap reporting form.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.] [for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

APP - Construction; G

Accident Prevention Plan (APP); G

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G

LHE Inspection Reports

SD-07 Certificates

Contractor Safety Self-Evaluation Checklist

Crane Operators/Riggers

Standard Lift Plan; G

Critical Lift Plan; G

Naval Architecture Analysis; G

Activity Hazard Analysis (AHA)

Confined Space Entry Permit

Hot Work Permit

Certificate of Compliance

Third Party Certification of Floating Cranes and Barge-Mounted Mobile Cranes

License Certificates

Radiography Operation Planning Work Sheet; G

Portable Gauge Operations Planning Worksheet; G

Machinery & Mechanized Equipment Certification Form

1.4 MONTHLY EXPOSURE REPORTS

Provide a Monthly Exposure Report and attach to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both Prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the voucher.

1.5 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

Not used.

1.6 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this Contract,

comply with the most recent edition of USACE EM 385-1-1, and all applicable federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.6.1 Subcontractor Safety Requirements

For this Contract, neither Contractor nor any subcontractor may enter into Contract with any subcontractor that fails to meet the following requirements. The term subcontractor in this and the following paragraphs means any entity holding a Contract with the Contractor or with a subcontractor at any tier.

1.6.1.1 Experience Modification Rate (EMR)

Subcontractors on this Contract must have an effective EMR less than or equal to 1.10, as computed by the National Council on Compensation Insurance (NCCI) or if not available, as computed by the state agency's rating bureau in the state where the subcontractor is registered, when entering into a subcontract agreement with the Prime Contractor or a subcontractor at any tier. The Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable EMR range cannot be achieved. Relaxation of the EMR range will only be considered for approval on a case-by-case basis for special conditions and must not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) must collect and maintain the certified EMR ratings for all subcontractors on the project and make them available to the Government at the Government's request.

1.6.1.2 OSHA Days Away from Work, Restricted Duty, or Job Transfer (DART) Rate

Subcontractors on this Contract must have a DART rate, calculated from the most recent, complete calendar year, less than or equal to 3.4 when entering into a subcontract agreement with the Prime Contractor or a subcontractor at any tier. The OSHA Dart Rate is calculated using the following formula:

$$(N/EH) \times 200,000$$

where:

N = number of injuries and illnesses with days away, restricted work, or job transfer

EH = total hours worked by all employees during most recent, complete calendar year

200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year)

The Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable OSHA Dart rate range cannot be achieved for a particular subcontractor. Relaxation of the OSHA DART

rate range will only be considered for approval on a case-by-case basis for special conditions and must not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) must collect and maintain self-certified OSHA DART rates for all subcontractors on the project and make them available to the Government at the Government's request.

1.7 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

1.7.1 Personnel Qualifications

1.7.1.1 Site Safety and Health Officer (SSHO)

Provide an SSHO that meets the requirements of EM 385-1-1 Section 1. The SSHO must ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Alternate SSHO must be at the work site at all times to implement and administer the Contractor's safety program and Government-accepted Accident Prevention Plan. The SSHO and Alternate SSHO must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO. When the SSHO is temporarily (up to 24 hours) off-site, a Designated Representative (DR), as identified in the AHA may be used in lieu of an Alternate SSHO, and must be on the project site at all times when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full time occupation.

1.7.1.1.1 Additional Site Safety and Health Officer (SSHO) Requirements and Duties

The SSHO may not serve as the Quality Control Manager. The SSHO may not serve as the Superintendent.

The SSHO must have completed a 40 hour contract safety awareness course based on the content and principles of EM 385-1-1, and instructed in accordance with the guidelines of ASSP Z490.1, by a trainer meeting the qualifications of paragraph QUALIFIED TRAINER REQUIREMENTS. If the SSHO does not have a current certification, certification must be obtained within 60 days, maximum, of Contract award.

1.7.1.2 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must be on-site at all times when the work that

presents the hazards associated with their professional expertise is being performed. Provide the credentials of the Competent Persons(s) to the Contracting Officer for information in consultation with the Safety Office.

1.7.1.2.1 Competent Person for Confined Space Entry

Provide a Confined Space (CP) Competent Person who meets the requirements of EM 385-1-1, Appendix Q, and herein. The CP for Confined Space Entry must supervise the entry into each confined space in accordance with EM 385-1-1, Section 34.

1.7.1.2.2 Competent Person for Scaffolding

Provide a Competent Person for Scaffolding who meets the requirements of EM 385-1-1, Section 22.B.02 and herein.

1.7.1.2.3 Competent Person for Fall Protection

Provide a Competent Person for Fall Protection who meets the requirements of EM 385-1-1, Section 21.C.04, 21.B.03, and herein.

1.7.1.3 Qualified Trainer Requirements

Individuals qualified to instruct the 40 hour contract safety awareness course, or portions thereof, must meet the definition of a Competent Person Trainer, and, at a minimum, possess a working knowledge of the following subject areas: EM 385-1-1, Electrical Standards, Lockout/Tagout, Fall Protection, Confined Space Entry for Construction; Excavation, Trenching and Soil Mechanics, and Scaffolds in accordance with 29 CFR 1926.450, Subpart L.

Instructors are required to:

- a. Prepare class presentations that cover construction-related safety requirements and includes topics covered in the NAVFAC Construction Safety Hazard Awareness Course for Contractors.
- b. Ensure that all attendees attend all sessions by using a class roster signed daily by each attendee. Maintain copies of the roster for at least five years. This is a certification class and must be attended 100 percent. In cases of emergency where an attendee cannot make it to a session, the attendee can make it up in another class session for the same subject.
- c. Update training course materials whenever an update of the EM 385-1-1 becomes available.
- d. Provide a written exam of at least 50 questions. Students are required to answer 80 percent correctly to pass.
- e. Request, review and incorporate student feedback into a continuous course improvement program.

1.7.1.4 Requirements for all Contractor Jobsite Personnel Holding H-1B or H-2B Visas:

Not used.

1.7.1.5 Dredging Contract Requirements

Not used.

1.7.1.6 Crane Operators/Riggers

Provide Operators, Signal Persons, and Riggers meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators and Signal Persons. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacities of 22,680 kg 50,000 pounds or greater, designate crane operators qualified by a source that qualifies crane operators (i.e., union, a Government agency, or an organization that tests and qualifies crane operators). Provide proof of current qualification.

Crane Operators must also meet the crane operator requirements of the State of Hawaii for Crane certification.

1.7.2 Personnel Duties

1.7.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

- a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.
- b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.
- c. Use and maintain OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and subcontractors, and make available to the Contracting Officer upon request. Post and maintain the Form 300A on the site Safety Bulletin Board.
- d. Maintain applicable safety reference material on the job site.
- e. Attend the pre-construction meeting conference, pre-work meetings including preparatory meetings, and periodic in-progress meetings.
- f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them.
- g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.
- h. Ensure subcontractor compliance with safety and health requirements.

- i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).
- j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.
- k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSHO are subject to dismissal if the above or any other required duties are not being effectively carried out. If either the Superintendent, QC Manager, or SSHO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

1.7.3 Meetings

1.7.3.1 Preconstruction Meeting Conference

- a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction meeting conference. This includes the project superintendent, Site Safety and Occupational Health Officer, quality control manager, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).
- b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the Contract. This list of proposed AHAs will be reviewed and an agreement will be reached between the Contractor and the Contracting Officer as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.
- c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for review prior to the start of construction. Work is not permitted to begin until an APP is established that is acceptable to the Contracting Officer.

1.7.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors at the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

1.8 ACCIDENT PREVENTION PLAN (APP)

Provide a site-specific Accident Prevention Plan (APP), including Activity Hazard Analyses (AHA), in accordance with EM 385-1-1 Appendix A, for the design team to follow during site visits and investigations. For subsequent visits, update the plan if there are changes in the personnel who will be attending, or the tasks to be performed. Submit the APP for review and acceptance by the Government at least 15 calendar days prior to the start of the design field work. Field work may not begin until the design APP is accepted by the Contracting Officer.

If the design scope includes borings or other subsurface investigations, include in the APP the type of field investigation and verification techniques, such as visual, local utility locating service scanning and third party/subcontractor scanning, potholing, or hand digging within two feet of a known utility that will be required. Mark underground utilities before starting any ground-disturbing actions. Notify the Contracting Officer 15 days prior to the start of soil borings or sub-surface investigations.

Prior to the start of construction incorporate the Design APP into the Construction APP so that one site specific APP exists for the project and submit to the Contracting Officer for acceptance.

1.8.1 APP - Construction

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A and show compliance with NASA NPR 8715.3. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the Contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP must be signed by an officer of the firm (Prime Contractor senior person), the individual preparing the APP, the on-site superintendent, the designated SSHO, the Contractor Quality Control Manager, and any designated Certified Safety Professional (CSP) or Certified Health Physicist (CIH). The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction meeting conference for acceptance. Submit the APP to the Contracting Officer within 30 calendar days of Contract award and not less than 10 calendar days

prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the Contract. Disregarding the provisions of this Contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the Contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSP A10.34), and the environment.

1.8.2 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

- a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.
- b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment and clothing to include selection, use and maintenance.

1.8.3 Plans

Provide plans in the APP in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

1.8.3.1 Confined Space Entry Plan

Develop a confined or enclosed space entry plan in accordance with EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive CPL 2.100, and any other federal, state and local regulatory requirements identified in this Contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by Contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

1.8.3.2 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of three months.

1.8.3.3 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. In addition, Critical Lift Plans are required for the following:

- a. Lifts over 50 percent of the capacity of barge mounted mobile crane's hoist.
- b. When working around energized power lines where the work will get closer than the minimum clearance distance in EM 385-1-1 Table 16-1.
- c. For lifts with anticipated binding conditions.
- d. When erecting cranes.

1.8.3.3.1 Critical Lift Plan Planning and Schedule

Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

1.8.3.3.2 Lifts of Personnel

In addition to the requirements of EM 385-1-1, Section 16.H.02, for lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

1.8.3.4 Barge Mounted Mobile Crane Lift Plan

Provide a Naval Architecture Analysis and include an LHE Manufacturer's Floating Service Load Chart in accordance with EM 385-1-1, Section 16.L.03.

1.8.3.5 Multi-Purpose Machines, Material Handling Equipment, and Construction Equipment Lift Plan

Multi-purpose machines, material handling equipment, and construction equipment used to lift loads that are suspended by rigging gear, require proof of authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Written approval from a qualified registered professional engineer, after a safety analysis is performed, is allowed in lieu of the OEM's approval. Demonstrate that the operator is properly trained and that the equipment is properly configured to make such lifts and is equipped with a load chart.

1.8.3.6 Fall Protection and Prevention (FP&P) Plan

The plan must be in accordance with the requirements of EM 385-1-1, Section 21.D and ASSP Z359.2, be site specific, and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 1.8 m 6 feet. A competent person or qualified person for fall protection must prepare and sign the plan documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, roles and responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Review and revise, as necessary, the Fall Protection and Prevention Plan documentation as conditions change, but at a minimum every six months, for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Plan documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Plan documentation in the Accident Prevention Plan (APP).

1.8.3.7 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSP Z359.2, and include in the FP&P Plan and as part of the APP. Include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility.

1.8.3.8 Hazardous Energy Control Program (HECP)

Develop a HECP in accordance with EM 385-1-1 Section 12, 29 CFR 1910.147, 29 CFR 1910.333, 29 CFR 1915.89, ASSP Z244.1, and ASSP A10.44. Submit this HECP as part of the Accident Prevention Plan (APP). Conduct a preparatory meeting and inspection with all effected personnel to coordinate all HECP activities. Document this meeting and inspection in accordance with EM 385-1-1, Section 12.A.02. Ensure that each employee is familiar with and complies with these procedures.

1.8.3.9 Excavation Plan

Identify the safety and health aspects of excavation, and provide and prepare the plan in accordance with EM 385-1-1, Section 25.A and Section 31 00 00 EARTHWORK.

1.8.3.10 Lead, Cadmium, and Chromium Compliance Plan

Identify the safety and health aspects of work involving lead, cadmium and chromium, and prepare in accordance with Section 02 83 00 LEAD REMEDIATION.

1.8.3.11 Asbestos Hazard Abatement Plan

Identify the safety and health aspects of asbestos work, and prepare in accordance

with Section 02 82 00 ASBESTOS REMEDIATION.

1.8.3.12 Site Safety and Health Plan

Identify the safety and health aspects, and prepare in accordance with Section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES.

1.8.3.13 Polychlorinated Biphenyls (PCB) Plan

Identify the safety and health aspects of Polychlorinated Biphenyls work, and prepare in accordance with Sections 02 84 33 REMOVAL AND DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCBs) and 02 61 23 REMOVAL AND DISPOSAL OF PCB CONTAMINATED SOILS.

1.8.3.14 Site Demolition Plan

Identify the safety and health aspects, and prepare in accordance with Section 02 41 00 [DEMOLITION] [AND] [DECONSTRUCTION] and referenced sources. Include engineering survey as applicable.

1.9 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least [15][]working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

1.9.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

1.9.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must review the

AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

1.10 DISPLAY OF SAFETY INFORMATION

1.10.1 Safety Bulletin Board

Prior to commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, may be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, Section 01.A.07. Additional items required to be posted include:

- a. Confined space entry permit.
- b. Hot work permit.

1.10.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

- a. Date deficiency identified;
- b. Description of deficiency;
- c. Name of person responsible for correcting deficiency;
- d. Projected resolution date;
- e. Date actually resolved.

1.11 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

1.12 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment in accordance with EM 385-1-1. Government has no responsibility to provide emergency medical treatment.

1.13 NOTIFICATIONS and REPORTS

1.13.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, or any property damage in accordance with NASA NPR 8621.1. For LHE or rigging mishaps, notify the Contracting Officer as soon as practical but not more than four hours after mishap. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

Within notification include Contractor name; Contract title; type of Contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any mishap.

1.13.2 Accident Reports

- a. Conduct an accident investigation for recordable injuries and illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the applicable NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS). Complete and submit an accident investigation report in ESAMS within 5 days for mishaps defined in EM 385-1-1 01.D.03 and 10 days for accidents defined by EM 385-1-1 01.D.05. Complete an investigation report within 30 days for those mishaps defined by EM 385-1-1 01.D.04. Mishaps defined by EM 385-1-1 01.D.04 and 01.D.05 must include a written report submitted as an attachment in ESAMS using the following outline: (1) Mishap summary description to include process, findings and outcomes; (2) Root Cause; (3) Direct Factors; (4) Indirect and Contributing Factors; (5) Corrective Actions; and (6) Recommendations. Complete the applicable USACE Accident Report Form 3394, and provide the report to the Contracting Officer within 5 calendar days of the accident. The Contracting Officer will provide copies of any required or special forms.
- b. Near Misses: For Navy Projects, complete the applicable documentation in NAVFAC Contractor Incident Reporting System (CIRS), and electronically submit via the NAVFAC Enterprise Safety Applications Management System (ESAMS). For Army projects, report all "Near Misses" to the GDA, using local mishap reporting procedures, within 24 hrs. The Contracting Officer will provide the Contractor the required forms. Near miss reports are considered positive and proactive Contractor safety management actions.
- c. Conduct an accident investigation for any load handling equipment accident (including rigging accidents) to establish the root cause(s) of the accident. Complete the LHE

Accident Report (Crane and Rigging Accident Report) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The Contracting Officer will provide a blank copy of the accident report form.

1.13.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.13.4 Certificate of Compliance and Pre-lift Plan/Checklist for LHE and Rigging

Provide a FORM 16-1 Certificate of Compliance for LHE entering an activity under this Contract and in accordance with EM 385-1-1. Post certifications on the crane.

Develop a Standard Lift Plan (SLP) in accordance with EM 385-1-1, Section 16.H.03 using Form 16-2 Standard Pre-Lift Crane Plan/Checklist for each lift planned. Submit SLP to the Contracting Officer for approval within 15 calendar days in advance of planned lift.

1.14 HOT WORK

1.14.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the Fire Division or department having jurisdiction. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. Provide at least two 9 kg 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency [Fire Division][] phone number. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE [FIRE DIVISION][] IMMEDIATELY.

1.14.2 Work Around Flammable Materials

Obtain permit approval from a NFPA Certified Marine Chemist, or Certified Industrial Hygienist for "HOT WORK" within or around flammable materials (such as fuel systems or welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, or vaults) that have the potential for flammable or explosive atmospheres.

Whenever these materials, except beryllium and chromium (VI), are encountered in

indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1, Section 06.H

1.15 RADIATION SAFETY REQUIREMENTS

Submit License Certificates, employee training records, and Leak Test Reports for radiation materials and equipment to the Contracting Officer and Radiation Safety Office (RSO), and Contracting Oversight Technician (COT) for all specialized and licensed material and equipment proposed for use on the construction project (excludes portable machine sources of ionizing radiation including moisture density and X-Ray Fluorescence (XRF)). Maintain on-site records whenever licensed radiological materials or ionizing equipment are on Government property.

Protect workers from radiation exposure in accordance with 10 CFR 20, ensuring any personnel exposures are maintained As Low As Reasonably Achievable.

1.15.1 Radiography Operation Planning Work Sheet

Submit a Gamma and X-Ray Radiography Operation Planning Work Sheet to Contracting Officer 14 days prior to commencement of operations involving radioactive materials or radiation generating devices. For portable machine sources of ionizing radiation, including moisture density and XRF, use and submit the Portable Gauge Operations Planning Worksheet instead. The Contracting Officer and COT will review the submitted worksheet and provide questions and comments.

Contractors must use primary dosimeters process by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory.

1.15.2 Site Access and Security

Coordinate site access and security requirements with the Contracting Officer and COT for all radiological materials and equipment containing ionizing radiation that are proposed for use on a government facility. For gamma radiography materials and equipment, a Government escort is required for any travels on the Installation. The Navy COT or Government authorized representative will meet the Contractor at a designated location outside the Installation, ensure safety of the materials being transported, and will escort the Contractor for gamma sources onto the Installation, to the job site, and off the Installation. For portable machine sources of ionizing radiation, including moisture density and XRF, the Navy COT or Government authorized representative will meet the Contractor at the job site.

Provide a copy of all calibration records, and utilization records to the COT for radiological operations performed on the site.

1.15.3 Loss or Release and Unplanned Personnel Exposure

Loss or release of radioactive materials, and unplanned personnel exposures must be reported immediately to the Contracting Officer, RSO, and Base Security Department Emergency Number.

1.15.4 Site Demarcation and Barricade

Properly demark and barricade an area surrounding radiological operations to preclude personnel entrance, in accordance with EM 385-1-1, Nuclear Regulatory Commission, and Applicable State regulations and license requirements, and in accordance with requirements established in the accepted Radiography Operation Planning Work Sheet.

Do not close or obstruct streets, walks, and other facilities occupied and used by the Government without written permission from the Contracting Officer.

1.15.5 Security of Material and Equipment

Properly secure the radiological material and ionizing radiation equipment at all times, including keeping the devices in a properly marked and locked container, and secondarily locking the container to a secure point in the Contractor's vehicle or other approved storage location during transportation and while not in use. While in use, maintain a continuous visual observation on the radiological material and ionizing radiation equipment. In instances where radiography is scheduled near or adjacent to buildings or areas having limited access or one-way doors, make no assumptions as to building occupancy. Where necessary, the Contracting Officer will direct the Contractor to conduct an actual building entry, search, and alert. Where removal of personnel from such a building cannot be accomplished and it is otherwise safe to proceed with the radiography, position a fully instructed employee inside the building or area to prevent exiting while external radiographic operations are in process.

1.15.6 Transportation of Material

Comply with 49 CFR 173 for Transportation of Regulated Amounts of Radioactive Material. Notify Local Fire authorities and the site Radiation Safety Officer (RSO) of any Radioactive Material use.

1.15.7 Schedule for Exposure or Unshielding

Actual exposure of the radiographic film or unshielding the source must not be initiated until after 5 p.m. on weekdays.

1.15.8 Transmitter Requirements

Adhere to the base policy concerning the use of transmitters, such as radios and cell phones. Obey Emissions control (EMCON) restrictions.

1.16 CONFINED SPACE ENTRY REQUIREMENTS

Confined space entry must comply with Section 34 of EM 385-1-1, OSHA 29 CFR 1926, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, and OSHA Directive CPL 2.100. Any potential for a hazard in the confined space requires a permit system to be used. [Contractors entering and working in confined spaces while performing shipyard industry work are required to follow the requirements of OSHA 29 CFR 1915 Subpart B.]

1.16.1 Entry Procedures

Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. Comply with EM 385-1-1, Section 34 for entry procedures. Hazards pertaining to the space must be reviewed with each employee during review of the AHA.

1.16.2 Forced Air Ventilation

Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its action level.

1.16.3 Sewer Wet Wells

Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

1.16.4 Rescue Procedures and Coordination with Local Emergency Responders

Develop and implement an on-site rescue and recovery plan and procedures. The rescue plan must not rely on local emergency responders for rescue from a confined space.

1.17 GAS PROTECTION

Not used.

1.18 HIGH NOISE LEVEL PROTECTION

Schedule operations that involve the use of equipment with output of high noise levels (i.e. jackhammers, air compressors, and explosive-actuated devices) for [weekends] [after duty working hours] during the hours 800 AM at 500 PM. Use of any such equipment must be approved in writing by the Contracting Officer prior to commencement of work.

1.19 DIVE SAFETY REQUIREMENTS

Not used.

1.20 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must comply with the applicable Storm Plan and:

- a. Secure outside equipment and materials and place materials that could be damaged in protected areas.
- b. Check surrounding area, including roof, for loose material, equipment, debris, and other

objects that could be blown away or against existing facilities.

- c. Ensure that temporary erosion controls are adequate.

PART 2 - PRODUCTS

Not Used

2.1 CONFINED SPACE SIGNAGE

Provide permanent signs integral to or securely attached to access covers for new permit-required confined spaces. Signs for confined spaces must comply with NEMA Z535.2. Provide signs with wording: "DANGER--PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" in bold letters a minimum of 25 mm one inch in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" must be red and readable from 1520 mm 5 feet.

PART 3 - EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be worn or carried/available on each person. Mandatory PPE includes:

- a. Hard Hat
- b. Long Pants
- c. Appropriate Safety Shoes
- d. Appropriate Class Reflective Vests

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. Develop an employee check-in/check-out communication procedure to ensure employee safety.

3.1.2 Hazardous Material Use

Each hazardous material must receive approval from the Contracting Office or their

designated representative prior to being brought onto the job site or prior to any other use in connection with this Contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material.

3.1.3 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this Contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

3.1.4 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to FAR 52.243-4 Changes and FAR 52.236-2 Differing Site Conditions.

3.2 UTILITY OUTAGE REQUIREMENTS

Apply for utility outages at least 14 days in advance. At a minimum, the written request must include the location of the outage, utilities being affected, duration of outage, any necessary sketches, and a description of the means to fulfill energy isolation requirements in accordance with EM 385-1-1, Section 11.A.02 (Isolation). Some examples of energy isolation devices and procedures are highlighted in EM 385-1-1, Section 12.D. In accordance with EM 385-1-1, Section 12.A.01, where outages involve Government or Utility personnel, coordinate with the Government on all activities involving the control of hazardous energy.

These activities include, but are not limited to, a review of HECP and HEC procedures, as well as applicable Activity Hazard Analyses (AHAs). In accordance with EM 385-1-1, Section 11.A.02 and NFPA 70E, work on energized electrical circuits must not be performed without prior Government authorization. Government permission is considered through the permit process and submission of a detailed AHA. Energized work permits are considered only when de-energizing introduces additional or increased hazard or when de-energizing is infeasible.

3.3 OUTAGE COORDINATION MEETING

After the utility outage request is approved and prior to beginning work on the utility system requiring shut-down, conduct a pre-outage coordination meeting in accordance with EM 385-1-1, Section 12.A. This meeting must include the Prime Contractor, the Prime and subcontractors performing the work, the Contracting Officer, and the [Installation representative][Public Utilities representative]. All parties must fully coordinate HEC activities with one another. During the coordination meeting, all parties must discuss and coordinate on the scope of work, HEC procedures (specifically, the lock-out/tag-out procedures for worker and utility protection), the AHA, assurance of trade personnel qualifications, identification of competent persons, and compliance with HECP training in accordance with EM 385-1-1, Section 12.C. Clarify when personal protective equipment is required during switching operations, inspection, and verification.

3.4 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Provide and operate a Hazardous Energy Control Program (HECP) in accordance with EM 385-1-1 Section 12, 29 CFR 1910.333, 29 CFR 1915.89, ASSP A10.44, NFPA 70E, and paragraph HAZARDOUS ENERGY CONTROL PROGRAM (HECP).

3.4.1 Safety Preparatory Inspection Coordination Meeting with the Government or Utility

For electrical distribution equipment that is to be operated by Government or Utility personnel, the Prime Contractor and the subcontractor performing the work must attend the safety preparatory inspection coordination meeting, which will also be attended by the Contracting Officer's Representative, and required by EM 385-1-1, Section 12.A.02. The meeting will occur immediately preceding the start of work and following the completion of the outage coordination meeting. Both the safety preparatory inspection coordination meeting and the outage coordination meeting must occur prior to conducting the outage and commencing with lockout/tagout procedures.

3.4.2 Lockout/Tagout Isolation

Where the Government or Utility performs equipment isolation and lockout/tagout, the Contractor must place their own locks and tags on each energy-isolating device and proceed in accordance with the HECP. Before any work begins, both the Contractor and the Government or Utility must perform energy isolation verification testing while wearing required PPE detailed in the Contractor's AHA and required by EM 385-1-1, Sections 05.I and 11.B. Install personal protective grounds, with tags, to eliminate the potential for induced voltage in accordance with EM 385-1-1, Section 12.E.06.

3.4.3 Lockout/Tagout Removal

Upon completion of work, conduct lockout/tagout removal procedure in accordance with the HECP. In accordance with EM 385-1-1, Section 12.E.08, each lock and tag must be removed from each energy isolating device by the authorized individual or systems operator who applied the device. Provide formal notification to the Government (by completing the Government form if provided by Contracting Officer's Representative), confirming that steps of de-energization and lockout/tagout removal procedure have been conducted and certified through inspection and verification. Government or Utility locks and tags used to support the Contractor's work will not be removed until the

authorized Government employee receives the formal notification.

3.5 FALL PROTECTION PROGRAM

Establish a fall protection program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify roles and responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures in accordance with ASSP Z359.2 and EM 385-1-1, Sections 21.A and 21.D.

3.5.1 Training

Institute a fall protection training program. As part of the Fall Protection Program, provide training for each employee who might be exposed to fall hazards and using personal fall protection equipment. Provide training by a competent person for fall protection in accordance with EM 385-1-1, Section 21.C. Document training and practical application of the competent person in accordance with EM 385-1-1, Section 21.C.04 and ASSP Z359.2 in the AHA.

3.5.2 Fall Protection Equipment and Systems

Enforce use of personal fall protection equipment and systems designated (to include fall arrest, restraint, and positioning) for each specific work activity in the Site Specific Fall Protection and Prevention Plan and AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21.

Provide personal fall protection equipment, systems, subsystems, and components that comply with EM 385-1-1 Section 21.I, 29 CFR 1926.500 Subpart M, ASSP Z359.0, ASSP Z359.1, ASSP Z359.2, ASSP Z359.3, ASSP Z359.4, ASSP Z359.6, ASSP Z359.7, ASSP Z359.11, ASSP Z359.12, ASSP Z359.13, ASSP Z359.14, ASSP Z359.15, ASSP Z359.16 and ASSP Z359.18.

3.5.2.1 Additional Personal Fall Protection Measures

In addition to the required fall protection systems, other protective measures such as safety skiffs, personal floatation devices, and life rings, are required when working above or next to water in accordance with EM 385-1-1, Sections 21.O through 21.O.06. Personal fall protection systems and equipment are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall protection systems are required when operating other equipment such as scissor lifts. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, travel, or while performing work.

3.5.2.2 Personal Fall Protection Equipment

Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. The use of body belts is not acceptable. Harnesses must have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Snap hooks and carabineers must be self-closing and self-locking, capable of

being opened only by at least two consecutive deliberate actions and have a minimum gate strength of 1633 kg 3,600 lbs in all directions. Use webbing, straps, and ropes made of synthetic fiber. The maximum free fall distance when using fall arrest equipment must not exceed 1.8 m 6 feet, unless the proper energy absorbing lanyard is used. Always take into consideration the total fall distance and any swinging of the worker (pendulum-like motion), that can occur during a fall, when attaching a person to a fall arrest system. Equip all full body harnesses with Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance in accordance with EM 385-1-1, Section 21.I.06.

3.5.3 Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

- (1) For work within 1.8 m 6 feet from unprotected edge of a roof having a slope less than or equal to 4:12 (vertical to horizontal), protect personnel from falling by the use of conventional fall protection systems (personal fall arrest/restraint systems, guardrails, or safety nets) in accordance with EM 385-1-1, Section 21 and 29 CFR 1926.500. A safety monitoring system is not adequate fall protection and is not authorized.
- (2) For work greater than 1.8 m 6 feet from the unprotected roof edge, addition to the use of conventional fall protection systems the use of a warning line system is also permitted, in accordance with 29 CFR 1926.500 and EM 385-1-1, Section 21.L.

b. Steep-Sloped Roofs: Work on a roof having a slope greater than 4:12 (vertical to horizontal) requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also applies to residential or housing type construction.

3.5.4 Horizontal Lifelines (HLL)

Provide HLL in accordance with EM 385-1-1, Section 21.I.08.d.2. Commercially manufactured horizontal lifelines (HLL) must be designed, installed, certified and used, under the supervision of a qualified person, for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500). The competent person for fall protection may (if deemed appropriate by the qualified person) supervise the assembly, disassembly, use and inspection of the HLL system under the direction of the qualified person. Locally manufactured HLLs are not acceptable unless they are custom designed for limited or site specific applications by a Registered Professional Engineer who is qualified in designing HLL systems.

3.5.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1, Section 21.F.01 and 29 CFR 1926 Subpart M.

3.5.6 Rescue and Evacuation Plan and Procedures

When personal fall arrest systems are used, ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue or assisted-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP). The plan must be in accordance with the requirements of EM 385-1-1, ASSP Z359.2, and ASSP Z359.4.

3.6 SHIPYARD REQUIREMENTS

Not Used.

3.7 WORK PLATFORMS

3.7.1 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Comply with the following requirements:

- a. Scaffold platforms greater than 6 m 20 feet in height must be accessed by use of a scaffold stair system.
- b. Ladders commonly provided by scaffold system manufacturers are prohibited for accessing scaffold platforms greater than 6 m 20 feet maximum in height.
- c. An adequate gate is required.
- d. Employees performing scaffold erection and dismantling must be qualified.
- e. Scaffold must be capable of supporting at least four times the maximum intended load, and provide appropriate fall protection as delineated in the accepted fall protection and prevention plan.
- f. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.
- g. Special care must be given to ensure scaffold systems are not overloaded.
- h. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to 4 times the width of the smallest dimension of the scaffold base.
- i. Scaffolding other than suspended types must bear on base plates upon wood mudsills (51 mm x 254 mm x 203 mm 2 in x 10 in x 8 in minimum) or other adequate firm

foundation.

- j. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than 1.83 meters 6 feet.
- k. Delineate fall protection requirements when working above 1.83 meters 6 feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.7.2 Elevated Aerial Work Platforms (AWPs)

Workers must be anchored to the basket or bucket in accordance with manufacturer's specifications and instructions (anchoring to the boom may only be used when allowed by the manufacturer and permitted by the CP). Lanyards used must be sufficiently short to prohibit worker from climbing out of basket. The climbing of rails is prohibited. Lanyards with built-in shock absorbers are acceptable. Self-retracting devices are not acceptable. Tying off to an adjacent pole or structure is not permitted unless a safe device for 100 percent tie-off is used for the transfer.

Use of AWP's must be operated, inspected, and maintained as specified in the operating manual for the equipment and delineated in the AHA. Operators of AWP's must be designated as qualified operators by the Prime Contractor. Maintain proof of qualifications on site for review and include in the AHA.

3.8 EQUIPMENT

3.8.1 Material Handling Equipment (MHE)

- a. Material handling equipment such as forklifts must not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Material handling equipment fitted with personnel work platform attachments are prohibited from traveling or positioning while personnel are working on the platform.
- b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions. Material Handling Equipment Operators must be trained in accordance with OSHA 29 CFR 1910, Subpart N.
- c. Operators of forklifts or power industrial trucks must be licensed in accordance with OSHA.

3.8.2 Load Handling Equipment (LHE)

The following requirements apply. In exception, these requirements do not apply to commercial truck mounted and articulating boom cranes used solely to deliver material and supplies (not prefabricated components, structural steel, or components of a systems-engineered metal building) where the lift consists of moving materials and supplies from a truck or trailer to the ground; to cranes installed on mechanics trucks that are used solely in the repair of shore-based equipment; to crane that enter the activity but are not used for lifting; nor to other machines not used to lift loads suspended by rigging equipment. However, LHE accidents occurring during

such operations must be reported.

- a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.
- b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated. Prior to cranes entering federal activities, a Crane Access Permit must be obtained from the Contracting Officer. A copy of the permitting process will be provided at the Preconstruction Meeting. Contractor's operator must remain with the crane during the spot check. Rigging gear must be in accordance with OSHA, ASME B30.9 Standards[and host country] safety standards.
- c. Comply with the LHE manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.
- d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, ASME B30.8 for floating cranes and floating derricks, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.
- e. When operating in the vicinity of overhead transmission lines, operators and riggers must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.
- f. Do not use crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.
- g. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.
- h. All employees must keep clear of loads about to be lifted and of suspended loads, except for employees required to handle the load.
- i. Use cribbing when performing lifts on outriggers.
- j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.
- k. A physical barricade must be positioned to prevent personnel access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.
- l. Maintain inspection records in accordance by EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.

- m. Maintain written reports of operational and load testing in accordance with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.
- n. Certify that all LHE operators have been trained in proper use of all safety devices (e.g. anti-two block devices).
- o. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. At wind speeds greater than 9 m/s 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated capacity if applicable. Include this maximum wind speed determination as part of the activity hazard analysis plan for that operation.
- p. Follow FAA guidelines when required based on project location.

3.8.3 Machinery and Mechanized Equipment

- a. Proof of qualifications for operator must be kept on the project site for review.
- b. Manufacture specifications or owner's manual for the equipment must be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.
- c. Submit a Machinery & Mechanized Equipment Certification Form to the Contracting Officer prior to being placed into use.

3.8.4 Base Mounted Drum Hoists

- a. Operation of base mounted drum hoists must be in accordance with EM 385-1-1 and ASSP A10.22.
- b. Rigging gear must be in accordance with applicable ASME/OSHA standards.
- c. When used on telecommunication towers, base mounted drum hoists must be in accordance with TIA-1019, TIA-222, ASME B30.7, 29 CFR 1926.552, and 29 CFR 1926.553.
- d. When used to hoist personnel, the AHA must include a written standard operating procedure. Operators must have a physical examination in accordance with EM 385-1-1 Section 16.B.05 and trained, at a minimum, in accordance with EM 385-1-1 Section 16.U and 16.T. The base mounted drum hoist must also comply with OSHA Instruction CPL 02-01-056 and ASME B30.23.
- e. Material and personnel must not be hoisted simultaneously.
- f. Personnel cage must be marked with the capacity (in number of persons) and load limit in kg pounds.

- g. Construction equipment must not be used for hoisting material or personnel or with trolley/tag lines. Construction equipment may be used for towing and assisting with anchoring guy lines.

3.8.5 Use of Explosives

Not used.

3.9 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

3.9.1 Utility Locations

Provide a third party, independent, private utility locating company to positively identify underground utilities in the work area in addition to any station locating service and coordinated with the station utility department.

3.9.2 Utility Location Verification

Physically verify underground utility locations, including utility depth, by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within one meter 3 feet of the underground system.

3.9.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever Contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

3.10 ELECTRICAL

Perform electrical work in accordance with EM 385-1-1, Sections 11 and 12.

3.10.1 Conduct of Electrical Work

As delineated in EM 385-1-1, electrical work is to be conducted in a de-energized state unless there is no alternative method for accomplishing the work. In those cases obtain an energized work permit from the Contracting Officer. The energized work permit application must be accompanied by the AHA and a summary of why the equipment/circuit needs to be worked energized. Underground electrical spaces must be

certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Attach temporary grounds in accordance with ASTM F855 and IEEE 1048. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator is allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method.

When working in energized substations, only qualified electrical workers are permitted to enter. When work requires work near energized circuits as defined by NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves and electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA. Ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

3.10.2 Qualifications

Electrical work must be performed by QP with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed, and must be identified in the appropriate AHA. Journeyman/Apprentice ratio must be in accordance with State, Local requirements applicable to where work is being performed.

3.10.3 Arc Flash

Conduct a hazard analysis/arc flash hazard analysis whenever work on or near energized parts greater than 50 volts is necessary, in accordance with NFPA 70E.

All personnel entering the identified arc flash protection boundary must be QPs and properly trained in NFPA 70E requirements and procedures. Unless permitted by NFPA 70E, no Unqualified Person is permitted to approach nearer than the Limited Approach Boundary of energized conductors and circuit parts. Training must be administered by an electrically qualified source and documented.

3.10.4 Grounding

Ground electrical circuits, equipment and enclosures in accordance with NFPA 70 and IEEE C2 to provide a permanent, continuous and effective path to ground unless otherwise noted by EM 385-1-1.

Check grounding circuits to ensure that the circuit between the ground and a grounded power conductor has a resistance low enough to permit sufficient current flow to allow the fuse or circuit breaker to interrupt the current.

3.10.5 Testing

Temporary electrical distribution systems and devices must be inspected, tested and

found acceptable for Ground-Fault Circuit Interrupter (GFCI) protection, polarity, ground continuity, and ground resistance before initial use, before use after modification and at least monthly. Monthly inspections and tests must be maintained for each temporary electrical distribution system, and signed by the electrical CP or QP.

-- End of Section --

SECTION 01 45 00.00 10 QUALITY CONTROL

11/16, CHG 2: 11/21

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 D3740	(2019) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2021) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1110-1-12	(2006; Change 1) Engineering and Design -- Quality Management

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program. Include all associated costs in the applicable [Bid] [Pricing] Schedule item.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.] [for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Quality Control (CQC) Plan; G

SD-05 Design Data

Discipline-Specific Checklists Design

Quality Control

SD-06 Test Reports
Verification Statement

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system that complies with FAR 52.246-12 Inspection of Construction. QC consist of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system covers all design and construction operations, both onsite and offsite, and be keyed to the proposed design and construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CONTRACTOR QUALITY CONTROL (CQC) PLAN

Submit no later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements FAR 52.246-12 Inspection of Construction. The Government will consider an interim plan for the first 60 days of operation. Construction Design and construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all design and construction-operations, both onsite and offsite, including work by subcontractors designers of record, consultants, architect/engineers (AE), fabricators, suppliers and purchasing agents:

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports to an individual other than the project superintendent. The individual should be outside of the project superintendent's chain of command and must be shown as at least one level above the project superintendent in the chain of command.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

- c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Furnish copies of these letters to the Contracting Officer.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
- e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer are required to be used.)
- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
- g. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
- h. Reporting procedures, including proposed reporting formats.
- i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of the specifications can generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.
- j. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections. Where the applicable code issued by the International Code Council (ICC) calls for inspections by the Building Official, the Contractor must include the inspections in the Quality Control Plan and must perform the inspections required by the applicable ICC. The Contractor must perform these inspections using independent qualified inspectors. Include the Special Inspection Plan requirements in the QC Plan.

3.2.2 Additional Requirements for Design Quality Control (DQC) Plan

Not used.

3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory

performance during the design and construction. The Government reserves the right to require the Contractor to make changes in the Contractor Quality Control(CQC) Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference/Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 30 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There can be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a Safety and Health Manager, CQC System Manager, and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible for maintaining these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC

matters for the Contractor. The CQC System Manager is required to be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 5 years construction experience on construction similar to this Contract. This CQC System Manager is on the site at all times during construction and is employed by the prime Contractor. The CQC System Manager is assigned no other duties. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: [electrical,] [mechanical,] [civil,] [structural,] [environmental,] [architectural,] [materials technician,] [submittals clerk,] [Cx Agent/LEED Specialist,] [occupied family housing coordinator]. These individuals or specialized technical companies [are directly employed by the prime Contractor and can not be employed by a supplier or subcontractor on this project] [are employees of the prime or subcontractor]; be responsible to the CQC System Manager; be physically present at the construction site during work on the specialized personnel's areas of responsibility; have the necessary education or experience in accordance with the experience matrix listed herein. These individuals [have no other duties other than quality control] [can perform other duties but need to be allowed sufficient time to perform the specialized personnel's assigned quality control duties as described in the Quality Control Plan]. [A single person can cover more than one area provided that the single person is qualified to perform quality control activities in each designated and that workload allows.]

Experience Matrix	
Area	Qualifications
Civil	Graduate Civil Engineer or Construction Manager with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
Mechanical	Graduate Mechanical Engineer with 5 years of experience supervising mechanical features of work in the field with a construction company
Electrical	Graduate Electrical Engineer with with two years related experience or person 5 years of experience supervising electrical features of work in the field with a construction company

Structural	Graduate Civil Engineer (with Structural Track or Focus) or Construction Manager with 2 years experience or person 5 years of experience supervising structural features of work in the field with a construction company
Architectural	Graduate Architect with 2 years experience or person with 5 years related experience
Environmental	Graduate Environmental Engineer with 3 years experience
Submittals	Submittal Clerk with 1 year experience
Concrete, Pavements and Soils	Materials Technician with 2 years experience for the appropriate area
Testing, Adjusting and Balancing (TAB) Personnel	Specialist must be a member of AABC or an experienced technician of the firm certified by the NEBB

3.4.4 Additional Requirement

In addition to the above experience and education requirements, the Contractor Quality Control(CQC) System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Contractors course. If the CQC System Manager does not have a current certification, obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

The Construction Quality Management Training certificate expires after 5 years. If the CQC System Manager's certificate has expired, retake the course to remain current.

3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, have to comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 01 91 00.15 10 TOTAL BUILDING COMMISSIONING are included in the contract, the submittals required by those sections have to be coordinated with Section 01 33 00 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

CQC is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

- a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.
 - b. Review of the Contract drawings.
 - c. Check to assure that all materials and equipment have been tested, submitted, and approved.
 - d. Review of provisions that have been made to provide required control inspection and testing.
 - e. Review Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.
- [e] [f]. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.
- [f] [g]. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- [g] [h]. Review of the appropriate activity hazard analysis to assure safety requirements are met.
- [h] [i]. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- [i] [j]. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.
- [j] [k]. Discussion of the initial control phase.
- [k] [l]. The Government needs to be notified at least 48 hours in advance of

beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

- a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing are in compliance with the contract.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The Government needs to be notified at least 48 hours in advance of beginning the initial phase for definable feature of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with follow-up phases.
- g. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
- h. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and acceptance tests when specified. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this Contract.

3.7.2 Testing Laboratories

All testing laboratories must be validated by the USACE Material Testing Center (MTC) for the tests to be performed. Information on the USACE MTC with web-links to both a list of validated testing laboratories and for the laboratory inspection request for can be found at: <https://mtc.erdc.dren.mil/>.

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel is required to meet criteria detailed

in ASTM D3740 and ASTM E329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of all associated fees to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the Contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC System Manager near the end of the work, or any increment of the work established by a time stated in FAR 52.211-10 Commencement, Prosecution, and Completion of Work, or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative is required to be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands can also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14 days prior to the final acceptance

inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the Contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance FAR 52.246-12 Inspection of Construction.

3.9 DOCUMENTATION

3.9.1 Quality Control Activities

Maintain current records providing factual evidence that required quality control activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

- a. The name and area of responsibility of the Contractor/Subcontractor.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
- d. Test and control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.
- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals and deliverables reviewed, with Contract reference, by whom, and action taken.
- g. Offsite surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and specifications.
- j. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identification of the Independent Technical Review (ITR) team, the ITR review comments, responses and the record of resolution of the comments.

3.9.2 Verification Statement

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Government daily within [] hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every 7 days of no

work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the Contractor Quality Control(CQC) System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

SECTION 01 58 00 PROJECT IDENTIFICATION

08/19, CHG 4: 05/22

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 WOOD PROTECTION ASSOCIATION (AWPA)

AWPA C1	(2003) All Timber Products - Preservative Treatment by Pressure Processes

AWPA C2	(2003) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 310-1-6a	(2006; 2019 Change 2) Project Operation -- Sign Standards Manual, VOL 1

EP 310-1-6b	(2006) Sign Standards Manual, VOL 2, Appendices

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Preliminary One Line Drawings Of Project Rendering; G

Preliminary Drawing Indicating Layout And Text Content; G

Sign Legend Orders; G

SD-04 Samples

Final Rendering Sample; G

Final Framed Rendering and Copies; G

Facility Recognition Plaque; G

1.3 QUALITY CONTROL

1.3.1 Rendering

Provide the project rendering in accordance with the following drawing stages as required in the SUBMITTALS paragraph. The following submittal data is required to properly identify the appropriate view and approve the final rendering of the facility. The final painted rendering will be used to produce the image for the signboard and framed photographic copies provided to the Contracting Officer.

1.3.1.1 Preliminary One Line Drawings

Provide three different views of the facility in a preliminary single line drawing (black and white) format. These three views will represent the best angles at which to view the proposed facility showing the best design features and the three dimensional character of the facility.

1.3.1.2 Final Rendering Sample

Provide a photographic copy (200 by 250 millimeters8 by 10 inches minimum size) of final rendering for approval of color, landscaping, and foreground/background development prior to final submittal.

1.3.1.3 Final Framed Rendering and Copies

Provide final full color rendering of the proposed facility as specified.

1.3.2 Facility Recognition Plaque

Submit full size drawing of Facility Recognition Plaque for approval. Confirm the content (message), location and mounting with Contracting Officer prior to fabrication. The final names on the plaque will be determined at the end of the project duration to assure that current participants can be identified and recognized on the plaque.

1.4 PROJECT IDENTIFICATION SIGN

Prior to initiating any work on site, provide one project identification sign at the location [indicated] [designated]. Construct the sign in accordance with project sign detail, which can be downloaded at: <http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-tables>. Maintain sign throughout the life of the project. Upon completion of the project, remove the sign from the site. [The Government will temporarily supply a copy of the rendering to use in the production of the final signboard artwork.] [Provide color rendering of the project. Reproduce the rendering on the signboard or enclose a copy of the rendering under a water-proof, transparent cover, and caulk for weather protection.]

1.4.1 Project Identification Signboard

Not required.

1.4.2 Project Signboard

Not used

1.4.3 Construction Project Signs

Furnish the construction project sign package, maintain the signs during construction, and remove the signs from the job site upon completion of the project. The construction project sign package consists of two signs: one for project identification and the other to show the on-the-job safety performance of the contractor. Ensure that the package conforms to the requirements of EP 310-1-6a and EP 310-1-6b, specifically Section 16. Submit the sign legend orders as described in Section 16 of EP 310-1-6a before erecting the signs.

Furnish project sign in accordance with ECB 2020-1 Attachment A Example Graphic of Signage with Dimensions for MILCON Project.

Utilize the Example Graphic of Signage with Dimensions for MILCON Project and follow USACE policy provided in Engineering Pamphlet (EP) 310-1-6a, Sign Standards Manual, VOL 1 for guidelines on fabricating, locating, and mounting construction project signs (https://www.publications.usace.army.mil/Portals/76/Users/182/86/2486/EP_310-1-6a%20change%202.pdf).

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

-- End of Section --

SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

02/19, CHG 3: 11/21

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.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 273	Standards for Universal Waste Management
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Co-mingle

The practice of placing unrelated materials together in a single container, usually for benefits of convenience and speed.

1.2.2 Construction Waste

Waste generated by construction activities, such as scrap materials, damaged or spoiled materials, temporary and expendable construction materials, and other waste generated by the workforce during construction activities.

1.2.3 Demolition Debris/Waste

Waste generated from demolition activities, including minor incidental demolition waste materials generated as a result of intentional dismantling of all or portions of a building, to include clearing of building contents that have been destroyed or damaged.

1.2.4 Disposal

Depositing waste in a solid waste disposal facility, usually a managed landfill or incinerator, regulated in the US under the Resource Conservation and Recovery Act (RCRA).

1.2.5 Diversion

The practice of diverting waste from disposal in a landfill or incinerator, by means of eliminating or minimizing waste, or reuse of materials.

1.2.6 Final Construction Waste Diversion Report

A written assertion by a material recovery facility operator identifying constituent

materials diverted from disposal, usually including summary tabulations of materials, weight in short-ton.

1.2.7 Recycling

The series of activities, including collection, separation, and processing, by which products or other materials are diverted from the solid waste stream for use in the form of raw materials in the manufacture of new products sold or distributed in commerce, or the reuse of such materials as substitutes for goods made of virgin materials, other than fuel.

1.2.8 Reuse

The use of a product or materials again for the same purpose, in its original form or with little enhancement or change.

1.2.9 Salvage

Usable, salable items derived from buildings undergoing demolition or deconstruction, parts from vehicles, machinery, other equipment, or other components.

1.2.10 Source Separation

The practice of administering and implementing a management strategy to identify and segregate unrelated waste at the first opportunity.

1.3 CONSTRUCTION WASTE (INCLUDES DEMOLITION DEBRIS/WASTE)

Divert a minimum of 60 percent by weight of the project construction waste and demolition debris/waste from the landfill or incinerator. Follow applicable industry standards in the management of waste. Apply sound environmental principles in the management of waste. (1) Practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction waste and demolition debris/waste from landfills and incinerators and to facilitate the recycling or reuse of excess construction materials.

1.4 CONSTRUCTION WASTE MANAGEMENT

Implement a Construction Waste Management Program for the project. Take a proactive, responsible role in the management of construction construction waste, recycling process, disposal of demolition debris/waste, and require all subcontractors, vendors, and suppliers to participate in the Construction Waste Management Program. Establish a process for clear tracking, and documentation of construction waste and demolition debris/waste.

1.4.1 Implementation of Construction Waste Management Program

Develop and document how the Construction Waste Management Program will be implemented in a Construction Waste Management Plan. Submit a Construction Waste Management Plan to the Contracting Officer for approval. Construction waste and demolition debris/waste materials include un-used construction materials not

incorporated in the final work, as well as demolition debris/waste materials from demolition activities or deconstruction activities. In the management of waste, consider the availability of viable markets, the condition of materials, the ability to provide material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates.

1.4.2 Oversight

The Quality Control Manager, as specified in Section 01 45 00.00 10 QUALITY CONTROL, is responsible for overseeing and documenting results from executing the Construction Waste Management Plan for the project. The Environmental Manager, as specified in Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, is responsible for overseeing and documenting results from executing the Construction Waste Management Plan for the project.

1.4.3 Special Programs

Implement special programs involving rebates or similar incentives related to recycling of construction waste and demolition debris/waste materials. Retain revenue or savings from salvaged or recycling, unless otherwise directed. Ensure firms and facilities used for recycling, reuse, and disposal are permitted for the intended use to the extent required by federal, state, and local regulations.

1.4.4 Special Instructions

Provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the projects. Designation of single source separating or commingling will be clearly marked on the containers.

1.4.5 Waste Streams

Delineate waste streams and characterization, including estimated material types and quantities of waste, in the Construction Waste Management Plan. Manage all waste streams associated with the project. Typical waste streams are listed below. Include additional waste streams not listed:

- a. Land Clearing Debris
- b. Asphalt
- c. Masonry and CMU
- d. Concrete
- e. Metals (Includes, but is not limited to, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, bronze.)
- f. Wood (nails and staples allowed)
- g. Glass

- h. Paper
- i. Plastics (PET, HDPE,PVC,LDPE,PP,PS, Other)
- j. Gypsum
- k. Non-hazardous paint and paint cans
- l. Carpet
- m. Ceiling Tiles
- n. Insulation
- o. Beverage Containers

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Waste Management Plan; G

SD-06 Test Reports

Quarterly Reports

Annual Report

SD-11 Closeout Submittals

Final Construction Waste Diversion Report; S

1.6 MEETINGS

Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed Construction Waste Management Plan and to develop a mutual understanding relative to the management of the Construction Waste Management Program and how waste diversion requirements will be met.

The requirements of this meeting may be fulfilled during the coordination and mutual Understanding meeting outlined in Section 01 45 00.00 10 01 45 00.00 20 01 45 00.00 40 QUALITY CONTROL. At a minimum, discuss and document waste management goals at following meetings:

- a. [Preconstruction] [Pre-demolition] meeting.
- b. Regular [site] [Quality Control] meetings.
- c. Work safety meeting (if applicable).

1.7 CONSTRUCTION WASTE MANAGEMENT PLAN

Submit Construction Waste Management Plan within 45 calendar days after notice to proceed. Revise and resubmit Construction Waste Management Plan as necessary, in order for construction to begin.]. [Submit Construction Waste Management Plan not less than 60 calendar days before scheduled final site or building design approval.

Revise and resubmit Construction Waste Management Plan until it receives final approval from the Contracting Officer, in order for construction to begin. Execute demolition or deconstruction activities in accordance with Section 02 41 00 DEMOLITION. Manage demolition debris/waste or deconstruction materials in accordance with the approved construction waste management plan.

An approved Construction Waste Management Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Ensure all subcontractors receive a copy of the approved Construction Waste Management Plan. The plan demonstrates how to meet the project waste diversion requirement. Also, include the following in the plan:

- a. Identify the names of individuals responsible for waste management and waste management tracking, along with roles and responsibilities on the project.
- b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.
- c. Description of the regular meetings to be held to address waste management.
- d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of materials.
- e. Name of landfill and incinerator to be used.
- f. Identification of local and regional re-use programs, including non-profit organizations such as schools, local housing agencies, and organization that accept used materials such as material exchange networks and resale stores. Include the name, location, phone number for each re-use facility identified, and provide a copy of the permit or license for each facility.
- g. List of specific materials, by type and quantity, that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Identify the recycling facilities by name, address, and phone number.

- h. Identification of materials that cannot be recycled or reused with an explanation or justification, to be approved by the Contracting Officer.
- i. Description of the means by which materials identified in item (g) above will be protected from contamination.
- j. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).
- k. Copy of training plan for subcontractors and other services to prevent contamination by co-mingling materials identified for diversion and waste materials.
- l. Identification of at least [5] [] construction or demolition material streams for diversion.
- m. Detailed plan and distribution of waste diversion between buildings, when project is a part of a campus.
- n. Facilities or subcontractors offering construction waste transport on-site or off-site must ensure that proper shipping orders, bill of lading, manifests, or other shipping documents containing waste diversion information meet requirements of 40 CFR 273 Universal Waste Management, 49 CFR 173 Shippers - General Requirements for Shipments and Packagings, and 49 CFR 178 Specifications for Packaging. Individuals signing manifests or other shipping documents should meet the minimum training requirements.
- o. List each supplier who deliver construction materials, in bulk, or package products in returnable containers or returnable packaging, or have take-back programs. List each program and the applicable material to actively monitor and track to assist in meeting waste diversion requirements on the project.]
- p. Identify local jurisdiction requirements for waste management. Include local requirements and points of contact.]

Distribute copies of the waste management plan to each subcontractor, Quality Control Manager Environmental Manager, and the Contracting Officer.

1.8 RECORDS (DOCUMENTATION)

1.8.1 General

Maintain records to document the types and quantities of waste generated and diverted through re-use, recycling and sale to third parties; through disposal to a landfill or incinerator facility. Provide explanations for materials not recycled, reused or sold. Collect and retain manifests, weight tickets, sales receipts, and invoices specifically identifying diverted project waste materials or disposed materials.

1.8.2 Accumulated

Maintain a running record of materials generated and diverted from landfill disposal,

including accumulated diversion rates for the project. Make records available to the Contracting Officer during construction or incidental demolition activities. Provide a copy of the diversion records to the Contracting Officer upon completion of the construction, incidental demolitions or minor deconstruction activities.

1.9 REPORTS

1.9.1 General

Maintain current construction waste diversion information on site for periodic inspection by the Contracting Officer. Include in the quarterly reports, annual reports and final reports: the project name, contract information, information for waste generated, diverted and disposed of for the current reporting period and show cumulative totals for the project. Reports must identify quantities of waste by type and disposal method. Also include in each report, supporting documentation to include manifests, weigh tickets, receipts, and invoices specifically identifying the project and waste material type and weighted sum.

1.9.2 Quarterly Reporting

Provide cumulative reports at the end of each quarter (December, March, June, and September, corresponding with the federal fiscal year for reporting purposes). Submit quarterly reports not later than 15 calendar days after the preceding quarter has ended. [Submit Quarterly Reports to the appropriate office or identified point of contact.]

1.9.3 Annual Reporting

Provide a cumulative construction waste diversion report annually. Submit annual report not later than 30 calendar days after the preceding fourth quarter has ended.[Provide copy of annual construction waste diversion report to the installation POC.]

1.10 FINAL CONSTRUCTION WASTE DIVERSION REPORT

A Final Construction Waste Diversion Report is required at the end of the project. Provide Final Construction Waste Diversion Report 60 days prior to the Beneficial Occupancy Date (BOD). The final Construction Waste Diversion Report must be included in the Sustainability eNotebook in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING.

1.11 COLLECTION

Collect, store, protect, and handle reusable and recyclable materials at the site in a manner which prevents contamination, and provides protection from the elements to preserve their usefulness and monetary value. Provide receptacles and storage areas designated specifically for recyclable and reusable materials and label them clearly and appropriately to prevent contamination from other waste materials. Keep receptacles or storage areas neat and clean.

Train subcontractors and other service providers to either separate waste streams or use the co-mingling method as described in the Construction Waste Management Plan. Handle hazardous waste and hazardous materials in accordance with applicable

regulations and coordinate with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS and Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS. Separate materials by one of the following methods described herein:

1.11.1 Source Separation Method

Separate waste products and materials that are recyclable from trash and sort as described below into appropriately marked separate containers and then transport to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the category types as defined in the Construction Waste Management Plan.

1.11.2 Co-Mingled Method

Place waste products and recyclable materials into a single container and then transport to an authorized recycling facility, which meets all applicable requirements to accept and dispose of recyclable materials in accordance with all applicable local, state and federal regulations. The Co-mingled materials must be sorted and processed in accordance with the approved Construction Waste Management Plan.

1.11.3 Other Methods

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.12 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures as described in the waste management plan. Except as otherwise specified in other sections of the specifications, dispose of in accordance with the following:

1.12.1 Reuse

Give first consideration to reusing construction and demolition materials as a disposition strategy. Recover for reuse materials, products, and components as described in the approved Construction Waste Management Plan. Coordinate with the Contracting Officer to identify onsite reuse opportunities or material sales or donation available through Government resale or donation programs. Sale of recovered materials [is] [is not] allowed on the Installation. Consider the use of surplus industrial supply broker services, who match entities with reusable or repurpose industrial materials with entities with need of such materials.

1.12.2 Recycle

Recycle non-hazardous construction and demolition/debris materials that are not suitable for reuse. Track rejection of contaminated recyclable materials by the recycling

facility. Rejected recyclables materials will not be counted as a percentage of diversion calculation. Recycle all fluorescent lamps, HID lamps, mercury (Hg) -containing thermostats and ampoules, and PCBs-containing ballasts and electrical components as directed by the Contracting Officer. Do not crush lamps on site as this creates a hazardous waste stream with additional handling requirements.

1.12.3 Compost

Consider composting on site if a reasonable amount of compostable materials will be available and a utilization of compostable material can be determined and appropriately planned for. Compostable materials include plant materials, sawdust and certain food scraps. Composting as a strategy must be explicitly addressed in the Construction Waste Management Plan submitted for approval to ensure it is feasible.

1.12.4 Waste

Dispose by landfill or incineration only those waste materials with no practical use, economic benefit, or recycling opportunity.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

-- End of Section --

SECTION 01 78 00 CLOSEOUT SUBMITTALS

05/19, CHG 1: 08/21

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 E1971	(2005; R 2011) Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings

GREEN SEAL (GS)

GS-37	(2017) Cleaning Products for Industrial and Institutional Use

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-1-2909	(2012) Engineering and Design -- Geospatial Data and Systems

ERDC/ITL TR-12-1	(2015) A/E/C Graphics Standard, Release 2.0

ERDC/ITL TR-12-6	(2015) A/E/C CAD Standard - Release 6.0

U.S. DEPARTMENT OF DEFENSE (DOD)

FC 1-300-09N	(2014; with Change 4, 2018) Navy and Marine Corps Design

UFC 1-300-08	(2009; with Change 2, 2011) Criteria for Transfer and Acceptance of DoD Real Property

1.2 DEFINITIONS

1.2.1 As-Built Drawings

As-built drawings are the marked-up drawings, maintained by the Contractor on-site, that depict actual conditions and deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to submitted Requests for Information (RFI's); direction from the Contracting Officer; design that is the responsibility of the Contractor, and differing site conditions. Maintain the as-builts throughout construction as[red-lined hard copies on site] [and] [or] [red-lined PDF files]. These files serve as the basis for the creation of the record drawings.

1.2.2 Record Drawings

The record drawings are the final compilation of actual conditions reflected in the as-built drawings.

1.2.3 Record Model

Not used.

1.2.4 Advanced Modeling

Not used.

1.2.5 USACE CAD/BIM Technology Center

Not used.

1.3 SOURCE DRAWING FILES

Request the full set of electronic drawings, in the source format, for Record Drawing preparation, after award and at least 30 days prior to required use.

1.3.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction [drawings and]data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CAD drawing files are not construction documents. Differences may exist between the CAD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CAD files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction [drawings and]data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

1.4 RECORD DRAWINGS

The Government will provide pdf and or program files at the preconstruction conference that contains one set of "as-designed" electronic CAD files in the specified software and format revised to reflect all amendments and the final contract PDF drawings. The CAD files are provided to enable preparation of as-built or as-constructed drawings. If discrepancies exist between the CAD files and the contract PDF drawings, correct the CAD files to show the contract PDF drawings.

1.4.1 Variation with Contract Drawings

The electronic files provided are not part of the contract documents. If there is any discrepancy between the electronic files and the contract drawings, the contract drawings govern. The Government has no responsibility to modify any GFM due to changes in the design that occur after award.

Evaluate the content and quality of the GFM upon receipt. If major discrepancies or omissions occur in the GFM, notify the Contracting Officer and indicate the nature of such variations.

1.4.2 Data Loss, Corruption, and Error

Transfer of GFM files may result in corrupted files resulting in data loss and errors. Use of GFM files at own risk. Verify data integrity upon receipt and request a replacement if necessary. Make any adjustment in file structure, format, or software version as needed to make GFM compatible with computer systems and/or software to meet the requirements of the contract.

1.4.3 Modeling Completeness and Quality

The Government makes no guarantee that the GFM provide the level of completeness or quality as required by the contract. Further, the Government makes no guarantee that identified variations will be corrected upon notification.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.] [for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Warranty Management Plan

Warranty Tags

Final Cleaning

Spare Parts Data

SD-08 Manufacturer's Instructions

Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

SD-11 Closeout Submittals

As-Built Drawings; G

Record Drawings; G

Record Model; G

As-Built Record of Equipment and Materials

Final Approved Shop Drawings; G

Construction Contract Specifications; G

Certification of EPA Designated Items; G

Certification Of USDA Designated Items; G

Interim DD FORM 1354; G

Checklist for DD FORM 1354; G

High Performance and Sustainable Building (HPSB) Checklist; G

1.6 SPARE PARTS DATA

Submit two copies of the Spare Parts Data list.

- a. Indicate manufacturer's name, part number, and stock level required for test and balance, pre-commissioning, maintenance and repair activities. List those items that may be standard to the normal maintenance of the system.
- b. At acceptance of commissioning, ensure the required stock level is supplied as indicated in subparagraph a for maintenance and repair activities through the facilities warranty period. Provision of spare parts does not relieve the Contractor of responsibilities listed under the contract guarantee provisions.

1.7 QUALITY CONTROL

Additions and corrections to the contract drawings must be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols must [conform to ERDC/ITL TR-12-6][be the same as the original line colors, line weights, lettering, layering conventions, and symbols].

1.8 WARRANTY MANAGEMENT

1.8.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to FAR 52.246-21 Warranty of Construction. At least 30 days before the planned pre-warranty conference, submit four sets of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan narrative must contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was accomplished. Submit warranty information, made available during the construction phase, to the Contracting Officer for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period must begin on the date of project acceptance and continue for the full product warranty period. Conduct a joint 4 month and 9 month warranty inspection, measured from time of acceptance; with the Contractor, Contracting Officer and the Customer Representative. The warranty management plan must include, but is not limited to, the following:

- a. Roles and responsibilities of personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subcontractors, manufacturers or suppliers involved.
- b. For each warranty, the name, address, telephone number, and e-mail of each of the guarantor's representatives nearest to the project location.
- c. A list and status of delivery of Certificates of Warranty for extended warranty items, including roofs, HVAC balancing, pumps, motors, transformers, and for commissioned systems, such as fire protection and alarm systems, sprinkler systems, and lightning protection systems.
- d. As-Built Record of Equipment and Materials list for each warranted equipment, item, feature of construction or system indicating:
 - (1) Name of item.
 - (2) Model and serial numbers.
 - (3) Location where installed.
 - (4) Name and phone numbers of manufacturers or suppliers.
 - (5) Names, addresses and telephone numbers of sources of spare parts.
 - (6) Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have warranties longer than one year must be indicated with separate warranty expiration dates.
 - (7) Cross-reference to warranty certificates as applicable.
 - (8) Starting point and duration of warranty period.
 - (9) Summary of maintenance procedures required to continue the warranty in force.
 - (10) Cross-reference to specific pertinent Operation and Maintenance manuals.

- (11) Organization, names and phone numbers of persons to call for warranty service.
- (12) Typical response time and repair time expected for various warranted equipment.

- e. The plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.
- f. Procedure and status of tagging of equipment covered by warranties longer than one year.
- g. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty or safety reasons.

1.8.2 Performance Bond

The Performance Bond must remain effective throughout the construction and warranty period.

- a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.
- b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.
- c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral instructions. Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.

1.8.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. At this meeting, establish and review communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact must be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.8.4 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the Contracting Officer, respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and back charge the construction warranty payment item established.

- a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.
- b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.
- c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.
- d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Life Safety Systems

- (1) Fire suppression systems.
- (2) Fire alarm system(s) in place in the building.

Code 1-Air Conditioning Systems

- (1) Recreational support.
- (2) Air conditioning leak in part of building, if causing damage.
- (3) Air conditioning system not cooling properly.

Code 1-Doors

- (1) Overhead doors not operational, causing a security, fire, or safety problem.
- (2) Interior, exterior personnel doors or hardware, not functioning properly, causing a security, fire, or safety problem.

Code 3-Doors

- (1) Overhead doors not operational.
- (2) Interior/exterior personnel doors or hardware not functioning properly.

Code 1-Electrical

- (1) Power failure (entire area or any building operational after 1600 hours).
- (2) Security lights
- (3) Smoke detectors

Code 2-Electrical

- (1) Power failure (no power to a room or part of building).
- (2) Receptacle and lights (in a room or part of building).

Code 3-Electrical Street lights.

Code 1-Gas

- (1) Leaks and breaks.
- (2) No gas to family housing unit or cantonment area.

Code 1-Heat

- (1) Area power failure affecting heat.
- (2) Heater in unit not working.

Code 2-Kitchen Equipment

- (1) Dishwasher not operating properly.
- (2) All other equipment hampering preparation of a meal.

Code 1-Plumbing

- (1) Hot water heater failure.
- (2) Leaking water supply pipes.

Code 2-Plumbing

- (1) Flush valves not operating properly.
- (2) Fixture drain, supply line to commode, or any water pipe leaking.
- (3) Commode leaking at base.

Code 3-Plumbing Leaky faucets.

Code 3-Interior

- (1) Floors damaged.
- (2) Paint chipping or peeling.
- (3) Casework.

Code 1-Roof Leaks

Temporary repairs will be made where major damage to property is occurring.

Code 2-Roof Leaks

Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

Code 2-Water (Exterior) No water to facility.

Code 2-Water (Hot)

No hot water in portion of building listed. Code 3-All other work not listed above.

1.8.5 Warranty Tags

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the Contracting Officer. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also, submit four record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following

information on the tag.

Type of product/material	
Model number	
Serial number	
Contract number	
Warranty period from/to	
Inspector's signature	
Construction Contractor	
Address	
Telephone number	
Warranty contact	
Address	
Telephone number	
Warranty response time priority code	
WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.	

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

Prepare the CAD drawing files in AutoCAD Release 2013 and MicroStation V8 format compatible with the current Windows operating system.

2.1.1 Additional Drawings

If additional drawings are required, prepare them using the specified electronic file format applying [the same graphic standards specified for original drawings] [ERDC/ITL TR-12-6 and ERDC/ITL TR-12-1]. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings.

2.1.1.1 Sheet Numbers and File Names

If a sheet needs to be added between two sequential sheets, append a Supplemental

Drawing Designator in accordance with ERDC/ITL TR-12-6 Adding a drawing sheet, and ERDC/ITL TR-12-1 Adding or deleting drawing sheets and index sheet procedures.

2.2 ADVANCED MODELING PACKAGE

For each Advanced Modeling Package submittal for both the Interim Record Model Package and the Final Record Model Package, submit in accordance with ERDC/ITL TR-12-6 [and in accordance with Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD)] and also provide the following items:

- a. Advanced Modeling PxP: Provide an electronic copy of the most current approved version of the project Advanced Modeling PxP.
- b. Electronic Files: Provide an electronic list (.txt file or similar), of all submitted electronic files including a description, directory, and file name for each file submitted. Identify which files have been produced from the Model and Facility Data. For all sheet files, include a list of the sheet titles and sheet numbers.
- c. Advanced Modeling Submittal Checklist: Complete the USACE BIM/CIM Advanced Modeling Submittal Checklist and include with each submittal. Download the Checklist from the USACE CAD/BIM Technology Center website.
- d. Advanced Modeling Files: Provide all native Advanced Modeling files associated with the production of the contract drawings and associated as-modeled drawings. Update and maintain in compliance with the Advanced Modeling formatting, content requirement, and standards in [Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD)] [_____], in order to yield a complete and coordinated document package.
- e. Quality Control (QC) Reports: Provide electronic PDFs of all QC reports and checklist utilized to ensure full compliance with the contract requirements and standards.
- f. CAD Exports of BIM-Generated Sheets and Drawings: Provide supplemental 2D CAD exports from the project BIM model as needed to demonstrate compliance with contract requirements. Export all contract drawings sheets to the CAD format(s) defined in Section 01 33 16.00 10 DESIGN DATA(DESIGN AFTER AWARD).]

2.3 CERTIFICATION OF EPA DESIGNATED ITEMS

Submit the Certification of EPA Designated Items as required by FAR 52.223-9 Estimate of Percentage of Recovered Material Content for EPA Designated Items and FAR 52-223-17 Affirmative Procurement of EPA designated items in Service and Construction Contracts. Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. ["I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

- a. The product does not meet appropriate performance standards;
- b. The product is not available within a reasonable time frame;
- c. The product is not available competitively (from two or more sources);
- d. The product is only available at an unreasonable price (compared with a comparable non-recycled content product)."] [_____]

Record each product used in the project that has a requirement or option of containing recycled content in accordance with SECTION 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, exemptions (a, b, c, or d, as indicated), and comments. Recycled content values may be determined by weight or volume percent, but must be consistent throughout.

2.4 CERTIFICATION OF USDA DESIGNATED ITEMS

Submit the Certification of USDA Designated Items as required by FAR 52-223-1 Bio-based Product Certifications and FAR 52.223-2 Affirmative Procurement of Biobased Products Under Service and Construction Contracts. Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. ["I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current USDA standards for biobased materials content. The following exemptions may apply to the non-procurement of biobased content materials:

- a. The product does not meet appropriate performance standards;
- b. The product is not available within a reasonable time frame;
- c. The product is not available competitively (from two or more sources);
- d. The product is only available at an unreasonable price (compared with a comparable bio-based content product)."] [_____]

Record each product used in the project that has a requirement or option of containing biobased content in accordance with SECTION 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, [total value of biobased content,] exemptions (a, b, c, or d, as indicated), and comments. Biobased content values may be determined by weight or volume percent, but must be consistent throughout.

2.5 PDF AS-BUILT FILES

Provide electronic PDF "plots" of all contract drawings sheets associated with the as-built drawing submittal. Compile and organize the PDF set to match the contract drawings. Bookmark and label the pages of the PDF file in accordance with Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD).

2.6 REDLINES AND MARKUPS

Provide PDFs of the current working redlines and/or markups complying with the as-built drawing and markup requirements contained in this specification.

2.7 GEO-DATA-BASE FILES

Provide a SDSFIE/FGDC GeoReferenced personal GeoDataBase. For all information outside of the building walls, provide a personal GeoDataBase in .mdb format using the latest version of Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) as the database structure. Provide a shell database to define the projection and database structure.

For all drawings within and including the exterior walls, utilize the advanced modeling formats described and referenced herein. Provide a short GeoDataBase read-me file explaining the deliverable. The read-me file will include a description of the software used to create the data, projection, and include the attribute tables used.

2.8 AS-BUILT OR ADVANCED MODELING RE-SUBMISSION REQUIREMENTS

If elements of an as-built submittal or advanced modeling package are rejected, provide the following for each re-submission, in addition to any information required in Section 01 33 00 SUBMITTAL PROCEDURES:

- a. Re-submit all components required under paragraph As-Built or Advanced Modeling Package, including a new Advanced Modeling Submittal Checklist and updated content in response to Government comments.
- b. Provide a copy of all Government review comments.
- c. Provide a disposition/response to each Government review comment for a back-check of the re-submission deliverable.

PART 3 - EXECUTION

3.1 AS-BUILT DRAWINGS

Provide and maintain two black line print copies of the PDF contract drawings for As-Built Drawings. Maintain the as-builts throughout construction as red-lined hard copies on site[and][or] red-lined PDF files. Submit As-Built Drawings 30 days prior to Beneficial Occupancy Date (BOD).

3.1.1 Markup Guidelines

Make comments and markup the drawings complete without reference to letters, memos, or materials that are not part of the As-Built drawing. Show what was changed, how it was changed, where item(s) were relocated and change related details. These working as-built markup prints must be neat, legible and accurate as follows:

- a. Use base colors of red, green, and blue. Color code for changes as

follows:

- (1) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.
 - (2) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.
 - (3) Additions (Green) - Added items, lettering in notes and leaders.
- b. Provide a legend if colors other than the "base" colors of red, green, and blue are used.
 - c. Add and denote any additional equipment or material facilities, service lines, incorporated under As-Built Revisions if not already shown in legend.
 - d. Use frequent written explanations on markup drawings to describe changes. Do not totally rely on graphic means to convey the revision.
 - e. Use legible lettering and precise and clear digital values when marking prints. Clarify ambiguities concerning the nature and application of change involved.
 - f. Wherever a revision is made, also make changes to related section views, details, legend, profiles, plans and elevation views, schedules, notes and call out designations, and mark accordingly to avoid conflicting data on all other sheets.
 - g. For deletions, cross out all features, data and captions that relate to that revision.
 - h. For changes on small-scale drawings and in restricted areas, provide large-scale inserts, with leaders to the applicable location.
 - i. Indicate one of the following when attaching a print or sketch to a markup print:
 - 1) Add an entire drawing to contract drawings
 - 2) Change the contract drawing to show changes on the drawing.
 - 3) Provided for reference only to further detail the initial design.
 - j. Incorporate all shop and fabrication drawings into the markup drawings.

3.1.2 As-Built Drawings Content

Revise As-Built Drawings and or red-lined PDF files in accordance with ERDC/ITL TR-12-1 and ERDC/ITL TR-12-6. Keep these working as-built markup drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract drawings which are made during construction or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Submit the working as-built

markup drawings for approval prior to submission of each monthly pay estimate. For failure to maintain the working and final record drawings as specified herein, the Contracting Officer will withhold [10] [] percent of the monthly progress payment until approval of updated drawings. Show on the as-built drawings, but not limited to, the following information:

- a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.
- b. The location and dimensions of any changes within the building structure.
- c. Layout and schematic drawings of electrical circuits and piping.
- d. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.
- e. Changes in details of design or additional information obtained from working drawings specified to be prepared or furnished by the Contractor; including but not limited to shop drawings, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment, and foundations.
- f. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.
- g. Changes or Revisions which result from the final inspection.
- h. Where contract drawings or specifications present options, show only the option selected for construction on the working as-built markup drawings.
- i. If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.
- j. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.
- k. Changes in location of equipment and architectural features.
- l. Modifications and compliance with FC 1-300-09N procedures.
- m. Actual location of anchors, construction and control joints, etc., in concrete.
- n. Unusual or uncharted obstructions that are encountered in the contract work area during construction.
- o. Location, extent, thickness, and size of stone protection particularly where it will be

normally submerged by water.

3.2 RECORD DRAWING FILES

If additional drawings are required, prepare them using the specified electronic file format applying [the same graphic standards specified for original drawings][ERDC/ITL TR-12-6 and ERDC/ITL TR-12-1]. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Accomplish additions and corrections to the contract drawings using CAD files. Provide all program files and hardware necessary to prepare final PDF record drawings. The Contracting Officer will review final PDF record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

3.2.1 Rename the CAD Drawing files

Rename the CAD Drawing files using the contract number as the Project Code field,(e.g., W91238-15-C-10A-102.DWGDGN) as instructed in the Pre-Construction conference. Use only those renamed files for the Marked-up changes. Make all changes on the layer/level as the original item.

- a. For AutoCAD files (DWG), enter all as-built delta changes and notations on the AS-BUILT layer. MicroStation files (DGN), enter all as-built delta changes and notations on:
 - Level #63
 - Level/Layer Name contains: ANNO-REVS
 - Level/Layer Description: Revisions
- b. When final revisions have been completed, show the wording "RECORD DRAWING AS-BUILTS" followed by the name of the Contractor in letters at least 5 mm 3/16 inch high on the cover sheet drawing. Date RECORD DRAWING AS-BUILTS" drawing revisions in the revision block.
- c. Within 120 days after Government approval of all of the working record drawings for a phase of work, prepare the final CAD record drawings for that phase of work and submit PDF drawing files and two sets of prints for review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 365 days revise the CAD files accordingly at no additional cost and submit one set of final prints for the completed phase of work to the Government. Within 120 days of substantial completion of all phases of work, submit the final record drawing package for the entire project. Submit one set of electronic CAD files, and one set of the approved working record PDF and or program files with two sets of prints. The CAD files must be complete in all details and identical in form and function to the CAD drawing files supplied by the Government. Prepare AutoCAD files for transmittal using e-Transmit. Prepare MicroStation files for transmittal using the Packager (Archive). Make any transactions or adjustments necessary to accomplish this. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CAD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final record PDF drawing files, CAD files and marked prints as specified will be cause for withholding any payment due under this contract. Approval and acceptance of final record drawings must be accomplished before final payment is made.

3.3 RECORD DRAWINGS

Prepare and provide Record Drawings and Source Documents in accordance with FC 1-300-09N. Provide four copies of Record Drawings and Documents on separate CDs or DVDs 30 days after BOD.

Prepare final record drawings after the completion of each definable [feature][phase] of work as listed in the Contractor Quality Control Plan (such as Foundations, Utilities, or Structural Steel as appropriate for the project). Transfer the changes from the approved working as-built markup drawings to the original electronic CAD drawing files. Modify the as-built CAD drawing files to correctly show the features of the project as-built by bringing the working CAD drawing set into agreement with approved working as-built markup drawings, and adding such additional drawings as may be necessary. Refer to ERDC/ITL TR-12-1. Jointly review the working as-built markup drawings with printouts from working as-built CAD drawing PDF files for accuracy and completeness. Monthly review of working as-built CAD drawing PDF file printouts must cover all sheets revised since the previous review. These PDF drawing files are part of the permanent records of this project. Any drawings damaged or lost must be satisfactorily replaced at no expense to the Government.

Drawing revisions (include within change order price the cost to change working and final record drawings to reflect revisions) and compliance with the following procedures.

- a. Follow directions in the revision for posting descriptive changes.
- b. The revision delta size must be 8 mm 5/16 inch unless the area where the delta is to be placed is crowded. Use a smaller size delta for crowded areas.
- c. Place a revision delta at the location of each deletion.
- d. For new details or sections which are added to a drawing, place a revision delta by the detail or section title.
- e. For minor changes, place a revision delta by the area changed on the drawing (each location).
- f. For major changes to a drawing, place a revision delta by the title of the affected plan, section, or detail at each location.
- g. For changes to schedules or drawings, place a revision delta either by the schedule heading or by the change in the schedule.

3.3.1 Final Record Drawing Package

Submit the final record PDF and CAD drawings package for the entire project within 20 days of substantial completion of all phases of work. Submit one set of ANSI D size PDF and CAD files, two sets of ANSI D size prints and one set of the approved working record drawings. The package must be complete in all details and identical in form and function to the contract drawing files supplied by the Government.

3.4 FINAL APPROVED SHOP DRAWINGS

Submit final approved project shop drawings 30 days after transfer of the completed facility.

3.5 CONSTRUCTION CONTRACT SPECIFICATIONS

Submit final PDF file record construction contract specifications, including revisions thereto, 30 days after transfer of the completed facility.

3.6 AS-BUILT RECORD OF EQUIPMENT AND MATERIALS

Furnish one copy of preliminary record of equipment and materials used on the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 2 days after final inspection with Government comments. Submit Two sets of final record of equipment and materials 10 days after final inspection. Key the designations to the related area depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				
Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

3.7 OPERATION AND MAINTENANCE MANUALS

Provide project operation and maintenance manuals as specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA. Provide four electronic copies of the Operation and Maintenance Manual files and four hard copies of the Operation and Maintenance Manuals]. Submit to the Contracting Officer for approval within 60 calendar days of the Beneficial Occupancy Date (BOD). Update and resubmit files for final approval at BOD.

3.8 CLEANUP

Provide final cleaning in accordance with ASTM E1971 and submit four copies of the listing of completed final clean-up items. Leave premises "broom clean." Comply with GS-37 for general purpose cleaning and bathroom cleaning. Use only nonhazardous cleaning materials, including natural cleaning materials, in the final cleanup. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. [Clean][Replace] filters of operating equipment and comply with the Indoor Air Quality (IAQ) Management Plan. Clean debris from roofs, gutters,

downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site. Recycle, salvage, and return construction and demolition waste from project in accordance with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, and 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

3.8.1 Extraordinary Cleanup Requirements

Not used.

3.9 REAL PROPERTY RECORD

Refer to UFC 1-300-08 for instruction on completing the DD FORM 1354. Contact the Contracting Officer for any project specific information necessary to complete the DD FORM 1354.

3.9.1 Interim DD FORM 1354

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete[, update draft DD FORM 1354 attached to this section,] and submit an accounting of all installed property with Interim DD FORM 1354. Include any additional assets, improvements, and alterations from the Draft DD FORM 1354.

3.9.2 Completed DD FORM 1354

[Attach the Real Property receiving Component's completed High Performance and Sustainable Building (HPSB) Checklist for each applicable building to the completed DD 1354, in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING.] For convenience, a blank fillable PDF DD FORM 1354 may be obtained at the following link: www.esd.whs.mil/Portals/54/Documents/DD/forms/dd/dd1354.pdf

Submit the completed Checklist for DD FORM 1354 of Installed Building Equipment items. Attach this list to the updated DD FORM 1354.

-- End of Section --

SECTION 01 78 23 OPERATION AND MAINTENANCE DATA

08/15, CHG 2: 08/21

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 E1971	(2005; R 2011) Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.] [for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-10 Operation and Maintenance

Data O&M Database; G

Training Plan; G

Training Outline; G

Training Content; G

SD-11 Closeout Submittals

Training Video Recording; G

Validation of Training Completion; G

1.3 OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data for the provided equipment, product, or system, defining the importance of system interactions, troubleshooting, and long-term preventive operation and maintenance. Compile, prepare, and aggregate O&M data to include clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index

preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.3.1 Package Quality

Documents must be fully legible. Operation and Maintenance data must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions.

1.3.2 Package Content

Provide data package content in accordance with paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES. Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Use Data Package [3] [4] [5] for commissioned items without a specified data package requirement in the individual technical sections. Provide a Data Package [3][4][5] instead of Data Package 1 or 2, as specified in the individual technical section, for items that are commissioned.

1.3.3 Changes to Submittals

Provide manufacturer-originated changes or revisions to submitted data if a component of an item is so affected subsequent to acceptance of the O&M Data. Submit changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data within 30 calendar days of the notification of this change requirement.

1.3.4 Commissioning Authority Review and Approval

Submit the commissioned systems and equipment submittals to the Commissioning Authority (CxA) to review for completeness and applicability. Obtain validation from the CxA that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. The CxA communicates deficiencies to the Contracting Officer. Submit the O&M manuals to the Contracting Officer upon a successful review of the corrections, and with the CxA recommendation for approval and acceptance of these O&M manuals. This work is in addition to the normal review procedures for O&M data.

1.4 O&M DATABASE

Develop an editable, electronic spreadsheet based on the equipment in the Operation and Maintenance Manuals that contains the information required to start a preventive maintenance program. As a minimum, provide list of system equipment, location installed, warranty expiration date, manufacturer, model, and serial number.

1.5 OPERATION AND MAINTENANCE MANUAL FILE FORMAT

Assemble data packages into electronic Operation and Maintenance Manuals. Assemble each manual into a composite electronically indexed file using the most current version

of Adobe Acrobat or similar software capable of producing PDF file format. Provide compact disks (CD) or data digital versatile disk (DVD) as appropriate, so that each one contains operation, maintenance and record files, project record documents, and training videos. Include a complete electronically linked operation and maintenance directory.

1.5.1 Organization

Bookmark Product and Drawing Information documents using the current version of CSI MasterFormat numbering system, and arrange submittals using the specification sections as a structure. Use CSI MasterFormat and UFGS numbers along with descriptive bookmarked titles that explain the content of the information that is being bookmarked.

1.5.2 CD or DVD Label and Disk Holder or Case

Provide the following information on the disk label and disk holder or case:

- a. Building Number
- b. Project Title
- c. Activity and Location
- d. Construction Contract Number
- e. Prepared For: (Contracting Agency)
- f. Prepared By: (Name, title, phone number and email address)
- g. Include the disk content on the disk label
- h. Date
- i. Virus scanning program used

1.6 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

The following are a detailed description of the data package items listed in paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES.

1.6.1 Operating Instructions

Provide specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.6.1.1 Safety Precautions and Hazards

List personnel hazards and equipment or product safety precautions for operating conditions. List all residual hazards identified in the Activity Hazard Analysis provided under Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS. Provide recommended safeguards for each identified hazard.

1.6.1.2 Operator Prestart

Provide procedures required to install, set up, and prepare each system for use.

1.6.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.6.1.4 Normal Operations

Provide Control Diagrams with data to explain operation and control of systems and specific equipment. Provide narrative description of Normal Operating Procedures.

1.6.1.5 Emergency Operations

Provide Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Provide Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.6.1.6 Operator Service Requirements

Provide instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gauge readings.

1.6.1.7 Environmental Conditions

Provide a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.6.1.8 Operating Log

Provide forms, sample logs, and instructions for maintaining necessary operating records.

1.6.1.9 Additional Requirements for HVAC Control Systems

Provide Data Package 5 and the following for control systems:

- a. Narrative description on how to perform and apply functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.
- b. Full as-built sequence of operations.

- c. Copies of checkout tests and calibrations performed by the Contractor (not Cx tests).
- d. Full points list. Provide a listing of rooms with the following information for each room:
 - (1) Floor
 - (2) Room number
 - (3) Room name
 - (4) Air handler unit ID
 - (5) Reference drawing number
 - (6) Air terminal unit tag ID
 - (7) Heating or cooling valve tag ID
 - (8) Minimum cfm
 - (9) Maximum cfm
- e. Full print out of all schedules and set points after testing and acceptance of the system.
- f. Full as-built print out of software program.
- g. Marking of system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

1.6.2 Preventive Maintenance

Provide the following information for preventive and scheduled maintenance to minimize repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.6.2.1 Lubrication Data

Include the following preventive maintenance lubrication data, in addition to instructions for lubrication required under paragraph OPERATOR SERVICE REQUIREMENTS:

- a. A table showing recommended lubricants for specific temperature ranges and applications.
- b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
- c. A Lubrication Schedule showing service interval frequency.

1.6.2.2 Preventive Maintenance Plan, Schedule, and Procedures

Provide manufacturer's schedule for routine preventive maintenance, inspections, condition monitoring (predictive tests) and adjustments required to ensure proper and economical operation and to minimize repairs. Provide instructions stating when the systems should be retested. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

- a. Define the anticipated time required to perform each of each test (work-hours), test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventive maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize repairs.
- b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

1.6.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E1971.

1.6.3 Repair

Provide manufacturer's recommended procedures and instructions for correcting problems and making repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.6.3.1 Troubleshooting Guides and Diagnostic Techniques

Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.6.3.2 Wiring Diagrams and Control Diagrams

Provide point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.6.3.3 Repair Procedures

Provide instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.6.3.4 Removal and Replacement Instructions

Provide step-by-step procedures and a list of required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Use a combination of text and illustrations.

1.6.3.5 Spare Parts and Supply Lists

Provide lists of spare parts and supplies required for repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.6.3.6 Repair Work-Hours

Provide manufacturer's projection of repair work-hours including requirements by type of craft. Identify, and tabulate separately, repair that requires the equipment manufacturer to complete or to participate.

1.6.4 Real Property Equipment

Provide a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "EQUIPMENT-IN-PLACE LIST" include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Submit the final list 30 days after transfer of the completed facility.

Key the designations to the related area depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				
Description	Specification Section	Manufacturer and Catalog, Model, and Serial Number	Composition and Size	Where Used

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA				

1.6.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.6.5.1 Product Submittal Data

Provide a copy of SD-03 Product Data submittals documented with the required approval.

1.6.5.2 Certificates

Provide a copy of SD-07 Certificates submittals documented with the required approval.

1.6.5.3 Manufacturer's Instructions

Provide a copy of SD-08 Manufacturer's Instructions submittals documented with the required approval.

1.6.5.4 O&M Submittal Data

Provide a copy of SD-10 Operation and Maintenance Data submittals documented with the required approval.

1.6.5.5 Parts Identification

Provide identification and coverage for the parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing must show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Group the parts shown in the listings by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog.

1.6.5.6 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components of the system. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.6.5.7 Extended Warranty Information

List all warranties for products, equipment, components, and sub-components whose duration exceeds one year. For each warranty listed, indicate the applicable

specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference the specific operation and maintenance procedures that must be performed to keep the warranty valid. Provide copies of warranties required by Section 01 78 00 CLOSEOUT SUBMITTALS.

1.6.5.8 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.6.5.9 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components. Provide final set points.

1.6.5.10 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms. Provide final set points.

1.6.5.11 Field Test Reports and Manufacturer's Field Reports

Provide a copy of Field Test Reports (SD-06) and Manufacturer's Field Reports (SD-09) submittals documented with the required approval.

1.6.5.12 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.7 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Provide the O&M data packages specified in individual technical sections. The information required in each type of data package follows:

1.7.1 Data Package 1

- a. Safety precautions and hazards
- b. Cleaning recommendations
- c. Maintenance and repair procedures
- d. Warranty information

- e. Extended warranty information
- f. Contractor information
- g. Spare parts and supply list

1.7.2 Data Package 2

- a. Safety precautions and hazards
- b. Normal operations
- c. Environmental conditions
- d. Lubrication data
- e. Preventive maintenance plan, schedule, and procedures
- f. Cleaning recommendations
- g. Maintenance and repair procedures
- h. Removal and replacement instructions
- i. Spare parts and supply list
- j. Parts identification
- k. Warranty information
- l. Extended warranty information
- m. Contractor information

1.7.3 Data Package 3

- a. Safety precautions and hazards
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Environmental conditions
- g. Operating log
- h. Lubrication data

- i. Preventive maintenance plan, schedule, and procedures
- j. Cleaning recommendations
- k. Troubleshooting guides and diagnostic techniques
- l. Wiring diagrams and control diagrams
- m. Maintenance and repair procedures
- n. Removal and replacement instructions
- o. Spare parts and supply list
- p. Product submittal data
- q. O&M submittal data
- r. Parts identification
- s. Warranty information
- t. Extended warranty information
- u. Testing equipment and special tool information
- v. Testing and performance data
- w. Contractor information
- x. Field test reports

1.7.4 Data Package 4

- a. Safety precautions and hazards
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Operator service requirements
- g. Environmental conditions
- h. Operating log

- i. Lubrication data
- j. Preventive maintenance plan, schedule, and procedures
- k. Cleaning recommendations
- l. Troubleshooting guides and diagnostic techniques
- m. Wiring diagrams and control diagrams
- n. Repair procedures
- o. Removal and replacement instructions
- p. Spare parts and supply list
- q. Repair work-hours
- r. Product submittal data
- s. O&M submittal data
- t. Parts identification
- u. Warranty information
- v. Extended warranty information
- w. Personnel training requirements
- x. Testing equipment and special tool information
- y. Testing and performance data
- z. Contractor information
- aa. Field test reports

1.7.5 Data Package 5

- a. Safety precautions and hazards
- b. Operator prestart
- c. Start-up, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Environmental conditions
- f. Preventive maintenance plan, schedule, and procedures

- g. Troubleshooting guides and diagnostic techniques
- h. Wiring and control diagrams
- i. Maintenance and repair procedures
- j. Removal and replacement instructions
- k. Spare parts and supply list
- l. Product submittal data
- m. Manufacturer's instructions
- n. O&M submittal data
- o. Parts identification
- p. Testing equipment and special tool information
- q. Warranty information
- r. Extended warranty information
- s. Testing and performance data
- t. Contractor information
- u. Field test reports
- v. Additional requirements for HVAC control systems

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 TRAINING

Prior to acceptance of the facility by the Contracting Officer for Beneficial Occupancy, provide comprehensive training for the systems and equipment specified in the technical specifications. The training must be targeted for the [Facilities Management Specialist,]building maintenance personnel, and applicable building occupants. Instructors must be well-versed in the particular systems that they are presenting. Address aspects of the [Operation and Maintenance Manual submitted in accordance with Section 01 78 00 CLOSEOUT SUBMITTALS.] [eOMSI Manual, as submitted in Section 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI)]. Training must include classroom or field lectures based on

the system operating requirements. The location of classroom training requires approval by the Contracting Officer.

3.1.1 Training Plan

Submit a written training plan to the Contracting Officer for approval at least 60 calendar days prior to the scheduled training. Training plan must be approved by the Quality Control Manager (QC) prior to forwarding to the Contracting Officer. Also, coordinate the training schedule with the Contracting Officer and QC. Include within the plan the following elements:

- a. Equipment included in training
- b. Intended audience
- c. Location of training
- d. Dates of training
- e. Objectives
- f. Outline of the information to be presented and subjects covered including description
- g. Start and finish times and duration of training on each subject
- h. Methods (e.g. classroom lecture, video, site walk-through, actual operational demonstrations, written handouts)
- i. Instructor names and instructor qualifications for each subject
- j. List of texts and other materials to be furnished by the Contractor that are required to support training
- k. Description of proposed software to be used for video recording of training sessions.

3.1.2 Training Content

The core of this training must be based on manufacturer's recommendations and the operation and maintenance information. The QC is responsible for overseeing and approving the content and adequacy of the training. Provide a brief summary of the FACILITY INFORMATION manual, and a more detailed presentation of the PRODUCT AND DRAWING MANUAL, specified in Section 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI). Spend 95 percent of the instruction time during the presentation on the OPERATION AND MAINTENANCE DATA. Include the following for each system training presentation:

- a. Start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, controls set-up and programming, troubleshooting, and alarms.

- b. Relevant health and safety issues.
- c. Discussion of how the feature or system is environmentally responsive. Advise adjustments and optimizing methods for energy conservation.
- d. Design intent.
- e. Use of O&M Manual Files.
- f. Review of control drawings and schematics.
- g. Interactions with other systems.
- h. Special maintenance and replacement sources.
- i. Tenant interaction issues.

3.1.3 Training Outline

Provide the Operation and Maintenance Manual Files (Bookmarked PDF) [eOMSI Manual files as specified in Section 01 78 24.00 20, FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI),]and a written course outline listing the major and minor topics to be discussed by the instructor on each day of the course to each trainee in the course. Provide the course outline 14 calendar days prior to the training.

3.1.4 Training Video Recording

Record classroom training session(s) on video. Provide to the Contracting Officer two copies of the training session(s) in DVD video recording format. Capture within the recording, in video and audio, the instructors' training presentations including question and answer periods with the attendees. The recording camera(s) must be attended by a person during the recording sessions to assure proper size of exhibits and projections during the recording are visible and readable when viewed as training.

3.1.5 Unresolved Questions from Attendees

If, at the end of the training course, there are questions from attendees that remain unresolved, the instructor must send the answers, in writing, to the Contracting Officer for transmittal to the attendees, and the training video must be modified to include the appropriate clarifications.

3.1.6 Validation of Training Completion

Ensure that each attendee at each training session signs a class roster daily to confirm Government participation in the training. At the completion of training, submit a signed validation letter that includes a sample record of training for reporting what systems were included in the training, who provided the training, when and where the training was performed, and copies of the signed class rosters. Provide two copies of the validation to the Contracting Officer, and one copy to the Operation and Maintenance Manual Preparer for inclusion into the Manual's documentation.

3.1.7 Quality Control Coordination

Coordinate this training with the QC in accordance with Section 01 45 00.00 10
QUALITY CONTROL.

-- End of Section --

DIVISION 2 – SITE CONSTRUCTION

SECTION 02050 - SITE DEMOLITION AND REMOVAL

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes procedures for demolition and removal work, including the following:
 - 1. It shall be the responsibility of the Contractor to examine the project site and determine for himself the existing conditions.
 - 2. Obvious conditions which exist on the site shall be accepted as part of the work, even though they may not be clearly indicated on the drawings and/or described herein, or may vary therefrom.
 - 3. All debris of any kind accumulated from the work of this Section shall be disposed off the site.
 - 4. Burning of any debris onsite will not be permitted.
 - 5. Permits, Notice, etc.: The Contractor shall procure and pay for all necessary permits or certificates that may be required in connection with this work.
 - 6. Protection: Throughout the work, protection shall be provided for all roads, walks, property, etc., scheduled to remain. Safe working conditions shall be maintained at all times for all personnel, and temporary lights and barricades shall be provided and maintained.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 DEMOLITION AND REMOVAL

- A. Cutting: All concrete and asphaltic concrete, when required, shall be cut full depth with a carborundum saw prior to removal, with water applied to control dust. Overcutting shall not be permitted.
- B. All work shall be executed in an orderly and careful manner, with due consideration for all items to remain, and the Contractor shall be strictly responsible for any damage thereto.
- C. Water and sewer facilities shall be available and in operating condition at all times. All dust shall be suppressed by a fog spray or other approved method.

- D. Demolish and remove existing pavings, and other obstructions or encumbrances of any kind or character within the Limits of Work, with the exception of any structures to remain and any active water, drainage, electrical, etc., lines, boxes and manholes, unless otherwise directed by the Contracting Officer.

3.02 PROCEDURES

- A. The Contractor shall provide for safe conduct of the work, careful removal and disposition of materials, protection of property which is to remain undisturbed, and coordination with other work in progress. The Contractor shall be responsible for the restoration of any utility disconnected for his work.

3.03 DISPOSITION OF MATERIALS

- A. All materials resulting from removal work shall become the property of the Contractor and shall be removed from the limits of the State property. Noncombustible and combustible materials shall be disposed of outside the limits of State controlled land at the Contractor's expense at an approved solid waste disposal site. The Contractor is encouraged to recycle materials to maximum extent possible to avoid disposal at a landfill.

3.04 DUST CONTROL

- A. The amount of dust resulting from demolition shall be controlled to prevent the spread of dust and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, a hazardous or objectionable condition such as flooding or pollution.

3.05 LIMITS OF WORK

- A. The Limits of work shall generally be as indicated on the plan, however, work outside of the Limits necessary to complete the project shall be included.

3.06 MAINTAINING TRAFFIC

- A. The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, etc.
- B. When necessary, the Contractor shall provide, erect and maintain lights, barriers, etc., as required by traffic and safety regulations with special attention to protection of life.

3.07 CLEAN UP

- A. Debris and rubbish shall be removed from the site daily. Debris and rubbish shall not be allowed to accumulate in the building or on site. Debris shall be removed and transported in a manner that will prevent spillage on streets or adjacent areas.

END OF SECTION

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. Extent of selective demolition work is indicated on drawings. Selective demolition work includes but is not limited to removal and subsequent disposal of all non-hazardous materials indicated or required to be removed.
- B. It shall be the responsibility of the Contractor to examine the project site and determine the existing conditions.
- C. Execute all work in an orderly and careful manner with due consideration for all items of work to remain.
- D. Obvious conditions which exist at the site shall be accepted as part of the work, even though they may not be clearly indicated on the Drawings and/or described herein, or may vary therefrom.
- E. All debris of any kind accumulated from the work of this Section shall be disposed off the site.
- F. Burning of any debris on-site will not be permitted.
- G. Permits, Notice, Etc.:
 - 1. The Contractor shall procure and pay for all necessary permits, certificates or approvals that may be required in connection with this work.
 - 2. The Contractor shall serve proper notice and consult with the Contracting Officer regarding any temporary barricades and disconnections of electrical or other utility lines in the area which may interfere with the removal work, and all such lines where necessary shall be properly disconnected or relocated before commencing with the work.
- H. Carefully remove and store materials indicated for relocation or reinstallation. Record all deficiencies prior to removal and record with the Contracting Officer. All damage caused by the Contractor's operations shall be repaired as approved by the Contracting Officer at no additional cost to the State.
- I. **Related Work Described Elsewhere:** Contractor shall review SECTION 01715 - EXISTING CONDITIONS - ASBESTOS/LEAD/HAZARDOUS MATERIAL SURVEY.

1.02 SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. **Schedule:** Submit two copies of schedule indicating proposed methods and sequence of operations for selective demolition work to the Contracting Officer for review prior to commencement of work. Include coordination for temporary shut-off and continuation of utility services as required, together with details for weather protection, dust and noise control protection.

1.03 JOB CONDITIONS

- A. **Condition of Structure:** The State assumes no responsibility for actual condition of items or portions of structure to be demolished.
- B. Conditions existing at time of commencement of contract will be maintained by the State insofar as practicable.
- C. Do not interfere with use of adjacent occupied spaces or buildings. Maintain free and safe passage to and from occupied spaces or other occupied buildings.
- D. **Partial Demolition and Removal:** Items indicated to be removed but of salvageable value to Contractor, may be removed as work progresses. Transport salvaged items from site as they are removed. Storage or sale of removed items on site will not be permitted.
- E. **Protections:** Provide temporary barricades and other forms of protection as required to protect the general public, school, staff, and students from injury due to selective demolition work.
 - 1. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of elements to be demolished, and adjacent facilities or work to remain.
 - 2. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 - 3. Life safety procedures and provisions shall be in conformance with all applicable Federal, State, and City and County regulations, including HIOSH.
 - 4. Provide accessibility around temporary structures conforming to ADAAG Section 201.3 and Section 206.1.
 - 5. Remove protections, obstructions, and barricades at completion of work.
 - 6. Where barriers are erected or placed to facilitate the work, barriers shall not affect or impact the facility's fire exiting route or alarm systems.
- F. **Damages:** Promptly repair damages caused to adjacent facilities by demolition work at no cost to the State.

G. **Traffic:** Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from the Contracting Officer. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations, as directed by the Contracting Officer.

H. **Dust Control:**

1. Keep dust within acceptable levels at all times, including non-working hours weekends and holidays, as specified in SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS.
2. Only wet grinding or cutting of concrete will be allowed on exterior surfaces.
3. Mechanical dry sweeping not permitted. Vacuuming, wet mopping, approved limited dry hand, wet or damp sweeping is acceptable.
4. During loading operations, water down debris and waste materials to allay dust.
5. The method of dust control and all costs incurred thereof shall be the responsibility of the Contractor.
6. Enclosed chutes shall be used for removing debris from above the ground floor level.
7. All carpet to be removed shall be vacuumed with a commercial vacuum prior to removal to remove dust particles.

I. **Noise Control:** As specified in SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS.

J. **Fire Safety:** Fire safety during demolition shall comply with NFPA 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations" and NFPA 1, "Fire Code", as amended.

K. **Demolition Work:** Conform to State of Hawaii, Occupational Safety and Health Standards; Subtitle 8, Division of Occupational Safety and Health; Part 3, Construction Standards; Chapter 131.1, Demolition.

L. **Other Controls:**

1. Wherever trucks and/or vehicles leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being spilled onto the pavement. Waste water shall not be discharged into existing streams, waterways, or drainage systems such as gutter and catch basins unless treated to comply with Department of Health pollution regulations.
2. Trucks hauling materials shall be covered as required by PUC regulation. Trucks hauling fine materials shall be covered.

PART 2- PRODUCTS

(Not applicable)

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Inventory existing conditions of structure surfaces, equipment or surrounding properties which could be misconstrued as damage resulting from selective demolition work; photograph, video or otherwise document and file with the Contracting Officer prior to starting work.
- B. Test all equipment that is to be relocated or reinstalled prior to disconnection. File a list of discrepancies with the Contracting Officer prior to disconnection and relocation. Allow the Contracting Officer 5 working days to verify discrepancies prior to removal.

3.02 PREPARATION

- A. Provide temporary security type weatherproof enclosures for exterior openings resulting from demolition work.

3.03 BARRICADES AND ENCLOSURES

- A. As specified in SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS.

3.04 SELECTIVE DEMOLITION

- A. Perform selective demolition work, including all exterior improvements indicated on the drawings, in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations.
 - 1. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction. All dust shall be suppressed by a fog spray or other approved method.
 - 2. Water and sewer facilities shall be available for the remainder of the building and in operating condition at all times.
 - 3. Extent of demolition and removal as shown are minimum requirements. Contractor shall be responsible for the extent of work required to properly accommodate the methods of construction required for the new work. Additional work required to accommodate construction shall be considered incidental to the new work and shall be done at no additional cost to the State.

- B. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to the Contracting Officer in written, accurate detail. Pending receipt of directive from the Contracting Officer rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.05 DRY ROT AND TERMITE DAMAGES

- A. All dry rot and termite damage discovered during the progress of the selective demolition work shall be reported to the Contracting Officer for inspection and recommendation. Failure to report such damage that result in inability to support or fasten new work shall be made good by the Contractor at no cost to the State.
- B. All materials used to replace deteriorated areas shall match the existing material in size, shape, and species and shall be preservative treated.
- C. All repair work of reported dry rot and termite damaged areas not indicated on the drawings as repair or replacement work shall be considered additional work and the Contractor shall be compensated for it in accordance with the GENERAL CONDITIONS.

3.06 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove debris, rubbish, and other materials resulting from demolition operations from building site daily. Transport and legally dispose of materials off site.
 - 1. If additional hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 - 2. Burning of removed materials is not permitted on project site.
- B. **Locksets on Swing Doors:** The Contractor shall remove all locksets from all swinging doors indicated to be removed and disposed of. Contractor shall give the locksets to the Contracting Officer after their removal.
- C. **Disposition of Materials:** All materials resulting from removal work shall become the property of the Contractor and shall be removed from the limits of the State property. Noncombustible and combustible materials shall be disposed of outside the limits of State controlled land at the Contractor's expense at an acceptable solid waste disposal site. The Contractor is encouraged to recycle materials to maximum extent possible to avoid disposal at a landfill.

3.07 CLEAN UP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave areas broom clean.

- B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.
- C. All existing grass areas disturbed or damaged due to construction or ingress or egress to the site shall be repaired to original conditions. Grass areas shall be recultivated, topsoiled, and then grassed with the same kind and type of material as existing, in a manner approved by and to the satisfaction of the Contracting Officer.

END OF SECTION

SECTION 02100 - SITE PREPARATION AND EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, tools and equipment necessary for excavation, filling, backfilling, rough and finish grading, exterior trench excavation and backfill for utility lines up to five feet from buildings, and related items necessary to complete all work shown on the Drawings and/or specified herein.

1.02 COORDINATION WITH OTHER SECTIONS

- A. Soil Treatment, Pavement, Concrete work and water system work, are specified in their respective sections.

1.03 GENERAL REQUIREMENTS

- A. The following construction standards, with certain modifications as hereinafter specified, are hereby incorporated into and made a part of these specifications by reference and apply to all work performed under this section.
 - 1. Specific Sections of the City and County of Honolulu STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION dated September 1986 and STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION dated September 1984 as revised, except as amended in the drawings and/or specifications herewith. (Paragraphs concerning Measurements and Payments in the Sections are not applicable to this project.)

1.04 ORDINANCES AND PERMITS

- A. The Contractor shall comply with all applicable ordinances and regulations and obtain and pay for the required permits.

1.05 EXISTING UTILITY LINES

- A. The existence of active and abandoned underground utility lines within the construction is not definitely known other than those indicated in their approximate locations on the Drawings. Contractor shall tone by inductive, conductive and radio frequency methods, the area prior to all excavation and trenching. Should any unknown line be encountered during excavation, the Contractor shall immediately notify the Contracting Officer of such discovery. Any line damaged by the Contractor that can be observed or found by toning shall be repaired by the Contractor at no cost to the State. The Contracting Officer shall investigate and issue instructions for the preservation or disposition of the unknown line. Authorization for extra work shall be issued by the Contracting Officer.

1.06 SUBMITTALS

- A. Submit in accordance with SECTION 01330- SUBMITTAL PROCEDURES.
- B. Product Certificates: Certificates from manufacturers or suppliers to verify that types of materials being supplied meet the requirements of these specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Imported Fill Material - Imported fill shall be well-graded, non-expansive granular material. Imported structural fill shall have a maximum particle size of 3 inches, and between 10 and 30 percent of soil by weight shall pass the #200 sieve. In addition, the plasticity index (P.I.) of that portion of the soil passing the #40 sieve shall not be greater than 10. Imported structural fill shall have a CBR expansion value no greater than 1.0 percent and a minimum CBR value of 20 or more, when tested in accordance with ASTM D1883.
- B. Base Course City and County Standard Specifications - SECTION 31.
- C. #3B Fine (ASTM C33 Size No. 67).
- D. Topsoil: Imported topsoil shall be fertile, friable soil of loamy character, free from subsoil, debris, stones. Topsoil *excavated* in connection with the construction of the project maybe used in lieu thereof.

PART 3 - EXECUTION

3.01 LAYING OUT

- A. The laying out of base lines, establishing of grades and staking out the entire work shall be done by a licensed Surveyor or Civil Engineer (licensed in the State of Hawaii) at the expense of the Contractor and he shall be solely responsible for their accuracy. The Contractor shall erect and maintain substantial batterboards showing construction lines and levels.
- B. Should any discrepancies be discovered in the dimensions given on the drawings, the Contractor shall immediately notify the Contracting Officer before proceeding any further with the work, otherwise, he will be held responsible for any costs involved in correction of construction placed due to such discrepancies.

3.02 SITE PREPARATION

- A. Prior to the start of the grading operations, the areas designated for new construction shall be cleared of all above-ground vegetation and other deleterious materials and underground tree roots, which shall be removed for disposal off-site.
- B. After clearing, grubbing, and demolition, areas designated to receive fills shall be scarified to a depth of about 6 inches, moisture-conditioned to about 2 percent above the optimum moisture content and compacted between 90 percent and 95 percent compaction as determined by ASTM D 1557 prior to the placement of the select granular fill.
- C. Underlying loose material, indicated by pumping conditions, shall be removed down to competent soils and replaced with granular fill compacted in 8-inch loose lifts to a minimum 95 percent compaction as determined by ASTM D 1557. The excavated soft and/or organic soils shall be properly disposed off off-site and/or used in landscape areas, where appropriate.

- D. The pavement subgrade soils under the pavement areas shall be scarified to a minimum depth of 6 inches, moisture-conditioned as necessary and compacted to not less than 95 percent compaction as determined by ASTM D 1557.
- E. Granular fill, such as imported structural fill, shall be place in maximum 8-inch lifts and compacted to at least 95 percent compaction as determined by ASTM D 1557.
- F. Base course shall be compacted to at least 95 percent compaction as determined by ASTM D 1557.

3.03 GRADING

- A. The Contractor shall at all times control the grading around building areas so that the ground is adequately sloped to preclude the ponding of water adjacent to and beneath the structures and their foundations. Surface water shall also be directed away from slopes.
- B. Grading work will be monitored by the Geotechnical Engineer and periodic density tests performed to verify the adequate compaction is consistently achieved by the grading contractor.
- C. Cut and fill slopes shall be no steeper than 2H:IV. Where fill must be constructed on sloping ground exceeding 5H:IV, the existing ground shall be benched with a series of horizontal terraces prior to fill placement. All slopes shall be planted as soon as possible after finish grading for erosion protection.
- D. All graded areas shall be planted as soon as possible after finish grading for erosion protection.

3.04 EXCAVATION

- A. Blasting as a means of excavation shall not be permitted.
- B. Excavated material shall be classified and disposed of as follows:
 - 1. Usable materials as approved by the Contracting Officer shall be stockpiled (for later use as fill material) in a location shown on Drawings or designated by the Contracting Officer. This material may also be excavated directly to fill at the Contractor's option. All excess usable material shall be disposed of at a suitable offsite disposal site.
 - 2. Non-usable material and soft material shall become the property of the Contractor and shall be disposed of at a suitable offsite disposal site.

3.05 FILL AND BACKFILL

- A. Imported fill and general fill shall be moisture-conditioned to above the optimum moisture content, placed in level lifts not exceeding eight inches in loose thickness, and compacted to a minimum 95 percent compaction.
- B. Filling operations shall be performed so as to bring the entire project area to the finish grades shown on the Drawings.

- C. Trench fill and backfill operations shall be carried out as follows:
1. Trenching backfills shall be placed and compacted in accordance with the grading recommendations utilizing the appropriate mechanical compactor around and above the pipes. Jetting and ponding of the backfill shall not be allowed.
 2. Adequate shoring and bracings should be provided by the Contractor in accordance with DOSH and other governmental regulations for the utility trenches and other similar deep excavations.
 3. Granular bedding shall consist of 6 inches of No. 38 Fine Gravel (ASTM C33, No. 67 gradation). Free-draining granular materials, such as No. 38 Fine gravel (ASTM C33, No. 67 gradation), shall be used for the initial trench backfill up to about 12 inches above the pipes.
 4. The upper portion of the trench backfill from the level 12 inches above the pipes to the top of the subgrade or finished grade may consist of the excavated on-site soils with a maximum particle size of 3 inches. The trench backfill shall be moisture-conditioned to above the optimum moisture content, placed in maximum 8-inch level loose lifts, and mechanically compacted to a minimum of 90 percent relative compaction to reduce the potential for appreciable future ground subsidence. Where trenches are below paved areas, the upper 3 feet of the trench backfill below the pavement surface shall be compacted to a minimum of 95 percent compaction.

3.06 INSUFFICIENT EARTH MATERIALS

- A Contractor shall import necessary materials without any additional cost to the State for structural fill or satisfactory backfill to complete grading work. Such imported materials shall be subject to approval of Contracting Officer and shall meet requirements as specified for each category of materials.

3.07 FILL COMPACTION TESTING

- A All satisfactory backfill, structural fill, road subgrade and pavement section shall be tested by an independent testing agency retained by the Contractor and having favorable review by the Contracting Officer and all test results submitted to the Contracting Officer for approval.
8. All cost of testing shall be done by a Geotechnical Engineer provided by the Contractor and having favorable review by the Contracting Officer. Testing shall be made throughout the area for each 6-inch compacted layer. All test results shall be approved before the Contractor can proceed with placing of topsoil, cushion fill, base course or select borrow subbase course. Testing shall be in accordance with ASTM D1557.

3.08 BMP INSPECTION

- A The Erosion and Sediment Control Plan Coordinator (ESCP) retained by the Contractor shall provide construction BMP Inspections, compile the checklists and submit to the City and County of Honolulu for permit closeout.

3.09 GRASSING AND MAINTENANCE

- A Coordinate with Landscape Specifications.

END OF SECTION

SECTION 02362 - SOIL TREATMENT FOR VEGETATION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. This work shall consist of placing or spraying weed killer on the prepared parking and driveway subgrade prior to the installation of the wearing course and where called for on drawings and on existing growth prior to application of asphalt in the case of patching.

1.02 SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. Product Data:
 - 1. Treatments.
 - 2. Application instructions.
 - 3. Copies of the EPA-registered labels for all chemicals.
 - 4. Product Data: Material Safety Data Sheets.
- C. Product Certificates: Signed by manufacturers of weed killer products certifying that treatments furnished comply with requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Weed Killer shall be "Casoron 4G", Norosac 4G", or an approved equal for under asphalt application on new pavement, and shall be "Hyvar X", "Roundup" or approval equal for application to existing weeds for patching of existing pavement.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Mix the under asphalt weed killer and uniformly spread using calibrated application equipment at the maximum rates permit for under asphalt use. Install base course material as soon as possible after applying the weed killer to preclude loss of germination inhibiting action.
- B. In treatment of existing growth on resurfacing jobs, mix the weed killer and uniformly spray.
- C. Retreat nut grass and weeds two (2) days after initial application and again if growth still exists.
- D. Notify the Contracting Officer 24 hours before application of weed killer.

END OF SECTION

SECTION 02500 - CONCRETE SIDEWALKS AND CURBS

PART 1 - GENERAL

1.01 SUMMARY

- A. Construct new concrete sidewalks and concrete curbs as indicated on the drawings and as specified within.

1.02 SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. Product Certificates: Certificates from manufacturers or supplier's to verify that types of materials being supplied meet the requirements of these specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Weed killer as specified in SECTION 02362 - SOIL TREATMENT FOR VEGETATION CONTROL
- B. Materials for concrete sidewalks, pavement curbs, gutters and walls shall be constructed in accordance with the below-listed sections of the City and County of Honolulu, Department of Public Works, Standard Specification for Public Works Construction, September 1986", including all revisions, shall govern all work except for the subsections of Measurement and Payment which shall not be applicable. This publication shall be referred to as the Standards Specification hereinafter.
 - 1. Subgrade Section 29
 - 2. Base Course Section 31
 - 3. Portland Cement Concrete Section 39
 - 4. Concrete Curb & Gutter Section 41
 - 5. Concrete Sidewalks Section 42
 - 6. Reinforcing Steel Section 48

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall stake out area of new work using wooden stakes on which final finish elevations, base course and subgrade elevations are clearly marked. All such stakes and elevations shall be approved by the Contracting Officer before any work is done.
- B. Concrete Sidewalks and Curbs: Installation shall be in accordance with the applicable sections noted hereinbefore and as shown on the drawings. Provide steel reinforcement in sidewalks and pavements.

3.02 FINAL INSPECTION

- A. At the time of final inspection of the work performed under the Contract, the work covered by this section shall be complete in every respect and operating as designed. All surplus materials of every character, resulting from the work of this section, shall have been removed. Any defects discovered in the work, subsequent to this inspection, shall be corrected prior to final acceptance.

END OF SECTION

SECTION 02513 - ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Asphaltic concrete pavement for trench patching and roadway restoration as indicated on the drawings and as specified herein.

1.02 SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. Product Certificates: Certificates from manufacturers or supplier's to verify that types of materials being supplied meet the requirements of these specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall be in accordance with the below-listed sections of the City and County of Honolulu STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION dated September 1986 and STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION dated September 1984 as revised except as amended in the plans and/or specifications herewith. (Paragraphs concerning Measurements and Payments in the sections are not applicable to this project.)

- 1. Aggregate Subbase Course Section 30
- 2. Aggregate Base Course Section 31
- 3. Asphalt Concrete Pavement Section 34
Mix shall be No. 4
- 4. Tack Coat.....Section 33

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall stake out the areas to be paved, using grade stakes on which the final finish elevations, base course and subgrade elevations are clearly marked. All such stakes and elevations shall be approved by the Contracting Officer before any work is done.
- B. Installation shall be in accordance with the applicable sections noted hereinabove and details shown on the plans. Pavement shall be sloped to prevent ponding.

3.02 REPAIR OF EXISTING ASPHALT CONCRETE PAVEMENT

- A. Any existing asphaltic concrete pavements including road or parking that have been damaged by construction activities shall be repaired to the original condition and to the satisfaction of the Contracting Officer. Damage done by heavy equipment especially on roads or parking not stable for such equipment shall be repaired to the original condition and to the satisfaction of the Contracting Officer.

3.03 INSPECTION

- A. At the time of final inspection of the work performed under the Contract, the work covered by this section shall be complete in every respect and operating as designed. All surplus materials of every character, resulting from the work of this section, shall have been removed. Any defects discovered in the work, subsequent to this inspection, shall be corrected prior to final acceptance.

END OF SECTION

SECTION 02577 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials and equipment necessary to provide pavement markings on previously constructed pavement as indicated on the drawings and as specified herein.

1.02 SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. Product Data: Material Safety Data Sheets.
- C. Product Certificates: Certificates from manufacturers or supplier's to verify that types of materials being supplied meet the requirements of these specifications.

1.03 DELIVERY AND STORAGE

- A. Deliver paints and paint material in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer. Provide storage facilities at the job site for maintaining materials at temperature recommended by the manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The State of Hawaii, Department of Transportation, Highways Division "Hawaii Standard Specifications for Road and Bridge Construction", 2005, including all revisions, shall govern all work except for subsections on Measurement and Payment which shall not be applicable. This publication shall be referred to as State D.O.T. Standard Specifications hereinafter
- B. Paint shall be in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's formulation number and directions, and name of the manufacturer, all of which shall be plainly legible at the time of use. The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics.
- C. Paint shall conform to the Hawaii Standard Specifications for Road and Bridge Construction, latest edition, Sections 708 and 755.
- D. Pavement Markings shall include but not limited to striping, arrows, letters, and numbers.

2.02 EQUIPMENT

- A. All equipment, tools and machinery used in the performance of the work covered by this section of the specifications shall be suitable for pavement markings installation and removal, and shall be maintained in satisfactory operating condition at all times.
 - 1. Paint Applicator: The equipment for applying paint to pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. The machine shall be capable of applying the stripe widths indicated on the drawings, shall have a speed during application of not less than five miles per hour, and shall be capable of applying the paint at the coverage rate specified hereinafter and at an even uniform thickness with clear-cut edges. The paint applicators shall have a paint reservoir of sufficient capacity and suitable gages to apply paint as specified herein. The reservoirs shall be equipped with suitable air-driven mechanical agitators. The spray mechanism shall be equipped with quick-action valves conveniently located, and shall include necessary pressure regulators and gages in full view and reach of the operator. Paint strainers shall be installed in the paint supply lines to insure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media. Pneumatic spray guns shall be provided for hand application of paint in areas where the mobile paint applicator cannot be used.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Bituminous Pavements: New asphalt concrete pavement shall be allowed to cure for a period of not less than seven days before the application of marking materials unless directed otherwise by the Contracting Officer. Dust, clay, silt and sand shall be removed from the pavement to be marked before application of paint by sweeping, blow with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance and other substances adhering to the pavement shall be removed with stiff brooms, scrapers, wire brushes, sandblasting or mechanical abrasion. Marker adhesives and paints shall not be applied when moisture or foreign matter is present on the pavement surface or when wind conditions are such as to cause dust to be deposited on the prepared areas or to prevent satisfactory application of the paint.

3.02 CONTROL POINTS

- A. The Contractor shall establish and space control points, satisfactory to the Contracting Officer, at intervals that will ensure accurate location of pavement markings.

3.03 TRAFFIC CONTROL

- A. The Contractor shall furnish, install and maintain suitable warning and directional signs, barricades and other traffic control devices near the beginning and well ahead of the work site. Traffic control devices shall be placed along the newly painted lines to control traffic and to prevent damage to the newly painted surfaces.

3.04 APPLICATION

- A. Paint shall not be applied to damp or wet pavement surfaces or when inclement weather threatens to interrupt normal progress of the work. Traffic paints shall be applied when air and pavement temperatures exceed 95 degrees F. Paint shall be applied with equipment specified herein and at the rate of coverage specified below. The Contractor shall provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters and symbols. All edges of markings shall be sharply outlined. The width of the lines supplied shall be within a tolerance of 1/2-inch. The center line of marking will not deviate more than one-inch laterally from a straight line at any point. Workmanship will conform to the best commercial practices consistent with these specifications. Areas not properly painted will be repainted. Any spilled paints will be cleaned from the paved areas to the satisfaction of the Contracting Officer. The Contractor will keep the premises clean at all times. Paint, empty containers and other material or equipment will not be stored or allowed to accumulate on or near the paved areas. Paint shall be applied evenly to the pavement at a rate between 100 and 110 square feet per gallon. Apply two coats of paint.

3.05 INSPECTION AND ACCEPTANCE

- A. Pavement markings shall be subject to rigid inspection at all times and provisions of this specification will be strictly enforced. Painting will not commence in any area until pavement surfaces have been inspected and approval is given to the Contractor to proceed. Such approval will be obtained each day and after periods of precipitation. If the Contracting Officer determines that the painted markings have not dried sufficiently in 90 minutes, painting shall be discontinued until the cause of slow drying is determined and corrected. Areas found to be deficient in accordance with this specification will be rejected and complete replacement or repainting will be required. Completed work will meet the Contracting Officer approval in all respects. Final acceptance will be contingent upon conformance with specification requirements outlined in this specification.

3.06 PROTECTION OF WORK

- A. Newly painted surfaces will be protected from damage by vehicles during the time required for paint to harden sufficiently to withstand traffic. During periods of high winds, painting will be discontinued. Any damage to newly painted markings due to Contractor's failure to provide adequate protection will be repaired by him.

END OF SECTION

SECTION 02600 - WATER SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, tools and equipment necessary for installation of water system as indicated on drawings and as specified herein.

1.02 REQUIREMENTS

- A. Make necessary deposits and/or pay for permits whenever required by State or local laws or regulations before proceeding with any work called for under this part of the specifications.
- B. In addition, the following construction standards, with certain modifications as hereinafter specified, are hereby incorporated into and made a part of these specifications by reference and apply to all work performed under this section.
 - 1. BOARD OF WATER SUPPLY CITY AND COUNTY OF HONOLULU, WATER SYSTEM STANDARDS, STATE OF HAWAII 2002, and the "Water System External Corrosion Control Standards," Volume 3, dated 1991, and all subsequent amendment and additions.

1.03 SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. Manufacturers Certification: Furnish copies of certificates from the manufacturers of pipe, pipe section, fittings, valves, etc. furnished and installed under this section verifying that such materials delivered to the project conform to the requirements of this specification.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials for Water Distribution System: In accordance with the Board of Water Supply's City and County of Honolulu WATER SYSTEM STANDARDS, except as amended in the drawings and/or revised specifications herewith. Paragraph concerning Measurements and Payments in the Sections are not applicable to this project.
 - 1. Valves and Appurtenances: Section 205
 - 2. Cast Iron Meter Box and Valve Box Covers and Frames: . Section 207
 - 3. Service Laterals and Appurtenances: Section 208
- B. Water Meter with Advance Meter Head.
 - 1. Provide an Advanced Metering Infrastructure (AMI) and Direct Digital Communication (DDC) compatible displacement type meter that meet the requirements of AWWA C700. Straight-reading registers are to read in U.S. gallons matching the accuracy and capacity requirements of AWWA C700. Provide a direct reading remote register designed in accordance with AWWA C706 or an encoder type remote register designed in accordance with AWWA C707. Coordinate with the HANG Energy Manager.

B. Detection Wire:

1. Provide for non-metallic underground pipes except for sewer and drain pipes which run directly between manholes and/or inlets and/or headwalls or for other situations where a detection wire will not substantially facilitate detection of the pipe.
2. Wire shall be insulated, one-piece (single strand) copper wire, No. 10 ga. (0.1019" dia.) minimum (American or Brown and Sharpe Gage).
3. The conducting cable shall be buried directly above the center-line of the pipe at a distance of approximately 6" above the top of the pipe. The wire shall extend continuously along the entire length of pipe, from manhole to manhole. The ends of the wire shall terminate inside of each manhole at each end of the pipe, with a minimum of 3' feet of wire, coiled, and remaining accessible in each manhole. The wire shall be insulated along its entire length.
4. The coil of wire shall be tied to the gate valve within the manhole. If no gate valve is present, the coil of wire shall be firmly affixed to the manhole side near the manhole cover frame.
5. Where the wires must be joined, the ends shall be tied in a knot and a splice made which provides electrical continuity across the wires.

C. Buried Warning and Identification Tape:

1. Provide for both non-metallic and metallic underground pipes except for duct banks encased in concrete.
2. Polyethylene plastic tape, acid and alkali resistant, approximately 3" wide, minimum 0.003" thick, with a strength of 1500 psi lengthwise and 1250 psi crosswise, maximum elongation of 350%, color-coded as noted below, with warning and identification of service imprinted in bold black lettering continuously over the entire length of the tape. Warning and identification to read "CAUTION, BURIED (type of utility service) LINE BELOW" or similar wording. The tape color and printing shall be permanent and unaffected by moisture.
3. Warning Tape Color Coded shall be as follows:

Blue	Water
4. The tape shall be buried directly above the center-line of the utility pipe, approximately 12" below finished grade. Where the utility pipe is under pavements and slabs, the tape shall be buried approximately 6" below the top of the subgrade.

PART 3 - EXECUTION

1.01 INSTALLATION

A. Location and Adjustment of Existing Utility Lines

1. Precisely lay out the various exterior utility lines shown on the contract drawings as provided elsewhere in these specifications. Locations shown on

the drawings of the various existing utility lines which the new lines are to cross over or under or connect to, were determined on the basis of the best information available; however, no assurance can be provided that the actual locations will be precisely as shown on the contract drawings. Contractor shall tone the area prior to excavation and trenching.

- 2. In performing all work, exercise due care and caution necessary to avoid any damage to and impairment in the use of any existing utility line. Immediately repair and restore any damage inflicted on existing lines resulting from the Contractor's operations as directed by the Contracting Officer at the Contractor's expense.

B. Excavation and Backfill

- 1. Trench excavation and backfill for the laying and installation of water pipes, to the required line and grade and structure excavation for the construction of the appurtenant structures, shall be governed by the following provisions of the BWS STANDARD as hereinbefore amended with respect to measurement and payment and with certain additional modifications noted below:

- a. Trench Excavation and Backfill: Section 302.02
.....and 302.03

- 2. Use surplus material resulting from trench and structure excavation for backfilling, filling and grading to the extent required as specified elsewhere in these specifications. In performing any work within the contract zone shown on the contract drawings, exercise due care to keep to an absolute minimum any damages to existing improvements, including plants and shrubs. Repair, replace and/or restore all damages to existing improvements to the acceptance of the Contracting Officer.

- 3. Water Distribution System: Installation shall be in accordance with the appropriate sections of Division 300 of the Water System Standards as listed below:

- a) General Construction Requirements: Section 302.01

- b) Trench Excavation and Backfill: Section 302.02
and 302.03

- c) Fittings Section 302.15

- d) Installation of Gate Valves: Section 302.16

- e) Service Laterals and Appurtenances:.....Section 302.18

- f) Concrete Blocks: Section 302.30

- g) Valve Boxes: Section 302.24

- h) Pipe Pressure Tests: Section 302.28

- i) Chlorination of Water Pipelines: Section 302.29

4. Connecting, Testing, Flushing and Disinfecting: Install but do not connect new lines until pressure testing is completed. Pressure testing, flushing of valves and mains, disinfection of the system shall be carried out in accordance with the Board of Water Supply's WATER SYSTEM STANDARDS. Submit the results of such tests to the Contracting Officer for approval. Supply and install any additional fittings of a temporary nature required for the purpose of working such tests.
- C. Final Inspection: At the time of final inspection of the work performed under the contract, the utilities covered by this section shall be complete in every respect and operating as designed. Remove all surplus materials of every character resulting from the work of this section. Correct any defects discovered in the utilities subsequent to this inspection prior to final acceptance.

END OF SECTION

SECTION 02810 - LANDSCAPE IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide a landscape irrigation system in the areas shown on the Drawings. Work indicated on the Drawings by notes shall be provided whether or not specifically mentioned in the Specifications. Items not specifically shown in the Drawings or specified, but normally required to conform with such intent, are considered part of the work. Contractor shall furnish materials, labor and equipment necessary to complete the work described herein and as indicated.
- B. The work in this Section includes, but is not limited to the following:
 - 1. All necessary permits and certificates.
 - 2. Excavation and backfilling.
 - 3. Installation of backflow prevention device, pipes, fittings, valves, irrigation heads, irrigation controller, and electrical wiring.
 - 4. Adjustment.
 - 5. Instructions to State's operating personnel.
 - 6. As-built drawings.
 - 7. Warranty.

1.2 RELATED WORK

- A. The contractor shall review all sections of these specifications to determine items of work that will interface with the application of this roofing system. Coordination and execution of related sections shall be the responsibility of the Contractor.

1.3 INCORPORATED DOCUMENTS

- A. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to work of this Section where cited by abbreviations noted below.
 - 1. American Society for Testing and Materials (ASTM).
 - 2. National Sanitation Foundation (NSF).
 - 3. Uniform Plumbing Code, current edition (UPC).

1.4 SUBMITTALS

- A. Substitutions: For purposes of establishing minimum requirements for type and quality of materials, the irrigation plan and specifications are based upon products of specific manufacturers. Whenever products of other manufacturers are to be considered, submit supporting technical literature to the Contracting Officer for prequalification prior to bidding.
- B. Manufacturer's Warranties: Submit manufacturer's certificates of warranty.
- C. As-built Drawings: Prepare and submit one reproducible as-built plan of the installation drawn or printed on tracing paper or mylar drafting film.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

- A. Work shall conform to governing laws, codes, ordinances and regulations.
- B. Procure and pay for necessary permits and certificates required in connection with this work.

1.6 WARRANTY

- A. Warranty entire irrigation system for a period of one year after the date of acceptance. Immediately repair or replace material and equipment found to be defective due to faulty material or workmanship during this period. This warranty does not include vandalism, negligence by others, or acts of God.
- B. Contractor is responsible for damage caused by the irrigation system during installation or the Warranty Period due to failure of workmanship or materials. Repair damage and return the area to the previous condition at Contractor's expense.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use new materials, in first class condition. Items of one type shall be from the same manufacturer.

2.2 IRRIGATION MAINS AND SLEEVES

- A. Polyvinyl chloride, Schedule 40, ASTM Type 1, Grade 1 (PVC 1120), NSF approved, conforming to ASTM D1784 and D1785 specifications, solvent weld bell, unless otherwise indicated. J-M or PW pipe or approved equal.

2.3 IRRIGATION LATERALS

- A. Polyvinyl chloride, 200 PSI (SDR 21), ASTM Type 1, Grade 1 (PVC 1120), NSF approved, conforming to ASTM D1784 and D2241 specifications, solvent weld bell, unless otherwise indicated. J-M or PW pipe or approved

equal.

2.4 FITTINGS

- A. Schedule 40 PVC, Type 1, ASTM D1784 and D2466 unless otherwise indicated. Dura, Lasco, Spears or approved equal.

2.5 IRRIGATION CABLE

- A. AWG #14, U.L. listed Type UF-600V, solid copper conductor.
- B. Common wire shall have a white jacket, control wires shall have a red jacket.

2.6 WIRE CONNECTORS

- A. 3M DBR/Y Direct Bury Splice Kit or approved equal.

2.7 SOLVENT CEMENT

- A. As recommended by the pipe manufacturer and conforming to ASTM D2564. Use primer approved by the pipe manufacturer.

2.8 CONCRETE ANCHOR BLOCKS

- A. 2500 PSI concrete.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect the substrates and conditions under which work of this Section will be performed. Do not proceed until unsatisfactory conditions have been corrected.

3.2 EXCAVATION AND BACKFILL

- A. Verify locations of utility lines. Arrange and pay for repair of utilities and structures damaged as a result of these operations.
- B. Install irrigation mains and electrical wiring at least 18 inches below finish grade; laterals at least 12 inches below finish grade; and sleeves, pipes and electrical wiring crossing pavement at least 18 inches below finish grade at sidewalks and 2 feet below finish grade at roadways. Install electrical wiring below irrigation pipes for protection.
- C. Provide firm uniform bed for the entire length of each pipeline.
- D. No rocks or sharp objects 1/2-inch or larger shall be within 6 inches of PVC pipe and fittings.

- E. Barricade and/or light the excavated areas to prevent undue hazard to the public.
- F. Should settlement occur over trenches after completion of irrigation system, refill and compact soil as directed.

3.3 INSTALLATION

- A. Installation of the materials and workmanship shall conform to the manufacturer's recommendations; where provisions of the specifications exceed such requirements, the specifications shall govern.
- B. Immediately notify Contracting Officer of any discrepancy between drawings and actual site conditions. Do not proceed with work within affected area until discrepancy has been resolved by Contracting Officer.
- C. Make minor field adjustments due to site conditions to insure adequate coverage and even distribution of water in landscape areas.
- D. Adjust the location, arc and radius of irrigation heads as required to eliminate dry areas and to minimize over spray.
- E. Allow for expansion and contraction of PVC pipe by snaking it from side to side in the trench.
- F. Parallel piping may be installed in the same trench with pipes at the same depth and 4-inch minimum horizontal separation between pipes. Parallel piping shall not cross in the trench.
- G. Crossing pipes shall have a 4-inch minimum vertical separation. No direct contact between other pipes or structures will be permitted.
- H. Prior to backfilling, pipes shall be tested and inspected for leaks at the joints and fittings and repaired or replaced as required.
- I. Prior to installing irrigation valves and heads, flush pipes under full pressure to insure removal of dirt and debris.
- J. Assemblies with threaded PVC pipe connections to metal pipe or fittings shall utilize PVC Schedule 40 male adapters or PVC Schedule 80 nipples unless otherwise indicated.
- K. Wire splices and connections shall be waterproof.
- L. Provide fittings and parts for a functioning irrigation system and connect to existing water source and stub outs.
- M. After installation, adjust irrigation heads and valves to provide the most effective coverage possible.

3.4 TESTS AND INSPECTIONS

- A. Pressure Test: Conform with UPC, General Regulations, Section 318, Subsection 2, Paragraph F.
- B. Preliminary Inspection: After irrigation system is complete, request a preliminary inspection. Perform coverage test in the presence of the Contracting Officer to determine if water distribution for areas is complete and adequate.
- C. Maintenance Period: Contractor is responsible for maintaining the irrigation system in an operable manner, including repair or replacement of stolen or vandalized equipment, until completion of landscape maintenance period and acceptance of landscaping.
- D. Final Inspection: At completion of maintenance period, request a final inspection. Perform coverage test in the presence of Contracting Officer. Warranty period shall not begin until corrections are completed to the satisfaction of the Contracting Officer.
- E. Completion of above tests shall not relieve Contractor from repairing leaks or areas of poor coverage discovered during the warranty period.

3.5 OPERATIONAL INSTRUCTION

- A. Prior to acceptance of the installation, arrange a meeting on site to instruct State's maintenance personnel in the proper operation of the irrigation system.

3.6 CLEAN UP

- A. Remove from the premises, as work progresses, rubbish and debris resulting from this work.
- B. Upon completion, leave entire area in a neat and orderly condition.
- C. Promptly remove any soil falling upon pavement as a result of these operations.

END OF SECTION

SECTION 02900 – LANDSCAPING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Provide landscape plantings in the areas shown on the Drawings with plants in a healthy, vigorous growing condition. Work indicated on the Drawings by notes shall be provided whether or not specifically mentioned in the Specifications. Items not specifically shown in the Drawings or specified, but normally required to conform with such intent, are considered part of the work.
- B. The work of this Section includes but is not limited to the following:
 - 1. Clearing and grubbing
 - 2. Imported screened soil.
 - 3. Pre-planting weed control.
 - 4. Soil preparation.
 - 5. Fine grading.
 - 6. Planting operations.
 - 7. Maintenance.
 - 8. Warranty.

1.2 RELATED WORK

- A. The contractor shall review all sections of these specifications to determine items of work that will interface with the application of this roofing system. Coordination and execution of related sections shall be the responsibility of the Contractor.

1.3 CODES AND STANDARDS

- A. Perform work in accordance with applicable laws, codes, and regulations required by authorities having jurisdiction over such work and provide for inspections and permits required by Federal, State and local authorities in furnishing, transporting and installing materials.

1.4 WARRANTY

- A. Warranty planting furnished or relocated under this contract until completion of the maintenance period. Immediately replace plants that decline or die during the warranty period, using the same kind and size as originally planted. Furnish, plant and maintain replacement plants as specified for original planting.
- B. Warranty planting for species, hybrid, flower color and/or variety specified. If after acceptance of the project, any warranted plant material proves to be of a different species, hybrid, flower color and/or variety not initially determinable, replace that plant with a new plant of the originally specified species, hybrid, flower color and/or variety. The new plant shall be equal in size to that of the incorrect plant at the time of its removal. The new plant shall meet the quality standards, be subject to the warranty, and be installed according to the Specifications. This warranty does not include plants reverting to the general species. There is no time limit to this warranty. The Contracting Officer will determine the nonconformance of the plant materials and notify the Contractor in writing of the required replacement work. Materials and work shall be at the expense of the Contractor. Work shall be completed within 10 working days from the date of notification by the Contracting Officer.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. Botanical and common names of plants specified on the Drawings conform with names given in Tropica by Alfred Byrd Graf, and In Gardens of Hawaii by Marie C. Neal. Names not included therein conform to names generally accepted in the local nursery trade.
- B. Plant material shall conform with recommendations and requirements of the most recent edition of the American Standard of Nursery Stock, published by the American Association of Nurseryman Inc., except as supplemented or modified by these specifications or the drawings.
- C. All plant material shall have a habit of growth that is normal for the species and shall be healthy and free from insects and injuries. Trees and shrubs shall have normal, well-developed branching, together with vigorous root systems. Roots must fill containers, but show no evidence of being or having been root bound. Any tree or shrub with a weak, thin trunk not capable of supporting itself when planted in the open will be rejected. Plants shall equal or exceed measurements specified on planting plan, which will be the minimum acceptable sizes after pruning.

2.2 TREE PAINT

- A. "Ortho Pruning Sealer" or approved equal.

2.3 IMPORTED SCREENED SOIL

- A. Fertile, friable soil of loamy character, free of clay, refuse, branches, weeds, noxious seeds, nematodes or other deleterious or extraneous matter. Soil shall have a minimum pH value of 5.4 and a maximum pH value of 7.0 prior to amending. Stones and earth lumps shall not exceed one inch in largest dimension. Red Humic latosol soils or types known as "Red Dirt" are unacceptable. Soil is subject to approval by the Contracting Officer.

2.4 FERTILIZERS AND SOIL AMENDMENTS

- A. Fertilizer: "Lesco sulfur-coated 14-14-14 + minors", or approved equal.
- B. Fertilizer Tablets: "Gro-Power 12-8-8 planting tablets", 7 gram, or approved equal.
- C. Manure: Cattle or chicken manure free of extraneous matter and screened to remove lumps larger than one inch in diameter.

2.5 PRE-EMERGENT HERBICIDE

- A. "Ronstar-G" or approved equal.

2.6 POST-EMERGENT HERBICIDE

- A. Selective herbicide for removal of existing weeds, lawn and nutgrass.

2.7 POLYETHYLENE BED DIVIDER (POLY DIVIDER)

- A. "Black Diamond", manufactured by Valley View Specialties Company; "Cobra High-Test Strip", manufactured by Old Dutch Materials Company, or approved equal.

2.8 BIOBARRIER

- A. "Tyar" Biobarrier manufactured by Reemay Inc. with 19.5 inches minimum width. Install per manufacturer's recommendations.

2.9 TREE TRUNK PROTECTOR

- A. Polyethylene with a minimum thickness of 0.06 inches; height of 9 inches and expanding diameter to a maximum of 4 inches. "Deep Root ArborGard + AG 9-4" or approved equal.

PART 3 - EXECUTION

3.1 INSPECTIONS

- A. Inspect the substrates and conditions under which work of this section will be performed. Do not proceed until unsatisfactory conditions have been corrected. Immediately notify Contracting Officer of any discrepancy between the Drawings and actual site conditions. Do not proceed with work

within affected area until discrepancy has been resolved by Contracting Officer.

3.2 PREPARATION OF PLANTING AREAS

- A. Clear planting areas of debris and foreign material. Remove rocks exceeding one inch in largest dimension and weeds and vegetation unless designated to remain. Spray nutgrass with post-emergent herbicide. Follow manufacturer's instructions for herbicide application.
- B. Cut and fill planting areas as required to set rough grade 4 inches below finish grade elevations specified on Grading Plan in areas where screened soil will be spread. Any fill required shall be approved screened soil.
- C. Spread fertilizer at rate of 20 lbs. per 1000 square feet over rough grade in planting areas and then scarify soil to a depth of 8 inches by tilling until the soil is loose and fine textured.
- D. All construction operations of soil transportation, spreading and fine grading shall conform to Chapter 23, Grading Soil Erosion Standards and Guidelines dated 1975, Revised Supplement 1 dated 1992 and amendment (Ordinance No. 96-34). Contractor shall not perform any construction work so as to cause falling rocks, soil, or debris in any form to fall, slide or flow onto adjoining properties, streets, natural watercourses, or drainage facilities. The Contractor shall also be responsible for conformity with the applicable provisions of Chapter 54, Water Quality Standards, and Chapter 55, Water Pollution Control, of Title 11, Administrative Rules of the State Department of Health. Should a violation occur, the cost incurred for any remedial action shall be at the expense of the Contractor.
- E. Dust Control: Contractor shall abide by all Federal, State and City ordinances regarding dust control practices during construction.
- F. After completion of tillage, spread 4-inch deep layer of screened soil mix over rough grade in planting areas unless otherwise indicated. Greater depths of screened soil mix may be required to meet specified finish grades adjacent to sidewalks, pavement and curbs. Finish grades shall be as specified on Grading Plan. Maintain previously established drainage swales.
- G. Remove stones exceeding one inch in largest dimension, sticks, rubbish, and other extraneous matter that is exposed by tilling. Remove this debris from the site.
- H. Fine grade: Grades shall be smooth and on a uniform plane with no abrupt changes or pockets and shall slope away from the building at a minimum slope of 1/4-inch per foot. Maintain previously established drainage swales. Verify the surface drainage of planting areas. Notify Contracting Officer of discrepancies, obstructions or other conditions considered detrimental to proper execution of the work.
- I. Tie landscape work to existing conditions and controls such as existing

walls, pavement, utility lines, storm drains, etc. Finish grades shall properly relate to such controls. Adjust new work as necessary and as directed to meet existing conditions and fulfill the intent of the Drawings.

- J. Finish grades adjacent to sidewalks, pavement and curbs shall be a 1-inch below top of sidewalk, pavement or curb and shall slope away at a maximum slope of one inch vertically to 6 inches horizontally to intersect the adjoining grade, unless otherwise indicated on Grading Plan.

3.3 INSTALLATION OF PLANT MATERIAL

- A. Quantities stated on planting plan and in plant list are only approximate. Verify quantities before bidding. Provide sufficient quantities to fulfill intent of plan with plants and other specified materials at locations, spacings and depths indicated. The planting plan takes precedence over stated quantities.
- B. Caliper measurements shall be taken at a point on the trunk 6 inches above natural ground lines for trees up to 4 inches in caliper and at a point 12 inches above the natural ground line for trees over 4 inches in caliper.
- C. Relocated and field stock plants shall have a root ball of sufficient size to support recovery of the plant from transplanting. Plants with small or inadequate root balls will be rejected.
- D. Verify locations of utility lines. Arrange and pay for repair of utilities and structures damaged as a result of these operations.
- E. Use adequate wrapping and padding to protect trunks and branches from rope, cable and equipment abrasions during planting operations.
- F. Notify Contracting Officer in writing of soil or drainage conditions encountered during planting operations which the Contractor considers detrimental to growth of plant material. If drainage conditions of plant pits appear unsatisfactory, test drainage by filling with water. Conditions permitting the retention of water in planting pits for an excessive period of time shall be brought to the attention of the Contracting Officer.
- G. Backfill mix for planting of trees and shrubs shall be 4 parts excavated soil from planting pit to 1 part manure. If the excavated soil is of poor quality or insufficient in quantity, provide the necessary additional screened soil.

Thoroughly mix backfill together with fertilizer at the following rates:

8 cups (4 lbs.)	per field stock or relocated tree
4 cups (2 lbs.)	per 25-gallon can tree or palm
3 cups (1 1/2 lbs.)	per 15-gallon can tree or palm
1/2 cup (1/4 lb.)	per 5-gallon can tree or shrub
1/2 cup (1/4 lb.)	per 3-gallon can shrub
1/4 cup (1/8 lb.)	per 1-gallon can shrub

- H. Diameter of plant pits for trees and shrubs shall be at least twice the

diameter of the rootball; depth of pits shall be sufficient to accommodate rootball when plant is set 2 inches below finish grade, allowing for at least one foot of prepared backfill mix below rootball.

- I. Set trees and shrubs on tamped backfill mix with top of rootball 2 inches below finish grade. Set each plant upright and in a position of natural balance and appearance and face to provide the best appearance in relationship to adjacent structures and surroundings.
- J. Carefully place backfill under and around rootball to ensure no air pockets and tamp firmly to prevent settling. Space fertilizer tablets evenly around rootball, approximately 2 inches from root tips, alongside lower half of rootball. Apply fertilizer tablets at the following rates:

Container Size	Number of Tablets
Field stock or relocated tree	50
25-gallon can	30
15-gallon can	20
5-gallon can	10
3-gallon can	5
1-gallon can	3

- K. Set finish grade of backfill approximately flush with top of rootball, leaving a 2-inch deep watering basin over the rootball.
- L. Support single trunk palms immediately after planting. Brace each palm with 3 equally spaced guys. Encase guys in garden hose at point of contact with tree trunk and attach to trunk at about 2/3 the height of the palm. Encase lower portion of guy wires in a 4 foot minimum length of 1/2-inch diameter PVC pipe. Pound stakes below finish grade after attaching guys. Flag each guy with at least 2 strips of yellow plastic tape; one tied at eye level and one at knee level, in such a manner as to remain in place without slipping. Keep guys taut throughout contract period.
- M. Pruning shall be performed by experienced tree trimmers who, through related training and on-the-job experience, are familiar with the techniques and hazards of this work.
 - 1. Limit pruning of trees and shrubs to the minimum necessary to remove dead and broken branches and undesirable growth, and to compensate for loss of roots during transplanting. Prune in a manner which retains the natural habit and shape of the plant.
 - 2. Branches should be cut back above the collar at a healthy limb or bud without leaving a stub which may decay and injure the plant. On larger branches and limbs requiring a saw for removal, a preliminary undercut approximately 1/3 through the limb must be made to prevent ripping and tearing of the bark. On the upper side of the limb, above the first cut, make a second cut to remove the limb. Then remove the remaining stub. Paint cuts over one inch in diameter on limbs or roots with tree paint. Do not paint cuts on palms.

- N. Apply pre-emergent herbicide in ground cover areas, except where seeds or unrooted cuttings are planted. Follow manufacturer's directions.

If Contractor elects to use "Ronstar-G" herbicide, apply it following completion of ground cover planting. Do not disturb the soil after spreading "Ronstar-G."

- O. Plant ground cover in neat rows insuring complete coverage of planting areas, including watering basins and under and around trees, shrubs and hedges. Spacings indicated on drawings are triangular spacing.
- P. Water each plant deeply and thoroughly, saturating rootball immediately following planting. Keep planting areas moist, but not saturated until completion of maintenance period.
- Q. Maintain finish grade established prior to planting. Restore finish grade in any area disturbed by erosion or planting operations.
- R. Poly Divider: Install in accordance with installation instructions furnished by the manufacturer. Join poly divider sections with approved fittings. Top of poly divider shall be one inch above finish grade.

3.4 CLEAN-UP

- A. Remove from the premises, as work progresses, rubbish and debris resulting from this work.
- B. Upon completion, leave entire area in a neat and orderly condition.
- C. Promptly remove any soil falling upon pavement as a result of these operations.

3.5 INSPECTION

- A. When planting and clean-up have been completed, request that an inspection be held so that the maintenance period may be started. Correct deficiencies noted at the inspection to the satisfaction of the Contracting Officer before starting the formal maintenance period.
- B. At the completion of the maintenance period, a final inspection shall be held to resolve and correct any deficiencies. Make corrections immediately.
- C. Contractor, Contracting Officer, or their representatives, shall be present at each inspection.
- D. Request inspections at least one week in advance so that a mutually agreeable time may be arranged.

3.6 MAINTENANCE

- A. Maintain planting within project limit from effective date of the construction

contract until 90 days after completion and approval of planting operations.

- B. Contractor shall have on-site at all times a written Best Management Practice (BMP) plan as stated within the Chapter 55, Water Pollution Control, of Title 11, Administrative Rules of the State Department of Health. Within BMP, the following shall be made part of the plan: types of fertilizer used based upon periodic soil analysis for plant nutrient level, irrigation operation (run time) based upon seasonal changes and annual rainfall with adjustment accordingly, chemical spraying for pests, etc.
- C. Maintain plants and planted areas in optimum growing conditions and appearance. Maintenance shall include watering, weeding, mowing, trimming, fertilizing, replacing, pruning, maintaining of grades and elevations in landscaped areas, and other operations necessary to maintain work. Remove from the site leaves, trash and debris which accumulate in planting areas.
1. Irrigate as necessary to secure maximum growth of plants. Regulate irrigation as required to avoid runoff and soil erosion.
 2. Keep planting areas free of weeds and undesirable grasses, including nutgrass. Remove entire root system of weeds.
 3. Mow lawn areas after grass is established, to a height of one inch whenever the height of the grass becomes 1-1/2 inches. Remove clippings.
 4. Topdress and roll lawn areas as necessary to obtain smooth and level lawn surface.
 5. Immediately regrass bare spots within lawn areas.
 6. Spread fertilizer over planting areas at rate of 10 lbs. per 1000 square feet; once, 30 days after start of maintenance period and again, every 30 days thereafter until completion of maintenance period. Notify Contracting Officer one day prior to application of fertilizer.
 7. Promptly wash off any fertilizer which adheres to foliage. Irrigate planting areas following fertilizer application. Promptly sweep off any fertilizer which falls on pavement, wood or metal surfaces to prevent staining.
 8. Prune trees and shrubs as required or as directed by the Contracting Officer.
 9. Maintain finish grade established prior to planting. When any planting areas become eroded or otherwise damaged, repair and replant.
 10. Protect areas susceptible to pedestrian or vehicular traffic by erecting barricades immediately after planting. Replant areas damaged by pedestrian or vehicular traffic, at no additional expense to the State. Barricades or warning signs erected for protection of landscaping are subject to approval of the Contracting Officer.
 11. Contractor is responsible for replacement of plants which are stolen, killed or damaged as a result of vandalism prior to completion of maintenance

period.

12. Inspect plants, including lawn, for fungus and insect damage weekly. Treat affected material immediately. Replace plants killed or disfigured by insects, fungus or disease.
13. Acceptance of lawn areas at conclusion of maintenance period shall be conditioned upon 99% coverage of the overall area. Individual bare spots shall not exceed 2 square feet in area. Maintenance period for planting shall be extended at no additional cost if grass planting does not meet this requirement.

END OF SECTION

SECTION 02920 - LAWNS AND GRASS

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Furnish labor, materials, equipment and tools for grass planting as specified herein. Grass shall be planted in areas indicated on the plans and as listed below:
 - 1. Existing grassed areas that are damaged by construction operations and irrigation system installation;
 - 2. Areas that are dug up for utility trenches;
 - 3. Areas from which existing structures are to be removed;
 - 4. Areas within "Contract Zone Limits" that are graded and covered with screened soil except areas designated for other plants; and
 - 5. Other areas within "Contract Zone Limits" that are indicated on the plans to be graded, whether with the addition of screened soil or not, such as slopes of banks, etc.

1.2 RELATED WORK

- A. The contractor shall review all sections of these specifications to determine items of work that will interface with the application of this roofing system. Coordination and execution of related sections shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Grass shall be that locally known as fine "Manienie" or Common Bermuda Grass (*Cynodon dactylon*). At the option of the Contractor, grass planting may be by seeds (plain seeding or by hydro-mulching) or by sprigs.
 - 1. Grass seeds shall be fresh, hulled, and meet the following requirements:

Pure seed	95.0% minimum
Crop seed	1.0% maximum
Weed	0.5% maximum
Inert material	5.0% maximum
Germination	85.0% minimum

Grass seeds shall be delivered to the site in unopened, sealed containers, labeled with the brand name and percent purity. Labeling shall indicate that the seeds passed a certified germination test no more than 12 months prior to use.

2. Grass sprigs shall be healthy living runners and stolons a minimum of 6 inches long with at least 3 nodes. After they are dug, they shall be covered and kept moist until planted.
- B. Fertilizer shall be pelleted and shall consist of the following percentages by weight of active ingredients:
1. For First Application:

Nitrogen	16%	
Phosphate	16%	
Potash		16%
 2. For Second Application:

Nitrogen	16%	
Phosphate	16%	
Potash		16%
- C. Mulch Materials
1. Mulch shall be specially-processed fiber containing no growth or germination-inhibiting factors. It shall be such that after addition and agitation in the hydraulic equipment with seed, fertilizer, water and other additives not detrimental to plant growth, the fibers will form a homogeneous slurry. When hydraulically sprayed on the soil, the fibers shall form a blotter-like ground cover which readily absorbs water and allows infiltration to the underlying soil.
 2. Stabilizing and water retaining agent for hydro-mulching option only shall be "Verdyol Super", "Ecology Control M-Binder" or approved equal.
- D. Screened soil for repair work: Meeting requirements of Section 02900, paragraph 2.03.
- E. Water shall be potable.

PART 3 - EXECUTION

1.1 INSTALLATION AND WORKMANSHIP

- A. Site Preparation: Refer to Section 02900 - Landscaping for soil preparation.
- B. Planting: The Contractor shall notify the Contracting Officer one day before

planting of grass.

1. Immediately prior to planting operations, planting areas shall be cleared of weeds, debris, rocks over one inch in diameter and clumps of earth that will not break up.
2. Option by Grass Seeding: If grass seeds are used, the following procedure shall be used (NOTE: Contractor should exercise caution in seeding slopes where seed may be washed away):
 - a. The grass seeds shall be broadcast uniformly by hand or by sowing equipment at the rate of 100 lbs. per acre. Half the seeds shall be sown with the sower moving in one direction and the remainder shall be sown at right angles to the first direction.
 - b. The surface shall then be raked to a smooth even plane while the seeds are simultaneously worked into the soil to a depth of about 1/2-inch.
 - c. The surface shall then be smoothed and compacted by means of a culti-packer, roller or other similar equipment weighing 60 to 90 lbs. per lineal foot of roller.
 - d. The planted area shall then be watered sufficiently to provide water penetration to a depth of at least 2 inches and shall then be kept moist until roots are established.
3. Option by Grass Sprigging
 - a. Furrows shall be placed perpendicular to drainage swales and parallel to contours on slopes and shall be spaced no more than 4 inches apart.
 - b. Fresh sprigs shall be planted in each furrow a maximum of 6 inches apart and covered with soil to a minimum depth of 2 inches.
 - c. The surface shall then be smoothed and compacted by means of a culti-packer, roller or other similar equipment weighing 60 to 90 lbs. per lineal foot of roller.
 - d. The planted areas shall be watered immediately after rolling in sufficient quantity to provide water penetration to a depth of at least 2 inches and shall then be kept moist until roots are established.
4. Option by Hydro-Mulching of Grass Seed: This work shall consist of furnishing and applying hulled Bermuda seed, fertilizer, mulch and stabilizing and water retaining agent by hydro-mulching.
 - a. The seeds shall be applied at the rate of 2 lbs. per 1,000 square feet

minimum. Mulch shall be applied at a rate of 30 lbs. per 1,000 square feet minimum. Stabilizing and water retaining agent shall be applied at the rate of 2 lbs. per 1,000 square feet for "Verdyol Super" or "Ecology Control M-Binder". In every application, complete and uniform coverage of the soil shall be attained.

- b. First application of fertilizer shall be included with mulch and seed.
 - c. The hydro-mulch equipment shall be capable of mixing the necessary ingredients to a uniform mixture and to apply the slurry to provide uniform coverage. Seed, fertilizer, mulch mix and stabilizing water retaining agent shall be applied in one operation by hydraulic equipment made specifically for this use. The equipment shall have a built-in agitation system with an operating capacity sufficient to keep the mix in uniform distribution until pumped from the tank. Distribution and discharge lines shall be large enough to prevent stoppage and shall be equipped with hydraulic discharge spray nozzles which provide a uniform distribution of the slurry.
 - d. Areas inaccessible to hydro-mulching application shall be seeded or hand sprigged and fertilized by approved hand methods.
 - e. Water shall be applied immediately following mulching and the planting area shall then be kept moist until roots are established.
- C. Application of Fertilizer: The Contractor shall notify the Contracting Officer one day before application of fertilizer.
- 1. Fertilizer shall be distributed uniformly over the planted area.
 - 2. Spread fertilizer over lawn areas at the rate of 10 pounds per 1,000 square feet; once, 30 days after start of maintenance period and again, every 30 days thereafter until completion of maintenance period.
 - 3. Promptly wash off any fertilizer which adheres to foliage. Irrigate planting areas following fertilizer application. Promptly sweep off any fertilizer which falls on pavement, wood or metal surfaces to prevent staining.
- D. Maintenance
- 1. General: The Contractor shall be responsible for the proper care of the grassed areas. Maintenance shall include watering, weeding, mowing, repairing, topdressing, regrassing and protection, and shall be required until the entire project is accepted, but in any event for a period of not less than 90 days after planting of grass.
 - 2. Watering: After planting of seeds or grass sprigs or mulching, the ground shall be watered as deemed necessary by the Contractor to establish a healthy growth. Watering shall be done in a manner that will prevent

erosion due to the application of excessive quantities of water, and the watering equipment shall be of a type that will prevent damage to the finished surface.

3. Weeding: Weeds shall be uprooted and removed completely and in no case shall they be allowed to grow and propagate more seeds. Large holes caused by weeding shall be filled with screened soil and raked level.
4. Mowing: Grass shall be mowed to a height of 1 inch whenever the height of grass becomes 1-1/2 inches.
5. Repairing and Regrassing: When any portion of the surface becomes gullied or otherwise damaged and grass has failed to grow, such areas shall be repaired with screened soil and replanted with grass. Any areas of one foot square or more in which grass has failed to grow after 30 days of maintenance shall be regrassed.
6. Topdress and roll lawn areas as necessary to obtain smooth and level lawn surface.
7. Protection: The grassed areas shall be protected against traffic so that the grass establishes a healthy growth. Grassed areas damaged by traffic shall be replanted.

1.2 ACCEPTANCE OF GRASSING

- A. At the time of acceptance, the grass shall be well established and shall be given a final weeding and a final mowing to a height of 1 inch. If the maintenance period has expired before acceptance of the entire project, the Contractor shall continue to maintain the grass until acceptance of the entire project. If the maintenance period should extend beyond acceptance of the entire project, the Contractor shall continue to maintain the grass until the end of the specified period of time required for maintenance.
- B. At the end of the maintenance period, should there appear areas where grass has failed to grow, such areas shall be replanted with grass, refertilized and maintained beyond the maintenance period until a healthy growth is established. Acceptance of lawn areas at conclusion of maintenance period shall be conditioned upon 99% coverage of the overall area. Individual bare spots shall not exceed 2 square feet in area. Maintenance period for planting shall be extended at no additional cost if grass planting does not meet this requirement.

END OF SECTION

DIVISION 5 - METAL

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.01. GENERAL PROVISIONS: The General Instructions to Bidders, the General Conditions of Construction Contracts, and Special Provisions preceding these specifications shall govern this section of the work.

1.02. SUMMARY

A. Provide all miscellaneous metal as indicated on the drawings and as specified herein, including, but not limited to, the following:

1. Railings and handrails.
2. Safety Renovation Treads
3. Miscellaneous framing and supports.
4. Include all anchors, angles, bolts for items, and other accessories shown in details and/or required for the complete installation of work in all sections.
5. Anti-slip safety stair treads and nosing.

B. **Related Work Specified Elsewhere:**

1. Section 03300 - CAST-IN-PLACE CONCRETE: Coordinate post and fastener installations.
2. Section 09902 - REPAINTING: Metal painting.

1.03. SUBMITTALS

A. Submit in accordance with Section 01300 - SUBMITTALS.

B. **Product Data:** Submit manufacturer's specifications, anchor details and installation instructions for products used in metal fabrications, including paint products and grouts.

C. **Shop Drawings:** Submit shop drawings as required for all work specified herein in accordance with the contract drawings. Shop drawings, where applicable, shall be referenced to sheet and detail being depicted. Include plans, elevations, component details, and attachments to other Work. Indicate materials and profiles of each metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items. Include setting drawings, templates, and directions for installing anchor bolts and other anchorages.

- D. **Samples for Verification:** Submit samples for each profile and pattern of fabricated metal and for each type of metal finish required, prepared on metal of same thickness and alloy indicated for the Work. If finishes involve normal color and texture variations, include sample sets, consisting of two or more units, showing the full range of variations expected. Include 6-inch-long samples of linear shapes.
- E. **Qualification Data:** Submit data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. **Conformance:** Where materials or fabrications are indicated to comply with certain requirements for design loading and system performance, include structural computations, material properties, and other information needed to verify conformance.
- G. **Certifications:** Submit certificates of asbestos-free, lead-free, zinc-chromate-free, strontium-chromate-free, cadmium-free, and mercury free paint.

1.04. QUALITY ASSURANCE

Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

1.05. SYSTEM PERFORMANCES

Structural Performances: Provide assemblies which, when installed, comply with the minimum requirements for structural performance, unless otherwise indicated or required by current International Building Code.

- 1. **Handrails and Toprails:** Capable of withstanding the following loads applied as indicated when tested per ASTM E 935: Concentrated loads of 200 lbs. applied at any point in any direction.
- 2. **Guardrails:** Intermediate grillage panels capable of withstanding a horizontal concentrated load of 50 lbs. applied to one sq. ft. at any point in system, including intermediate rails, balusters or other elements composing infill area.

1.06. PROJECT CONDITIONS

Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

- 1.07. COORDINATION:** Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation,

PART 2 - PRODUCTS

1.01 MATERIALS AND COMPONENTS

- A. **Metal Surfaces. General:** For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- B. **Steel Plates, Shapes and Bars:** ASTM A 36/A 36M, hot-dip galvanized.
- C. **Steel Pipe:** ASTM A 53/A 53M, Grade B, minimum yield stress of 35,000 psi, hot dip galvanized, standard weight (Schedule 40), unless otherwise indicated.
- D. **Steel Tube:** ASTM A 500 or ASTM A 501, hot-dip galvanized.
- E. **Non-shrink, Nonmetallic Grout:** Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

1.02 FASTENERS

- A. **General:** Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Provide stainless steel fasteners at stainless steel materials and where dissimilar metals are joined or where indicated. Select fasteners for the type, grade, and class required or as indicated.
- B. **Steel Bolts:** Regular hexagon-head type, ASTM A 307, hot-dip galvanized.
- C. **Stainless Steel Bolts and Screws:** ASTM F 593, Type 304.
- D. **Washers and Nuts:** Same material and finish as bolts.
- E. **Expansion Anchors:**

1. **Anchor Bolt and Sleeve:** Anchor bolt and sleeve assembly of carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5 with capability to sustain without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 2. **Metal Anchor Bolts. Straps, Hangers. Brackets and Other Inserts:** Furnish to other trades the anchor bolts, straps, hangers, brackets and other inserts which are necessary for the final installation of work under this and other trades, where not specified to be furnished under the other sections of the specifications. This trade shall also furnish templates if required by others and shall check the installation of all bolts and inserts for accuracy. Anchor bolts and washers of same quality as bolt. All items shall be galvanized except use stainless steel at aluminum metals.
- F. **Cast-in-Place Anchors in Concrete:** Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47 M malleable irons or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized, ASTM A 153/ A 153M.

1.03 PAINT

- A. **Galvanizing Repair Paint:** High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC - Paint 20.
- B. **Finish Painting:** Paint all exposed metal fabrication items except for prefinished items as specified in Section 09901 - PAINTING.

1.04 FABRICATION, GENERAL

- A. **Shop Assembly:** Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. **Workmanship:** Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in the finished product. Work to dimensions shown or accepted on the shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for the various components of the Work.
- C. Form exposed work true to line and level, with accurate angles and surfaces and with straight sharp edges. Ease exposed edges to a radius of approximately 1/32-inch unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces. Provide welds behind finish surfaces without distorting or discoloring exposed side.

- E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat head (countersunk) screws or bolts.
- F. Provide for anchorage of the type shown, coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
- G. Cut, reinforce, drill, and tap miscellaneous metal work to receive finish hardware and similar items.
- H. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.
- I. **Galvanizing:** Provide all steel fabrications with hot-dip galvanized coating, unless otherwise indicated, as follows:
 - 1. ASTM A 153/A 153M for galvanizing iron and steel hardware.
 - 2. ASTM A 123/A 123M for galvanizing rolled, pressed, and forged steel shapes, plates, bars, and strip 1/8-inch thick and heavier, and assembled steel products.

1.05 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures.
- B. Fabricate items of sizes, shapes and dimensions required. Furnish steel washers.

1.06 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Provide miscellaneous steel framing and supports, as required to complete work.
- B. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes, plates, and steel bars, for supports, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
- C. Galvanize all miscellaneous framing and supports unless otherwise specified.
- D. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Galvanize all miscellaneous frames and supports.

2.07. STEEL PIPE RAILINGS AND HANDRAILS

- A. Fabricate steel railings and handrails to dimensions, spacing, details and anchorages, with smooth bends and welded joints ground smooth and flush. Adjust railings prior to anchoring to ensure matching alignment at butting joints. Provide brackets as detailed. Provide formed sleeve. Fill the annular space between post and sleeve solid with non-shrink, nonferrous grout.
- B. Handrail and any wall or other surfaces to it shall be free of any sharp or abrasive elements. Edges shall have a minimum radius of 1/8-inch in compliance with ADAAG 5.05.8
- C. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
 - 1. At tee and cross intersections provide coped joints.
 - 2. At bends interconnect pipe by means of prefabricated elbow fittings or flush radius bends, as applicable, of radiuses indicated.
 - 3. At elbow bends provide mitered joints.
 - 4. Form bends by use of prefabricated elbow fittings and radius bends or by bending pipe, at fabricator's option.
 - 5. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.
 - 6. Provide wall returns at ends of wall mounted handrails, except where otherwise indicated.
 - 7. Where required, close exposed ends of pipe by welding 3/16-inch thick steel plate in place or by use of prefabricated fittings.

2.08 METAL GATES: Gates and frames, unless otherwise indicated, shall consist of tubular steel for perimeter frames and horizontal and vertical intermediate members. Miter and weld all corners; butt weld horizontal rails to frame members and vertical members to tubular steel members. Grind all welds smooth. Hot-dip galvanize gates and frames after fabrication.

2.09 SAFETY RENOVATION TREAD: Provide Wooster Products Inc., Type 500 SN and Type 162, 6063 –T5 extruded aluminum with beveled ends. Accepted equivalent products of other manufacturers are acceptable.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prior to all work of this section, the Contractor shall carefully inspect the installed work of all other trades and verify that all such work is complete to the point where fabrication and installation of the work of this section may properly commence.
- B. The Contractors shall make all required measurements in the field to ensure proper and adequate fit of all metal fabrication items.
- C. Installer must examine the areas and conditions under which metal fabrication items are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- D. **Dissimilar Metals:** Coat aluminum surfaces that will be in contact with dissimilar metals, grout, or concrete with a heavy coat of bituminous paint.

3.02 INSTALLATION

- A. **General:** Install metal fabrications as per approved shop drawings and manufacturer's written instructions.
- B. **Fastening to In-Place Construction:** Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- C. **Cutting, Fitting, and Placement:** Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment, and elevation, plumb, level, true, and free from rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
- D. **Connections:** Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up repair paint. Do not weld, cut, or abrade the surfaces of units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
- E. **Field Welding:** Comply with AWS Code for procedures of manual shielded metal- arc welding, appearance and quality of weld made, and methods in correcting welding work.
- F. **Grouting:** Mix the specified and accepted grout with potable water and in the consistency recommended by the manufacturer in a non-contaminating container. Mix only the amount of grout that will be placed within the specified pot life of the material. Any grout that has set shall be discarded. Pour the grout in small amounts from one side only, tamping between pours to eliminated air pockets. Cure grout as recommended by the manufacturer.

3.03 CLEAN UP

- A. After installation, all surfaces shall be cleaned and ready to receive final treatment. All unused materials, tools and equipment shall be removed from the project site.
- B. All rubbish, debris, fines, etc., accumulated from the work of this section shall be removed from the project site and the area left neat and clean.

END OF SECTION

DIVISION 7 – THERMAL & MOISTURE PROTECTION

SECTION 07240 - EXTERIOR FINISH SYSTEM

PART 1 - GENERAL

1.01 PROVISIONS: The General Instructions to Bidders, the General Conditions of Construction Contracts, and Special Provisions preceding these specifications shall govern this section of the work.

1.02 ARY

A. Provide all exterior finish systems as indicated on the drawings and as specified herein, including the following:

1. Direct-applied exterior finish applied over exterior sheathing board.
2. Provide exterior sheathing board suitable for direct application.

B. **Work Specified Elsewhere:**

1. **07920 - JOINT SEALANTS: Sealing joints.**

1.03 ITTALS

A. Submit in accordance with Section 01300 - SUBMITTALS.

B. **Product Data:** Submit product data for each component of exterior finish system.

C. **Drawings:** Submit shop drawings showing installation of system, including sections, details of components, joint configurations within system and between system and adjacent construction.

D. **for Initial Selection Purposes:** Submit manufacturer's standard color charts and small-scale samples indicating fine sand textured finish. Submit sealant manufacturer's standard bead samples consisting of strips of actual products showing full range of available colors.

E. **for Verification Purposes:** Submit samples in the form of 1-foot square panel for finish, color, and texture specified. Prepare samples using same tools and techniques intended for actual work. Incorporate within each sample a typical control joint filled with sealant of color as scheduled.

F. **Certificates:** Submit certificate signed by system manufacturer certifying that installers comply with specified requirements.

G. **Compatibility and Adhesion Test Report:** Submit test report from sealant manufacturer certifying that materials forming joint substrates of system have been tested for compatibility and adhesion with joint sealants; include sealant manufacturer's interpretation of results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

- H. **rranty:** Submit warranty as noted under item entitled "WARRANTY" herein below.

1.04 **ANTY**

- A. mit original and copies of a properly executed manufacturer's standard warranty for five (5) years from the project acceptance date.
- B. under this section shall be warranted against defects in materials, including substrate and workmanship for a period from the project acceptance date as stated below. Written manufacturer's warranty shall include materials and labor required to repair deficiencies at one's own expense. Efflorescence removal and uniform color restoration during the initial 12 months of this warranty shall be provided as part of this warranty.

1.05 **TY ASSURANCE**

- A. Qualifications: Engage an experienced Installer who is certified in writing by system manufacturer as qualified to install manufacturer's system.
- B. Representative: The manufacturer's technical representative shall review all drawings/details and revise as required to meet the manufacturer's system. These revisions shall be incorporated in the shop drawing submittal.
- C. Limitations: Obtain materials for system from either a single manufacturer or manufacturers accepted by the system manufacturer as compatible with other system components.

1.06 **NITIONS**

- A. applied exterior finish system (DEFS) refers to exterior assembly consisting of a layer of exterior gypsum sheathing board, an integrally reinforced base coat, and a textured protective finish coating, directly applied to supporting frame construction.
- B. terior finish system (EFS) over CMU and concrete consists of a base coat and textured protective finish coating applied directly to CMU and concrete.
- C. stem manufacturer refers to the manufacturer of the exterior finish system.

1.07 **EM PERFORMANCE REQUIREMENTS:** Provide system complying with the following performance requirements:

1. **Bond Integrity:** Free from bond failure within system components or between system and supporting construction, resulting from exposure to fire, wind loads, weather, or other conditions.
2. **Weathertightness:** Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building that results in deterioration of thermal insulating effectiveness or other degradation of system and assemblies behind system, including substrate construction and interior finish.

1.08 ERY, STORAGE, AND HANDLING

- A. ver products in original, unopened packages and containers with manufacturer's labels identifying products legible and intact.
- B. materials inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic and other causes.
- C. sheathing boards flat and off the ground.

PART 2 - PRODUCTS

2.01 MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Dryvit System, Inc.
- 2. STO Industries
- 3. Omega Products International, Inc.

2.02 MATERIALS

- A. **Compatibility:** Provide adhesive, sheathing board, reinforcing fabrics, base and finish coat materials, sealants, and accessories that are compatible with one another and accepted for use by system manufacturer.
- B. **Colors and Textures of Protective Finish Coating:** Texture shall be equal to STO Industries "Stolit .75 - Fine" at locations indicated. Color as scheduled on the drawings
- C. **Gypsum Sheathing Board:** Equivalent to Georgia-Pacific "Dens-Glass Gold sheathing, made of a silicone-treated gypsum core, surfaced with inorganic fiberglass mats, and alkali-resistant surface coating; 5/8-inch thick Firestop, Type X, ASTM C 1177/ C 1177M
- D. **Building Wrap:** Flash spun bonded olefin, non-woven, non-perforated, 2.1 oz. per yard, secondary weather resistant barrier complying with ASTM E 1677, Type 1, as Tyvek Stucco Wrap. Provide manufacturer's pressure-sensitive plastic tape and fasteners as applicable to the building wrap and as recommended by the manufacturer.

2.03 EXTERIOR FINISH SYSTEM

- A. **Base Coat:** System manufacturer's standard factory-mixed, formulation of polymer-emulsion adhesive and inert fillers, ready for use without other materials, and suitable for use as leveling coat over CMU and concrete; embedding reinforcing fabric over gypsum sheathing board substrate, and for receiving finish coat.

- B. **Finish Coat:** System manufacturer's standard factory-mixed formulation of pure acrylic polymer, colorfast mineral pigment and fine aggregates, compatible with base coat.
- C. **Reinforcing Fabric:** Balanced, alkali-resistant open weave glass fiber fabric treated for compatibility with other system materials; made from continuous multi-end strands with tensile strength of not less than 145 lb and 150 lb in warp and fill directions per ASTM D 5034 and ASTM D 5035; complying with ASTM D 578 and the following requirements for minimum weight:

Standard Reinforcing Fabric: 4.8 oz. per sq. Yd.
- D. **Mechanical Fasteners:** Of type recommended by sheathing manufacturer for securing sheathing board to framing.
- E. **Primer:** System manufacturer's standard factory-mixed polymer-modified primer for improving adhesion of finish coat to base coat.
- F. **Sealer:** Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.
- G. **Waterproofing:** Acrylic-based, fiber reinforced, flexible waterproofing applied prior to finish coat. Sto Flexyl or accepted equivalent products of other manufacturers compatible with exterior finish system.

2.04 ACCESSORIES

- A. **Manufacturers:** Vinyl Corp., Miami, Florida, Plastic Components, Inc., Miami, Florida; MM Systems, or accepted equivalent.
- B. **Accessories:** Fabricated of PVC extrusions. Provide soffit vents, casing beads, etc. Types indicated or required.

2.05 ELASTOMERIC SEALANTS

- A. **Sealant Products:** Provide system manufacturer's approved sealant that is compatible with joint fillers, joint substrates, and other related materials and complies with requirements of Section 07920 – JOINT SEALANTS
- B. **Sealant Color:** Comply with the following requirement: Match finish coat color of system.

2.06 MIXING

General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as approved by system manufacturer. Mix materials in clean containers. Use materials within time period specified by system manufacturer or discard.

PART 3 - EXECUTION

3.01 EXAMINATION: Examine substrates, with Installer present, to determine if they are in satisfactory condition for installation of system. Verify supports and framing locations, spacing, etc. for installation of sheathing board. Do not proceed with installation of system until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling resulting from application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coatings on other work.
- B. Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.

3.03 INSTALLATION

- A. **General:** Comply with system manufacturer's current published instructions for installation of system as applicable to type of substrate.
- B. **Building Wrap:** Install a layer between sheathing board and studs. Overlap to drain in direction of flow. Apply horizontally with 2-inch overlap and 6-inch staggered end lap.
- C. Mechanically attach gypsum sheathing board to framing with recommended fasteners. Space fasteners according to board manufacturer's written requirements.
 - 1. Cut sheathing board to fit corners and projections precisely and to produce edges and shapes conforming to required details.
- D. **Base Coat Over Sheathing Board:**
 - 1. Apply base coat to recommended thickness over entire sheathing board surfaces, including edges.
 - 2. Immediately place the reinforcing fabric over entire sheathing board against the wet base coat and by troweling from the center of the edges, embed the fabric into the coating. Fabric should be embedded enough so that the fabric color is not visible.
 - 3. Allow at least 24 hours of drying time. Additional time may be required for temperature or humidity conditions.
- E. **Finish Coat Over Sheathing Board:**
 - 1. Thoroughly mix the factory-prepared finish coat material in accordance with manufacturer's printed instructions.
 - 2. Provide finish color(s) and texture(s) to match approved sample(s).

3. Apply primer to base coat according to manufacturer's instructions.
4. Apply finish coat by trowel over cured primer and in thickness required by system manufacturer to produce a uniform finish of texture and color to match approved sample.

3.04 INSTALLATION OF JOINT SEALANTS: Prepare joint and apply sealants, of type and at locations indicated, to comply with applicable requirements of Section 07920 - JOINT SEALANTS, and with "EIMA Guide for Use of Sealants with Exterior Insulation and Finish Systems, Class PB".

1. Clean surfaces to receive sealants to comply with indicated requirements and system manufacturer's written instructions.
2. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
3. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
4. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
5. Apply joint sealants after base coat has cured but before applying finish coat.

3.05 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove system coatings from window and door frames and any other surfaces outside areas indicated to receive system coating.
- B. Provide final protection and maintain conditions in a manner acceptable to Installer and system manufacturer that ensures system's being without damage or deterioration at time of project acceptance.

END OF SECTION

SECTION 07560 LIQUID APPLIED ROOFING

PART 1 – GENERAL

1.01. DESCRIPTION OF EXISTING SUBSTRATES

This specification is intended to outline the requirements for application of the Fluid Applied Roof System, in conjunction with the appropriate product technical data sheets, over approved roof substrates in acceptable condition.

1.02. DESCRIPTION OF LIQUID-APPLIED ROOFING SYSTEM

- A. The Liquid-Applied System consists of a polyester-reinforced elastomeric acrylic system specifically designed for roofing installation. The system is 1) Approved by FM (Factory Mutual) according to the complete Standard 4470 for Class 1 Roof Constructions; 2) Classified and subjected to follow-up by UL (Underwriters Laboratories); 3) Accepted by Miami-Dade County; and 4) Manufactured in accordance with ISO 9001:2008 regulations.

1.03. SECTION INCLUDES

- A. Liquid-Applied flexible acrylic waterproofing system for use over insulation and one ply of SBS modified base sheet (torched adhere). Work shall include the preparation of the roof surface, flashing, detailing, application of the roof system, and cleanup.

1.04. RELATED WORK

- A. Contractor shall review all sections of the project specifications to determine items of work that will interface with the application of this roofing system. Compliance with applicable building codes shall be assured by the specifier or project engineer, while coordination and execution of related sections shall be the responsibility of the approved contractor.

1.05. REFERENCES

- A. NRCA Roofing and Waterproofing Manual
- B. Factory Mutual RoofNav Directory
- C. Underwriters Laboratories Building Materials Directory
- D. Miami-Dade County Product Control Section, Board and Code Administration
- E. ASTM D5034-09(2013) Breaking Strength and Elongation of Textile Fabrics
- F. ASTM D3787-07(2011) Bursting Strength of Textiles
- G. ASTM D1117-01 Guide for Evaluating Nonwoven Fabric
- H. ASTM D1777-96(2011) Thickness of Textile Materials
- I. ASTM B117-11 Standard Practice for Operating Salt Spray (Fog) Apparatus
- J. ASTM G29-96(2010) Test Methods for Algae Resistance
- K. ASTM E108-11 Test Method for Fire Tests of Roof Coverings
- L. ASTM D1653-13 Water Vapor Transmission of Organic Coating Films
- M. ASTM G155-13 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
- N. ASTM D412-06a (2013) Tensile Properties of Vulcanized Rubber & Thermoplastic Elastomers
- O. ASTM D6083-05e1 Standard Specification for Liquid Applied Acrylic Coating
- P. ASTM C1549-09 Determination of Solar Reflectance at Near Ambient Temperature Using a Portable Solar Reflectometer
- Q. ASTM C1371-04a(2010)e1 Determination of Emittance of Materials at Near Room Temperature Using Portable Emissometers
- R. ASTM D 7281 Membrane Leakage Resistance
- S. ASTM D 6163 Type I Standard Specification for SBS Membrane
- T. FM 4470 Standard for Class 1 Spread of Flame, Windstorm Pressure, Windstorm Pull, Hail Damage, Resistance to Foot Traffic, and Susceptibility to Leakage

1.06. REVIEW / SUBMITTALS

- A. **Shop Drawings:** Submit a scale drawing illustrating layout of joint reinforcing and all flashing details.
- B. **Product Data:** Provide manufacturer's published technical literature, SDS, and warranty on products that make up the roofing system, including coatings, reinforcing fabrics, flashing materials, roof drains, fasteners, etc.
- C. **Installation Instructions:** Submit all data sheets available from the manufacturer on the installation of the roofing system applicable to the project.
- D. Submit manufacturer's Certificates of Compliance or Analysis that all products meet or exceed project requirements. If required, Contractor to supply samples or mockup.
- E. Applicator is responsible for submitting proof of appropriate GAF Certified Contractor Status.
- F. Prior to bid, all project specifications, details, and submittals shall be reviewed by manufacturer for pre-approval and to comply with warranty requirements. Successful bidder should initiate warranty pre-inspection process before commencing work.

1.07. QUALIFICATIONS

- A. **Contractor Qualifications:** The Applicator of the specified roofing material shall be a Certified Contractor designated by manufacturer. The Applicator shall provide a certified contractor letter from the roofing system manufacturer verifying the Contractor's status, level, and ability to furnish the specified warranty type and term.
- B. **Manufacturer Qualifications:** Manufacturer shall have a minimum twenty (20) years manufacturing experience in the roof coating industry.

1.08. QUALITY CONTROL

- A. **Codes and Standards:** The contractor shall become thoroughly familiar with all codes, regulations and standards governing the specified work. Any contradiction between the manufacturer's requirements and these specifications shall be brought to the attention of the manufacturer and the specifier or project engineer.
- B. **Deviations:** There shall not be any deviations from these specifications unless the deviation is submitted in writing to the specifier/project engineer. Any request for deviation must be approved in writing from the roofing manufacturer's technical department delineating the details of the deviation.
- C. **Training and Documentation:** The Contractor is responsible for ensuring a trained foreman is on site during the installation of any products. A daily log of application activities and environmental conditions should be maintained and available on-site with copies of technical data/application instructions & SDS.

- D. **Technical Inspections:** The Manufacturer may require Technical Inspections based on warranty types and terms. These inspections include, but not limited to, pre-construction, interim, and final inspections. Consult Manufacturers Technical Services to confirm inspection requirements.

1.09. DELIVERY, STORAGE & HANDLING

- A. Deliver materials to jobsite in manufacturer's unopened and undamaged containers bearing the following information:

1. Name and Address of Manufacturer
2. Identification of Contents – Including Product Code
3. Net Volume of Contents
4. Lot or Batch Number
5. VOC Content
6. Storage Temperature Limits
7. Shelf Life and Expiration Date
8. Mixing Instructions and Proportions of Contents
9. Safety Information and Instructions

- B. Store and protect materials from damage and weather in accordance with manufacturer's published instructions.

- C. Ambient temperatures should range between 50 and 90°F (10 to 32°C). Keep out of direct sunlight.

- D. Place stored material containers on pallets and cover with tarpaulin tied to bottom of pallets.

1.10. ENVIRONMENTAL REQUIREMENTS

- A. Do not apply if ambient temperatures are expected to fall below 50°F (10°C), or if rain or heavy dew is anticipated before liquid coating component has cured.

1.11. WARRANTIES AND ELIGIBILITY

- A. Contractor to furnish Warranty or Guarantee in accordance with project specifications. Contractor shall follow written application process in accordance with manufacturer's warranty program.

- B. Warranty shall be a Ten Year Material and Labor Warranty that shall cover defects in the roofing materials or contractor's workmanship.

PART 2 – PRODUCTS

2.01. MANUFACTURER

- A. GAF - 1 Campus Drive Parsippany, New Jersey 07054, 1-973-628-3000, www.gaf.com.
- B. Other manufacturers that meets specification requirements.

2.02. MEMBRANE COMPOUND MATERIAL

- A. **Waterproofing Material: Fluid Applied Roof System:** three stage, fabric-reinforced, flexible acrylic coating, fluid-applied in successive steps to form a continuous, seamless, watertight membrane; 39 mil (1,143 micron) minimum cured total system thickness, comprised of the following:
1. **Foundation and Saturation Coats: Foundation Coat** highly flexible, water-based, 100% pure acrylic polymer resin coatings and must be UV resistant
 2. **Fabric:** Fabric polyester, non-woven, stitch-bonded and heat-set fabric.
 3. **FinishCoat: FinishCoat**, ultraviolet light-resistant blend of highly flexible, water-based, 100% pure acrylic polymer resin coating. Color as selected from manufacturer's standard color chart.
- B. **Reinforcing Fabric: Fabric** shall be non-woven, 100% polyester, stitch bonded, heat-set fabric with the following characteristics:

Weight:	3 oz. / per square yard (102 grams/m ²)	
Tensile Strength	MD: 124 lbs. (56 kg)	ASTM D5034
	CD: 77 lbs. (35 kg)	
Elongation @ Break	MD: 26%	ASTM D5034
	CD: 64%	
Ball Burst	109 lbs. (49 kg)	ASTM D3787
Trapezoid	MD: 17 lbs. (7.7 kg)	ASTM D1117
	CD: 20 lbs. (9.1 kg)	
Thickness	0.018 inches (0.457 mm)	ASTM D1777

C. Cured Membrane Characteristics

ASTM D-6083 Material Properties			
Property	Method	PremiumCoat®	PremiumCoat®
Krebs Viscosity	D-562	130	123
Brookfield 6 rpm Viscosity	D-2196	66,400	34,000
Volume Solids	D-2697	52	52
Weight Solids	D-1644	66	66
Tensile	D-2370	207	173
Elongation	D-2370	306	323
Elongation, Post 1,000 hrs Xenon	D-2370	148	122
Tear Resistance	D-624	93	82
Accelerated Weathering @ 1,000 hrs	D-4798	Pass, no change	Pass, no change
Low Temp Flex, Post 1,000 hrs Xenon	D-522	Pass -15°F	Pass -15°F
Water Swelling @ 7 days	D-471	9.2	7.8
Permeance (wet cup)	D-1653	3.9	4.9
Wet Adhesion	D-903	8.7	7.3
Fungi Resistance	G-21	0 rating	0 rating
Membrane Properties			
Property	Method	PremiumCoat® System	
Wind Driven Rain	TT-C-555B/D6904	Pass 0.0 lbs weight gain	
Elongation of Membrane (40 mils DFT)	ASTM D4798 (G155) and D2370	MD: 36% @ 8000 hrs weathering CD: 41% @ 8000 hrs weathering	
Tensile Strength of membrane (40 mils DFT)	ASTM D4798 (G155) and D2370	MD: 65lbs/in-width @ 8000 hrs weathering CD: 69lbs/in-width @ 8000 hrs	
Tensile strength of membrane (40 mils DFT)	ASTM D-412	2210 PSI (13,789 kPa)	
Water vapor permeability (40 mils DFT)	ASTM E-96	3-5 perms; a Class III vapor retarder	
Cured Weight	Generic	0.33 lbs per ft² (56.8 oz. per m²)	
Salt Spray	ASTM B-117	No effects	
Algae Resistance:	ASTM G-29	0 rating	
IBC Code Approval Properties			
Property	IBC Test Reference	Rating	A2LA/ANSI Approved Lab
Exterior Fire	ASTM E108/UL790	Class A up to 4"/12" slope	File R26758 and FM RoofNav
Interior Fire	FM 4470 Calorimeter	Class 1	FM RoofNav
Wind	FM 4470/4474 and TAS 114 D&J and TAS 125	Concrete: 6,089 (psf) LWIC: 4,621 (psf) Polyisocyanurate: 1,189 (psf) Smooth BUR: 2,261 (psf) Granulated Cap Sheet: 1,753 (psf)	FM RoofNav Dade County NOAs
Impact/Durability	FM 4470 Foot Traffic	Pass	FM RoofNav
Leakage	FM 4470 ASTM D7281	Pass a free standing membrane	FM RoofNav Report J.I. 3000150
Hail	FM 4470 Hail	Pass-Severe	FM RoofNav
Weathering	ASTM D4798 (G155) and D2370	40 mil system: Pass, maintained over 90% tensile strength after 8,000 hrs ASTM Xenon-Acr.	PRI-CMT HSI-012-02-01

ASTM Material Properties	ASTM D-6083	Pass	PRI-CMT
Solar Reflectance	79% initial, 70% aged	Pass all standards	CRRC/UL
Thermal Emittance	0.9 initial and aged	Pass all standards	CRRC/UL
SRI Index	99 initial, 86 aged	Pass all standards	CRRC/UL
Safety	Generic	ISO 14001:2004	ANSI/PJR
Quality	Generic	ISO 9001:2008	ANSI /PJR

2.03. ACCESSORIES

- A. **Cant Strips:** Approved composition materials are EPS (Expanded Polystyrene), ISO (Polyisocyanurate), and wood (Non-Pressure Treated). Refer to construction details for installation requirements as specified by GAF.
- B. **Polyisocyanurate:** Polyisocyanurate Insulation with glass-based facer meeting or exceeding the requirements for ASTM C1289 [min. 16 psi (1.1 kg/cm) compressive strength]. 1.5" (38 mm) minimum thickness. Max board size: 4' x 8' (1.2 m x 2.4 m) if mechanically fastened or 4' x 4' (1.2 m x 1.2 m) if adhered with Factory Mutual approved roofing adhesive.
- C. **DensDeck or SecuRock:** ¼" (6 mm) minimum thickness if used over an approved, smooth existing substrate. The standard thickness recommendation is ½" (13 mm).
- D. **SBS Heat Welded Base Sheet:** ASTM D 6163, Type I, S, 1.5 square feet (163.75 gross sq.), 49.2'x39.375"(49.2'x 3.2'), 105 pounds per roll.
- E. **Insulation Adhesives:** OlyBond or Low rise foam Adhesive.
- F. **Mechanical Fasteners:** Drill-Tec™ membrane fasteners and plates, insulation fasteners and plates, and flashing fasteners and termination bars.
- G. **Butter Grade Acrylic:** Single package, high solids acrylic, elastomeric sealant.
- H. **Fiber:** Bulking material used in conjunction with **Foundation Coat** or **Butter Grade**.
- I. **Water-based Rust Primer:** Water-based, surfactant-free primer used on direct-to-metal applications to stabilize and protect metal surfaces.
- J. **Acrylic Primer:** Water-based acrylic primer for sealing masonry, metal, and chalky surfaces.
- K. **Penetrating Epoxy Primer:** Penetrating adhesive/primer for saturating fabric and adhering coating.
- L. **Traffic Coat:** Durable wear coating to provide additional abrasion resistance and color selection.

M. **Biodegradable Cleaning Concentrate:** Non-Toxic cleaner for use on existing elastomeric roof coatings metal surfaces, concrete and masonry substrates, as well as uncoated roof, deck and wall surfaces.

N. **Epoxy Primer:** Use to penetrate and seal porous substrates and to improve the adhesion of high performance topcoats.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are durable, free of frozen matter, dampness, loose particles, cracks, pits, projections, and/or foreign matter detrimental to adhesion or application of waterproofing system.
- B. Verify that substrate surfaces are smooth and not detrimental to full contact bond of waterproofing materials.
- C. Verify items that penetrate surfaces to receive waterproofing are securely installed and suitably flashed.
- D. Verify that substrate areas are adequately supported and firmly fastened in place.
- E. Verify that roof deck has a minimum slope of ¼:12.
- F. Verify that roof does not have areas of ponding water.
- G. Verify that all contiguous walls are properly waterproofed.

3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.
- B. Inspect and make all necessary repairs to substrate. Remove and replace wet substrates and insulation, if applicable.
- C. At a minimum, clean and prepare surfaces to receive waterproofing by removing all dirt, dust, loose and flaking particles, grease and debris with the use of a stiff bristle push broom. Apply United Cleaning Concentrate and rinse per manufacturer's instructions. Care should be taken not to inject water into the substrate during the preparation phase. Allow adequate time for complete drying after the cleaning process.
- D. Substrates with heavy contamination of grease, oils, dirt, etc. may require supplemental cleaning methods. Contact a Technical Services or Technical Sales Representative for additional information.

- E. At a minimum, seal cracks and joints with Foundation Coat or Butter Grade and polyester Fabric. Repair additional substrate conditions per approved details. Contact a Technical Services or Technical Sales Representative for additional information.
- F. Do not apply waterproofing to surfaces unacceptable to manufacturer, or under inclement environmental conditions.

3.03 APPLICATION

- A. **Polyisoinsulation Attachment:** Adhere or mechanically fasten insulation to deck with polyurethane adhesive or approved fasteners in accordance with manufacturer's installation instructions to meet a minimum uplift requirement of 1-90. Verify the proper uplift requirements with the specifier or the local building code authority.
 - 1. Insulation shall be 4'x4'.
 - 2. Stagger all board joints. Lay boards with edges in moderate contact, without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through the roof.
 - 3. Apply no more insulation than can be covered with waterproofing on the same day.
 - 4. Install cant strips at internal corners and metal drip edge on outside perimeter.
- B. **Attachment Primed DensDeck or Securock Recovery Board:** Adhere or mechanically fasten insulation to deck with polyurethane adhesive or approved fasteners in accordance with manufacturer's installation instructions to meet a minimum uplift requirement of 1-90. Verify the proper uplift requirements with the specifier or the local building code authority.
 - 1. Stagger all board joints. Lay boards with edges in moderate contact, without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through the roof.
 - 2. Apply no more insulation than can be covered with waterproofing on the same day.
 - 3. Install cant strips at internal corners and metal drip edge on outside perimeter.
- C. **Heat Weld SBS Base Sheet over recovery board:** Heat weld one (1) layer of SBS Base Sheet to the surface of the recovery board with three inch overlapping seams and six inch endlaps.

D. Foundation Coat & Fabric Components: This procedure consists of one coat of Foundation Coat applied to the substrate at the rate of 1.25 to 2.0 gallons / square (5.1 – 8.2 L/10 m²). Fabric (sizes vary) laid into the wet Foundation Coat, and a second coat of Foundation Coat immediately applied over the top at the rate of 1.25 to 2.0 gallons / square (5.1 – 8.2 L/10 m²) to saturate the Fabric. Foundation Coat is applied at a total rate of 2.5 to 4.0 gallons / square (10.2 – 16.3 L/10 m²), depending on the texture and porosity of the substrate. Foundation Coat should only be applied using approved roof brushes. Rolling and/or spraying Foundation Coat is strictly prohibited. Total Dry Film Thickness of Foundation Coat & Fabric Components is a minimum 27 mils.

1. Recovery Board Seams – Using 12” (305 mm) Fabric and Foundation Coat components (as described above), waterproof all board seams, cracks and non-working joints. Center 6” (152 mm) fabric over all seams.
2. Roof Perimeter- Using 12” (305 mm) Fabric and Foundation Coat components (described above), waterproof entire roof perimeter. Continue waterproofing up vertical surfaces and onto deck a minimum of 6” (152 mm) in each direction.
3. Roof Penetrations- Using 12” (305 mm) Fabric and Foundation Coat components (described above) seal any items projecting through waterproofing material so they are watertight. Waterproof up penetrations a minimum of 6” (152 mm).
4. Roof Field- Using 40” (1016 mm) Fabric and Foundation Coat components (as described above) seal the entire roof field. Overlap adjacent runs of fabric a minimum of 4” (102 mm).

E. Finish Coat Component:

1. Apply Finish Coat in two separate applications.
2. Apply each coat perpendicularly to the previous coat.
3. Precautions:
 - a. Finish Coat should not be applied at rates exceeding 1.5 gallons / square (6.1 L/10 m²) in a single coat.
 - b. Atmospheric conditions may require application rates of less than 1.5 gallons /square (6.1 L/10 m²) per coat to allow for reasonable cure times, as well as preventing “cracking” of the Finish Coat.
 - c. The installing contractor is responsible for adjusting application rates and number of coats installed based on conditions such as ambient temperature, relative humidity, and future weather forecasting as they relate to a specific application of the PremiumCoat® system.

10-Year Warranty requirement – Apply a minimum of 2 coats of Finish Coat at a total finished rate of 1.5 gallons / square (6.1 L/10 m²). Allow to dry between coats. Total Dry Film Thickness of Finish Coat Component is 12.5 mils. Completed PremiumCoat® System must be installed to a minimum 39 mil total cured thickness.

4.01 PROTECTION OF FINISHED WORK

- A. Monitor finished system for seven days, sweeping off any birdbaths to allow for full cure.

4.02 DRY MIL TEST.

- A. Owner reserves the right to require up to three dry mil test to assure mil thick meets the 52 Mil requirement.
- B. If test is required, the contractor is responsible to patch the roof, in strict accordance with manufacturer's requirements to maintain the roof warranty.
- C. If mil thickness on any of the three test is less than system requirements, the contractor shall recoat the entire roof so as to meet mil thickness.

4.03 CLEANING

- A. Immediately clean surfaces not scheduled to receive waterproofing in accordance with manufacturer's instructions.

END OF SECTION

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 GENERAL PROVISIONS: The General Instructions to Bidders, the General Conditions of Construction Contracts, and Special Provisions preceding these specifications shall govern this section of the work.

1.02 SUMMARY

A. Provide all sheet metal flashing and other related work as indicated on the drawings and as specified herein, including the following:

1. Gutters, leaders, and collection boxes.
2. Downspouts.
3. Flashings.
4. Vent pipe flashings.
5. Miscellaneous accessories.

B. Related Work Specified Elsewhere:

1. Section 07560 - FLUID APPLIED ROOFING: Coordinate installation.
2. Section 07920 - JOINT SEALANTS: Sealant applications.
3. Section 09901 - PAINTING: Sheet metal painting.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01300 - SUBMITTALS.
- B. **Product Data:** Submit manufacturer's material and finish data, installation instructions, and general recommendations for each material.
- C. **Shop Drawings:** Submit shop drawings of all required details of items specified herein, showing layout, profile, methods of joining, and anchorage details.
- D. **Samples:** Submit flashing, trim, and accessory items in the specified finish. Submit 8-inch square samples of sheet materials and 12-inch long samples of factory-fabricated products.
- E. **Warranty:** Submit warranty as noted under item entitled "WARRANTY" herein below.

1.04 WARRANTY: The Contractor shall furnish a written warranty on the sheet metal for a two (2) year period after the project acceptance date. The warranty shall provide for the repair of all leaks as well as repair and replacement of sheet metal flashing and trim and damage to the building and/or its finishes at Contractor's own expense.

1.05 QUALITY ASSURANCE

- A. Engage an experienced installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- B. All sheet metal fabrications shall conform to State and local codes, SMACNA (latest edition) and industry standards.
- C. Coordinate work with roofing work to provide required supports and fasteners to comply with roofing performance requirements.

1.06 PERFORMANCE REQUIREMENTS

- A. Install flashing and sheet metal work to withstand wind loads, structural movement thermally induced movement and exposure to weather without falling, rattling leaking, and fastener disengagement.
- B. **Performance:** Provide flashing assembly that meets requirements of 105 mph, Exposure C windloads, in accordance with current Building Code of the City & County of Honolulu amended International Building Code.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.08 COORDINATION: Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leak-proof, secure, and non-corrosive installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. **Gutter, Leader, Flashing, etc.:** Copper, ASTM B 370, cold rolled 20 oz. weight for gutters, 16 oz. weight for leader, downspouts, flashing, etc.
- B. **Hangers, Spacers, Brackets, Straps, etc., at Copper Materials:** Copper, ASTM B 152/B 152M, size and shape as indicated on the drawings or if not indicated, as per requirements of Architectural Sheet Metal Manual.
- C. **Downspout Strainer:** Type 316 Stainless steel.
- D. **Fasteners:** Fasteners shall be manufacturer's standard or custom fabricated stainless steel or copper types at copper materials and stainless steel types at other metal materials. Exposed fasteners where occurs or where required shall be of head to match flashing finish with composite metal and neoprene washer.
- E. **Solder:** ASTM B 32, of grade and type required for materials to be soldered.
- F. **Splash Block:** Standard 12-inch wide x 16-inch long x 4-inch deep formed concrete.
- G. **Moisture Barrier:** ASTM D 226, Type II, No. 30, asbestos free, asphalt saturated roofing felt.
- H. **Cleating:** Continuous cleats for sheet metal work shall be provided where required. Match material being cleated.
- I. **Adhesive:** Type recommended by flashing sheet metal manufacturer for waterproofing and weather resistant seaming and adhesive application of flashing sheet metal.

2.02 FABRICATION, GENERAL

- A. **Sheet Metal Fabrication Standard:** Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. **Fabricating:** Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. **Forming:** Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed **edges** folded back to form hems.
- D. **Seams:** Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

- E. **Expansion Provisions:** Space movement joints at maximum of 50-feet with no joints allowed within 24-inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with mastic sealant (concealed within joints).
- F. **Sealed Joints:** Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- G. **Separation:** Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- H. **Fasteners:** Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view unless indicated.
- I. **Attachments:** Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer. Size shall be as recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

PART 3 - EXECUTION

3.1 INSTALLATION AND WORKMANSHIP

- A. **General:** Surface to which sheet metal is to be applied shall be even, smooth, sound, thoroughly clean and dry, and free from defects that might affect the application. Installer shall report any unsatisfactory surfaces to the Contractor. All such areas and/or conditions shall be corrected by the Contractor. Proceed with installation only after unsatisfactory conditions have been corrected. In the absence of such a report, the Contractor shall be held responsible for the finished product.
- B. **Accessories:** All accessories or other items essential for the completeness of the sheet metal installation, though not specifically indicated on the drawings or specified, shall be provided. All such items unless otherwise indicated on the drawings or specified, shall be of the same kind of materials as the item to be applied, unless otherwise indicated or specified herein. Nails, screws and bolts shall be of the type best suited for the purpose intended and shall be of stainless steel or of a composition that is compatible with metal to which it will contact.
- C. **Workmanship:** Except as otherwise indicated on the drawings or specified, the workmanship of sheet metal work, method of forming joints, anchoring, cleating, provisions for expansion, etc., shall conform to the standards details and recommendations of the Sheet Metal and Air Conditioning Contractors National Association's "Architectural Sheet Metal Manual".

- D. **Gutters:** Provide gutters complete with mitered corners, end pieces, and special pieces that are required. Form gutters in sections not less than 8-feet in length. Join ends of each length with lapped and riveted and soldered joints. Expansion-type slip joints shall be provided at the center of the runs and at intervals of not more than 30-feet. Provide hangers of an accepted type, spaced not to exceed 36-inches on center. Slope gutters to downspouts or outlets. Indicate slopes on shop drawings for acceptance.
 - E. **Downspout and Leader:** Provide downspouts and leaders complete, including elbow and offsets. Position downspouts not less than 1/2-inch away from walls and fasten to the walls at top, bottom, and at not to exceed 5-foot on centers.
 - F. **Weather Resistance:** All sheet metal work shall be fabricated to watertight and wind-tight in compliance with the purpose intended.
 - G. **Protection from Contact of Dissimilar Materials:** Surfaces in contact with dissimilar metal shall be painted with heavy-bodied bituminous paint, or shall be separated by means of moisture proof building felts.
- 3.2 PROTECTION:** Protect all sheet metal work until final acceptance of the building.
- 3.3 CLEAN-UP**
- A. Remove all adhesive, sealants, grease, dirt, etc. from flashing and sheet metal and clean surfaces as recommended by the manufacturer and maintain in a clean condition during construction.
 - B. At completion of the work, clean up and remove all rubbish and debris from the premises which resulted from this work.

END OF SECTION

SECTION 07920 - SEALANTS

PART 1 - GENERAL

1.01. SUMMARY

- A. Completely close with sealant all joints specified or required to be sealed to a watertight condition.

1.02. SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. Manufacturer's Data: Submit copies of manufacturer's product data and specifications for type of sealant required, to the Contracting Officer for approval.
- C. Material Safety Data Sheets (MSDS): Submit MSDS for each sealant product.
- D. Color Samples: Submit 3 sets each of color finish samples of sealants.
- E. Guaranty: Submit written guaranty as specified in paragraph entitled "GUARANTY" herein below.

1.03. JOB CONDITIONS

- A. Examine joint surfaces and backing, and their anchorage to the structure, and conditions under which joint sealer work is to be performed, and notify Contractor in writing of conditions detrimental to proper completion of the work and performance of sealers. Do not proceed with joint sealer work until unsatisfactory conditions have been corrected in a manner acceptable to Installer. On surfaces to be painted, install sealants prior to painting. Coordinate with SECTION 09902 - REPAINTING.
- B. **Weather Conditions:** Do not proceed with installation of sealants under adverse weather conditions. Proceed with the work only when weather conditions are favorable for proper cure and development of high early bond strength.

1.04. PRODUCT HANDLING

- A. **Delivery:** Deliver sealants to the jobsite in sealed containers labeled to show the designated name, formula, or specification number, lot number, color, date of manufacture, shelf life, curing time, manufacturer's directions, and name of manufacturer.
- B. **Storage:** Carefully handle and store all materials to prevent inclusion of foreign materials. Remove from project site all damaged and deteriorated materials and materials exceeding shelf life.
- C. All sealant materials shall be installed prior to expiration of shelf life.

1.05. GUARANTY

A Provide a 2-year guaranty against leaks, air infiltration, cracks and other failures of the installation and materials.

1. Repair or replace sealants to seal leaks caused by faulty materials or workmanship.
2. Repair or replace damage to the building or its finishes, equipment or furniture when occasioned by such leaks.

PART 2 - PRODUCTS

2.01. MATERIALS

- A. **Sealant Backer Rod**; Compressible rod stock of polyethylene foam, polyethylene-jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable, non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer to control the joint depth for sealant placement, to break bond of sealant at bottom of joint, to form optimum shape of sealant bead on back side, and to provide a highly compressible backer which will minimize the possibility of sealant extrusion when joint is compressed. Do not use oakum or other types of absorptive materials as backstops.
- B. **Bond-Breaker Tape**; Polyethylene tape or other plastic tape as recommended by sealant manufacturer.
- C. **Masking Tape**: Non-staining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.
- D. **Primer for Sealants**: Non-staining, as recommended by the sealant manufacturer.
- E. **Sealants at Exterior and Interior Vertical and Overhead Moving Joints**: One-part polyurethane-based sealant, conforming to ASTM C 920, Type S, Grade NS, Class 25, Use NT. Provide one of the following, or approved equal:
1. Dymonic; Tremco, Inc.
 2. Chem-Calk 900; Bostik Construction Products Div.
 3. Sikaflex 1a; Sika Corp.
 4. Dynatrol I; Pecora Corp.
 5. NP-1; Sonneborn.
- F. **Sealants at Interior Vertical and Overhead Non-Moving Joints**: Non-Elastomeric Sealant; acrylic-emulsion type, conforming to ASTM C 834. Provide one of the following, or approved equal:

1. AC-20 Acrylic Latex; Pecora Corp.
 2. Tremco Acrylic Latex 834; Tremco, Inc.
 3. Chem-Calk 600; Bostik Construction Products Div.
 4. Sonolac; Sonneborn.
- G. **Silicone Sealant:** At Perimeter of All Plumbing Fixtures and Fittings: One-part mildew-resistant silicone sealant conforming to ASTM C 920, Type S, Grade NS Class 25, Use NT, formulated with fungicide; intended for sealing interior joints with non-porous substrates. Provide one of the following, or approved equal:
1. Dow Corning 786; Dow Corning Corp.
 2. SCS 1702 Sanitary; General Electric Co.
 3. Tremsil 600 White; Tremco, Inc.
 4. Omni Plus; Sonneborn.
 5. 898 or 893, No. 345; Pecora Corp.
- H. **Bedding Compound:** For installation of thresholds and similar items indicated to be bedded in sealant, use a preformed butyl-polyisobutylene sealant tape. Size of tape as required for the specific application. Provide one of the following, or approved equal:
1. Extru-Seal; Pecora Corp.
 2. 440 Tape; Tremco, Inc.
 3. Chem-Tape 40; Bostik Construction Products Div.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

3.02 EXAMINATION

- A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.03 JOINT PREPARATION

- A. **Surface Cleaning of Joints:** Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
 - 1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellants; water; and surface dirt.
 - 2. Clean concrete, masonry, and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form release agents from concrete.
 - 4. Steel Surfaces in Contact with Sealant: Scrape and wire brush to remove loose mill scale. Remove dirt, oil, or grease by solvent cleaning, and wipe surfaces with clean cloths.
 - 5. Clean metal and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- B. **Joint Priming:** Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond; do not allow spillage or migration onto adjoining surfaces.
- C. **Masking Tape:** Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.04 INSTALLATION OF JOINT SEALERS

- A. **General:** Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Do not apply sealant on wet surfaces or when the surface temperature exceeds 130 degrees F.
- B. **Sealant Installation Standard:** Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. **Installation of Sealant Backings:** Install sealant backings to comply with the following requirements:
 - 1. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.
 - 2. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.
 - 3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers. Primer: Immediately prior to application of the sealant, clean out all loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete, masonry units, wood, and other porous surfaces in accordance with compound manufacturer's instructions. Do not apply primer to exposed finish surfaces.
- D. **Installation of Sealants:** Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- E. **Tooling of Non-sag Sealants:** Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer. Provide concave joint configuration per Figure 5A in ASTM C 1193.

3.05 CLEAN UP

- A. Immediately scrape off fresh sealant compound that has been smeared on masonry or porous surfaces and rub clean with a solvent as recommended by the compound manufacturer. Upon completion of sealant compound application, remove all remaining smears and stains resulting therefrom and leave the work in a clean, uniform, and neat condition.

3.06 PROTECTION

- A. Protect areas adjacent to joints from compound smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.
- B. **Protect** joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION

SECTION 07950 - EXPANSION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Architectural joint systems for building exteriors.

1.02 DEFINITIONS

- A. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- B. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- C. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint.
- D. Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.

1.03 SUBMITTALS

- A. Shop Drawings: Provide the following for each joint system specified and obtain approval prior to fabrication and shipment of materials to the job site:
 - 1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- B. Product Data: Submit copies of manufacturer's latest published literature for materials specified herein for approval, and obtain approval before materials are fabricated and delivered to the site. Data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seal for UV exposure.
- C. Samples for Initial Selection: For each type of joint system indicated.
 - 1. Include manufacturer's color charts showing the standard range of colors and finishes available for each exposed metal and elastomeric seal material.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Approved by manufacturer and having experience installing joint systems that are similar in design complexity.

- B. Source Limitations: Obtain all architectural joint systems through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 01 Section "Product Requirements."
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Loading Characteristics: Standard loading refers to covers that are capable of withstanding up to 500 lb. point loads. Heavy duty refers to covers that are capable of withstanding up to 2000 lb. point loads.
- E. Manufacturer to provide 5 year warranty for all joint covers. The Surety shall not be held liable beyond 2 years from the project acceptance date.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aluminum: ASTM B 221, Alloy 6063-T5, 6063-T6, 6063-T52, 6061-T5, 6061-T6, 6061-T51, 6105-T5, 6105-T6, 6005-T5, 6005A-T5, 6005A-T61 for extrusions; ASTM B 209, Alloy 6061-T6, 3003-H14, 5005-H34 for sheet and plate.
 - 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
 - 2. Mill Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
 - 3. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
 - 4. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
 - 5. High-Performance Organic Finish (Two-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.

- a. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- B. Brass: ASTM B 36/B 36M, UNS Alloy C26000 for half hard sheet and coil.
- C. Bronze: ASTM B 455, Alloy C38500 for extrusions; Alloy C28000 Muntz Metal for plates.
- D. Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.
- E. Compression Seals: ASTM D2000; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.
- F. Moisture Barrier: 7-ply laminate reinforced Polyethylene.
- G. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.02 ARCHITECTURAL JOINT SYSTEMS, GENERAL

- A. General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
- B. Design architectural joint systems for the following size and movement characteristics:
 - 1. Nominal Joint Width: As indicated on Drawings
 - 2. Minimum Joint Width: As indicated on Drawings

2.03 ARCHITECTURAL JOINT SYSTEMS FOR BUILDING INTERIORS

- A. Basis of Design: Construction Specialties, Inc., P.O. Box 380 Muncy, PA, shall manufacture expansion joint cover assemblies specified herein and indicated on the drawings of approved equal.
- B. Floor-to-Floor Joint Systems:
 - 1. Basis-of-Design Product: Construction Specialties, Inc. model RFD
 - 2. Type: Hinged Coverplate.
 - a. Exposed Metal: Aluminum.
 - 1) Finish: Anodized
 - 3. Cover-Plate Design: Serrated/Striated.

4. Attachment Method: Mechanical anchors.
5. Load Capacity: Heavy duty

2.04 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces and blockouts where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to architectural joint system manufacturer's written instructions.
- B. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.
- C. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

3.03 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.
 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.

2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.
 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 4. Locate in continuous contact with adjacent surfaces.
 5. Standard-Duty Systems: Shim to level where required. Support underside of frames continuously to prevent vertical deflection when in service.
 6. Heavy-Duty Systems: Repair or grout blockout as required for continuous frame support and to bring frame to proper level. Shimming is not allowed.
 7. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
1. Provide in continuous lengths for straight sections.
 2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer before installing compression seals.
- E. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.
- F. Water Barrier: Provide water barrier at exterior joints and where called for on Drawings. Provide drainage fittings where indicated.

3.04 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION

DIVISION 8 - DOORS AND WINDOWS

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01. GENERAL PROVISIONS: The General Instructions to Bidders, the General Conditions of Construction Contracts, and Special Provisions preceding these specifications shall govern this section of the work.

1.02. SUMMARY

A. **Provide** all steel doors and frames as indicated on the drawings and specified herein, including the following:

1. Steel doors.
2. Steel door frames.
3. Fire-rated door and frame assemblies.
4. Glass lite in doors.

B. **Related Work Specified Elsewhere:**

1. Section 08710 - DOOR HARDWARE: Door hardware and weather-stripping.
2. Section 08800 - GLAZING: Glass in glass lite openings.
3. Section 09901 - PAINTING: Field painting factory-primed doors and frames.

1.03. SUBMITTALS

A. Submit in accordance with Section 01300 -SUBMITTALS.

B. **Product Data:** Submit for each type of door and frame indicated; include door designation, type, level and model, material description, core description, construction details, label compliance, fire-resistance ratings, and finishes.

C. **Shop Drawings:** Submit drawings showing the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details.
3. Frame details for each frame type, including dimensioned profiles.

4. Details and locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, accessories, joints, and connections.
 7. Coordination of glazing frames and stops with glass and glazing requirements.
- D. **Door Schedule:** Submit door schedule using the same reference designations indicated on drawings in preparing schedule for doors and frames.

1.04. QUALITY ASSURANCE

- A. **Steel Door and Frame Standard:** Comply with ANSI A 250.8, unless more stringent requirements are indicated.
- B. **Fire-Rated Door Assemblies:** Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. **Delivery:** Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. **Inspection:** Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Officer-in-Charge. Remove and replace damaged items that cannot be repaired as directed.
- C. **Storage:** Store doors and frames at building site under cover. Place units on minimum 4-inch high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

- 2.01. **MANUFACTURERS:** Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1 Ceco Door Products; a United Dominion Company
- 2 Curries Company
- 3 Republic Builders Products
- 4 Steelcraft; a division of Ingersoli-Rand

2.02. MATERIALS

Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

2.03. DOORS

- A. **General:** Provide doors of sizes, thicknesses, and designs indicated.
- B. **Interior Doors:** Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical- endurance level:

Level 2 and Physical Performance Level B (Heavy Duty), Model 2
(Seamless), minimum 18 gauge.

2.04. FRAMES

- A. **General:** Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B. **Frames:** Provide minimum 16 gauge steel sheet for Level 2 and 3 steel doors.
- C. **Door Silencers:** Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-doorframes.
- D. **Plaster Guards:** Provide 26 gauge steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware openings.
- E. **Supports and Anchors:** Fabricated from not less than 18 gauge, electrolytic zinc-coated or metallic-coated steel sheet.
- F. **Inserts. Bolts and Fasteners:** Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.05. FABRICATION

- A. **General:** Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects, including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

- B. **Core Construction:** Manufacturer's standard core construction that produces a door complying with SDI standards.
- C. **Clearances for Non-Fire-Rated Doors:** Not more than 1/8-inch at jambs and heads, except not more than 1/4-inch between pairs of doors. Not more than 3/4-inch at bottom.
- D. **Clearances for Fire-Rated Doors:** As required by NFPA 80.
- E. **Single-Acting, Door-Edge Profile:** Beveled edge, unless square edge is indicated.
- F. **Tolerances:** Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames".
- G. **Fabrications:** Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- H. **Exposed Fasteners:** Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- I. **Hardware Preparation:** Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.
- J. **Frame Construction:** Fabricate frames to shape shown.
 - 1. For exterior applications, fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
 - 2. For interior applications, fabricate knock-down frames with mitered or coped corners, for field assembly.
- K. **Reinforcements:** Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- L. **Hardware:** Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- M. **Grouted Frames:** Grout where indicated as recommended by the manufacturer.

2.06. FINISHES

Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. **General:** Install steel doors, frames, and accessories according to Shop Drawings manufacturer's data, and as specified.
- B. **Placing Frames:** Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged. Install according to the following requirements where conditions occur.
 - 1 In concrete or masonry construction provide at least three completed opening anchors per jamb install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
 - 2. Install fire-rated frames according to NFPA 80
- C. **Door Installation:** Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames within clearances specified in ANSI A250.8. Shim as necessary to comply with SD1122 and ANSI/DHI A115.1G.

Fire-Rated Doors Install within clearances specified in NFPA 80.

3.02 ADJUSTING AND CLEANING

- A. **Prime Coat Touchup:** Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air drying primer.
- B. **Protection Removal:** Immediately before final inspection, remove protective wrappings from doors and frames

END OF SECTION

SECTION 08311 - ACCESS DOORS AND FRAMES

1.01 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.
2. Floor access doors and frames.

1.02 ACTION SUBMITTALS

- A. **Product Data:** For each type of product.
- B. **Shop Drawings:** Include plans, elevations, sections, details, and attachments to other work.
- C. **Samples:** For each door face material.
- D. **Schedule:** Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.01 FLOOR ACCESS DOORS AND FRAMES

- A. **Manufacturers:** Subject to compliance with requirements,:
- B. **Basis-of-Design Product:** The Bilco Company Model J-AL. Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 1. Acudor Products, Inc.
 2. Babcock-Davis.
 3. Cendrex Inc.
 4. Dur-Red Products.
 5. Jensen Industries; Div. of Broan-Nutone, LLC.
 6. Karp Associates, Inc.

- C. Floor Doors, General: Equip each door with adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with red vinyl grip that allows for one-handed closure, and recessed lift handle. See Evaluations for discussion of AASHTO H20.
- D. Watertight Aluminum Floor Door: Single leaf opening. Extruded-aluminum gutter frame with NPS 1-1/2 (DN 40) drainage coupling and 1/4-inch- (6.4-mm-) thick, diamond-pattern, aluminum tread plate door; watertight; loading capacity to support 300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live load.
- E. **Hardware:** Provide the following:
 - 1. **Hinges:** Heavy-duty stainless steel butt hinges with stainless-steel pins.
 - 2. **Latch:** Stainless-steel slam latch.
 - 3. **Lock:** Removable key wrench & removable cover plug.
 - 4. **Hardware Material:** Stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and all brackets, hinges, pins, and fasteners.

2.02 MATERIALS

- A. **Steel Plates, Shapes, and Bars:** ASTM A 36/A 36M.
- B. **Rolled-Steel Floor Plate:** ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- C. **Steel Sheet:** Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- D. **Metallic-Coated Steel Sheet:** ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- E. **Aluminum Extrusions:** ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- F. **Aluminum-Alloy Rolled Tread Plate:** ASTM B 632/B 632M, Alloy 6061-T6.
- G. **Aluminum Sheet:** ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2 (ANSI H35.2M).
- H. **Frame Anchors:** Same type as door face.
- I. **Inserts, Bolts, and Anchor Fasteners:** Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.03 FABRICATION

- A. **General:** Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. **Metal Surfaces:** For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. **Doors and Frames:** Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- D. **Recessed Access Doors:** Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
 - 1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.
- E. **Latching Mechanisms:** Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder locks, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
- F. **Extruded Aluminum:** After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.04 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. **Appearance of Finished Work:** Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. **Steel and Metallic-Coated-Steel Finishes:**
 - 1. **Factory Prime:** Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
 - 2. **Factory Finish:** Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and

thermosetting topcoat, with a minimum dry-film thickness of 1 mil (0.025 mm) for topcoat.

E. **Aluminum Finishes:**

1. Mill finish.
2. **Clear Anodic Finish:** AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.02 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08410 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01. GENERAL PROVISIONS: The General Instructions to Bidders, the General Conditions of Construction Contracts, and Special Provisions preceding these specifications shall govern this section of the work.

1.02. SUMMARY

- A. Provide all aluminum entrances and storefronts as indicated on the drawings and specified herein.
- B. Related Work Specified Elsewhere:
- C.
 - 1. Section 07920 - JOINT SEALANTS: Field applied sealants.
 - 2. Section 08710 - DOOR HARDWARE: Door hardware.
 - 3. Section 08800 - GLAZING: Glazing requirements.

1.03. SUBMITTALS

- A. Submit in accordance with Section 01300 -SUBMITTALS.
- B. Product Data: Submit literature for each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- C. Shop Drawings: Submit drawings for entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.
- D. Samples: Submit each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- E. Cutaway Sample: Submit each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch lengths of full-size components and showing details of the following:
 - 1. Joinery.

2. Anchorage.
 3. Glazing.
- F. **Installer Certificates:** Submit certificates signed by manufacturer certifying that the Contractor is an accepted installer and will comply with specified requirements.
- G. **Product Test Reports:** Submit reports based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems within comprehensive testing of current systems. requirements based on
- H. **Warranty:** Submit warranty as noted under item entitled "WARRANTY" herein below.

1.04. **WARRANTY**

- A. **General Warranty:** The warranty specified in this Article shall not deprive the City & County of other rights the City & County may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
1. **Warranty:** Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period at one's own expense. Failures include, but are not limited to structural failures and excessive deflection.
 2. Adhesive sealant failures.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Failure of operating components to function normally.
 5. Water leakage through fixed glazing and frame areas.
- B. **Warranty Period:** Two (2) years from the project acceptance date.

1.05. **QUALITY ASSURANCE**

- A. **Installer Qualifications:** Engage an experienced installer to assume engineering responsibility and perform work of this section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.

Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

- B. **Source Limitations:** Obtain each type of entrance and storefront system through one source from a single manufacturer.
- C. **Welding Standards:** Comply with applicable provisions of AWS D1.2, "Structural Welding Code-Aluminum".

1.06. **SYSTEM DESCRIPTION**

- A. **General:** Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
 - 1. Air infiltration and water penetration exceeding specified limits.
 - 2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- B. **Glazing:** Physically and thermally isolate glazing from framing members.
- C. **Wind Loads:** Provide entrance; and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction Fabricate exterior components which have been tested in accordance with ASTM E 330i to withstand wind velocity of 105 mph, Exposure C in accordance with current Building Code of the City & County of Honolulu amended International Building Code.

1. **Design Pressure:**

- a. Storefront Window: psf inward and psf outward.
- b. Storefront Doors: psf inward and psf outward.
- 2. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4-inch, whichever is smaller, unless otherwise indicated.
- 3. **Static-Pressure Test Performance:** Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

- D. **Air Infiltration:** Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 10.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft.
- E. **Performance for Hurricane and Missile:** Provide entrances and storefront systems, which comply with ASTM E 1996 and ASTM E 1886.
- F. **Water Penetration:** Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures", but not less than 6.24 lbf/sq. ft. Water leakage is defined as follows:

Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

- G. **Thermal Movements:** Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.

Temperature Change (Range): 120 ldeg F, ambient; 180 ldeg F, material surfaces.

- H. **Structural-Support Movement:** Provide entrance and storefront systems that accommodate structural movements, including, but not limited to, sway and deflection.
- I. **Dimensional Tolerances:** Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.07. PROJECT CONDITIONS

Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating systems without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01. MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Arcadia
 - 2. Kawneer
 - 3. U.S. Aluminum
- B. Products are based on the following manufacturer and model to establish the basis of design.
 - 1. Arcadia, Inc. "WWS-512 Series, Wide+ Stile Entrance Door" door system with laminated glass.
 - 2. Arcadia, Inc. "AG451 Series, Non-Thermal, 2-Inchx4 ½ Inch Center Glazed System" storefront system with insulating-glass units and tempered insulating-glass units as scheduled.

2.02. MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
 - 1. **Sheet and Plate:** ASTM B 209.
 - 2. **Extruded Bars, Rods. Shapes and Tubes:** ASTM B 221.
 - 3. **Extruded Structural Pipe and Tubes:** ASTM B 429/B 429M.
 - 4. **Bars, Rods, and Wire:** ASTM B 11.
 - 5. **Welding Rods and Bare:** Electrodes: AWS A5.101.
- B. **Steel Reinforcement:** Complying with ASTM A 36/A 36M for structural shapes, plates, and bars; ASTM A 1008/A 1008M for cold-rolled sheet and strip; or ASTM A 1011/A 1011M for hot-rolled sheet and strip.
- C. Glazing of insulated glass as specified in Section 08800 - GLAZING.
- D. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
- E. Sealants and joint fillers for joints at perimeter of entrance and storefront systems

as specified in Section 07920 - JOINT SEALANTS.

- F. **Bituminous Paint:** Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30 mil thickness per coat.

2.03. COMPONENTS

- A. **Doors:** Provide manufacturer's standard 1-3/4 inch thick glazed doors with minimum 0.125-inch thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
1. **Glazing Stops and Gaskets:** Provide manufacturer's standard snap-on extruded-aluminum glazing stops and 1 preformed gaskets unless otherwise indicated.
 2. **Stile Design:** As selected from manufacturer's standard products.
- B. **Brackets and Reinforcements:** Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide non-staining, nonferrous shims for aligning system components. Provide concealed structural members in storefront members as required to meet wind load requirements.
- C. **Fasteners and Accessories:** Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
1. Reinforce members as required to retain fastener threads.
 2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
- D. **Concealed Closure:** See hardware schedule, Section 08710 - DOOR HARDWARE.
- E. **Concealed Flashing:** Dead-soft, 0.018-inch-thick stainless steel, complying with ASTM A 666, of type selected by manufacturer for compatibility with system.
- F. **Weather Stripping:** Manufacturer's standard replaceable weather stripping as follows:
1. **Compression Weather Stripping:** Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.

2. **Sliding Weather Stripping:** Wool, polypropylene, or nylon woven pile with

nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

- 2.04. HARDWARE:** Provide all hardware as specified in Section 08710 – DOOR HARDWARE. Provide all other miscellaneous hardware not provided in Section 08710 - DOOR HARDWARE for a complete installation.

2.05. FABRICATION

- A. **General:** Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- B. **Forming:** Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
- C. Prepare components to receive concealed fasteners and anchor and connection devices.
- D. **Fabricate** components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- E. **Welding:** Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- F. **Glazing Channels:** Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual".
- G. **Entrances:** Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.

- H. **Storefronts:** Fabricate storefronts (windows) in profiles and configurations indicated. Provide subframes, reinforcing, and stops of types indicated or, if not indicated, as required for a complete system.

2.06. ALUMINUM FINISHES

- A. **General:** Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. **Appearance of Finished Work:** Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of accepted Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

PART 3 - EXECUTION

- 3.01 **EXAMINATION:** Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. **General:** Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion, rigidly secure non-movement joints. Seal joints watertight .
- B. **Metal Protection:** Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Section 07920 JOINT SEALANTS.
- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members .
- F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions. Install surface-mounted hardware according to manufacturer's written instructions using concealed

fasteners to greatest extent possible.

- G. Install glazing to comply with requirements of Section 08800 - IGLAZING, unless otherwise indicated.
- H. Install perimeter sealant to comply with requirements of Section 07920 - JOINT SEALANTS, unless otherwise indicated.
- I. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/16-inch in 12-feet; 1/4-inch over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16-inch. Where surfaces meet at corners, limit offset from true alignment to 1/32-inch.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8-inch.

3.03 ADJUSTING AND CLEANING

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

- 3.04 PROTECTION:** Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure entrance and storefront systems are without damage or deterioration at the time of project acceptance.

END OF SECTION

SECTION 08511 - ALUMINUM WINDOWS

PART 1 GENERAL

1.01. SUMMARY

- A. Provide all aluminum windows as indicated on the drawings and specified herein including the following:

1. Awning Windows.
2. Fixed Windows.

For Deductive Alternate Bid Item No. 5 related to this section, see sheet A-2.4.

B. **Related Work Specified Elsewhere:**

1. SECTION 07920 - JOINT SEALANTS: Field applied sealants.
2. SECTION 08800 - GLAZING: Glazing requirements for aluminum windows.
3. SECTION 08911 – Glazed Aluminum Curtin Wall:

1.02. SUBMITTALS

- A. Submit in accordance with SECTION 01330-SUBMITTAL PROCEDURES.
- B. **Product Data:** Submit manufacturer's literature and data to include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
- C. **Shop Drawings:** Submit shop drawings to include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:
1. Mullion details, including reinforcement and stiffeners.
 2. Flashing and drainage details.
 3. Weather-stripping details.
 4. Glazing details.
 5. Window System Operators: Show locations, mounting, and details for installing operator components and controls.
- D. **Samples:** Submit samples for aluminum window components required, prepared on samples of size indicated below.

1. **Main Framing Members:** 12-inch long, full-size sections of extrusions with factory-applied color finish.
 2. **Hardware:** Full-size units with factory-applied finish.
- E. **Weathers Stripping:** 12-inch long sections.
- F. **Installer Certificate:** Submit certificate signed by manufacturer certifying that Contractor is an approved installer and will comply with specified requirements.
- G. **Product Test Reports:** Submit reports based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each type, grade, and size of aluminum window. Test results based on use of down-sized test units will not be accepted.
- H. **Maintenance Data:** Submit data for operable window sash, operating hardware, weather stripping, window system operators, and finishes to include in maintenance manuals.
- I. **Certification:** Submit certification by the manufacturer that the windows, including finish, conform to specifications.
- J. **Warranty:** Submit warranty as noted under item entitled "WARRANTY" herein below.

1.03. WARRANTY

- A. Manufacturer's standard form in which the manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period at no cost to the State. Failures include, but are not limited to, the following:
1. Failure to meet performance requirements.
 2. Structural failures, including excessive deflection.
 3. Water leakage or air infiltration.
 4. Faulty operation of movable sash and hardware.
 5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. **Warranty Period:** Two (2) years from the project acceptance date.

1.04. PERFORMANCE REQUIREMENTS

- A. **Fabrication:** Fabricate exterior components from manufacturer's stock systems which have been tested in accordance with ASTE E 330 to withstand minimum wind velocity of 105 mph, Exposure C in accordance with current IBC. Provide test reports under item entitled "SUBMITTALS" hereinabove.

- B. **Thermal Movements:** Provide aluminum windows, including anchorage, that accommodate thermal movements of units resulting from the following maximum change (range) in ambient and surface temperatures without buckling, distortion, opening of joints, failure of joint sealants, damaging loads and stresses on glazing and connections, and other detrimental effects. Base engineering calculations on actual surface temperatures of materials due to solar heat gain and nighttime-sky heat loss.

1. **Temperature Change (Range):** 120 deg F, ambient; 180 deg F material surfaces.

1.05. QUALITY ASSURANCE

- A. **Installer Qualifications:** An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- B. **Source Limitations:** Obtain aluminum windows through one source from a single manufacturer unless otherwise specified herein.
- C. **Fenestration Standard:** Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated. Provide AAMA or WDMA certified aluminum windows with an attached label.
- D. **Glazing Publications:** Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.
- E. **Preinstallation Conference:** Conduct conference at project site to review methods and procedures related to aluminum windows, including, but not limited to, the following:
1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.06. PROJECT CONDITIONS

- A. **Field Measurements:** Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. **Established Dimensions:** Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of the following manufacturers or approved equal are acceptable provided they meet the materials and standards of quality specified herein.
1. Fleetwood Aluminum Products, Inc.
 2. Arcadia, Inc.
 3. Kawneer Co

2.02 MATERIALS, GENERAL

- A. **Aluminum Extrusions:** All extruded members shall be commercial quality 6063-T5 tempered alloy.
- B. **Fasteners:** Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components. Cadmium-plated steel fasteners are not permitted.
1. **Reinforcement:** Where fasteners screw-anchor into aluminum less than 0.125-inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 2. **Exposed Fasteners:** Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- C. **Anchors, Clips, and Accessories:** Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to meet performance requirements. Cadmium-plated steel anchors, clips, and accessories are not permitted.
- D. **Reinforcing Members:** Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to meet performance requirements. Cadmium-plated steel reinforcing members are not permitted.
- E. **Compression-Type Weather Stripping:** Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when aluminum window is closed.
- F. **Weather-Stripping Material:** Manufacturer's standard system and materials complying with AAMA/NWWDA 101/1.S.2.

- G. **Weather Seals:** Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.
- H. **Replaceable Weather Seals:** Comply with AAMA 701/702.
- I. **Sealant:** For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.
- J. **Muntins:** "True Muntins" of extruded aluminum, same finish as aluminum window frames of individual glazing, in configuration as indicated on the drawings or if not indicated 10-inch maximum net individual glazing dimension both ways, as selected by the Contracting Officer.

2.03 GLAZING

- A. **Glass Type:** Sections, unless otherwise indicated, shall be provided with clear laminated glass, not less than 3/8" including the interlayer, unless otherwise indicated on the drawings and specified in SECTION 08800 - GLAZING.
- B. **Glass and Glazing Materials:** Refer to SECTION 08800 - GLAZING for glass units and glazing requirements applicable to glazed aluminum window units.
- C. **Glazing System:** Manufacturer's standard factory-glazing system as required by the window manufacturer and as indicated in SECTION 08800 - GLAZING.

2.04 HARDWARE

- A. **General:** Provide manufacturer's standard hardware fabricated from aluminum stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Cadmium-plated hardware is not permitted. Do not use aluminum in frictional contact with other metals. Where exposed, provide solid bronze extruded, cast, or wrought aluminum or nonmagnetic stainless steel.
- B. **Sill Cap/Track:** Extruded-aluminum with natural anodized finish track of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
- C. **Locks and Latches:** Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.

2.05 AWNING WINDOW

- A. **Push Bar Operators:** Provide telescoping type, push-bar operator designed to open and close ventilators with fixed screens.
- B. **Hinges:** Concealed four-bar friction hinges located on each jamb near top rail; two per ventilator.

- C. **Lock:** Manufacturer's standard.

2.06 FIXED WINDOWS

- A. Aluminum for windows and components.

1. Provide fixed windows from same materials as required for awning windows to fabricate fixed units.

2.07 INSECT SCREENS

- A. **General:** Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on inside of window and provide for each operable exterior sash or ventilator.
- B. **Aluminum Tubular Frame Screens:** Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Architectural C-24 class.
- C. **Aluminum Insect Screen Frames:** Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
 1. Extruded-Aluminum or Aluminum Tubular Framing Sections and Cross Braces: Not less than 0.40-inch wall thickness.
- D. **Finish:** Same finish as aluminum window frames.
- E. **Aluminum Wire Fabric:** 18-by-16 mesh of 0.011-inch diameter, coated aluminum wire.
- F. **Wire-Fabric Finish:** Charcoal gray unless otherwise selected by the Contracting Officer.

2.08 FABRICATION

- A. **General:** Fabricate aluminum windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class indicated. Include a complete system for assembling components and anchoring windows.
- B. **Fabricate:** Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- C. **Thermally Improved Construction:** Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
- D. **Weather Stripping:** Provide full-perimeter weather stripping for each operable sash and ventilator.

- E. **Weep Holes:** Provide weep holes and internal passages to conduct infiltrating water to exterior.
- F. **Sills:** Provide with sill pan and flashing with end drums.
- G. **Mullions:** Provide mullions and cover plates as shown or required, matching window units complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding performance requirements of window units.
- H. **Subframes:** Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0,062-inch thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding performance requirements of window units.
- I. **Factory-Glazed Fabrication:** Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in SECTION 08800- GLAZING and with AAMA/NWWDA 101/I.S.2.
- J. **Glazing Stops:** Provide snap-on glazing stops coordinated with SECTION 08800 - GLAZING and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.09 FINISHES

- A. **General:** Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. **Finish Designation:** Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. **High-Performance Organic Coating Finish:** AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 - 1. **Fluoropolymer 2-Coat Coating System:** Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color top coat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.
 - 2. **Color and Gloss:** As selected by the Contracting Officer from manufacturer's full range of choices for color and gloss.

PART 3- EXECUTION

3.01 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, and other built-in components; operational clearances; and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. **General:** Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and improper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- E. **Metal Protection:** Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/1.S.2,

3.03 ADJUSTING

- A. Adjust operating sashes and ventilators, screens, hardware, operators, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.04 PROTECTION AND CLEANING

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior wall surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other containments. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

- B. Clean aluminum surfaces immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train project's maintenance personnel to adjust, operate, and maintain window operating system.

END OF SECTION

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Mechanical door hardware for the indicated doors.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Details of electrified door hardware.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Other Action Submittals:
 - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same scheduling sequence and format as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - 2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
 - 1. For door hardware, an Architectural Hardware Consultant (AHC).
- C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.
- D. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.
- E. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with requirements of the Americans with Disability Act Accessibility Guidelines (ADAAG).
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high

4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- G. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination."

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- B. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.05 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - a. Locks: Five years from date of Substantial Completion.
 - b. Exit Devices: Two years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing

minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.02 LOCK CYLINDERS

- A. Lock Cylinders: Match existing lock cylinders.
- B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.03 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 1. No Master Key System: Only change keys operate cylinder.
 2. Master Key System: Change keys and a master key operate cylinders.
 3. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
 4. Great-Grand Master Key System: Change keys, a master key, a grand master key, and a great-grand master key operate cylinders.
 5. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.
 - b. Re-key Owner's existing master key system into new keying system.
 6. Keyed Alike: Key all cylinders to same change key.
- B. Keys: Brass
 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."
 2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.

- b. Master Keys: Five.
- c. Grand Master Keys: Five.
- d. Great-Grand Master Keys: Five.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
- C. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- E. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- F. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

- G. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying schedule.
 - 2. Furnish permanent cores to Owner for installation.
- H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07920 "Joint Sealants."
- I. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- M. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.02 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

3.03 DOOR HARDWARE SCHEDULE

MANUFACTURER LIST

<u>CATEGORY</u>	<u>VENDOR NAME</u>	<u>MFG</u>
HINGE	BY McKINNEY PRODUCTS CO.	MCK
DOOR BOTTOM	BY PEMKO	PEM
DOOR SEAL	BY PEMKO	PEM
THRESHOLD	BY PEMKO	PEM
INTERMEDIATE PIVOT	BY RIXSON MARKETING	RIX
O.H. CONCEALED CLOSER	BY RIXSON MARKETING	RIX
CONCEALED VR EXIT DEVICE	BY SARGENT MANUFACTURING CO.	SAR
DOOR CLOSER	BY SARGENT MANUFACTURING CO.	SAR
LOCKSET	BY SARGENT MANUFACTURING CO.	SAR
CONCEALED VR EXIT DEVICE	BY SARGENT MANUFACTURING CO.	SAR
FLOOR STOP	BY TRIMCO	TRI

HW-GROUP – 1 (CORRIDOR, HALL)

<u>Qty.</u>	<u>Item</u>	<u>Product</u>	<u>MFG</u>
2.0 EA	O.H. CONCEALED CLOSER	0700 US 28	RIX
6.0 EA	INTERMEDIATE PIVOT	M19 US26D	RIX
2.0 EA	CONCEALED VR EXIT DEVICE	MD8443 ETL US32D	SAR
1.0 EA	FLOOR STOP	1211 626	TRI
1.0 EA	THRESHOLD	158A	PEM
	(SEALS, DOOR BOTTOM BY DOOR SUPPLIER)		

HW-GROUP – 2 (STORAGE)

<u>Qty.</u>	<u>Item</u>	<u>Product</u>	<u>MFG</u>
3.0 EA	HINGE	TA2314 4.5 x 4.5 US32D CPC	MCK
1.0 EA	LOCKSET	28-10G24 LL US26D	SAR
1.0 EA	DOOR CLOSER	1431 UO EN	SAR
1.0 EA	DOOR SEAL	PK55D17	PEM
1.0 EA	DOOR BOTTOM	234AV 36"	PEM

END OF SECTION

SECTION 08800 -GLAZING

PART 1 - GENERAL

1.01. GENERAL PROVISIONS: The General Instructions to Bidders, the General Conditions of Construction Contracts, and Special Provisions preceding these specifications shall govern this section of the work.

1.02. SUMMARY

- A. Provide all glazing as indicated on the drawings and as specified herein for the following:
 - 1. Doors.
 - 2. Entrances and storefronts.
 - 3. Windows.
- B. Related Work Specified Elsewhere:
 - 1. Section 08410 - ALUMINUM ENTRANCES AND STOREFRONTS: Entrance and storefront glass.
 - 2. Section 08511 - ALUMINUM WINDOWS: Window glass.
 - 3. Section 08911 – Glazed Aluminum Curtain Wall: Window glass.

1.03. SUBMITTALS

- A. Submit in accordance with Section 01300 - SUBMITTALS.
- B. **Product Data:** Submit for information only, manufacturer's product specifications, and instructions for handling, storing, installing, cleaning, and protecting each type of glass and glazing material.
- C. **Samples:** Submit 4-inch x 4-inch samples of each type and thickness of glass for acceptance prior to ordering.
- D. **Product Certificates:** Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- E. **Warranty:** Submit warranty as noted under item entitled "WARRANTY" herein below.

1.04. WARRANTY

- A. **Manufacturer's Special Warranty on Insulating Glass:** Written warranty by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate.
- B. **Deterioration of Insulating Glass:** Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

Warranty Period: 10 years from date of project acceptance.

1.05. QUALITY ASSURANCE

- A. **Installer Qualifications:** An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- B. **Source Limitations for Glass:** Obtain each type of glass/units from one manufacturer using the same type of glass and other components for each type of unit indicated.
- C. **Source Limitations for Glazing Accessories:** Obtain glazing accessories from one source for each product and installation method required.
- D. **Glazing Publications:** Comply with published recommendations of glass product manufacturer and organization as applicable to glass types specified herein.

1.06. **PRODUCT HANDLING:** Comply with manufacturer's instructions for shipping, handling, storing and protecting glass and glazing materials. Exercise exceptional care to prevent edge damage to glass.

1.07. **LABELING:** Each piece of glass shall be of domestic manufacture and label showing the name of the manufacturer and the grade or quality thereof. The labels shall be intact before and after installations. When glass is not cut to size by the manufacturer, and is furnished unlabeled from local stock, the Contractor shall submit an affidavit stating the quality, thickness, type and manufacturer of the glass furnished.

1.08. DEFINITION

Manufacturer: A firm that produces primary glass or fabricated glass as defined in applicable glazing publications.

1.09. PERFORMANCE REQUIREMENTS

- A. **General:** Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. **Glass Design:** Glass thicknesses indicated or specified are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths required to meet or exceed all applicable codes, including the International Building Code and the following criteria:

Specified Design Wind Loads: As indicated in Section 08410 ALUMINUM ENTRANCES AND STOREFRONTS, Section 08511 – ALUMINUM WINDOWS, and Section 08911 – Glazed Aluminum Curtain Wall.

- C. **Thermal Movements:** Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

Temperature Change (Range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.

- D. **Performance for Hurricane and Missile:** Provide all exterior glass that complies with ASTM E 1996 and ASTM E 1886.

PART 2 - PRODUCTS

2.01. MATERIALS:

- A. Glass at all exterior windows shall be 70 XL Solar Control Low-E Glass – Atlantica. Glass shall have these properties:

Ultraviolet: 2%
Shading Coefficient: .28
Solar Heat Gain Coefficient: .25

- B. All glass products shall be of the quality as manufactured by Pittsburgh Plate Glass Company, Libbey Owens Ford Company, ASG Industries, CE Glass Company, Guardian Industries, Sierracin/ Sylmar, or accepted equivalent. Proprietary products are named to establish the basis of design. Accepted equivalent products of other manufacturers may be used.

1. **Laminated Glass. Clear (Aluminum Entrance Door System):** ASTM C 1172, Type I, Class 1, Quality q3, minimum 9/16-inch thick. Clear polyvinyl butyral sheet interlayer material.
2. **Insulating Glass Units, Clear:** Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace. The inner light shall be ASTM C 1172, Type I, Class 1, q3, 19/32-inch thick laminate (1/4-inch clear - 0.090- inch equivalent to "DuPont Sentry Glass", 1/4-inch clear). The outer light shall be ASTM C 1036, Type I, Class 1, q3, 1/4-inch thick float equivalent to "Oldcastle Glass SunGlass". Low E coating on inner surface number 2 as recommended by the glass manufacturer. Overall thickness shall be 1-5/16 inch thick unless otherwise required by the glass, storefront, and window manufacturers. Provide inner light with obscured laminate glass where indicated on the drawings. Provide same interlayer material specified hereinabove.
3. **Insulating-Glass Units:** Preassembled units consisting of sealed lites of glass separated by dehydrated interspace. The inner light shall be ASTM C 1172, Type 1, Class 1, q3, Laminated (3/16" Clear HS (Heat 3/16" Clear Heat straightened)-060 SGP-equivalent to Kurray - 3/16" Clear Heat Straightened. The Outer light shall be ASTM C 1036, Type I, q3, 1/4" Thick float equivalent to "Vitro (Old PPG) Solar Ban 70 XL Atlantica, Low E coating on #2 surface. Overall thickness 1 1/16" Unless otherwise required. Provide same interlayer material specified herein above.
 - A. **Tempered Insulating-Glass Units:** Preassembled units consisting of sealed lites of glass separated by dehydrated interspace. The inner light shall be ASM C 1172, Type 1, Class 1 q3, Laminated (3/16" Clear HS (Heat straightened)-060 SGP-equivalent to Kurray - 3/16" Clear Heat Straightened. The Outer light shall be ASTM C 1048, Type I, q3, 1/4" Thick tempered equivalent to "Vitro (Old PPG) Solar Ban 70 XL Atlantica, Low E coating on #2 surface. Overall thickness 1 1/16" Unless otherwise required. Provide same interlayer material specified herein above.

2.02. GLAZING TAPES (Where required by Type 1 Glazing)

- A. **Back-Bedding Mastic Glazing Tape:** Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application required; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated. AAMA 804.3 tape, AAMA 806.3 tape, or AAMA 807.3 tape as recommended by the glass and door/window manufacturers as required for each installation.

- B. **Expanded Cellular Glazing Tape:** Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

Type 1, for glazing applications in which tape acts as the primary sealant.

2.03. GLAZING GASKETS (Where required by Type 2 Glazing)

- A. **Dense Compression Gaskets:** Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. EPDM, ASTM C 864.
2. Silicone, ASTM C 1115.
3. Thermoplastic polyolefin rubber, ASTM C 1115.
4. Any material indicated above as per manufacturer's recommendations.

- B. **Soft Compression Gaskets:** Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. EPDM.
2. Silicone.
3. Thermoplastic polyolefin rubber.
4. Any material indicated above as per manufacturer's recommendations.

2.04. MISCELLANEOUS GLAZING MATERIALS

- A. **General:** Provide products of material, size, and shape complying with applicable glazing standard, requirements of manufacturers of glass and other glazing materials for application required, and with a proven record of compatibility with surfaces contacted in installation.
- B. **Cleaners, Primers, and Sealers:** Types recommended by sealant or gasket manufacturer.
- C. **Setting Blocks:** Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- D. **Spacers:** Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

- E. **Edge Blocks:** Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.05. FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS: Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and applicable glazing standard, to comply with system performance requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Door and window manufacturer's representative shall examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system
3. Minimum required face or edge clearances
4. Effective sealing between joints of glass-framing members

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION: Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.03 GLAZING GENERAL

- A. Perform glazing as per manufacturer's recommendations of Type # Glazing as specified hereafter and for the type glazing required by the manufacturers of sections as noted in paragraph entitled "Related Work Specified Elsewhere" hereinabove.
- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are required.
- C. Glazing channel of manufacturer shall provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- D. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- E. Apply primers to joint surfaces where required for adhesion of sealants, determine by

preconstruction sealant-substrate testing as per manufacturer's requirements.

- F. Install setting blocks in sill rabbets, sized and located to comply with applicable glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- G. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- H. Provide spacers for glass lites where the length plus width is larger than 50-inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equivalent to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- I. Provide edge blocking where required to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer.
- J. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Where applicable, square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 TAPE GLAZING (Type 1 Glazing)

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant accepted by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant where required.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape where required.

3.05 GASKET GLAZING (DRY) (Type 2 Glazing)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.06 PROTECTION AND REPLACEMENT: All glass shall be protected against damage. At completion of work, all imperfect glass which cannot be properly cleaned shall be replaced in kind. All broken or cracked glass shall be replaced.

3.07 CLEANING AND WASHING: At the completion of construction, this Contractor shall clean and wash all of the glass provided by him, removing all dirt, putty stains, etc., and shall leave the glass perfectly cleaned and polished.

END OF SECTION

SECTION 08911 – GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.01. SUMMARY

- A. Section includes conventionally glazed aluminum curtain walls installed stick assemblies.

1.02. PERFORMANCE REQUIREMENTS

- A. **General Performance:** Comply with performance requirements specified, as determined by testing on manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure
 - b. Glass breakage, noise or vibration created by wind and thermal and structural movements
 - c. Loosening or weakening of fasteners, attachments, and other components,
 - d. Failure of operating units.
- B. **Delegated Design:** Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. **Wind Loads:** As indicated on drawings.
- D. **Structural-Test Performance:** Test according to ASTM E 330 as follows:
 - 1. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - 2. **Test Durations:** 10 seconds.

- E. **Deflection of Framing Members:** At design wind pressure, as follows:
1. **Deflection Normal to Wall Plane:** Limited to edge of glass in a direction perpendicular to glass plane not exceeding $L/175$ of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
 2. **Deflection Parallel to Glazing Plane:** Limited to $L/360$ of clear span or 1/8 inch (3.2 mm), whichever is smaller.
 3. **Cantilever Deflection:** Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.
- F. **Water Penetration under Static Pressure:** No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less 15 lbf/sq. ft. (720 Pa).
- G. **Energy Performance:** Glazed aluminum curtain wall shall have certified and labeled energy performance ratings in accordance with NFRC.
- H. **Thermal Transmittance (U-factor):** Fixed glazing and framing areas shall have U-factor of not more .65BTU.HR/Degree F/SF as determined according to NFRC 100.
1. **Solar Heat Gain Coefficient:** Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than .25 as determined according to NFRC 200.
 2. **Air Infiltration:** Maximum air leakage through fixed glazing and framing areas of 0.30 cfm/sq. ft. (1.50 L/s per sq. m) of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).

1.03. ACTION SUBMITTALS

- A. **Product Data:** For each type of product indicated.
- B. **Shop Drawings:** For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:

- a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
- C. **Samples:** For each type of exposed finish required.
- D. **Delegated-Design Submittal:** For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04. INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For qualified Installer and testing agency.
- B. **Energy Performance Certificates:** For glazed aluminum curtain walls, accessories, and components, from manufacturer.
- 1. **Basis for Certification:** NFRC-certified energy performance values for each glazed aluminum curtain wall.
- C. Product test reports.
- D. Field quality-control reports.
- E. **Warranties:** Sample of special warranties.

1.05. CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.06. QUALITY ASSURANCE

- A. **Installer Qualifications:** Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. **Testing Agency Qualifications:** Qualified according to ASTM E 699 for testing indicated.

- C. **Product Options:** Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
- D. **Energy Performance Standards:** Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - 1. Provide NFRC-certified glazed aluminum curtain walls with an attached label.

1.07. WARRANTY

- A. **Special Assembly Warranty:** Standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain walls that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. **Warranty Period:** two years from date of Substantial Completion.
- B. **Special Finish Warranty:** Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. **Warranty Period:** Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01. MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following.
- B. **Basis-of-Design Product:** Subject to compliance with requirements, Arcadia, INC. T500B Glazed Aluminum Curtain Wall or comparable product by one of the following:
 - 1. Arcadia, Inc.
 - 2. Kawneer North America; an Alcoa company.
 - 3. United States Aluminum.
 - 4. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.

2.02. MATERIALS

- A. **Aluminum:** Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. **Sheet and Plate:** ASTM B 209 (ASTM B 209M).
 2. **Extruded Bars, Rods, Profiles, and Tubes:** ASTM B 221 (ASTM B 221M).
 3. **Extruded Structural Pipe and Tubes:** ASTM B 429.
 4. **Structural Profiles:** ASTM B 308/B 308M.
 5. **Welding Rods and Bare Electrodes:** AWS A5.10/A5.10M.
- B. **Steel Reinforcement:** With manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
1. **Structural Shapes, Plates, and Bars:** ASTM A 36/A 36M.
 2. **Cold-Rolled Sheet and Strip:** ASTM A 1008/A 1008M.
 3. **Hot-Rolled Sheet and Strip:** ASTM A 1011/A 1011M.

2.03. FRAMING

- A. **Framing Members:** Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. **Construction:** Nonthermal.
 2. **Glazing System:** Retained mechanically with gaskets on four sides.
 3. **Glazing Plane:** Front.
- B. **Brackets and Reinforcements:** Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
- C. **Fasteners and Accessories:** Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.

2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- D. **Anchors:** Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
1. **Concrete and Masonry Inserts:** Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- E. **Concealed Flashing:** Manufacturer's standard corrosion-resistant, non-staining, nonbleeding flashing compatible with adjacent materials.
- F. **Framing Sealants:** Manufacturer's standard sealants.

2.04. GLAZING

- A. **Glazing:** Comply with Section 08800 "Glazing."
- B. **Glazing Gaskets:** Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. **Glazing Sealants:** As recommended by manufacturer.
1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.05. ACCESSORY MATERIALS

- A. **Bituminous Paint:** Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.06. FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

- C. Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Physical and thermal isolation of glazing from framing members.
 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 5. Provisions for field replacement of glazing from exterior.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Fabricate components that, when assembled, have the following characteristics:
1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
- E. **Factory-Assembled Frame Units:**
1. Rigidly secure nonmovement joints.
 2. Seal joints watertight unless otherwise indicated.
 3. Install glazing to comply with requirements in Section 08800 "Glazing."
- F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.07. ALUMINUM FINISHES

- A. **High-Performance Organic Finish:** Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
1. **Color and Gloss:** As selected by the contracting officer from manufacturer's full range.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Section 08800 "Glazing."

3.02 ERECTION TOLERANCES

- A. **Erection Tolerances:** Install glazed aluminum curtain walls to comply with the following maximum tolerances:
1. **Plumb:** 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6 mm in 12 m).
 2. **Level:** 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6 mm in 12 m).

3. **Alignment:**

- a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
 - c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.7 m); 1/2 inch (12.7 mm) over total length.

3.03 FIELD QUALITY CONTROL

- A. **Testing Agency:** Engage a qualified testing agency to perform tests and inspections.
- B. **Testing Services:** Testing and inspecting of representative areas of glazed aluminum curtain walls shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.
- 1. **Air Infiltration:** Areas shall be tested for air leakage of [1.5 times the rate specified for laboratory testing in "Performance Requirements" Article, but not more than 0.50 cfm/sq. ft. (2.25 L/s per sq. m), of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure differential 6.24 lbf/sq. ft. (300 Pa).
 - a. **Test Area:** One bay wide, but not less than 30 feet (9.1 m), by one story of glazed aluminum curtain wall
 - b. Perform a minimum of two tests in areas as directed by the contracting officer.
 - c. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 - 2. **Water Penetration:** Areas shall be tested according to ASTM E 1105 at a minimum uniform static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. (300 Pa), and shall not evidence water penetration.
 - a. **Test Area:** One bay wide, but not less than 30 feet (9.1 m), by one story of glazed aluminum curtain wall.
 - b. Perform a minimum of two tests in areas as directed by contracting officer.

- c. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
- 3. **Water Spray Test:** Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - a. **Test Area:** A minimum area of 75 feet (23 m) by one story of glazed aluminum curtain wall
- C. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09902 - REPAINTING

PART 1 - GENERAL

1.01. SUMMARY

- A. Surface preparation and field application of paints and coatings to new and existing surfaces.

B. Areas (Surfaces) to be Painted:

1. Interior Surfaces to be Painted: All existing interior painted surfaces shall be painted unless otherwise indicated on the plans and/or specifically deleted in these specifications.

Interior surfaces to be painted shall be those surfaces not exposed to weather in an area enclosed by 4 walls.

Also, a surface shall be considered an interior surface and painted as such whenever the color is that of the existing interior color.

Extent of treatment for special items is as follows:

- a. All interior surfaces, walls, ceiling, trims, etc.
 - b. PVC pipes, G.I. Pipes and conduits, electrical boxes, and similar appurtenances.
 - c. Light fixture stems, canopies, and unistrut.
2. **Exterior Surfaces to be Painted:** All existing exterior painted surfaces shall be painted unless otherwise indicated on the plans and/or specifically deleted in these specifications.

Exterior surfaces to be painted shall be any surface exposed to weather in an area not enclosed by 4 walls and a roof. Also, a surface shall be considered and painted as an exterior surface whenever the color is that of the existing exterior color.

The extent of treatment for special items is as follows:

- a. **Exterior doors** - both faces, top, bottom and side edges.
- b. Exterior wood ramps, landings, railings, steps, lanais, including attached pipe handrails, brackets, etc.
- c. Concrete soffits - bottom and edges.
- d. Concrete stairs - soffit and both sides and edges of concrete railing.

- e. Grille work or mesh - both sides and inside openings. Galvanized steel security screens and related steel framing and attachments. (Do not paint existing anodized aluminum security screens).
- f. G.I., metal, copper, and PVC pipes and conduits, electric boxes, exhaust ducts, fan housing and similar appurtenances - exposed surfaces.
- g. .PVC, metal, and copper flashings, gutters, downspouts, drain lines and brackets.
- h. "Skirting" around buildings, lanais, steps and ramps.

Eaves and all surfaces (including undersides) of overhangs, brows, and similar exterior architectural features of the buildings.

- i. Guardrail walls, guardrails and handrails, fixed lockers, fixed benches and similar separate but permanent features of the buildings.
- j. Both the exterior walls and continuing and connected "interior but not enclosed" walls and ceilings of stairwells, connecting passages from building to building, security gates and similar exterior architectural features of the buildings.

All areas damaged during construction.

- k. Exterior structures such as benches, enclosures, etc.

3. Surfaces Not to be Painted:

- a. Metal surfaces of anodized aluminum, stainless steel and similar finished metal surfaces shall not require painting unless previously painted or otherwise scheduled.
 - b. **Factory/Pre-finished Items:** When factory finishing or installer-finishing is specified, such items shall not require painting unless otherwise scheduled.
 - c. **Labels:** Do not paint over any code-required labels, such as Underwriters' Laboratories, or any equipment identification, performance rating, name, or nomenclature plates.
 - d. NSSB data equipment cable connection.
4. "Paint" as used herein means all coating system materials, including primers, enamels, sealers, stains, varnish, and fillers, and other applied materials whether used as prime, intermediate or finish coats, except as specifically noted herein.

1.02. RELATED SECTIONS

- A. SECTION 07920 - SEALANTS.
- B. SECTION 13283 - LEAD-BASED PAINT CONTROL MEASURES.
- C. Divisions 15 and 16, identification marking of painting of mechanical and electrical equipment and apparatus.

1.03. REFERENCES

- A. ASTM D 16 - Definition of terms relating to Paint, Varnish, Lacquer and Related Products.
- B. ASTM D 2016 - Test Method for Moisture Content of Wood.
- C. PCA (Portland Cement Association) - Painting Concrete.
- D. PCDA (Painting and Decorating Contractors of America - Painting - Architectural Specification Manual.
- E. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.

1.04. DEFINITIONS

- A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05. SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. **Product Data:**
 - 1. **Materials List:** Provide an inclusive list of required patching and coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - a. For products with premixed colors, provide manufacturer's standard color chips for selection by Contracting Officer.
 - 2. **Manufacturer's Information:** Provide data on all listed materials, including:
 - a. Thinning and mixing instructions.
 - b. Application instructions and required mil film thicknesses.
 - c. Manufacturer's Material Safety Data Sheets.

- C. **Certifications:** Provide a letter certifying paints and coatings are free of asbestos lead, zinc-chromate, strontium chromate, cadmium, mercury, crystalline silica (except for chalkboard resurfacing paint) and other EPA regulated and hazard materials. Provide a letter certifying the amounts of mildewcide added by both the paint manufacturer and paint supplier.
- D. **Schedule of Finishes:** Provide finish schedule including paint spread rates required to achieve final dry film thickness indicated in the schedule.
- E. **Schedule of Operations:** Provide a work schedule showing sequence of operation and installation dates.
- F. **Samples:**
 - 1. Submit color and finish samples, at manufacturers normal paint chip size illustrating range of colors and textures available for each surface finishing product scheduled.
 - 2. After color and finish sample are returned, submit paint finish samples, 8.5-inches x 11-inches in size illustrating selected colors and textures for each selection. Divide sample in horizontal strips showing prime and overlapping second and finish coats. Show coat tinting. Prepare transparent finish samples on same material as that on which coating will be applied. Identify each sample.
- G. **Manufacturer's Instructions:** Indicate special surface preparation procedures, and substrate conditions requiring special attention. Refer to paragraph entitled "EXAMINATION" herein below.
- H. Provide a Comprehensive Spray Plan when airless spraying is proposed.
- I. **Qualification Data:** For Applicator.
- J. **Delivery Receipts:** Provide 3 copies of the delivery receipt, signed by the user's representative, attesting to delivery of extra paint as required under paragraph entitled "EXTRA MATERIAL" herein below.
- K. **Guaranty:** Submit written guaranty as specified in paragraph entitled "GUARANTY" herein below.

1.06. REGULATORY REQUIREMENTS

- A. Comply with State OSHL (Occupancy Safety and Health Law) and pollution controls regulations of the State Department of Health and EPA.

1.07. QUALITY ASSURANCE

- A. **Applicator Qualifications:** A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

- B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.
 - 1. **Exception:** Alkali resistant primers if compatible with the intermediate coat paint products.
- C. Field Samples (Mockups): Provide a full-coat field sample panel for each type of coating and substrate scheduled in Part 3. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
 - 1. Contracting Officer will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a. **Wall Surfaces:** Provide samples at least 4-feet long by 8-feet high unless indicated otherwise on drawings.
 - b. **Small Areas and Items:** Contracting Officer will designate items or areas required.
 - 2. Apply benchmark samples, according to requirements for the completed Work. Provide temporary lighting levels similar to permanent lighting conditions for Contracting Officer's evaluation.
 - a. After finishes are accepted, Contracting Officer will use the room or surface to evaluate coating systems of a similar nature.
- D. Comprehensive Spray Plan for Airless Spraying: Where airless spraying is proposed, provide a comprehensive spray plan to include:
 - 1. Documentation that the individual spray applicator(s) on the project have completed an approved spray applicator certification program conducted by the Painting Industry of Hawaii. The certification program shall include material and equipment selection, use and maintenance, hands-on application and safety training.
 - 2. Proposed overspray protection methods.
 - 3. Paint Manufacturer's spray application instructions and recommendations for products to be used.
 - 4. Proposed schedule to shut-down or covering existing air-conditioning and ventilation equipment and existing air intake, return and diffuser grilles.
- E. In addition, the Contracting Officer shall have the right to require the immediate removal of any paint applicator who demonstrates negligence, lack of competence or repeated non-compliance with the contract requirements.

1.08. DELIVERY STORAGE AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
- B. Product name or title of material.
 - 1. Product description (generic classification or binder type).
 - 2. Manufacturer's brand name and lot number and date of manufacture.
 - 3. Contents by volume, for pigment and vehicle constituents.
 - 4. Thinning instructions.
 - 5. Color name and number.
 - 6. VOC content.
- C. Storage:
 - 1. **Non-flammable Materials:** Store materials not in use in tightly covered containers in a well-ventilated area. Maintain storage containers in a clean condition free of foreign materials.
 - 2. **Flammable Materials:** Store in such a manner as to prevent damage. No paint material empty cans paint brushes and rollers may be stored in the building(s). Store these items in separate storage facilities away from the building(s). Contractor may furnish a separate job site storage structure, if the structure complies with the requirements of the local Fire Department. Keep the storage area shall clean. Lock any storage structures when not in use or when no visual supervision is possible.
- D. All rejected materials shall be removed from the job site immediately.

1.09. PROJECT CONDITIONS

- A. Do not apply materials when surfaces and ambient temperatures are outside the ranges required by the paint product manufacturer. Do not apply exterior coatings during rain or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- B. Protect public, pedestrians and tenants from injury. Provided, erect and maintain safety barricades around scaffolds, hoists and where construction operations create hazardous conditions.
- C. **Completed Work:** Provide necessary protection for wet paint surfaces.

- D. **Protective Covering and Enclosures:** Provide and install clean sanitary drop cloth or plastic sheets to protect furniture, equipment, floor and other areas that are not scheduled for treatment. Remove any paint applied to surfaces not scheduled for treatment.
- E. **Fire Safety:** Contractor and its employees shall not to smoke in the vicinity of the paint storage area. Exercise precautions against fire at all times and remove waste rags, plastic (polyester sheets), and empty cans the site at the end of each day and other similar items from.
- F. Where airless spraying is used ensure that protective enclosures are erected to prevent the escape of overspray from the work area.
- G. **Safeguarding Property:** Safeguard the work and also the property of the State and other individuals in the vicinity of Contractor's work. Make good on any damages and for losses to work or property caused by Contractor or its employee's negligence. Where damaged property cannot be cleaned and restored to its original condition (i.e. prior to being damaged) replace it with a new product of equal quality. No proration or use of "used" products will be permitted.
1. For painting and spray painting operation, assume that cars will not be temporarily relocated from parking areas during the painting operations.
 2. Paint overspray shall not carry more than 5 lineal feet beyond the building eave line nor within 10 lineal feet of pedestrians or property and surfaces not scheduled to be painted. Immediately cease spray painting when overspray carries beyond these specified limits. Do not continue until protective barriers are erected to properly contain the overspray and damages caused by the overspray have been corrected.
 3. The Contractor shall be assessed \$1,000.00 for each incidence of property or personal damage caused by overspray until such time that a satisfactory settlement has been agreed upon by the damaged party and corrective action has been completed. All corrective action shall be settled within 24 hours from the time the damage is discovered. Should the Contractor fail to take corrective action in a timely and expeditious manner, the Contracting Officer shall contact the Contractor's Insurance company to seek resolution on the matter.
- H. **Other Incidental Work to be Performed by Contractor:**
1. Unless otherwise specified, the Contractor is responsible for moving about all furniture and equipment to provide himself with sufficient working space.

The Contractor shall protect these items and make good any damage to them at no cost to the State. After the painting of the room is completed, the Contractor shall replace all furniture and equipment to their original locations.

2. The Contractor shall carefully remove and neatly store away or properly protect in-place fans, clocks, fire extinguishers, metal shelving, etc. Removed items shall be reinstalled at the completion of the work.
 3. All items on shelving and in cabinets to be painted will be removed by the user personnel prior to painting work.
- I. Trim back shrubbery and plants shall 6-inches from surfaces to be painted.
 - J. **Areas Inaccessible to Normal Painting:** The Contractor shall remove and reinstall expanded mesh security screens.

1.10. COMPATIBILITY OF PAINTING SYSTEMS AND SUBSTRATES

- A. The Contractor shall ensure that painting systems specified are compatible with existing painted surfaces. Alkyd paints shall not be applied over existing latex coating. Alkyd paints shall not be used over cementitious surfaces. Latex paints shall not be applied directly over alkyd paints without proper conditioner and approval by the Contracting Officer.
- B. **Field Tests for Alkyd or Latex Paints:** The Contractor shall perform the following field tests for compatibility of substrates to new paint systems prior to ordering paint:
 1. Latex films will dissolve when wiped with rubbing alcohol; alkyd films will not.
 2. When sanded, latex films will "clog" sandpaper; alkyd films will sand clean.
 3. Alkyds will soften after applying a 10 percent solution of Drano in water; latex films will not soften.
 4. Alkyds will burn when exposed to a flame; latex film will not burn.
 5. Paints which do not respond to 2 or more of these tests are probably epoxy urethane, or other type of coating.
 6. Provide a packaged swab test in accordance with the package directions.
 7. Existing paint identified or suspect of having lead-containing paint shall be tested in a manner that does not produce airborne or uncontrolled lead debris.

- C. Should there be any discrepancies between the specified Schedule of Finishes and the existing paint systems, the Contractor shall notify the Contracting Officer in writing of any incompatible systems specified and submit a revised Schedule of Finishes for approval when necessary. With the approval of the revised Schedule of Finishes, the Contractor shall make any corrections and/or revisions necessary to resolve the discrepancies and/or inconsistencies. The Contractor shall not proceed with any painting systems that are incompatible, although specified otherwise, until all incompatible conditions detrimental for the proper application and performance of the painting systems have been corrected. The failures due to the application of the incompatible paint systems shall be corrected at no additional cost to the State. Proceeding with the work shall imply acceptance of the specified Schedule of Finishes and the compatibility with the existing painted surfaces by the Contractor.

1.11. MINIMUM PAINTING WORK

- A. Unless noted otherwise, minimum interior painting work area shall be the complete inside surfaces of one room. Minimum exterior painting work area shall be one side of a single story building or one side of one story on multiple story buildings.

1.12. GUARANTY

- A. Contractor shall provide a 2 year guaranty that the work performed under this section conforms to the contract requirements and is free of any defect of material or workmanship.

1.13. EXTRA MATERIAL

- A. Provide extra paint in each of the different colors, types and surface textures of exterior and interior paint to the user/school upon completion of the project. Paint shall be in unopened one gallon containers and labeled with color, type, texture, room locations, and date in addition to manufacturer's label.
 - 1. Provide 5 gallons of each color for paint used over large areas, such as the exterior of the building and in several classrooms.
 - 2. Provide one gallon of each color for all other areas.

PART 2 - PRODUCTS

2.01. PAINT MATERIALS, GENERAL

- A. **Material Compatibility:** Provide block fillers, patching materials, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

- B. **Material Quality:** Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
1. **Proprietary Names:** Use of manufacturer's proprietary product names in the color schedule to designate colors or materials, is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed products to be used.
- C. **Colors:** As scheduled or as selected by the Contracting Officer. Program Bells shall be painted "Battleship Gray". Fire Bells shall be painted "Fire Engine Red".
- D. **EPA Regulated and Hazard Materials:** Do not use paint or paint products containing asbestos, lead, mercury, zinc chromates, strontium-chromate, cadmium mercury, crystalline silica (except for chalkboard resurfacing paint) or the EPA regulated or hazard materials.
- E. **Mildew Stains:** Provide spot priming of product equal to Bulls Eye Odorless or Cover Stain, as required for existing stains.
- F. **Interior Paints:** Provide low odor solvent free paints, semi-gloss unless scheduled otherwise.
1. Interior Acrylic Semi-Gloss Paint complete with tint bases to color as scheduled or to match existing including dark and specialty colors (not limited to green, blue, red, yellow, and brown), products must meet or exceed the following:
- a. Acrylic semi-gloss, interior finish for wood, masonry, metal, plaster, and drywall.
 - b. **Semi-gloss/satin finish:** Gloss at 60 degrees 55-70.
 - c. **Resin:** 100 percent acrylic.
 - d. **Pigment:** Minimum 90 percent titanium dioxide.
 - e. **Viscosity:** 90 - 100 K.U.
 - f. **Percent Solids by Volume:** 34 percent minimum.
 - g. **Weight per Gallon:** 10.3 pounds minimum.
 - h. To be as scheduled, except Sherwin Williams Metalatex Semi-Gloss with accepted deviations of above performance requirements is accepted as an equal.

G. **Exterior Paints:** Provide semi-gloss unless scheduled otherwise.

1. Exterior Acrylic Semi-Gloss Paint complete with tint bases to color as scheduled or to match existing including dark and specialty colors (not limited to green, blue, red, yellow, and brown), products must meet or exceed the following:
 - a. Acrylic semi-gloss, exterior finish for wood, masonry, metal, plaster, and drywall.
 - b. **Semi-gloss/satin finish:** Gloss at 60 degrees 45-50.
 - c. **Resin:** 100 percent acrylic.
 - d. **Pigment:** Minimum 90 percent titanium dioxide.
 - e. **Viscosity:** 95 - 105 K.U.
 - f. **Percent Solids by Volume:** 35 percent minimum.
 - g. **Weight per Gallon:** 10.5 pounds minimum.
 - h. To be as scheduled, except Sherwin Williams Super Paint Exterior Gloss and Semi-Gloss with accepted deviations of above performance requirements is accepted as an equal.

H. **Primers:** Provide universal type that is capable of being used over existing alkyd and latex substrates or primers that are specifically compatible with each existing substrate.

1. **Typical Primer/Sealer including tinting to match color of finish paint:**

- a. Primer, interior/exterior, oil base, all purpose for wood, concrete, clean galvanized metal, aluminum, plaster, drywall, and hardboard.
- b. Undercoat for gloss latex or alkyd enamels.
- c. Able to sand and recoat in one hour.
- d. Virtually VOC free product.
- e. Tinting: Light to mid-tone.
- f. Stain killer.
- g. To be Zinsser Cover Stain or equal.

2. Odorless Interior Primer/Sealer including tinting to match color of finish paint:

- a. Primer, interior, oil base, for wood, plaster, drywall, hardboard, paneling, stucco and metal.
 - b. Odorless.
 - c. .Undercoat for gloss latex or alkyd enamels.
 - d. Able to sand and recoat in 2 hours.
 - e. Virtually VOC free product.
 - f. Tinting: Light to mid-tone.
 - g. Stain killer.
 - h. To be Zinsser Bulls Eye Odorless or equal.
3. **Special Primers:** Provide special primers for uncoated copper, PVC, or other metals as required and recommended by the paint manufacturer for each condition required.
- I. Paints shall be as manufactured by Benjamin Moore, Cabot's, Carboline, Devoe Coatings, PPG Paints, Pratt & Lambert, Rust-Oleum, Sherwin-Williams, Thoro Systems, Tnemec, Zinsser, or approved equal.
- J. Except for metal primers all paint shall contain the maximum amount of mildewcide per gallon of paint permitted by the mildewcide manufacturer without adversely affecting the quality of the paint. Contractor shall pre-mix mildewcide into all interior and exterior paints and primers except as specified otherwise. Mercurial fungicide shall not be used.

2.02. MISCELLANEOUS MATERIALS

- A. Provide patching and repair materials. Compatible with paint finishes and substrates. Use weather resistant materials for exterior surfaces and surfaces exposed to moisture.
- B. **Accessories**
- 1. **General:** Provide other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
 - 2. **Thinners:** Thinning of paint shall be done using material recommended by the manufacturer. Mix proprietary products according to manufacturer's requirements. Do not use compound thinner, mineral oil, kerosene, refined linseed oil, or gasoline for thinning.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare substrate, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
 - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - a. Ensure that concrete and masonry surfaces are cured, are within acceptable alkalinity and dried to meet paint manufacturer's recommendations.
 - b. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1) **Plaster and Gypsum Wallboard:** 12 percent.
 - 2) **Masonry, Concrete and Concrete masonry units:** 12 percent.
 - 3) **Wood:** 15 percent, measured in accordance with ASTM D 2016.
 - c. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

3.02 SEQUENCING OF WORK

- A. Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- B. Notify Contracting Officer about anticipated problems when using the materials specified over substrates primed by others.

3.03 CLEANING

- A. **General:** Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. **Painting:** Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. **Surface Preparation:** Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 1. **General:** Correct defects and clean surfaces which affect work of this section. Remove existing coatings that exhibit loose surface defects.
 - a. Provide barrier coats over marks, patches, and other imperfections which may bleed through surface finish.
 - b. Remove from surfaces to be repainted all foreign matter such as nails screws, staples, tape and gum.
 - c. Remove all loose, blistered, scaled, crazed or chalky finish to an existing tight and firm finish.
 - d. Remove mildew as noted in paragraph entitled "Mildew Removal Preparation" herein below.
 - e. Spot prime areas where bare wood, concrete, masonry, plaster, fill, seal or patched material is exposed with the specified primer and feather out onto adjacent paint.
 - f. Remove all loose or cracked caulking.
 2. Wash all surfaces with a solution of tri-sodium phosphate and water or other appropriate solution to remove any accumulated film of wax, oil, grease, smoke, dust, dirt, chalking or other foreign matter which would impair the bond of, or bleed through the new paint finish. After washing, rinse the surface with potable water and allow to thoroughly dry. Rinsing may be performed by high pressure water washing as noted in paragraph entitled "High Pressure Water Washing Preparation" herein below.
 - a. Surfaces shall dry a minimum of 24 hours before the application of primers. For wood surfaces drying shall continue until the moisture content of the wood is less than 15 percent. For concrete and concrete masonry surfaces test for alkali and moisture.
 3. Lightly sand the surface where existing finish remains tight and firm. Where the paint has been removed, sand the edges of scarred areas to a smooth feathered edge.
 4. Fill holes (nail, tack, staple, and other similar items), cracks, open joints and other imperfections with appropriate compound and allow to set (door and trim included). Reseal all joints where loose or cracked caulking were removed. Seal all openings which will permit the entrance of water. Sealing compounds shall be compatible with the substrate, primer and paint. Apply and allow sealants to set in accordance with the manufacturer's recommendations.

5. **Crack Materials:** Seal all cracks hairline to 1/8-inch in width with concrete patching compound. All cracks over 1/8-inch in width and holes 1/4- inch diameter or greater shall be sealed with a latex modified or epoxy modified reinforced patching system before paint application. All patching shall be done in accordance with the patching manufacturer's recommendations and instructions. All patching shall be done in accordance with the manufacturer's recommendations and instructions. Apply texture, if required, to match existing textured surfaces.
6. **Plaster Surfaces:** Scarred plaster areas shall be patched with appropriate plaster materials. Fill holes, cracks, open joints and damaged areas with vinyl base or latex modified patching system. Apply texture, if required, to match existing textured surfaces.
7. **Plum Board Surfaces:** Fill minor defects with filler compound. Spot prime defects after repair.
8. **Wood:**
 - a. **Interior:** Wipe off dust and grit prior to sealing.
 - b. **Exterior:** Wash glu-laminated wood with solvent to remove grease and dirt prior to sealing.
 - c. Seal knots, pitch streaks, and sappy sections with sealer. Fill fastener holes and cracks after priming has dried; sand between coats.
9. **Structural and Galvanized Metal Surfaces:**
 - a. Comply with preparation requirements of the Steel Structures Painting Council (SSPC) Standard SP3.
 - b. Remove rust, loose mill scale and blistering / loose paint by power tool chipping, de-scaling, sanding, wire brushing and grinding down to bare metal. Only tightly adhering surface rust, mill scale and paint which cannot be removed with a dull putty knife may remain. Do not burnish the surfaces during cleaning.
 - c. Completely wipe surfaces with mineral spirits or other appropriate solution to remove accumulated film of wax, oil, grease, smoke, dust, or dirt, chalky or other foreign matter which would impair the bond of, or bleed through the new paint finish. Patch imperfections, holes, dents to form a smooth surface.
 - d. Lightly sand the surface where existing finish remains tight and firm. Where the paint has been removed, sand the edges of scarred areas to a smooth feathered edge. Allow the surfaces to thoroughly dry and immediately spot prime bare metal areas with the specified primer and feather out onto adjacent paint.

10. **per Surfaces Scheduled for Paint Finish:**

- a. Remove contamination by steam, high pressure wash, or solvent clean.
- b. Apply vinyl etch primer immediately following cleaning.

11. : Lightly roughen surface of PVC with Scotch Brite pads prior to painting.

D. gh Pressure Water Washing Preparation:

1. gh pressure water washing may be used in lieu of brush washing to remove loose paint material, chalking, dirt, and debris from exterior wood, concrete and masonry surfaces to be painted. Use skilled mechanics experienced in the use and operation of the sprayer equipment.
2. gh pressure water washing does not replace proper preparatory work such as sanding of the substrate prior to painting. Remove surface contaminants and loose paint material remaining after pressure washing by other means.
3. sure the pressure rating of the sprayer equipment will not damage the substrate. Ensure the nozzle type and size is appropriate to clean the surface without damaging the substrate. Restore or repair any damage surfaces to its original condition.
4. ke precautions prevent over-spray and water infiltration into the building through doors, windows, vents, louvers, cracks and other building openings. Seal openings. Immediately clean water and debris that entered the building. Restore or repair any damage surfaces to its original condition.
5. r mildew removal, use high pressure washing only to wash the surface after is has first been sterilized with a mildew treatment solution.

E. Idew Removal Preparation:

1. Remove mildew and sterilize the surface to be painted using one of the following methods:
 - a. Apply a commercial mildew remover applied per manufacturer's instructions.
2. Following treatment, clean the surface with potable water and allow to thoroughly dry before priming, painting or applying sealing and caulking compounds.

F. terial Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. intain containers used in mixing and applying paint in a clean condition free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Only thinners approved by paint manufacturer and only within
4. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.04 PAINT APPLICATION

- A. **General:** Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
 1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, covers, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only, unless otherwise noted.
 6. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 7. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
 8. Blend lightly between each succeeding enamel or varnish coat.
 9. Ensure primers are top coated within the times required by the paint manufacturers. Top coats not applied within the recoating window may be rejected.
 10. Exterior wood decking treated with oil-borne preservatives shall be primed with oil base primer prior to painting.
 11. Do not close doors, operable windows, drawers, etc. until the paint is thoroughly dry.

- B. **Scheduling Painting:** Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
 4. Be aware of the requirements and restrictions of paragraph entitled "PROJECT CONDITIONS" hereinabove on spray painting.
- C. **Application Procedures:** Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. **Brushes:** Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. **Rollers:** Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. **Spray Equipment:** Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. **Minimum Coating Thickness:** Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. **Prime Coats:** Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

- F. **mented (Opaque) Finishes:** Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- G. **ansparent (Clear) Finishes:** Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. ovide satin finish for final coats.
- H. **mpleted Work:** Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.05 D QUALITY CONTROL TESTING

- A. **spection and Approvals:** Unless directed otherwise by the Contracting Officer, obtain written approval upon completion of each phase of work (phases of work are: surface preparation and spot prime, prime, first finish coat, second finish coat) before proceeding into the next phase or work. For any particular area of work that deviates from the submitted work schedule, notify the Contracting Officer one day in advance when completing any phase of work. Provide access to areas to be inspected.
- B. **ilure to obtain approval of any phase of work for a work area may result in redoing the operation at no cost to the State.**
- C. **ght of Rejection:** Non-conforming work will be rejected by the Contracting Officer. Remove rejected material from the job site immediately. Redo rejected work at no cost to the State.
 - 1. ere the required paint thickness is deficient, provide additional coats to the affected surface(s) to meet the required paint thickness.

3.06 NING

- A. **eanup:** At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
 - 1. ter completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.07 ECTION

- A. **otect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and**

- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.08 SCHEDULE OF FINISHES

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

- B. The Schedule of Finishes is as follows: Provide prime coat and one finish coat unless otherwise noted/scheduled or specified herein.

1. Provide primer and 2 finish coats over existing paint surfaces in poor condition; where color of existing paint is darker than new paint color; where one finish coat will not hide differences in color and shows streaking; where existing paint is peeling and flaking; and where there is rust and scaling on ferrous metal surfaces.
2. Provide primer and 2 finish coats on all new surfaces.
3. Prime with appropriate primer for the material being painted as per the manufacturer's recommendations.
4. Prime with appropriate finish coats for material being painted to match existing sheen and color unless otherwise noted/scheduled or directed by the Contracting Officer.
5. Touch up paint with appropriate paint where noted/scheduled or directed by the Contracting Officer.

C. Exterior:

1. Concrete:

Primer: PPG Paints Perma-Crete Alkali Resistant Primer, 4-603

Finish Coat(s): PPG Paints Speedhide 100% Acrylic Latex Exterior Semi-Gloss, 6900XI Series

2. Concrete Masonry:

Primer: PPG Paints Perma-Crete Alkali Resistant Primer, 4-603

Finish Coat(s): PPG Paints Speedhide 100% Acrylic Latex Exterior Semi-Gloss, 6900XI Series

3. **psum Wallboard Soffits and Plaster:**

Primer: PPG Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921

Finish Coat(s): PPG Paints Speedhide 100% Acrylic Latex Exterior Semi-Gloss, 6900XI Series

4. **od:**

Primer: PPG Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921

Finish Coat(s): PPG Paints Speedhide 100% Acrylic Latex Exterior Semi-Gloss, 6900XI Series

Or:

Finish Coat(s): PPG Paints Pitt Tech Plus Int./Ext. Semi-Gloss DTM Industrial Enamel 4216 HP

5. **Ivanized Metal or Copper:**

Pretreatment: OSPHO Metal Treatment Solution or equal (at rusted or corroded areas only)

Primer: PPG Paints Pitt-Tech Plus Int./Ext. DTM Primer 4020 PF

Finish Coat(s): PPG Paints Pitt-Tech Plus Int./Ext. Semi-Gloss DTM Industrial Enamel 4216 HP

6. **C Downspouts:**

Primer: PPG Paints Pitt-Tech Plus Int./Ext. DTM Primer 4020 PF

Finish Coat(s): PPG Paints Pitt-Tech Plus Int./Ext. Semi-Gloss DTM Industrial Enamel 4216 HP

Note: Prior to any paint application, scuff-sand and solvent wipe to promote adhesion.

D. **terior:** Provide Low VOC/Low Odor Paints & Coatings.

1. **ncrete:**

Primer: PPG Paints Perma-Crete Alkali Resistant Primer, 4-603

Finish Coat(s): PPG Paints Pure Performance Paint & Primer in One Interior 100% Acrylic Latex Semi-Gloss, 9-500 Series

2. Concrete Masonry:

Primer: PPG Paints Perma-Crete Alkali Resistant Primer, 4-603

Finish Coat(s): PPG Paints Pure Performance Paint & Primer in One Interior 100% Acrylic Latex Semi-Gloss, 9-500 Series

3. Gypsum Wallboard:

Primer: PPG Paints Pure Performance Interior 100% Acrylic Latex Primer, 9-900

Finish Coat(s): PPG Paints Pure Performance Paint & Primer in One Interior 100% Acrylic Latex Semi-Gloss, 9-500 Series

4. Acoustical Panels:

Primer: PPG Paints Pure Performance Interior 100% Acrylic Latex Primer, 9-900

Finish Coat(s): PPG Paints Pure Performance Paint & Primer in One Interior 100% Acrylic Latex Flat, 9-100 Series

5. Wood:

Primer: PPG Paints Pure Performance Interior 100% Acrylic Latex Primer, 9-900

Finish Coat(s): PPG Paints Pure Performance Paint & Primer in One Interior 100% Acrylic Latex Semi-Gloss, 9-500 Series

Or:

Finish Coat(s): PPG Paints Pitt-Tech Plus Int./Ext. Semi-Gloss DTM Industrial Enamel 4216 HP

6. Natural Wood Surfaces for Stain and Transparent Finish (Existing with Damage):

Filler: Color Putty Oil-Based Formula(to repair scratches, nicks and other minor surface damages)

Touch-up Stain: PPG Paints Deft Interior Oil-Based Wood Stain, DFT 400

Sealer (1) Coat: PPG Paints Deft Interior Water Based Acrylic Polyurethane Satin, DFT 159

Finish (2) Coats: PPG Paints Deft Interior Water Based Acrylic Polyurethane Satin, DFT 159

7. Ivanized Metal:

Pretreatment: OSPHO Metal Treatment Solution or equal (at rusted or corroded areas only)

Primer: PPG Paints Pitt-Tech Plus Int./Ext. DTM Primer 4020 PF

Finish Coat(s): PPG Paints Pitt-Tech Plus Int./Ext. Semi-Gloss DTM Industrial Enamel 4216 HP

8. sketball Court Stripe:

Finish Coat: PPG Zoneline Acrylic Traffic & Zone Marking Paint, Flat Finish 11-53 Series (15 mils wet/8.6 mils dry)

- E. y existing painted surface not specifically noted in the finish schedule shall be finished to match adjoining work.

END OF SECTION

DIVISION 10 - SPECIALTIES

SECTION 10240 - ALUMINUM SECURITY SCREENS

PART 1 - GENERAL

1.01. SUMMARY

- A. Provide and install aluminum security screens complete with frames and angle clips as specified herein.
- B. Provide and install stainless steel anchors, bolts, expansion shields, and other fasteners as detailed and/or required for the complete installation of work under this section for both new security screens and for the reinstallation of existing security screens.
- C. Security screens shall be removable for maintenance work.

1.02. COORDINATION

- A. Before commencing with the work, the Contractor shall examine the surfaces and conditions under which security screens are to be installed and shall report all discrepancies and/or defective conditions to the Contracting Officer so that corrective measures can be taken.
- B. Fabrication of the aluminum security screen work shall not commence until these discrepancies and/or defective conditions are corrected, or unless otherwise approved by the Contracting Officer.

1.03. QUALITY ASSURANCE

- A. **Qualifications of the Manufacturer:** Use products produced by manufacturers regularly engaged in the manufacture of aluminum security screens and with a history of successful production.
- B. **Qualifications of the Installer:** The Installer shall be thoroughly trained in the fabrication and installation of the security screens.

1.04. SUBMITTALS

- A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.
- B. **Manufacturer's Data:** Submit manufacturer's product data for all components showing compliance with specified requirements.
- C. **Shop Drawings:** Submit complete sets of installation drawings showing the complete arrangement of screens and details in accordance with the contract drawings.

The shop drawings shall include reference to the sheet and detail on the contract drawings they depict.

- D. **Mock-up Sample:** One 12-inch x 12-inch mock-up sample consisting of the perimeter extruded frame, mullion, screen mesh, angle clip and fasteners.

Reference to a current sample in the Contracting Officer's Office may be made in lieu of submittal of the sample mock-up provided such sample is exactly in accordance with the product to be furnished.

- E. **Certificates:** Submit a signed certificate from the proposed manufacturer showing that the Installer has been trained in the fabrication and installation of the security screens.
- F. Fabrication of the screens shall not commence until all submittals have been approved by the Contracting Officer ,

1.05. DRAWINGS AND SPECIFICATIONS

- A. Should the products of other manufacturer's require different drawings, details or other requirements, provide the necessary adjustments at no additional cost to the State.

1.06. PRODUCT HANDLING

- A. The Contractor shall execute the necessary precautions to properly protect the security screens and its finish against damage during assembly, transport, storage and installation.
- B. The Contractor shall execute the necessary precautions to properly protect surrounding surfaces and parts of the building(s) against damage. Any work or materials damaged as a result of the work performed under this section shall be immediately repaired or restored to its original undamaged condition or replaced with new to the satisfaction of the Contracting Officer at no additional cost to the State.

PART 2 - PRODUCTS

2.01. MANUFACTURERS

- A. The products of the following manufacturers or approved equal are acceptable provided they meet the materials, construction and standard of quality specified herein:
 - 1. Emtex Products, Inc.; Amplimesh No. 103 Standard Pattern.
 - 2. Ullrich Aluminum Company; Securamesh "007" Aluminum Grille Specification or as required by mesh size.

2.02. MATERIALS

- A. **Aluminum Security Screen Mesh:** Aluminum security screen mesh shall be manufactured from 6063-T5 or 6063-T4 aluminum alloy and temper.

1. **Standard Size Mesh:**
 - a. **Minimum Extrusion Section Width:** 0.228-inch.
 - b. **Minimum Extrusion Section Height:** 0.276-inch.
 - c. **Maximum Opening Dimension:** 2.875-inches by 3.125-inches.
- B. **Aluminum Extruded Framing:** Aluminum framing shall be manufactured from 6063-T5 or 6063-T4 aluminum alloy and temper of the sizes and shapes as detailed in the contract drawings or as recommended by the aluminum security screen manufacturer.
- C. **Screen Frame Corner Reinforcement:** Aluminum, of the type and size recommended by the aluminum security screen manufacturer.
- D. **Aluminum Angle Clips:** 1-1/2 inches wide x 1/8-inch thick. The length of the angle legs shall be as indicated on the contract drawings.
- E. **Spacers:** 5/8-inch diameter round anodized aluminum. PVC spacers shall not be used.
- F. **Anchor Bolts, Screws, Nuts & Washers:** Stainless steel, Type 304 alloy of the sizes and types recommended by the aluminum security screen manufacturer. Fasteners shall be tamper-resistant type where specified. Use of plastic or lead shields will not be permitted.
- G. **Pop-Rivets:** Pop-rivets shall be 1/8-inch diameter anodized aluminum as recommended by the aluminum security screen manufacturer.
- H. **Touch-up Paint:** L-4485 AN-A-KOTE, dark bronze color or equivalent coating as recommended by the aluminum security screen manufacturer.
- I. **Finish:**
 1. The aluminum security screen shall be free of major scratches and other surface blemishes.
 2. All exposed security screen mesh, frame and clip angle surfaces shall be provided with a dark bronze anodized finish of minimum 0.0007-inch (17.58 microns) thickness.
 3. Cut ends, punched or drilled holes, fasteners used to connect bronze anodized parts and minor scratches shall be touch-up painted to match the dark bronze anodized finish.
 4. Anchor bolts, screws, nuts and washers exposed surfaces shall be dark bronze finish or equivalent to match aluminum security screen assembly as recommended by the aluminum security screen manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to fabrication of the security screens, the Installer shall examine the areas and conditions under which they are to be installed. The required measurements shall be accurately taken to ensure proper fit of the screens. Should any condition be found unsuitable, fabrication of the screens shall not commence until the unsatisfactory condition(s) have been corrected and are acceptable to the Installer. Proceeding with the work will imply acceptance of the conditions by the Installer.

3.02 FABRICATION AND WORKMANSHIP

- A. **Fittings and Shop Assembly:** Insofar as possible, fit and shop-assemble the work complete and ready for erection and installation in accordance with the approved shop drawings and trade standards.
- B. **Accuracy of the Work:** Fabricate and erect the work square, plumb, straight and true. All cuts shall be accurate for the minimum joint gap.
- C. **Holes:** Drill or punch holes required for bolted or pop-rivet connections and for the attachment of work of other trades. Burned holes are not acceptable.
- D. Cut ends and holes shall be free of burrs.
- E. The security screen mesh opening size specified above and the orientation of the security screen mesh within the frame shall be maintained at each opening unless otherwise approved in writing by the Contracting Officer.
- F. The security screen mesh shall be oriented within the frame so that the direction of the extrusion is in the vertical position. Also, where the screen mesh is connected to the frame and mullions, the mesh opening adjacent to the frame/mullion shall be at least one-half of the opening size noted above.
- G. The corners of the aluminum extrusion frames shall be neatly mitered and assembled using corner reinforcement. The security screen mesh shall be securely fastened to the extruded framing with pop-rivets spaced at a maximum of 6-inches on-center. Welding of the screens and frames is not acceptable.
- H. Where provided, vertical "H" section splice bars/mullions shall be located so that they are aligned with the window mullions.
- I. Concealed fasteners shall be used to secure the security screen/frame assembly to the supporting angle clips. The angle clips shall be oriented so that the leg in contact with the building is not exposed (located behind the security screen). This leg shall also have slotted holes to permit for field adjustment of the screens.

3.03 INSTALLATION AND ERECTION

- A. **Installation:** The aluminum security screens shall be installed and erected in their proper location/opening, plumb and true, and securely anchored to the substrate in accordance with the manufacturer's installation details, instructions and recommendations.

Fasteners securing the clip angle to the substrate and other fasteners which are exposed or accessible to vandalism shall be the tamper-resistant type. (Note: One-way non-removable fasteners are not permitted.)

- B. The security screens shall be independent of the window assemblies which they protect.
1. Security screens shall be positioned so that they do not interfere with the proper operation of the window.
 2. Attachment of the security screen/frame to the existing window frames is not permitted.
- C. **Replacement:** Aluminum security screen sections which are damaged during fabrication, storage, transport or installation shall be immediately removed from the site and replaced with new sections matching the existing.
- D. **Protection from Entrapped Water:** Provide for the drainage of water entrapped within the screen framing system.
- E. **Dissimilar Materials:** Where aluminum surfaces come in contact with dissimilar materials, coat contact surfaces with primer and a heavy coat of bituminous paint of minimum 15 mils dry film thickness or a separator as recommended by the security screen manufacturer. Care shall be taken so that the protective coating is not visible when the assembly is completed.

3.04 CLEAN-UP

- A. Upon completion of the installation, the security screens shall be cleaned and all dirt and debris shall be removed from the site. Care shall be taken so as not to damage surrounding areas, surfaces and parts of the building(s). The entire installation shall be left clean and in a condition acceptable to the Contracting Officer.

END OF SECTION

SECTION 15058 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.03 REFERENCE STANDARDS:

- A. Applicable Standards (latest edition):
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. NEMA MG 1 - Motors and Generators.

1.04 COORDINATION:

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.01 GENERAL MOTOR REQUIREMENTS:

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.

2.02 MOTOR CHARACTERISTICS:

- A. Duty: Continuous duty at ambient temperature of 40° and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.03 SINGLE-PHASE MOTORS:

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 15058

SECTION 15062 - HANGERS AND SUPPORTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

- 1.01 ARY:
- A. Section includes:
1. supports.
 2. hangers.
 3. hangers with vertical-limit stops.
 4. braces and cables.
- 1.02 ED REQUIREMENTS:
1. SECTION 15815 - METAL DUCTS for duct hangers and supports.
- 1.03 STANDARDS:
- A. Standards (Latest Edition):
1. Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
 - a. ASCE/SEI 7 - Minimum Design Loads for Buildings and Other Structures.
 2. International (ASME):
 3. International (ASTM):
 - a. ASTM A36 - Specification for Carbon Structural Steel.
 - b. ASTM A492 - Specification for Stainless Steel Rope Wire.
 - c. ASTM A603 - Specification for Zinc-Coated Steel Structural Wire Rope.
 - d. ASTM A780 - Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - e. ASTM E488 - Test Methods for Strength of Anchors in Concrete and Masonry Elements.
- 1.04 ORMANCE REQUIREMENTS:
- A. Design: Design equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Performance: Hangers and supports for HVAC equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
1. equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 2. seismic-restraint hangers and supports for equipment and obtain approval from authorities having jurisdiction.
- 1.05 ECT CONDITIONS
- A. Loading:
1. Basic Wind Speed: 130 mph
 2. Building Risk Category: II
 3. Minimum 55 lb/sq. ft. multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.
- B. Loading:
1. Class as Defined in the IBC: D.

2. Seismic Occupancy Category as Defined in the IBC: D
 - a. Component Importance Factor: 1.0.
 - b. Component Response Modification Factor: Depends on equipment or system per ASCE 7, Table 13.6-1
 - c. Component Amplification Factor: Depends on equipment or system per ASCE 7, Table 13.6-1
3. Spectral Response Acceleration at Short Periods (0.2 Second): 52g
4. Spectral Response Acceleration at 1-Second Period: 24g
5. Design Category: D

1.06

- A. Data: For each type of product indicated.
- B. Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 1. restraints and hangers.
- A. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators, seismic restraints, and for designing vibration isolation bases.
 2. Vibration Isolation Base Details: Detail overall dimensions, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.
 3. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other DIVISION 15 Sections for equipment mounted outdoors.
 - d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

PART 2 - PRODUCTS

2.01 EQUIPMENT SUPPORTS:

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.02 MISCELLANEOUS MATERIALS:

- A. Structural Steel: ASTM A36, carbon-steel plates, shapes, and bars; black and galvanized.

2.03 VIBRATION ISOLATORS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amber/Booth Company, Inc.
 - 2. Kinetics Noise Control.
 - 3. Mason Industries.
 - 4. Vibration Eliminator Co., Inc.
 - 5. Vibration Mountings & Controls, Inc.
- B. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
 - 1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 - 2. Outside Spring Diameter: Not less than 80% of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50% of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80% of rated vertical stiffness.
 - 5. Overload Capacity: Support 200% of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 - 7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- C. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
 - 1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 - 2. Outside Spring Diameter: Not less than 80% of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50% of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80% of rated vertical stiffness.
 - 5. Overload Capacity: Support 200% of rated load, fully compressed, without deformation or failure.
 - 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - 7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 - 8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

2.04 SEISMIC-RESTRAINT DEVICES:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amber/Booth Company, Inc.
 - 2. Hilti, Inc.

3. Kinetics Noise Control.
4. Mason Industries.
5. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Restraint Cables: ASTM A603 galvanized or ASTM A492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.
- E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
- F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- G. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E488. Minimum length of eight times diameter.
- H. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E488.

PART 3 - EXECUTION

- 3.01 HANGER AND SUPPORT INSTALLATION:
 - A. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
 - B. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- 3.02 APPLICATIONS:
 - A. Hanger Rod Stiffeners: Install hanger rod stiffeners where required to receive them and where required to prevent buckling of hanger rods due to seismic forces.
 - B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.
- 3.03 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION:
 - A. Install cables so they do not bend across edges of adjacent equipment or building structure.
 - B. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

- C. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
 - D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
 - E. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.
- 3.04 EQUIPMENT SUPPORTS:
- A. Fabricate structural-steel stands to suspend equipment from structure overhead.
 - B. Provide lateral bracing, to prevent swaying, for equipment supports.
- 3.05 METAL FABRICATIONS:
- A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.
- 3.06 ADJUSTING:
- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
 - B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.
 - C. Adjust active height of spring isolators.
 - D. Adjust restraints to permit free movement of equipment within normal mode of operation.
- 3.07 PAINTING:
- A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.
- 3.08 HANGER AND SUPPORT SCHEDULE:
- A. Use hangers and supports with galvanized metallic coatings for equipment that will not have field-applied finish.
 - B. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 15062

SECTION 15077 – IDENTIFICATION FOR HVAC EQUIPMENT

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS:
 - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.02 SUMMARY:
 - A. This Section includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
- 1.03 SUBMITTALS:
 - A. Product Data: For each type of product indicated.
 - B. Samples: For color, letter style, and graphic representation required for each identification material and device.
 - C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- 1.04 COORDINATION:
 - A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

PART 2 - PRODUCTS

- 2.01 EQUIPMENT LABELS:
 - A. Metal Labels for Equipment:
 - 1. Material and Thickness: Brass, 0.032 inch or Aluminum, 0.032 inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inches.
 - 3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch (13 mm) for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 4. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
 - B. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: Black >.
 - 3. Background Color: White.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160°F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inches.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- 2.02 WARNING SIGNS AND LABELS:
- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
 - B. Letter Color: Black.
 - C. Background Color: Yellow.
 - D. Maximum Temperature: Able to withstand temperatures up to 160°F.
 - E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inches.
 - F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - G. Fasteners: Stainless-steel rivets or self-tapping screws.
 - H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
 - I. Label Content: Include caution and warning information, plus emergency notification instructions.
- 2.03 WARNING TAGS:
- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 1. Size: Approximately 4 by 7 inches.
 2. Fasteners: Reinforced grommet and wire or string.
 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

- 1.01 PREPARATION:
- A. Clean equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.
- 1.02 PERMANENT LABEL INSTALLATION:
- A. Permanently fasten labels on each major item of mechanical equipment.
 - B. Install equipment labels where accessible and visible.

1.03 INSTALLATION:

- A. required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 15077

SECTION 15140 – DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section includes:
 - 1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings.

1.03 REFERENCED STANDARDS:

- A. Applicable Standards (Latest Edition):
 - 1. American Society of Sanitary Engineering (ASSE):
 - a. ASSE 1079 - Dielectric Pipe Unions.
 - 2. American Water Works Association (AWWA):
 - a. AWWA C651 - Disinfecting Water Mains.
 - b. AWWA C652 - Disinfection of Water-Storage Facilities.
 - 3. Welding Society (AWS):
 - a. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
 - 4. International (ASME):
 - a. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 5. International (ASTM):
 - a. ASTM A674 - Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids.
 - b. ASTM B32 - Specification for Solder Metal.
 - c. ASTM B88 - Specification for Seamless Copper Water Tube.
 - d. ASTM B813 - Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
 - e. ASTM B828 - Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
 - 6. Development Association:
 - a. Copper Tube Handbook, 2006.
 - 7. Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
 - a. MSS SP-123 - Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper Water Tube.
 - 8. International (NSF):
 - a. NSF 61 - Drinking Water System Components - Health Effects
 - b. NSF 372 - Drinking Water System Components - Lead Content.

1.04 SUBMITTALS:

- A. Product Data: For piping, transition fittings, and dielectric fittings. Submit schedule of pipe materials used for each application.
- B. System purging and disinfecting activities report.
- C. Field quality-control reports.

- 1.05 SEQUENCING AND SCHEDULING:
- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify Contracting Officer no fewer than two days in advance of proposed interruption of water service.
 - 2. Do not interrupt water service without Contracting Officer's written permission.

PART 2 - PRODUCTS

- 2.01 PIPING MATERIALS:
- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
 - B. Potable-water piping and components shall comply with NSF 61, and NSF 372.
- 2.02 COPPER TUBE AND FITTINGS:
- 1. Hard Copper Tube: ASTM B88, Type K and ASTM B88, Type L water tube, drawn temper.
 - 2. Soft Copper Tube: ASTM B88, Type K water tube, annealed temper.
 - 3. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - 4. Copper Unions:
 - a. MSS SP-123.
 - b. Cast-copper alloy, hexagonal-stock body.
 - c. Ball-and-socket, metal-to-metal seating surfaces.
 - d. Solder-joint or threaded ends.
- 2.03 PIPING JOINING MATERIALS:
- A. Solder Filler Metals: ASTM B32, lead-free alloys.
 - B. Flux: ASTM B813, water flushable.
Braze Filler Metals: AWS A5.8/, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.
- 2.04 ENCASEMENT FOR PIPING:
- A. Standard: ASTM A674 or AWWA C105/A21.5.
 - B. Form: Sheet or tube.
 - C. Color: Manufacturer's standard.
- 2.05 TRANSITION FITTINGS:
- A. General Requirements:
 - 1. Same size as pipes to be joined.
 - 2. Pressure rating at least equal to pipes to be joined.
 - 3. End connections compatible with pipes to be joined.
 - B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

- 2.06 DIELECTRIC FITTINGS:
- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
 - B. Dielectric Unions:
 - 1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
 - a. Hart Industries International, Inc.
 - b. McDonald, A. Y. Mfg. Co.
 - c. Watts; a division of Watts Water Technologies, Inc.
 - d. Wilkins; a Zurn company.
 - e. Zurn Industries, LLC.
 - 2. Standard: ASSE 1079.
 - 3. Pressure Rating: 150 psig at a minimum temperature of 180°F. Pressure rating shall be minimum 20 psi above system design pressure.
 - 4. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

- 3.01 EARTHWORK:
- A. Comply with requirements in DIVISION 02 for excavating, trenching, and backfilling.
- 3.02 PIPING INSTALLATION:
- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated, unless deviations to layout are approved on coordination drawings.
 - B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
 - C. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A674 or AWWA C105/A21.5.
 - D. Install domestic water piping level without pitch and plumb.
 - E. Install piping indicated to be exposed at right angles or parallel to building walls. Diagonal runs are prohibited, unless specifically indicated otherwise.
 - F. Install nipples, unions, special fittings with pressure ratings the same as or higher than the system pressure rating used in applications below, unless otherwise indicated.
 - G. Install piping free of sags and bends.
 - H. Install fittings for changes in direction and branch connections.
 - I. Install unions in copper tubing at final connection to each specialty.
 - J. Install sleeve seals for piping penetrations of concrete walls and slabs.
- 3.03 JOINT CONSTRUCTION:
- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
 - C. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

- D. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."
 - E. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.
- 3.04 TRANSITION FITTING INSTALLATION:
- A. Install transition couplings at joints of dissimilar piping.
 - B. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.
- 3.05 DIELECTRIC FITTING INSTALLATION:
- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples or unions.
- 3.06 CONNECTIONS:
- A. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Equipment.
 - C. Label pressure piping with system operating pressure.
- 3.07 FIELD QUALITY CONTROL:
- A. Perform the following tests and inspections:
 - 1. Piping Inspections:
 - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - (1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - (2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
 - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 - 2. Piping Tests:
 - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

- d. Cap and subject piping to static water pressure of 50 psig (above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
 - f. Prepare reports for tests and for corrective action required.
- B. Domestic water piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.08 ADJUSTING:

- A. Perform the following adjustments before operation:
 - 1. Close hose bibbs.
 - 2. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 - 3. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.09 CLEANING:

- A. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - (1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - (2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- C. Clean interior of domestic water piping system. Remove dirt and debris as Work progresses.

3.10 PIPING SCHEDULE:

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- B. Unions may be used for aboveground piping joints, unless otherwise indicated.
- C. Fitting Option: Brazed joints may be used on aboveground copper tubing.
- D. Below grade, domestic water, building-service piping, NPS 3 and smaller, shall be one of the following:

1. Soft copper tube, ASTM B88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
- E. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
 1. Hard copper tube, ASTM B88, Type L; cast- or wrought-copper, solder-joint fittings; and brazed or soldered joints.

END OF SECTION 15140

SECTION 15145 – DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS:
 - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.
- 1.02 SUMMARY:
 - A. This Section includes:
 - 1. Hose bibbs.
- 1.03 REFERENCE STANDARDS:
 - A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - B. American Society of Sanitary Engineering (ASSE):
 - 1. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers (ANSI).
 - C. ASME International (ASME):
 - 1. ASME A112.18.1 - Plumbing Supply Fittings.
 - 2. ASME B1.20.7 - Hose Coupling Screw Threads, Inch.
 - D. NSF International (NSF):
 - 1. NSF 61 - Drinking Water System Components - Health Effects; Sections 1 through 9 (ANSI).
 - 2. NSF 372 – Drinking Water System Components – Lead Content
- 1.04 SUBMITTALS:
 - A. Product Data: For each type of product.
 - B. Field quality-control reports.
 - C. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

- 2.01 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES:
 - A. Potable-water piping and components shall comply with NSF 61 and 372.
- 2.02 PERFORMANCE REQUIREMENTS:
 - A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.
- 2.03 HOSE BIBBS:
 - A. Hose Bibbs:
 - 1. Standard: ASME A112.18.1 for sediment faucets.
 - 2. Body Material: Bronze.
 - 3. Seat: Bronze, replaceable.
 - 4. Supply Connections: NPS 3/4 threaded or solder-joint inlet.
 - 5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.

6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Operation for Service Areas: Wheel handle.

PART 3 - EXECUTION

1.01 CONNECTIONS:

- A. Comply with requirements for piping specified in other DIVISION 15 sections. Drawings indicate general arrangement of piping, fittings, and specialties.

END OF SECTION 15145

SECTION 15815 – METAL DUCTS

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS:
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.
- 1.02 SUMMARY:
- A. This Section includes:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Sheet metal materials.
 - 3. Sealants and gaskets.
 - 4. Hangers and supports.
 - 5. Seismic-restraint devices.
- 1.03 RELATED REQUIREMENTS:
- A. Section 15950 - Testing, Adjusting, and Balancing for testing, adjusting, and balancing requirements for metal ducts.
- 1.04 REFERENCE STANDARDS:
- A. Applicable Standards (Latest Edition):
 - 1. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
 - a. ASCE/SEI 7 - Minimum Design Loads for Buildings and Other Structures.
 - 2. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - a. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality (ANSI).
 - 3. ASTM International (ASTM):
 - a. ASTM A36 - Specification for Carbon Structural Steel.
 - b. ASTM A603 - Specification for Zinc-Coated Steel Structural Wire Rope.
 - c. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - d. ASTM C920 - Specification for Elastomeric Joint Sealants.
 - e. ASTM E488 - Test Methods for Strength of Anchors in Concrete and Masonry Elements.
 - 4. Code of Federal Regulations (CFR):
 - a. 40 CFR - Protection of Environment, Chapter I - Environmental Protection Agency, Part 59 - "National Volatile Organic Compound Emission Standards for Consumer and Commercial Products," Subpart D - "National Volatile Organic Compound Emission Standards for Architectural Coatings."
 - 5. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
 - a. HVAC Duct Construction Standards - Metal and Flexible.
 - b. IAQ Guidelines for Occupied Buildings under Construction - Appendix G, Duct Cleanliness for New Construction Guidelines.
 - c. Seismic Restraint Manual: Guidelines for Mechanical Systems.
 - 6. Underwriters Laboratories, Inc. (UL):
 - a. UL 723 - Test for Surface Burning Characteristics of Building Materials.

- 1.05 PERFORMANCE/DESIGN CRITERIA:
- A. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.
- 1.06 SUBMITTALS:
- A. Product Data: For each type of the following products:
1. Sealants and gaskets.
 2. Seismic-restraint devices.
- B. Shop Drawings:
1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 2. Factory- and shop-fabricated ducts and fittings.
 3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
 4. Elevation of top of ducts.
 5. Dimensions of main duct runs from building grid lines.
 6. Fittings.
 7. Reinforcement and spacing.
 8. Seam and joint construction.
 9. Penetrations through fire-rated and other partitions.
 10. Equipment installation based on equipment being used on Project.
 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 12. Hangers and supports, including methods for duct and building attachment , seismic

PART 2 - PRODUCTS

- 2.01 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS:
- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class, unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-

support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SHEET METAL MATERIALS:

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A653.
 - 1. Galvanized Coating Designation: G90 (Z275).
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Reinforcement Shapes and Plates: ASTM A36, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 SEALANT AND GASKETS:

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Tape Width: 4 inches.
 - 3. Sealant: Modified styrene acrylic.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. Maximum Static-Pressure Class: 10-inch w.g., positive and negative.
 - 7. Service: Indoor and outdoor.
 - 8. Service Temperature: -40 to +200°F.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 - 10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65%.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L.
 - 7. Maximum Static-Pressure Class: 10-inch w.g., positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C920.

1. General: Single-component, acid-curing, silicone, elastomeric.
 2. Type: S.
 3. Grade: NS.
 4. Class: 25.
 5. Use: O.
 6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- 2.04 HANGERS AND SUPPORTS:
- A. Hanger Rods for Noncorrosive Environments: Zinc-plated steel rods and nuts.
 - B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
 - C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
 - D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A603.
 - E. Zinc-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
 - F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
 - G. Trapeze and Riser Supports:
 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
- 2.05 SEISMIC-RESTRAINT DEVICES:
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper B-Line, Inc.; a division of Cooper Industries.
 2. Ductmate Industries, Inc.
 3. Hilti Corp.
 4. Kinetics Noise Control.
 5. Unistrut Corporation; Tyco International, Ltd.
 - B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of the ICC Evaluation Service.
 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
 - C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
 - D. Restraint Cables: ASTM A603, galvanized-steel cables with end connections made of zinc-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod.
- F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E488.

PART 3 - EXECUTION

3.01 DUCT INSTALLATION:

- A. Coordinate duct layout and duct accessory arrangement with Drawings. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated, unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," unless otherwise indicated.
- C. Install ducts with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers.
- K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.02 INSTALLATION OF EXPOSED DUCTWORK:

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.03 DUCT SEALING:

- A. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- 3.04 HANGER AND SUPPORT INSTALLATION:
- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
 - B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 1. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 2. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick. These fasteners shall not be used to support ductwork larger than 24 inches square.
 3. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 4. Do not use powder-actuated concrete fasteners for seismic restraints.
 - C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
 - D. Hangers Exposed to View: Threaded rod and angle or channel supports.
 - E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
 - F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- 3.05 SEISMIC-RESTRAINT-DEVICE INSTALLATION:
- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with ASCE/SEI 7.
 1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 2. Brace a change of direction longer than 12 feet.
 - B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
 - C. Install cables so they do not bend across edges of adjacent equipment or building structure.
 - D. Install cable restraints on ducts that are suspended with vibration isolators.
 - E. Install seismic-restraint devices using methods approved by an evaluation service member of the ICC Evaluation Service.
 - F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
 - G. Drilling for and Setting Anchors:
 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items

during drilling. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 4. Set anchors to manufacturer's recommended torque, using a torque wrench.
 5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.
- 3.06 CONNECTIONS:
- A. Make connections to equipment with flexible connectors complying with Section 15820 - Air Duct Accessories.
 - B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.
- 3.07 START UP:
- A. Air Balance: Comply with requirements in Section 15950 - Testing, Adjusting, and Balancing for HVAC.
- 3.08 DUCT SCHEDULE:
- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:
 - B. Exhaust Ducts:
 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 1-inch w.g.
 - b. Minimum SMACNA Seal Class: A.

END OF SECTION 15815

SECTION 15820 – AIR DUCT ACCESSORIES

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS:
 - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.
- 1.02 SUMMARY:
 - A. This Section includes:
 - 1. Control dampers.
 - 2. Flexible connectors.
 - 3. Duct accessory hardware.
- 1.03 REFERENCE STANDARDS:
 - A. Applicable Standards (Latest Edition):
 - 1. ASTM International (ASTM):
 - a. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. NFPA:
 - a. NFPA 90A - Installation of Air Conditioning and Ventilating Systems (ANSI).
 - b. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems (ANSI).
 - 3. Underwriters Laboratories, Inc. (UL):
 - a. UL 181 - Factory-Made Air Ducts and Air Connectors.
- 1.04 SUBMITTALS:
 - A. Product Data: For each type of product.
 - B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
 - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Control-damper installations.
 - C. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

- 2.01 MBLY DESCRIPTION:
 - A. with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
 - B. y with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

- 2.02 LS:
- A. Sheet Steel: Comply with ASTM A653.
 - 1. Coating Designation: G90 (Z275).
 - 2. Surface Finish: Mill phosphatized.
 - B. Sheets: Comply with ASTM B209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
 - C. Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
 - D. Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch (minimum diameter for lengths longer than 36 inches).
- 2.03 ROL DAMPERS:
- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Warming and Ventilating; a division of Mestek, Inc.
 - 2. United Industries; a division of Mestek, Inc.
 - 3. Fan Corporation.
 - 4. AirFlow, LLC.
 - 5. Industries, Inc.
 - 6.
 - 7. Company.
 - B. Rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
 - C.
 - 1. 0.094-inch thick, galvanized sheet steel.
 - 2. Mitered and welded corners.
 - D.
 - 1. blade with maximum blade width of 6 inches.
 - 2. design.
 - 3.
 - 4.
 - 5. Edging: Closed-cell neoprene.
 - E. Axles: 1/2-inch diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - 1. Temperature Range: From -40 to +200°F.
 - F.
 - 1. bronze or stainless-steel sleeve.
 - 2. in ducts with pressure classes of 3-inch w.g. or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 3. bearings at each end of every blade.
- 2.04 RIBBLE CONNECTORS:
- A. Subject to compliance with requirements, provide products by one of the following:
 - 1. Industries, Inc.
 - 2. Dyne, Inc.
 - 3. Manufacturing.
 - 4. Inc.
 - 5. Industries, Inc.; a division of Hart & Cooley, Inc.
 - B. Flame-retardant or noncombustible fabrics.

- C. and Adhesives: Comply with UL 181, Class 1.
- D. System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. um Weight: 26 oz./sq. yd.
 - 2. Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Temperature: -40 to +200°F.

2.05 ACCESSORY HARDWARE:

- 1. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- 2. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel.
- C. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Set dampers to fully open position before testing, adjusting, and balancing.
- E. Install test holes at fan inlets and outlets and elsewhere as indicated.
- F. Install flexible connectors to connect ducts to equipment.
- G. Install duct test holes where required for testing and balancing purposes.
- H. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.02 FIELD QUALITY CONTROL:

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.

END OF SECTION 15820

SECTION 15858 – HVAC POWER VENTILATORS

PAR 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section includes:
 - 1. In-line centrifugal fans.
 - 2. Propeller fans.

1.03 REFERENCE STANDARDS:

- A. Air Movement and Control Association International, Inc. (AMCA):
 - 1. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
 - 2. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data (ANSI).
- B. Air Movement and Control Association International, Inc./American Society of Heating, Refrigerating and Air-Conditioning Engineers (AMCA/ASHRAE):
 - 1. AMCA 210/ASHRAE 51 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI).
- C. NFPA:
 - 1. NFPA 70 - National Electrical Code.
- D. Underwriters Laboratories, Inc. (UL):
 - 1. UL 705 - Power Ventilators.

1.04 PERFORMANCE REQUIREMENTS:

- A. Project Altitude: Base fan-performance ratings on actual Project Site elevations.

1.05 SUBMITTALS:

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material thickness and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

- 1.06 QUALITY ASSURANCE:
- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.
 - C. UL Standards: Power ventilators shall comply with UL 705.
- 1.07 COORDINATION:
- A. Coordinate sizes and locations of wall penetrations with actual equipment provided.

PART 2 - PRODUCTS

- 2.01 IN-LINE CENTRIFUGAL FANS:
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Greenheck Fan Corporation.
 - 2. Aerovent; a division of Twin City Fan Companies, Ltd.
 - 3. Hartzell Fan, Incorporated.
 - 4. Loren Cook Company.
 - 5. PennBarry.
 - B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to side wall mounting.
 - C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.
 - D. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.
 - E. Accessories:
 - 1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50%.
 - 2. Companion Flanges: For inlet and outlet duct connections.
 - 3. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
 - 4. Motor and Drive Cover: Epoxy-coated steel.
 - F. Capacities and Characteristics: Refer to Fan Schedule on Drawings.
- 2.02 PROPELLER FANS:
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Greenheck Fan Corporation.
 - 2. Aerovent; a division of Twin City Fan Companies, Ltd.
 - 3. Hartzell Fan, Incorporated.
 - 4. Loren Cook Company.
 - 5. PennBarry.
 - B. Housing: Galvanized-steel sheet with flanged edges and integral orifice ring with baked-enamel finish coat applied after assembly.

- C. Fan Wheel: Replaceable, cast or extruded-aluminum, airfoil blades fastened to cast-aluminum hub; factory set pitch angle of blades.
- D. Fan Drive: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.
- E. Accessories:
 - 1. Gravity Shutters: Aluminum blades in aluminum frame; interlocked blades with nylon bearings.
 - 2. Motor-Side Back Guard: Galvanized steel, complying with OSHA Specifications, removable for maintenance.
 - 3. Wall Sleeve: Galvanized steel to match fan and accessory size.
- F. Capacities and Characteristics: Refer to Fan Schedule on Drawings.

2.03 MOTORS:

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 12058 - Common Motor Requirements for HVAC Equipment.
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 16 Sections.

2.04 SOURCE QUALITY CONTROL:

- A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Install power ventilators level and plumb.
- B. Install units with clearances for service and maintenance.
- C. Label units according to requirements specified in Section 15077 - Identification for HVAC Piping and Equipment.

3.02 CONNECTIONS:

- A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 15820 - Air Duct Accessories.
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Division 16.
- D. Connect wiring according to Division 16.

3.03 FIELD QUALITY CONTROL:

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system.
 - 5. Adjust damper linkages for proper damper operation.
 - 6. Verify lubrication for bearings and other moving parts.
 - 7. Verify that manual and automatic volume control dampers in connected ductwork systems are in fully open position.
 - 8. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 - 9. Shut unit down and reconnect automatic temperature-control operators.
 - 10. Remove and replace malfunctioning units and retest as specified above.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Prepare test and inspection reports.

3.04 ADJUSTING:

- A. Adjust damper linkages for proper damper operation.
- B. Comply with requirements in Section 15950 - Testing, Adjusting, and Balancing for testing, adjusting, and balancing procedures.
- C. Lubricate bearings.

END OF SECTION 15858

SECTION 15900 – HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section includes control equipment for HVAC systems and components.

1.03 REFERENCE STANDARDS:

- A. Applicable Standards (Latest Edition):
 - 1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - a. ASHRAE 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks.
 - 2. The Instrumentation, Systems, and Automation Society (67 Alexander Dr., Research Triangle Park, NC 27709; 919-549-8411) (ISA):
 - a. ISA 50.00.01 - Compatibility of Analog Signals for Electronic Industrial Process Instruments.
 - 3. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250 - Enclosures for Electrical Equipment (100V Maximum).
 - 4. NFPA:
 - a. NFPA 70 - National Electrical Code.

1.04 DEFINITIONS:

- A. DDC: Direct digital control.
- B. I/O: Input/output.
- C. MS/TP: Master slave/token passing.
- D. PC: Personal computer.
- E. PID: Proportional plus integral plus derivative.
- F. RTD: Resistance temperature detector.

1.05 SYSTEM PERFORMANCE:

- A. Comply with the following performance requirements:
 - 1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
 - 2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
 - 3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
 - 4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
 - 5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
 - 6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.

7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
 - a. Water Flow: $\pm 5\%$ of full scale.
 - b. Space Temperature: $\pm 1^\circ\text{F}$.
- B. All digital controls equipment in the building should be designed to be part of a single networked system, which is designed to be connected to the existing State of Hawaii, Dept of Defense, Hawaii Army National Guard, Energy Management Controls System (EMCS). The building's EMCS will be user-friendly functionality utilize a web-based user interface, accessible by any standard web browser. The web page files to support the user interface will reside on the existing State DOD central server. The primary building controllers that connect to the EMCS must be fully compatible BACnet interface with owner's central server. All controls components must be fully compatible and able to communicate with each other and central server, and provide single web-based, uniform user interface at all buildings.
- C. BACnet - All controllers connected to the primary controller should communicate using BACnet communication protocol, unless specifically approved in advance by the building owner. BACnet is an open communication protocol systems whose functional profiles conform the guidelines of the BACnet Manufacturers Association, and are certified compliant by that organization.
- D. Third party control systems - Third party control systems should be avoided as much as possible, and if used, must be COMPLETELY integrated into the building EMCS system, with all points and control parameters fully accessible from the EMCS system. Owner's representative shall verify that specifications for any third party control systems used, and the control systems of all mechanical equipment controlled by the building EMCS system, specify controls and equipment that will be fully compatible with the EMCS.
- E. Controllers must be provided with an open license, open system design to include:

1. Property	Value
2. Station Compatibility In	All
3. Station Compatibility Out	All
4. Tool Compatibility In	All
5. Tool Compatibility Out	All
- F. Browser interface to system, additional or special workstation (HMI) software will not be accepted. System must be web-based and compatible with existing State DOD website.
- G. Provide communication output from meters. Provide cabling to existing HIARNG network switch.
- H. Provide mapping to existing State DOD statewide BACnet server. (Note: Mapping must be performed by an authorized Automated Logic vendor).
- I. The programming language shall be graphical programming, line programming is not acceptable. The system HMI shall include a LOGIC page for every system. This logic page shall allow the operator to view the program logic with the live data display throughout the logic. Authorized operators shall have the capability to change parameters on-line. Programming changes shall be in background mode only.
- J. Color graphics shall follow the DoD EMCS Graphic Standard.
- K. Color computer Graphics shall be provided for each piece of equipment.

- L. Color computer Graphic floor plans shall be provided with thermal graphs. Thermal graphs will indicate each zone within the floor plan with room numbers and changing colors to indicate the following:
 - 1. If the space is unoccupied the color will be GRAY
 - 2. If the space is occupied:
 - a. GREEN shall indicate the zone is at set-point.
 - b. YELLOW shall indicate the zone is slightly warmer than set-point.
 - c. ORANGE shall indicate the zone is well above set-point.
 - d. LIGHT BLUE shall indicate the zone is slightly cooler than set-point.
 - e. DARK BLUE shall indicate the zone is well below set-point.
 - f. RED shall indicate the zone is in alarm.
 - g. CHARTRUSSE shall indicate that there is not communications to the DDC module.
 - M. Trending shall be required for every point in the system. Every trend shall be historically trended and saved in the hard drive data base. Exporting of trends shall be included, trends shall be exported to an Excel spreadsheet without the use of any specialty software.
 - N. All software tools shall be provided and installed on the system computer server. Software tools shall include at minimum:
 - 1. Data base configuration software and tools.
 - 2. Graphic programming software.
 - 3. Graphic designing software.
 - 4. All implementation software tools required to build this system from scratch.
 - O. DDC controller: Automated Logic SE6166 (or approved equal).
 - P. DDC controller: Automated Logic ZN551 (or approved equal).
 - Q. DDC Communication Router/Gateway: Automated Logic LGR1000 (or approved equal).
- 1.06 SUBMITTALS:
- A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
 - 1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
 - 2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
 - 3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.
 - B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
 - 2. Schematic flow diagrams showing fans, dampers, and control devices.
 - 3. Wiring Diagrams: Power, signal, and control wiring.

4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. DDC System Hardware:
 - a. Wiring diagrams for control units with termination numbers.
 - b. Schematic diagrams and floor plans for field sensors and control hardware.
 - c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.
8. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
9. Controlled Systems:
 - a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
 - b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
 - c. Written description of sequence of operation including schematic diagram.
 - d. Points list.
- C. Samples for Initial Selection: For each color required, of each type of thermostat or sensor cover with factory-applied color finishes.
- D. Samples for Verification: For each color required, of each type of thermostat or sensor cover.
- E. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.
- F. Qualification Data: For Installer and manufacturer.
- G. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.
- H. Field quality-control test reports.
- I. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:
 1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
 2. Interconnection wiring diagrams with identified and numbered system components and devices.
 3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
 4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
 5. Calibration records and list of set points.
- J. Software and Firmware Operational Documentation: Include the following:
 1. Software operating and upgrade manuals.
 2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
 3. Device address list.
 4. Printout of software application and graphic screens.
 5. Software license required by and installed for DDC workstations and control systems.
- K. All direct digital controllers shall be native BACnet.

- 1.07 QUALITY ASSURANCE:
- A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.
 - B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - C. Comply with ASHRAE 135 for DDC system components.
- 1.08 DELIVERY, STORAGE, AND HANDLING:
- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
 - B. System Software: Update to latest version of software at Project completion.
- 1.09 COORDINATION:
- A. Coordinate location of thermostats and other exposed control sensors with plans and room details before installation.
 - B. Coordinate equipment with Division 16 to achieve compatibility with equipment that interfaces with that system.
 - C. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.
 - D. Coordinate equipment with Division 16 to achieve compatibility of communication interfaces.
 - E. Coordinate equipment with Division 16 to achieve compatibility with starter coils and annunciation devices.
 - F. Coordinate equipment with Division 16 to achieve compatibility with motor starters and annunciation devices.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS:
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 2.02 CONTROL SYSTEM:
- A. Manufacturers:
 - 1. Automated Logic Corporation (or approved equal, to be pre-approved with Owner's Energy Manager).
 - B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

2.03 DDC EQUIPMENT:

- A. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.
 - 1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
 - 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse I/O.
 - c. Monitoring, controlling, or addressing data points.
 - d. Software applications, scheduling, and alarm processing.
 - e. Testing and developing control algorithms without disrupting field hardware and controlled environment.
 - 3. Standard Application Programs:
 - a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, antishort cycling, PID control, DDC with fine tuning, and trend logging.
 - b. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
 - c. Remote communications.
 - d. Maintenance management.
 - e. Units of Measure: Inch-pound.
 - 4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
 - 5. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
- B. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
 - 1. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.
 - 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse I/O.
 - c. Monitoring, controlling, or addressing data points.
 - 3. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
 - 4. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
- C. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.
 - 1. Binary Inputs: Allow monitoring of on-off signals without external power.
 - 2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
 - 3. Analog Inputs: Allow monitoring of low-voltage (0 to 10Vdc), current (4 to 20 mA), or resistance signals.

4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.
5. Analog Outputs: Provide modulating signal, either low voltage (0 to 10Vdc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer.
6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.
- D. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80% of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:
 1. Output ripple of 5.0 mV maximum peak to peak.
 2. Combined 1% line and load regulation with 100-mic.sec. response time for 50% load changes.
 3. Built-in overvoltage and overcurrent protection and be able to withstand 150% overload for at least 3 seconds without failure.
- E. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:
 1. Minimum dielectric strength of 1,000V.
 2. Maximum response time of 10 nanoseconds.
 3. Minimum transverse-mode noise attenuation of 65 dB.
 4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

2.04 UNITARY CONTROLLERS:

- A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.
 1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72hour battery backup.
 2. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform automatic system diagnostics; monitor system and report failures.
 3. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on network using MS/TP datalink/physical layer protocol and have service communication port for connection to diagnostic terminal unit.
 4. Enclosure: Dustproof rated for operation at 32 to 120°F.

2.05 ANALOG CONTROLLERS:

- A. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.
 1. Single controllers can be integral with control motor if provided with accessible control readjustment potentiometer.

- 2.06 STATUS SENSORS:
- A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.
 - B. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175% of rated motor current.
 - C. Voltage Transmitter (100 to 600Vac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1% full-scale accuracy.
 - D. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2% error at 1.0 power factor and 2.5% error at 0.5 power factor.
 - E. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.
 - F. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2 to 10Vdc, feedback signal.
- 2.07 THERMOSTATS:
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Automated Logic ZS Pro Room Sensor ZSP-HC-ALC (or approved equal)
- 2.08 ACTUATORS:
- A. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Belimo Aircontrols (USA), Inc or approved equal.
 - 2. Dampers: Size for running torque calculated as follows:
 - a. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
 - b. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1,000 to 2,500 fpm: Increase running torque by 1.5.
 - 3. Coupling: V-bolt and V-shaped, toothed cradle.
 - 4. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
 - 5. Power Requirements (Two-Position Spring Return): 24 Vac.
 - 6. Proportional Signal: 2 to 10Vdc or 4 to 20 mA, and 2 to 10Vdc position feedback signal.
 - 7. Temperature Rating: 40 to 104°F.
 - 8. Run Time: 30 seconds.
- 2.09 CONTROL CABLE:
- A. Communication cabling shall be high speed ARCnet (156k) using low-capacitance cable.
 - B. Refer to Division 16 for testing procedures.

PART 3 - EXECUTION

- 3.01 EXAMINATION:
- A. Verify that power supply is available to control units.

3.02 INSTALLATION:

- A. Install software in control units. Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- B. Connect and configure equipment and software to achieve sequence of operation specified.
- C. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above the floor.
- D. Install labels and nameplates to identify control components according to Section 15077 – "Identification For HVAC Equipment."

3.03 ELECTRICAL WIRING AND CONNECTION INSTALLATION:

- A. Install raceways, boxes, and cabinets according to Division 16.
- B. Install building wire and cable according to Division 16.
- C. Install signal and communication cable according to Division 16.
 - 1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
 - 2. Install exposed cable in raceway.
 - 3. Install concealed cable in raceway.
 - 4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
 - 5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
 - 6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
 - 7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.
- D. Connect manual-reset limit controls independent of manual-control switch positions.
- E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.04 FIELD QUALITY CONTROL:

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
 - 2. Test and adjust controls and safeties.
 - 3. Test each point through its full operating range to verify that safety and operating control set points are as required.
 - 4. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
 - 5. Test each system for compliance with sequence of operation.
 - 6. Test software and hardware interlocks.
- C. DDC Verification:
 - 1. Verify that instruments are installed before calibration, testing, and loop or leak checks.

2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
5. Check temperature instruments and material and length of sensing elements.
6. Check DDC system as follows:
 - a. Verify that DDC controller power supply is from emergency power supply, if applicable.
 - b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
 - c. Verify that spare I/O capacity has been provided.
 - d. Verify that DDC controllers are protected from power supply surges.
- D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.05 ADJUSTING:

- A. Calibrating and Adjusting:
 1. Calibrate instruments.
 2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
 3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
 4. Control System Inputs and Outputs:
 - a. Check analog inputs at 0, 50, and 100% of span.
 - b. Check analog outputs using milliamper meter at 0, 50, and 100% output.
 - c. Check digital inputs using jumper wire.
 - d. Check digital outputs using ohmmeter to test for contact making or breaking.
 - e. Check resistance temperature inputs at 0, 50, and 100% of span using a precision-resistant source.
 5. Flow:
 - a. Set differential pressure flow transmitters for 0 and 100% values with 3-point calibration accomplished at 50, 90, and 100% of span.
 - b. Manually operate flow switches to verify that they make or break contact.
 6. Temperature:
 - a. Calibrate resistance temperature transmitters at 0, 50, and 100% of span using a precision-resistance source.
 - b. Calibrate temperature switches to make or break contacts.
 7. Stroke and adjust control dampers without positioners, following the manufacturer's recommended procedure, so that damper is 100% open and closed.
 8. Stroke and adjust control dampers with positioners, following manufacturer's recommended procedure, so that damper is 0, 50, and 100% closed.
 9. Provide diagnostic and test instruments for calibration and adjustment of system.
 10. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.
- B. Adjust initial temperature set points.

3.06 DEMONSTRATION:

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Division 01.

END OF SECTION 15900

SECTION 15950 – TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.

1.03 REFERENCE STANDARDS:

- A. Applicable Standards (latest edition):
 - 1. Air Movement and Control Association International Inc. (AMCA):
 - a. 201 - Fans and Systems.
 - 2. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - a. 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. Associated Air Balance Council (AABC):
 - a. National Standards for Total System Balance.
 - 4. National Environmental Balancing Bureau (NEBB):
 - a. Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
 - 5. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
 - a. HVAC Systems - Duct Design.
 - b. HVAC Systems - Testing, Adjusting, and Balancing.

1.04 DEFINITIONS:

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, Adjusting, and Balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.
- F. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- G. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.
- H. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.
- I. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin that is normally dissipated.
- J. NC: Noise criteria.

- K. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- L. RC: Room criteria.
- M. Report Forms: Test data sheets for recording test data in logical order.
- N. Smoke-Control System: An engineered system that uses fans to produce airflow and pressure differences across barriers to limit smoke movement.
- O. Smoke-Control Zone: A space within a building that is enclosed by smoke barriers and is a part of a zoned smoke-control system.
- P. Stair Pressurization System: A type of smoke-control system that is intended to positively pressurize stair towers with outdoor air by using fans to keep smoke from contaminating the stair towers during an alarm condition.
- Q. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- R. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- S. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- T. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- U. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- V. Test: A procedure to determine quantitative performance of systems or equipment.
- W. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.05 SUBMITTALS:

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.
- F. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.06 QUALITY ASSURANCE:

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB, or TABB.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB, or TABB.

2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB, or TABB as a TAB technician.
 - B. Certify TAB field data reports and perform the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
 - C. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer.
 - D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
 - E. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.
 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.
- 1.07 PROJECT CONDITIONS:
- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- 1.08 COORDINATION:
- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.
 - B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

- 3.01 EXAMINATION:
- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
 - B. Examine systems for installed balancing devices, such as test ports and manual volume dampers. Verify that locations of these balancing devices are accessible.
 - C. Examine the approved submittals for HVAC systems and equipment.
 - D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
 - E. Examine Equipment performance data including fan curves.
 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 2. Calculate system-effect factors to reduce performance ratings of HVAC Equipment when installed under conditions different from the conditions used to

rate Equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

- F. Examine system and equipment installations and verify that field quality control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC Equipment and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine operating safety interlocks and controls on HVAC Equipment.
- J. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.
- K. Examine automatic temperature system components to verify the following:
 - 1. Dampers and other controlled devices are operated by the intended controller.
 - 2. Dampers are in the position indicated by the controller.
 - 3. Integrity of dampers for free and full operation and for tightness of fully closed and fully open positions.
 - 4. Sensors are located to sense only the intended conditions.
 - 5. Sequence of operation for control modes in according to the Contract Documents.
 - 6. Controller set points are set at indicated values.
 - 7. Interlocked system are operating.

3.02 PREPARATION:

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Balance dampers are open.
 - 4. Windows and doors can be closed so indicated conditions for system operations can be met.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING:

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing", and in this Section.
- B. Cut ducts and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
- C. Mark Equipment and balancing devices, including damper-control positions, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

- 3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS:
- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
 - B. Prepare schematic diagrams of systems' "as-built" duct layouts.
 - C. Determine the best locations in main ducts for accurate duct-airflow measurements.
 - D. Check airflow patterns from the exhaust-air dampers through the supply-fan discharge dampers.
 - E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
 - F. Verify that motor starters are equipped with properly sized thermal protection.
 - G. Check dampers for proper position to achieve desired airflow path.
 - H. Check for airflow blockages.
 - I. Verify that air duct system is sealed as specified in Section 15815 - Metal Ducts.
- 3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS:
- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - 3. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed.
 - 4. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur.
 - B. Measure air outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
 - C. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values.
 - 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
- 3.06 TOLERANCES:
- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 - 1. Exhaust Fans and Equipment with Fans: $\pm 10\%$.
 - 2. Air Outlets and Inlets: 0 to $+10\%$.

- 3.07 REPORTING:
- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- 3.08 FINAL REPORT:
- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Notes to explain why certain final data in the body of reports vary from indicated values.
 14. Test conditions for fans performance forms including the following:
 - a. Settings for exhaust-air dampers.
 - b. Fan drive settings including settings and percentage of maximum pitch diameter.
 - c. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of exhaust airflows.
 2. Duct, outlet, and inlet sizes.

3. Position of balancing devices.
- E. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches w.g.
 - c. Fan rpm.
 - d. Discharge static pressure in inches w.g.
 - e. Suction static pressure in inches w.g.
- F. Instrument Calibration Reports:
 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.09 INSPECTIONS:

- A. Initial Inspection:
 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 2. Check the following for each system:
 - a. Measure airflow of at least 10% of air outlets.
 - b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - c. Verify that balancing devices are marked with final balance position.
 - d. Note deviations from the Contract Documents in the final report.
- B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Engineer.
 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Engineer.
 3. Engineer shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10% of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
 5. If the number of "FAILED" measurements is greater than 10% of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- C. TAB work will be considered defective if it does not pass final inspections. If TAB work fails, proceed as follows:
1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.
- 3.10 ADDITIONAL TESTS:
- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

END OF SECTION 15950

SECTION 16060 – GROUNDING AND BONDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section specifies electrical grounding and bonding as indicated on Drawings and schedules and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.
- B. Type of electrical grounding and bonding work specified in this Section includes the following:
 - 1. Solidly grounded. Grounded through a ground connection in which no impedance has been intentionally inserted.
- C. Applications of electrical grounding and bonding work in this Section include the following:
 - 1. Electrical power systems.
 - 2. Raceways.
 - 3. Service equipment.
 - 4. Boxes and enclosures.
 - 5. Equipment.
 - 6. Lighting standards and poles.
 - 7. Cable tray.
 - 8. Chainlink fences and gates.
- D. Refer to other DIVISION 16 Sections for wires/cables, electrical raceways, boxes and fittings, and wiring devices which are required in conjunction with electrical grounding and bonding work; not work of this Section.

1.03 RELATED REQUIREMENTS

- A. SECTION 16289 - SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS for surge protection.

1.04 REFERENCES

- A. Applicable Standards:
 - 1. Institute of Electrical and Electronic Engineers (IEEE): Comply with applicable requirements and recommended installation practices of the following IEEE Standards pertaining to grounding and bonding of systems, circuits, and equipment:
 - a. 32 - Requirements, Terminology, and Test procedures for Neutral Grounding Devices.
 - b. 80 - Guide for Safety in Substation Grounding.
 - c. 81 - Guide for Measuring Ground Resistance, and Potential Gradient in the Earth.

- d. 141 - Recommended Practice for Electric Power Distribution for Industrial Plants.
 - e. 142 - Recommended Practice for Grounding Industrial and Commercial Power Systems.
- 2. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code (NEC): Comply with applicable local electrical code requirements of the authority having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits, and equipment.
 - b. 780 - Lightning Protection Code.
- 3. Underwriters Laboratories (UL): Comply with applicable requirements of the following standards. Provide grounding and bonding products which are UL-listed and labeled for their intended usage.
 - a. 467 - Electrical Grounding and Bonding Equipment.
 - b. 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.
 - c. 869 - Electrical Service Equipment.

1.05 SUBMITTALS

- A. Refer to DIVISION for administrative and procedural requirements for Submittals.
- B. Includes, but not limited to, the following:
 - 1. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.
 - 2. Qualification Data: For Qualified Testing Agency and testing agencies field Supervisor.
 - 3. All field test reports.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide grounding and bonding products of one of the following (for each type of product):
 - 1. Grounding Products:
 - a. Adalet-PLM Div; Scott Fetzer Co.
 - b. Anderson/Square D.
 - c. Burndy Corporation.
 - d. Cadweld Div; Erico Products Inc.
 - e. Crouse-Hinds Div; Cooper Industries.

- f. Ideal Industries, Inc.
- g. Joslyn Corporation.
- h. Myers Electric Products, Inc.
- i. O. Z. Gedney Div; General Signal Corp.
- j. Thomas and Betts Corp.

2.02 GROUNDING AND BONDING

A. Materials and Components:

1. General: Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials, including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where more than one type component product meets indicated requirements, selection is Contractor's code-compliance option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications.
2. Conductors: Unless otherwise indicated, provide insulated electrical grounding conductors for equipment grounding conductor connections that match power supply wiring materials and as a minimum are sized according to the NEC. Provide uninsulated, stranded, tinned, copper cable for ground electrode conductors.
3. Service Lightning Arrester:
 - a. Service Lightning Arrester: 2-pole, 1-phase, 120/240V, #14 AWG 3-wire including ground, 18-inch leads, with watertight enclosure.
 - b. Service Lightning Arrester: Electrical service arrester, pellet type, 120/240V, 1-phase, 3-wire, for exterior mounting.
4. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Lexan or PVC, impulse tested at 5,000V.
5. Bonding Plates, Connectors, Terminals, and Clamps: Provide electrical bonding plates, connectors, terminals, lugs, and clamps as recommended by bonding plate, connector, terminal, and clamp manufacturers for indicated applications.
 - a. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - b. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
 - c. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals and long-barrel, two-bolt connection to ground bus bar.
6. Ground Rods:
 - a. Ground Rods or Grounding Electrodes: Stainless steel, 3/4-inch diameter by 10 feet.
7. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type service required or indicated.

8. Field Welding: Provide exothermic welded connections where grounding conductors connect to underground grounding conductors and underground grounding electrodes.

PART 3 - EXECUTION

3.01 APPLICATIONS:

- A. Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's instructions and applicable portions of NEC, NECA's "Standard of Installation," and in accordance with recognized industry practices to ensure that products comply with requirements.
- B. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- C. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 minimum.
 1. Bury at least 24 inches (600 mm) below grade.
- D. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- E. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 4. Connections to Structural Steel: Welded connectors.
 5. Clean metal contact surfaces of clamp-on connectors to ensure electrical conductivity and circuit integrity.

3.02 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug on substation, switchgear, switchboard, motor control center, or panelboard ground bus. When conduit enters from below and is not connected to the enclosure, ground equipment grounding conductor on conduit grounding bushing and then bond to ground bus (or grounded enclosure if there is no ground bus).
- C. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Receptacle circuits.
 4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway and power cords runs.
 7. Armored and metal-clad cable runs.
 8. Ground wireway at least once and at 10-foot intervals.
 9. Ground all continuous runs of metallic cable tray and all isolated sections of metallic cable tray at each end. Install NEC sized bare copper equipment ground

- conductor in all cable tray. Clamp equipment ground conductor to cable tray at 20-foot intervals.
10. Bond cable trays routed parallel to each other with an NEC sized, bare copper tray bonding jumper ground conductor (based on highest ampacity circuit) at (100-) foot intervals.
- D. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
 - E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
 - F. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 1. For telephone, alarm, voice and data, and other communication equipment, provide No.-4-AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4- by 4- by 12-inch (6.3- by 100- by 300-mm) grounding bus.
 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.03 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 10 inches below finished floor or final grade unless otherwise indicated. Do not drill or jet. Drive ground rods into unexcavated portions of earth where possible. If rods must be driven into excavated areas, drive rods after compaction of backfill is completed.
 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 2. At grounding receptacles, drive rods to a depth such that the top of the receptacle is flush with the finished surface.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
- H. Ground each separately derived system neutral to:
1. Main building ground system.
- I. Ground all exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductors in raceways and cables, receptacle ground conductors, and metallic plumbing systems.
- J. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.
- K. Apply corrosion-resistant finish to field connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed, which are subjected to corrosive action.

3.04 LABELING

- A. Comply with requirements in SECTION 16075 – ELECTRICAL IDENTIFICATION for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- D. Grounding system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. Report measured ground resistances that exceed the following values:
 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
- G. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 16060

SECTION 16075 – ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section specifies electrical identification work including the following:
 - 1. Electrical power, control, and communication conductors (and raceways).
 - 2. Operational instructions and warnings.
 - 3. Danger, caution and warning signs.
 - 4. Equipment/system identification nameplates.

1.03 REFERENCE STANDARDS

- A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- B. Applicable Standards: Comply with the applicable requirements of the following standards.
 - 1. The American Society of Mechanical Engineers (ASME):
 - a. A13.1 - Scheme for the Identification of Piping Systems.
 - 2. ASTM International (ASTM):
 - a. ASTM D709 - Standard Specification for Laminated Thermosetting Materials.
 - 3. National Electrical Manufacturers Association (NEMA):
 - a. Z535.1 – Safety Colors.
 - b. Z535.4 – Product Safety Signs and Labels.
 - 4. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code (NEC), as applicable to installation of identifying labels and markers for wiring and equipment.
 - b. 70E – Standard For Electrical Safety In The Workplace.
 - c. 72 – National Electric Safety Code (NESC) – IEEE C2.
 - 5. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910.144 – Safety Color Code for Marking Physical Hazards.
 - b. 29 CFR 1910.145 - Specifications for Accident Prevention Signs and Tags.
 - 6. Underwriters Laboratories (UL), pertaining to electrical identification systems:
 - a. 969-1995 – Standards for Marking and Labeling Systems.- Fourth Edition; Reprint with Revisions Through and Including September 19, 2014.

1.04 SUBMITTALS

- A. Refer to Division 01 for administrative and procedural requirements for submittals.
- B. Includes, but not limited to, the following:
 - 1. Product Data: Submit manufacturer's data on electrical identification materials and products.

1.05 QUALITY ASSURANCE

- A. Comply with ASME A13.1 [and IEEE C2].
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with NEMA Z535.4 – Product Safety Signs and Labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.06 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide electrical identification products of one of the following (for each type marker):
 - 1. Brady Worldwide, Inc.
 - 2. Panduit Corp.
 - 3. Seton Identification Products.
 - 4. Thomas & Betts Corp.

2.02 ELECTRICAL IDENTIFICATION MATERIALS

- A. General: Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option; but provide single selection for each application.
- B. Orange "Emergency" and "()-VOLT" Conduit, Equipment, Box, and Cable Tray Markers:
 - 1. General: Self-adhesive vinyl tape marker not less than 3 mils thick. Provide 1-1/8 inch wide by 4-1/2 inch long marker for 2 inch and smaller conduit. Provide 2-1/4 inch wide by 9 inch long marker for 2-1/2 inch and larger conduit and all cable tray. Except as otherwise indicated, provide black lettering which indicates highest voltage of cables(s) in conduit or cable tray. Provide black lettering that indicates "Emergency" power circuit is in conduit or cable tray.
 - 2. Colors: Unless otherwise indicated or required by governing regulations, provide orange background tape marker.

- C. Wire/Cable Identification Bands:
 - 1. General: Vinyl-cloth self-adhesive cable/conductor markers of wrap-around type, either prenumbered plastic coated type or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification number indicated on Drawings or Shop Drawings.
- D. Plasticized Tags:
 - 1. General: Preprinted or partially preprinted accident-prevention and operational tags, on plasticized card stock with matt finish suitable for writing, approximately 3-1/4 inches by 5-5/8 inches, with brass grommets and wire fasteners, and with appropriate preprinted wording, including large-size primary wording, e.g., "DANGER, DO NOT OPERATE." Tags shall comply with OSHA requirements.
- E. Self-Adhesive Plastic Signs:
 - 1. General: Self-adhesive or pressure-sensitive, preprinted, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application, e.g., "EXHAUST FAN."
 - a. Colors: Unless otherwise indicated or required by governing regulations, provide white signs with black lettering.
- F. Baked Enamel "Danger" Signs:
 - 1. "DANGER" signs of baked enamel finish on 20-gauge steel (unless specified otherwise); of standard safety red, safety black, and safety white ; 14 inches by 10 inches size, except where 10 inches by 7 inches is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording, e.g., " _____VOLTS, KEEP AWAY." Sign shall conform to OSHA and NEMA Z535.4.
- G. Baked Enamel "Caution" Signs:
 - 1. "CAUTION" signs of baked enamel finish on 20 gauge steel (unless specified otherwise); of standard safety yellow with safety black letters; 14 inches by 10 inches size, except where 10 inches by 7 inches is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording, e.g., "Caution for Ear Protection Required in this Area."
- H. Based Enamel "WARNING" Signs:
 - 1. "WARNING" signs of baked enamel finish on 20 gauge steel (unless specified otherwise); of standard safety orange with safety black letters; 14 inches by 10 inches size, except where 10 inches by 7 inches is largest size that can be applied where needed and except where larger size is needed for adequate vision; with recognized standard explanation wording. Sign shall conform to OSHA and NEMA Z535.4.
- I. Engraved Plastic-Laminate Nameplates:
 - 1. General: Engraving stock melamine plastic laminate nameplates, in sizes (minimum height of characters shall be 1/8 inch) and thicknesses specified or indicated, engraved with engraver's standard letter style of sizes and wording indicated, white face and black core plies (letter color) except as otherwise indicated, specified or required. Colors shall comply with OSHA and NEMA Z535.1. Nameplate shall be punched for mechanical fastening except where adhesive mounting is necessary because of surface it is mounted to.

- a. Thickness: 1/16-inch, for units up to 20 square inches or 8 inch length; 1/8-inch for larger units.
- b. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate surface it is mounted to.
- 2. Lettering and Graphics:
 - a. Coordinate names, abbreviations, and other designations used in electric identification work with corresponding designations shown, specified, or scheduled. Provide numbers, lettering, and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/maintenance of electrical systems and equipment. Comply with ASME A13.1 pertaining to minimum sizes for letters and numbers. Comply with OSHA and NEMA Z535.4 requirements.

PART 3 - EXECUTION

3.01 APPLICATION AND INSTALLATION:

- A. General Installation Requirements:
 - 1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions and requirements of NEC.
 - 2. Coordination: Where identification is to be applied to surfaces which require finish painting, install identification after completion of painting.
 - 3. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.
- B. Conduit and Cable Tray Identification Markers:
 - 1. General: Where electrical conduit is exposed, apply identification markers on electrical conduit at 20 foot intervals (visible from the floor) and within 3 feet of all panelboards, switchboards, switchgear, automatic transfer switches, emergency generators, substations, switches, devices, and circuit breakers (readily visible when standing in front of equipment). Identification on cable tray shall be on outside of both sidewalls at 20 foot intervals.
- C. Wire/Cable Identification Bands:
 - 1. General: Apply cable/conductor identification bands, including circuit number, on each wire/cable in each box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project's electrical work.
- D. Operational Identification and Warning Plasticized Tags and Metal Signs and Plastic Signs:
 - 1. General: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems, and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install signs with instruction or warnings. When signs are installed on switches, outlets, controls, devices and covers of electrical enclosures they may be self-adhesive vinyl or plastic. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.
- E. Danger Signs:

1. General: In addition to installation of danger signs specified, indicated, and required by governing regulations and authorities, install appropriate danger signs at locations indicated and at locations subsequently identified by Installer of electrical work as constituting similar dangers for persons in or about Project.
 2. XXXX Volts: Install danger signs (with actual circuit voltage) on all building doors, substations, switchgear, switchboards, panelboards switches, circuit breakers, etc., wherever it is possible (under any circumstances) for persons to come into contact with electrical voltages to ground greater than 277V.
 3. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons or damage to or loss of property.
- F. Warning Signs:
1. Provide cable tray warning signs with 1-1/2-inch high black letters on an orange background that reads: "Warning! Not to be used as a walkway, ladder or support for ladders for personnel." Provide on each side of cable tray at 10-foot intervals, visible from the floor below.
 2. Provide Arc Flash Warning signs on electrical equipment such as switchboards, switchgear, panelboards, transfer switches, industrial control panels, motor control centers and meter socket enclosures that are likely to require examination, adjustment, servicing, or maintenance while energized. Marking shall be permanently affixed and of a durable nature to withstand the environment within which it is installed.
- G. Equipment/System Identification Nameplates:
1. General: Install engraved plastic-laminated nameplates on each major unit of electrical equipment in the building; including central or master unit of each electrical system including communication/control/signal/alarm systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2-inch high lettering on 1-1/2-inch high sign (2 inches high where two lines are required), black lettering on white field. Provide text matching terminology and numbering of the contract documents and shop drawings. Nameplate shall include unit designation, normal source circuit number ("Fed from..."), circuit voltage, and other data specifically indicated. Nameplate shall indicate normal source circuit number ("Fed from..."), and emergency source circuit number ("Fed from..."), when the equipment is a transfer switch or fed directly from a transfer switch. Provide nameplates for each unit of the following categories of electrical work:
 - a. Switchboards, panelboards, electrical cabinets, and enclosures. (Include main bus ampacity on the nameplate.)
 - b. Lighting control equipment and contactors.
 - c. Remote controlled switches, dimmer modules, and control devices.
 - d. Telephone cabinets and switching equipment. (Circuit number and voltage not required on nameplate.)
 - e. Wireway used as auxiliary gutter tap locations with circuit number of circuit being tapped. Provide on outside of wireway.
 2. Install markers, tags, nameplates, and signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure the

identification with fasteners, except use adhesive where fasteners should not or cannot penetrate surface.

END OF SECTION 16075

SECTION 16091 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes:
 - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Sleeve-seal systems.
 - 3. Sleeve-seal fittings.
 - 4. Grout.

1.03 RELATED REQUIREMENTS

- A. DIVISION 07, Section "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.04 SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.01 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
 - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D1785, Schedule 40.
- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:

- a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
- b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.02 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.
 - 3. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 4. Pressure Plates: Stainless steel.
 - 5. Connecting Bolts and Nuts Stainless steel of length required to secure pressure plates to sealing elements.

2.03 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Presealed Systems.

2.04 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

PART 4 - SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS:

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in DIVISION 07, Section "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) or unless seismic criteria require different clearance.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

4.02 SLEEVE-SEAL-SYSTEM INSTALLATION:

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

4.03 SLEEVE-SEAL-FITTING INSTALLATION:

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 16091

SECTION 16120 – CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600V and less.
 - 2. Connectors, splices, and terminations rated 600V and less.

1.03 REFERENCE STANDARDS

- A. Applicable Standards (latest edition):
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM A53/A53M - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - 2. Code of Federal Regulations (CFR):
 - a. 29 CFR - Labor, Chapter XVII - Occupational Safety and Health Administration, Department of Labor, Part 1910 - "Occupational Safety and Health Standards," Subpart A - "General," Section 1910.7 - "Definition and Requirements for a Nationally Recognized Testing Laboratory."
 - 3. The Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. IEEE 141 - Recommended Practice for Electric Power Distribution for Industrial Plants (the Red Book).
 - b. IEEE 241 - Recommended Practice for Electric Power Systems in Commercial Buildings (the Gray Book).
 - 4. International Electrical Testing Association (NETA):
 - a. NETA Acceptance Testing Specification - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
 - 5. National Electrical Manufacturers Association (NEMA):
 - a. NEMA WC 26 - Binational Wire and Cable Packaging Standard (EEMAC 201).
 - b. NEMA WC 70 - Non-Shielded Power Cable 2,000V or less.
 - 6. National Fire Protection Association (NFPA):
 - a. NFPA 70 - National Electrical Code.
 - 7. Underwriters Laboratories Inc. (UL):
 - a. UL 4 - Armored Cable.
 - b. UL 44 - Thermoset-Insulated Wires and Cables.
 - c. UL 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.
 - d. UL 486B - Wire Connectors for Use with Aluminum Conductors.
 - e. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables.
 - f. UL 83 - Thermoplastic-Insulated Wires and Cables.

- g. UL 854 - Service-Entrance Cables.
- h. UL 1569 - Metal-Clad Cables.

1.04 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. American Insulated Wire Corp.; a Leviton Company.
 - 3. General Cable Corporation.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
 - 6. Pyrotenax.
- C. Conductors #6 AWG and smaller must be copper. Aluminum conductors of equivalent ampacity can be used instead of copper for #4 AWG and larger sizes. Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.

- E. Multiconductor Cable: Comply with NEMA WC 70 for armored cable, Type AC, metal-clad cable, Type MC, mineral-insulated, metal-sheathed cable, Type MI, and Type USE with ground wire.

2.02 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. General: Provide wire and cable suitable for the location where installed.
- B. Conductors: Minimum conductor size shall be #12 AWG.
- C. Feeders: Copper for feeders smaller than No. 6 AWG; copper or aluminum for feeders No. 4 AWG and larger. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- D. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway, Mineral-insulated, metal-sheathed cable, Type MI.
- B. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- C. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway, Mineral-insulated, metal-sheathed cable, Type MI.
- D. Feeders in Cable Tray: Type THHN-THWN, single conductors in raceway, Mineral-insulated, metal-sheathed cable, Type MI.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC, Mineral-insulated, metal-sheathed cable, Type MI, Nonmetallic-sheathed cable, Type NM.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway. Armored cable, Type AC and Metal-clad cable, Type MC may be allowed concealed in renovations where walls and ceilings are not disturbed. Mineral-insulated, metal-sheathed cable, Type MI.

- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- H. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- I. Branch Circuits in Cable Tray: Type THHN-THWN, single conductors in raceway, Armored cable, Type AC, Metal-clad cable, Type MC, Mineral-insulated, metal-sheathed cable, Type MI.
- J. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. General: Install electrical cables, wires, and connectors in compliance with NEC.
- B. Coordinate cable installation with other Work.
- C. Do not pull wire and cable until raceway system is complete. Pull conductors simultaneously where more than one is being installed in same raceway.
- D. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- E. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- F. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- G. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- H. Support cables according to SECTION 16073 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.
- I. Identify and color-code conductors and cables according to SECTION 16075 – ELECTRICAL IDENTIFICATION.
- J. Keep conductor splices to a minimum. All splices shall be made in junction boxes.
- K. Provide adequate length of conductors within electrical enclosures and neatly train the conductors to terminal points. Circuits with conductors larger than No. 10 AWG shall be bundled together inside of enclosures. Make terminations so there are no bare conductors visible at the terminal.
- L. Table 1:
 - 1. Insulation Color Coding for Phase Identification:
 - 2. Color code 600V insulated, service entrance, feeder, and branch circuit conductors with factory-applied colored insulation for No. 8 AWG and smaller (except: No. 6 AWG and smaller for green ground wire); 1-inch band of colored tape at all splices and terminations for No. 6 AWG and larger (except: No. 4 AWG and larger for green ground wire) as follows:

208Y/120V	Phase	480Y/277V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray

Green

Ground

Green

- M. Group circuits in conduit such that no conduit contains more than a total of three phase conductors, (one neutral conductor) (three neutral conductors), and one ground conductor (unless indicated or specified otherwise).
- N. Install wire and cable numbers on all field wiring that matches electrical schematics.

3.04 CONNECTIONS

- A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated.
 - 1. Lighting and receptacle circuit connectors for No. 10 AWG and smaller shall be twist-on spring solderless connectors. Provide silicone filled twist-on watertight/raintight connectors for all lighting circuits and receptacles circuits routed outdoors or indoors in wet locations.
 - 2. Nonlighting and nonreceptacle circuit connectors for No. 12 AWG and larger shall be solderless connectors.
 - 3. All uninsulated joints shall be taped to provide an insulation value equal to that of the wire.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- C. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- D. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.05 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in SECTION 16091 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING.

3.06 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.
- C. Tests and Inspections:
 - 1. Prior to energizing, test wires and cables for electrical continuity and for short circuits.
 - 2. Prior to energizing, check all installed feeders and building service wires and cables with insulation megohm meter to determine insulation resistance levels to assure requirements are fulfilled. Record and submit all field test data. Megger 300V cables with 500Vdc megohm meter between each conductor and ground. Megger 600V cables with 1,000Vdc megger between each conductor and ground. Also, megger between adjacent conductors. Megger cables after

installation (not on cable reel) with cables disconnected at both ends. The values must be approximately as follows:

Conductor Size AWG or MCM)	Resistance (Megohms-1,000 ft.)
14-8	200
6-2/0	100
3/0-500	50

3. Do not test wires or cables with an ac test set.
4. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
5. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Test Reports: Prepare a written report to record the following:
 1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 16120

SECTION 16130 – RACEWAYS AND BOXES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section specifies the following:
 - 1. Conduit.
 - 2. Wireway.
 - 3. Surface metal raceways.
 - 4. Outlet and device boxes.
 - 5. Weatherproof boxes.
 - 6. Junction boxes.
 - 7. Pull boxes.
 - 8. Fittings.
 - 9. Bushings and ground bushings.
 - 10. Locknuts.
 - 11. Knockout closures.
 - 12. Telephone terminal cabinets.
 - 13. Supports and accessories.
 - 14. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 15. Sleeve-seal systems.
 - 16. Sleeve-seal fittings.
 - 17. Grout.

1.03 RELATED REQUIREMENTS:

- A. Division 07 - Penetration Firestopping for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.
- B. Division 17 - Communications.
- C. Section 16060 – Grounding and Bonding
- D. Section 16073 - Hangers and Supports for Electrical Systems.
- E. Section 16075 - Electrical Identification.

1.04 REFERENCE STANDARDS

- A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- B. National Electrical Contractors Association (NECA):
 - 1. NECA NEIS 1 - Standard Practice of Good Workmanship in Electrical Construction.
- C. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA C80.1 - Electrical Rigid Steel Conduit (ERSC).

2. NEMA C80.3 - Steel Electrical Metallic Tubing (EMT).
3. NEMA C80.5 - Electrical Rigid Aluminum Conduit (ERAC).
4. NEMA RN1 - PolyVinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
5. NEMA TC-2 - Electrical Polyvinyl Chloride (PVC) Conduit.
6. NEMA TC-3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
7. NEMA TC-6 and 8 - Polyvinyl Chloride (PVC) Plastic Utilities for Underground Installation.
8. NEMA TC-9 - Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation.
9. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
10. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
11. NEMA 250 - Enclosures for Electrical Equipment (1,000V Maximum).
12. NEMA VE 1 - Metal Cable Tray Systems.
13. NEMA VE 2 - Metal Cable Tray Installation Guidelines.
- D. National Fire Protection Association (NFPA):
 1. NFPA-70 - National Electrical Code, (NEC). Comply with applicable requirements of NEC pertaining to construction and installation of raceway systems.
- E. Underwriters Laboratories (UL):
 1. Provide all devices and equipment which are UL listed and labeled.
 2. UL 1 - Standards for Flexible Metal Conduit.
 3. UL 5, 5A, 5B, 5C - Standard for Surface Metal Raceways and Fittings.
 4. UL 6 - Electrical Rigid Metal Conduit – Steel.
 5. UL 6A - Electrical Rigid Metal Conduit – Aluminum, Red Brass, and Stainless Steel.
 6. UL 50, 50E - Standard for Enclosures for Electrical Equipment.
 7. UL 360 - Standard for Liquid-Tight Flexible Metal Conduit.
 8. UL 467 - Grounding and Bonding Equipment.
 9. UL 514A - Metallic Outlet Boxes.
 10. UL 514B - Conduit, Tubing, and Cable Fittings.
 11. UL 514C - Standard for Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
 12. UL 651 - Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
 13. UL 651A - Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit.
 14. UL 797 - Electrical Metallic Tubing – Steel.
 15. UL 797A - Standard for Electrical Metallic Tubing – Aluminum and Stainless Steel.
 16. UL 870 - Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
 17. UL 1203 - Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.
 18. UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.

1.05 SUBMITTALS

- A. Refer to Division 01 and for administrative and procedural requirements for submittals.

- B. Submittals shall include, but not be limited to, the following:
1. Product Data:
 - a. Submit manufacturer's technical product data, including specifications and installation instructions, for each type of product required. Include data substantiating that materials comply with requirements.
 - b. Submit layout drawings of electrical floor, junction and pull boxes showing accurately scaled box layouts and their spatial relationship to associated equipment.
 2. Samples: For wireways and surface raceways and for each color and texture specified, 12 inches long.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer:
1. Subject to compliance with requirements, provide each type of raceway from one of the following:
 - a. Rigid Aluminum Conduit:
 - (1) Allied Tube & Conduit; Atkore International.
 - (2) Republic Conduit, Inc.
 - (3) Wheatland Tube Co.; JMC Steel Group.
 - b. Rigid Steel Conduit:
 - (1) Allied Tube & Conduit; Atkore International.
 - (2) Republic Conduit, Inc.
 - (3) Wheatland Tube Co.
 - c. Intermediate Steel Conduit:
 - (1) Allied Tube and Conduit; Atkore International.
 - (2) Republic Conduit, Inc.
 - (3) Wheatland Tube Co.; JMC Steel Group.
 - d. EMT:
 - (1) Allied Tube and Conduit; Atkore International.
 - (2) Republic Conduit, Inc.
 - (3) Wheatland Tube Co.; JMC Steel Group.
 - e. PVC Coated Rigid Steel Conduit:
 - (1) Externally Coated:
 - (a) Allied Tube and Conduit; Atkore International.
 - (b) Calbond; Calpipe Industries, Inc.
 - (c) Perma-Cote Coated Conduit; Robroy Industries.
 - (2) Externally and Internally Coated:
 - (a) Perma-Cote Coated Conduit; Robroy Industries.
 - (b) Calbond; Calpipe Industries, Inc.
 - f. Flexible Metal Conduit:
 - (1) AFC Cable Systems; Atkore International.
 - (2) Anaconda Sealtite; Division of ANAMET Electrical, Inc.
 - (3) Electri-Flex Co.
 - (4) Southwire Company.
 - g. Rigid Metal Conduit Fittings:

- (1) Appleton; EGS Electrical Group.
 - (2) Racor; Hubbell Company.
 - (3) Thomas & Betts Corp.
- h. Flexible Metal Conduit Fittings:
 - (1) Appleton; EGS Electrical Group.
 - (2) Electri-Flex Co.
 - (3) O-Z/Gedney; EGS Electrical Group.
- i. Liquid-tight Flexible Metal Conduit Fittings:
 - (1) Appleton; EGS Electrical Group.
 - (2) Electri-Flex Co.
 - (3) O-Z/Gedney; EGS Electrical Group.
- j. EMT Fittings:
 - (1) Appleton; EGS Electrical Group.
 - (2) Racor; Hubbell Company.
 - (3) Thomas & Betts Corp.
- k. Nonmetallic Rigid Conduit and Fittings:
 - (1) Carlon; Thomas & Betts Corp.
 - (2) Prime Conduit.
- l. Wireway:
 - (1) Hoffman; Pentair Equipment Protection.
 - (2) Schneider Electric.
- m. Surface Metal Raceway:
 - (1) Hubbell Wiring Systems.
 - (2) MonoSystems.
 - (3) Panduit.
 - (4) Wiremold; Legrand.
- n. Conduit Bodies:
 - (1) Appleton; EGS Electrical Group.
 - (2) Arrow-Hart Div; Cooper Industries.
 - (3) Killark; Hubbell Inc.
 - (4) O-Z/Gedney; EGS Electrical Group.
- o. Interior Boxes:
 - (1) Appleton; EGS Electrical Group.
 - (2) Bell; Hubbell, Inc.
 - (3) O-Z/Gedney; EGS Electrical Group.
 - (4) Pass and Seymour; Legrand.
 - (5) Racor; Hubbell, Inc.
 - (6) Steel City; Thomas & Betts Corp.
- p. Weatherproof Boxes:
 - (1) Appleton; EGS Electrical Group.
 - (2) Arrow Hart; Eaton.
 - (3) Hubbell, Inc.
 - (4) O-Z/Gedney; EGS Electrical Group.
 - (5) Pass and Seymour; Legrand.
- q. Junction and Pull Boxes:
 - (1) Appleton; EGS Electrical Group.
 - (2) Arrow Hart; Eaton.
 - (3) Bell Electric, Square D Company.
 - (4) Hoffman Engineering Company.
 - (5) O-Z/Gedney; EGS Electrical Group.

- r. Poke Throughs & Floor Boxes:
 - (1) Arrow Hart; Eaton.
 - (2) FSR, Inc.
 - (3) Hubbell, Inc.
 - (4) MonoSystems.
 - (5) Steel City; Thomas & Betts Corp.
 - (6) Wiremold; Legrand.
- s. Bushings, Grounding Bushings and Locknuts:
 - (1) Arrow Hart; Eaton.
 - (2) Appleton; EGS Electrical Group.
 - (3) O-Z/Gedney; EGS Electrical Group.
 - (4) Raco; Hubbell, Inc.
 - (5) Steel City; Thomas & Betts Corp.
- t. Electrical Enclosures:
 - (1) Hoffman; Pentair Equipment Protection.
 - (2) Wiegmann; Hubbell, Inc.
- u. Telephone Terminal Cabinets:
 - (1) Hoffman; Pentair Equipment Protection.
 - (2) Schneider Electric.
- v. Sleeve-Seal Systems:
 - (1) Advance Products & Systems, Inc.
 - (2) CALPICO, Inc.
 - (3) Metraflex Company (The).
 - (4) Pipeline Seal and Insulator, Inc.
 - (5) Proco Products, Inc.
- w. Sleeve-Seal Fittings:
 - (1) Link-Seal.
 - (2) Presealed Systems.

2.02 METAL CONDUIT AND TUBING:

- A. General: Provide metal conduit, tubing, and fittings of types, grades, sizes, and weights (wall thicknesses) for each service indicated. Where types and grades are not specified or indicated, provide proper selection to fulfill specified requirements, and comply with applicable portions of NEC for raceways. Minimum size shall be 3/4 inch, unless indicated or specified otherwise.
- B. Rigid Aluminum Conduit: Rigid aluminum 6063 Alloy, T41 temper, conforming to UL-6A.
 - 1. Factory-applied, closed-end thread protectors.
- C. Rigid Steel Conduit: Rigid steel, zinc coated, threaded type conforming to UL 6A.
 - 1. Zinc coating fused to inside and outside walls.
- D. Intermediate Steel Conduit: Rigid intermediate grade (IMC) hot-dip galvanized conforming to UL 1242.
- E. Electrical Metallic Tubing (EMT): UL 797.
- F. PVC Externally (and Internally) Coated Rigid Steel Conduit: Rigid steel zinc coated with additional external 40 mil coating of PVC (and 2 mil urethane internal coating) conforming to NEMA RN1. Coating shall be bonded to conduit. (Extruded coating shall not be accepted.)

- G. Flexible Metal Conduit: UL 1. Formed from continuous length of spirally-wound, interlocked zinc-coated strip steel. Minimum size shall be 1/2 inch unless indicated or specified otherwise. Approved as a grounding path for circuits rated 20 amperes or less and in lengths of 6 feet and less.
- H. Liquid-Tight, Flexible Metal Conduit: Liquid-tight flexible metal conduit; construct of single strip, flexible, continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coat with (oil-resistant,) liquid-tight thermoplastic jacket. Approved as a grounding path in conduit sizes 1-1/4 inch and smaller and in lengths 6 feet or less when protected as follows:
 - 1. 3/8 inch and 1/2 inch protected at 20 amperes or less.
 - 2. 3/4 inch, 1 inch and 1-1/4 inch protected at 60 amperes or less.
- I. Rigid Metal Conduit Fittings: Threaded cast-malleable iron, galvanized or cadmium plated, conforming to UL 514B.
 - 1. Provide steel fittings for steel conduit.
 - 2. Provide aluminum fittings for aluminum conduit.
- J. Flexible Metal Conduit Fittings: Threadless hinged clamp type. Provide conduit fittings for use with flexible steel conduit. Fittings shall be approved for grounding per NFPA 70 Article 348.60.
 - 1. Straight Terminal Connectors: One-piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provide with locknut.
 - 2. 45 degree or 90 degree Terminal Angle Connectors: Two piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
- K. Liquid-Tight Flexible Metal Conduit Fittings: Provide cadmium plated, malleable-iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated or noninsulated throat. Fittings shall be approved for grounding in conduit sizes 1-1/4 inch and smaller per NFPA 70 Article 350.60.
- L. EMT Fittings: Steel compression type.
- M. Conduit Bodies: Galvanized cast-metal conduit bodies of types, shapes, and sizes as required to fulfill job requirements and NFPA-70 requirements. Construct conduit bodies with threaded conduit entrance ends, removable covers, either cast or of galvanized steel, and corrosion-resistant screws.
- N. Conduit and Tubing Accessories: Provide conduit and tubing accessories of types, sizes, and materials, complying with manufacturer's published product information which mate and match conduit and tubing.
- O. Conduit Bushings: Provide insulated throat for all bushings. Grounding bushings shall have an integral copper set-screw type cable grounding lug.

2.03 NONMETALLIC CONDUIT AND FITTINGS:

- A. General: Provide nonmetallic conduit, ducts, and fittings of types, sizes, and weights for each service indicated. Where types and grades are not indicated, provide proper selection determined by installer to fulfill wiring requirements which comply with provisions of NFPA 70 for raceways. Minimum size shall be 3/4 inch, unless indicated otherwise.
- B. Electrical Plastic Conduit:

1. Heavy-Wall Conduit: Schedule 40, 90°C, UL rated, constructed of polyvinyl chloride and conforming to NEMA TC-2, for direct burial or normal aboveground use, UL listed, and in conformity with NFPA 70 Article 352.
2. Extra-Heavy-Wall Conduit: Schedule 80, 90°C, UL rated, constructed of polyvinyl chloride compound C 200 PVC, and UL listed in accordance with NFPA 70 Article 352 for direct burial or aboveground use.
- C. PVC Conduit Fittings: NEMA TC-3, mate and match to conduit or tubing type and material.
- D. Underground PVC Plastic Utilities Duct: (NEMA TC-6 and -8, Type EB-20 for encased burial in concrete, Type DB-60 for direct burial, Type EB-35 for encased burial in concrete, Type DB-120 for direct buried.)
- E. PVC and ABS Plastic Utilities Duct Fittings: NEMA TC-9, mate and match to duct type and material.
- F. Conduit and Tubing Accessories: Provide conduit, tubing, and duct accessories of types, sizes, and materials, complying with manufacturer's published information which mate and match conduit and tubing.

2.04 WIREWAYS:

- A. General: Provide electrical wireways of types, grades, sizes, and number of channels for each type of service as indicated or required. Provide complete assembly of raceway including, but not limited to, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other components and accessories as required for complete system.
- B. Lay-in Wireways: NEMA (1) (3R) (12) Enclosure. Provide 2.5 by 2.5 inch, 4 by 4 inch, 6 by 6 inch, 8 by 8 inch and 12 by 12 inch sizes as indicated or required. Construct lay-in wireways with hinged covers, in accordance with UL 870 and with components UL listed, including lengths, connectors, and fittings. Wireways shall allow fastening hinged cover closed without use of parts other than standard lengths, fittings, and connectors. The 2 1/2-inch, 4-inch and 6 inch wireways shall be constructed with 16 gauge steel. The 8-inch and 12-inch wireways shall be constructed with 14-gauge steel. Wireway shall be painted with epoxy paint. Units shall be capable of sealing cover in closed position with screws. Provide NEMA 1 wireways in the 2 1/2 inch, 4 inch and 6 inch sizes with knockouts.
 1. Connectors: Provide wireway connectors suitable for lay in conductors, with connector covers permanently attached such that removal is not necessary to utilize the lay in feature.
 2. Finish: Protect sheet metal parts with rust inhibiting coating and baked enamel finish. Plate finish hardware to prevent corrosion. Protect screws installed toward inside of wireway with spring nuts to prevent wire insulation damage.
- C. Raintight Lay in Wireway: NEMA 3R Enclosure. Provide 4 by 4 inch, 6 by 6 inch, 8 by 8 inch, and 12 by 12 inch sizes as required or indicated. Construct raintight lay in wireways with hinged covers in accordance with UL 870 and with components UL listed, including lengths, connectors, and fittings. Design units to allow fastening hinged cover closed without use of parts other than standard lengths, fittings, and connectors. Construct units to be capable of sealing cover in closed position with screws.
 1. Construction: 16-gauge galvanized sheet metal parts for 4-inch by 4-inch to 6-inch by 6 inch sections, and 14-gauge parts for 8 inch by 8 inch and larger

sections. Do not use gasketing that can rip or tear during installation, or would compromise raintight capability of the trough. Do not use cover screws that will protrude into the trough area and damage wire insulation.

2. Finish: Provide 14-gauge and 16-gauge galvanized sheet metal parts with corrosion-resistant primer and baked epoxy enamel finish. Plate hardware to prevent corrosion.

2.05 SURFACE METAL RACEWAYS:

- A. Surface Metal Raceways shall comply with UL 5 and UL 5C and be UL labeled.
 1. Type 1 Raceway: Multi-outlet assembly for prewired outlets, lengths as indicated. Provide 3-wire, single circuit with outlets on 12-inch centers. Provide green insulated ground as third wire.
 2. Type 2 Raceway: Multi-outlet assembly for prewired outlets, lengths as indicated. Provide 4 wire, double circuit with outlets on 12-inch centers. Provide green insulated ground as fourth wire.
 3. Type 3 Raceway: Two-piece type with single compartment, lengths as indicated. Provide nominal 2-3/4 inch by 1-7/16 inch with flush, snap-on cover. Install devices as indicated in raceway.
 4. Type 4 Raceway: Two-piece type, divided for power and communication use, lengths as indicated. Provide nominal 4-3/4 inch by 1-3/4 inch with two 2-3/8-inch compartments.
 5. Type 5 Raceway: Surface mounted type for power use, lengths as indicated. Provide nominal 3/4 inch wide, depth as required, single piece type.
 6. Type 6 Raceway: Two-piece type with single compartment, length as indicated. Provide nominal 4-3/4 inch by 3-9/16 inch with flush, snap-on cover. Install devices as indicated in raceway.
 7. Boxes for Surface Raceways: Designed, manufactured, and supplied by raceway manufacturer for use with specified raceway.

2.06 FABRICATED MATERIALS:

- A. Outlet Boxes: Galvanized, coated, flat rolled, sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as required, indicated, and specified, suitable for installation at respective locations. Construct outlet boxes with mounting holes and with conduit knockout openings in bottom and sides. Provide boxes with threaded screw holes for grounding screws, fastening devices, box covers, and for equipment grounding. Minimum box size shall be 4-inch by 4-inch by 1.5 inches, provide larger box if required, specified or indicated otherwise.
- B. Device Boxes: Galvanized, coated, flat rolled, sheet-steel gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as required, indicated, and specified, suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, with conduit knockout openings in bottom and sides, and with threaded screw holes for fastening devices and box covers. Provide corrosion-resistant screws for equipment grounding. Minimum box size shall be 4-inch by 4-inch by 1.5 inches, provide larger box if required, specified or indicated otherwise.
 1. Device Box Accessories: Provide as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners (use only in existing walls) which are compatible with device boxes being utilized to fulfill installation requirements for

individual wiring situations. Choice of accessories is Contractor's code-compliance option.

- C. Weatherproof Boxes: Corrosion-resistant, cast-metal, weatherproof, outlet wiring boxes, of types, shapes, and sizes, including depth of boxes as required with threaded conduit hubs for fastening electrical conduit. Provide cast-metal face plates with spring-hinged, watertight caps suitably configured for each application, including face plate gaskets and corrosion-resistant fasteners.
- D. Junction and Pull Boxes: Galvanized, code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes, and sizes, to suit each respective location and installation; with welded seams and equipped with manufacturer's standard corrosion resistant steel nuts, bolts, screws and washers.
- E. Bushings: Provide threaded, nylon insulated metallic bushings. Provide steel bushings for conduit sizes 1.5 inches and smaller. Provide malleable iron bushings for conduit sizes 2 inches and larger.
- F. Grounding Bushings: Provided where indicated, specified and required by NEC. Provide threaded, insulated, malleable iron bushing with lay-in screw clamp lug.
- G. Locknuts: Provide steel locknuts for conduit sizes 2 inches and smaller. Provide malleable iron for conduit sizes 2.5 inches and larger.
- H. Sealing Hub: Provide watertight, threaded, insulated sealing hub connectors for all outdoor and indoor wet locations where conduit enters into enclosures. Sealing hub threaded lengths shall be adequate to allow installation of bushing.
- I. Knockout Closures: Provide steel press-in knockout seals for all unused punched out knockouts 2 inches and smaller. Provide steel two-piece bolt on knockout seals for all unused punched out knockouts 2.5 inches and larger.
- J. Fittings: Provide all threaded nipples, insulated short elbows, offset nipples, offset connectors, enlargers and reducers as required. Provide EMT compression type connectors with insulated throat. Provide EMT compression type insulated short elbows as required. Provide EMT set-screw type offset connectors as required.
- K. Telephone Terminal Cabinets: Provide telephone terminal cabinets of sizes indicated, constructed of code gauge steel painted gray, concealed hinge door, keyed flush lock (all locks shall be keyed identically, provide one key per lock) and with 3/4-inch plywood backing. Plywood backing shall be finished with black paint.
- L. Hinged-Cover Enclosures:
 - 1. Comply with UL 50 and NEMA 250, TYPE 1 with continuous-hinge cover with flush latch unless otherwise indicated.
 - a. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - b. Nonmetallic Enclosures: Plastic
 - c. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- M. Cabinets:
 - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.07 SLEEVES:

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
 - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D1785, Schedule 40.
- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.08 SLEEVE-SEAL SYSTEMS:

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Stainless steel.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.09 SLEEVE-SEAL FITTINGS:

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.10 GROUT:

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.01 INSTALLATION OF RACEWAYS

- A. General:
 - 1. Install raceways as indicated in accordance with manufacturer's written installation instructions and in compliance with NEC. Install raceways plumb and level, and maintain NEC recommended clearances. Provide raceway supports in accordance with the NEC and Section 16073 - Hangers and Supports for Electrical Systems.
- B. Coordinate with other work including wires/cables, boxes, and panel work as necessary to interface installation of electrical raceways and components with other work.
- C. Provide seismic bracing such that the raceways will not collapse during a Seismic event.

3.02 INSTALLATION OF CONDUITS

- A. General: Install concealed conduits in new construction work - in walls, in slabs, or above suspended ceilings. Run conduits concealed in existing work where practicable. Where conduits cannot be concealed in finished areas, use surface metal raceways only where indicated. Provide holes for conduit in all boxes, panels and enclosures as required.
 - 1. All conduit installed above grade (including exposed and concealed above removable suspended ceilings) that contains emergency power and emergency lighting conductors shall be identified in accordance with Section 16075 – Electrical Identification.
 - 2. Mechanically fasten together metal conduits, enclosures, and raceways to form continuous electrical conductor. Connect to electrical boxes, fittings, and cabinets to provide electrical continuity and firm mechanical assembly.
 - 3. Avoid use of dissimilar metals throughout system to eliminate possibility of galvanic corrosion. Where dissimilar metals are in contact, coat surfaces with corrosion inhibiting compound before assembling.
 - 4. Install miscellaneous fittings such as reducers, close nipples, 3 piece unions, split couplings, and plugs that have been specifically designed and manufactured for their particular application. Install telescoping type linear expansion fittings in raceways every 200 foot linear run and wherever structural expansion joints are crossed.
 - 5. Use roughing-in dimensions of electrically powered units furnished by unit manufacturer. Set conduit and boxes for connection to units only after receiving dimensions and after checking location with other trades.
 - 6. Test conduits (witnessed by the Owner's representative) required to be installed but left empty with ball mandrel. Clear any conduit which rejects ball mandrel. Pay costs involved for restoration of conduit and surrounding surfaces to original condition. Provide 200-pound tensile strength nylon conduit fish line throughout the entire length of all empty conduits. Leave 12 inches of slack at each end.
 - 7. Do not install conduit in front of covers of new and existing electrical equipment, pull boxes, and junction boxes.
 - 8. Provide all openings in floors, walls, ceilings and roofs for passage of conduit. Fire ratings of walls, floors, ceiling and roofs shall be maintained when passing

through them by providing fire seals in accordance with Section 16073 - Hangers and Supports for Electrical Systems.

9. Where different conduits contain circuits of different noise levels the horizontal and vertical spacing in inches between the outside surfaces of the conduits (or conduit to cable tray) shall not be less than indicated below (unless specified otherwise, indicated otherwise, or required otherwise by the equipment manufacturer):
 - a. Noise Level 1 Circuits: Analog circuits less than 50V, digital circuits less than 12V or telephone circuits.
 - b. Noise Level 2 Circuits: Analog circuits greater than 50V or digital circuits greater than 12V.
 - c. Noise Level 3 Circuits: 120Vac or dc circuits operating at less than 20 amperes.
 - d. Noise Level 4 Circuits: Ac or dc circuits less than 800V operating with currents less than 800 amperes.
 - e. Noise Level 5 Circuits: Circuits over 800Vac or dc and/or over 800 amperes.

MINIMUM HORIZONTAL AND VERTICAL SPACING BETWEEN DIFFERENT CONDUIT OUTSIDE SURFACES (OR CONDUIT TO CABLE TRAY) IN INCHES					
NOISE LEVEL	1	2	3	4	5
1	*	1	3	12	12
2	1	*	3	9	12
3	3	3	*	*	6
4	12	9	*	*	*
5	12	12	6	*	*
* = MINIMUM SEPARATION REQUIRED FOR INSTALLATION OF LOCKNUTS AS IF ADJACENT CONDUIT WERE TERMINATING IN AN ENCLOSURE.					

10. Provide a weatherproof duct seal compound between the conductors and the inner walls of all conduit that are routed to NEMA 3, 3R, 3S, 4 and 4X enclosures to prohibit moisture and/or humid air from entering the raceway and condensing.
 11. Repair damage to galvanized finishes with a zinc-rich paint recommended by the manufacturer.
 12. Repair damage to PVC finishes with matching touch-up coating recommended by the manufacturer.
 13. Where metallic conduit leaves cast-in-place concrete (to air, to earth or to compacted fill) coat the conduit 2 inches on either side of the line formed by the finished concrete surface with a bitumastic asphalt coating.
- B. Conduit Installation: Provide rigid steel zinc-coated conduit where embedded in cast-in-place concrete, in hazardous locations, routed below floor slabs, when containing circuits over 600Vac, routed through cast-in-place masonry, or installed outdoors. Follow minimum requirements in other areas as follows:
1. Use rigid steel zinc-coated conduit in mechanical equipment rooms, electrical equipment rooms, penthouses where exposed to physical damage, crawl spaces, tunnels, service splines, kitchens and cafeterias, and in warehouse

- spaces below 18 feet-0 inches height, and for 208V feeder circuits to switchboards, panelboards, switchgear and motor control centers.
2. Use steel zinc-coated EMT for interior 208V branch circuits, interior concealed 120V power, lighting, alarms, controls, and communications in offices, corridors, toilets, lunchroom areas, lab areas, ceiling plenum areas, and in warehouse spaces above 18 feet-0 inches height.
 3. Use flexible steel conduit only in movable partitions and from outlet boxes to interior recessed lighting fixtures (Maximum of 6 feet long and a minimum of 4 feet long in nonenvironmental air plenums. Maximum length in environmental air plenums shall be 4 feet long), and final 24 inches of connection to motors, transformers, and control items. Provide where subject to movement and vibration where connections are in dry, nonhazardous, interior locations. Provide in cells of precast concrete panels. Provide a "green" insulated equipment ground wire suitably sized per NEC 250.122 unless indicated otherwise in all flexible steel conduit. (Except equipment ground wire is not required on control circuits rated 20 amperes or less where flexible steel conduit 6 feet or less in length is used only for vibration elimination purposes and not for purposes of providing flexibility for movement.)
 4. Use liquid-tight flexible conduit in nonhazardous locations (length shall not exceed 6 feet, unless indicated otherwise) where subjected to movement and vibration where connections are subjected to one or more of the following conditions:
 - a. Exterior location.
 - b. Moist or humid atmosphere where condensation can be expected to accumulate.
 - c. Corrosive atmosphere.
 - d. Subjected to water spray or dripping oil, water or grease.
 - e. Connected to a motor driving a nonsubmerged pump.
 5. Provide a "green" insulated equipment ground wire suitably sized per NEC 250.122 unless indicated otherwise in all liquid-tight flexible conduit. (Except equipment ground wire is not required on control circuits rated 20 amperes or less where liquid-tight flexible conduit 6 feet or less in length and conduit is sized 1-1/4 inch or less is used only for vibration elimination purposes and not for purposes of providing flexibility for movement.)
 6. Cut conduits straight, properly ream, and cut threads for threaded conduit deep and clean.
 7. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.
 8. Size conduits as indicated, unless no size is indicated then size per NEC, except no conduit smaller than 3/4 inch shall be embedded in concrete or masonry.
 9. Fasten indoor, dry location threaded conduit terminations in sheet metal enclosures by 2 locknuts, and terminate with bushing. Install locknuts inside and outside enclosure.
 10. Conduits shall not cross pipe shafts, access openings or ductwork openings.
 11. Keep conduits a minimum distance of 6 inches from parallel runs of flues, hot water pipes or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.
 12. Support riser conduit at each floor level with clamp hangers.

13. Use of running threads at conduit joints and terminations is prohibited. Where required, use 3-piece union or split coupling.
 14. Complete installation of electrical raceways before starting installation of cables/wires within raceways.
 15. Use externally PVC coated (and internally urethane coated) rigid steel conduit where specified or indicated.
 16. Conduit installed above suspended ceilings shall comply with the following:
 - a. Install exposed conduits and extensions from concealed conduit systems neatly and parallel with or at right angles to walls of building or structure.
 - b. Install exposed conduit work so as not to interfere with ceiling inserts, windows, doors, lights, ventilation ducts or outlets.
 - c. Support exposed conduits by use of hangers, clamps, or clips. Support conduits on each side of bends and on spacing not to exceed NEC requirements.
- C. Concealed Conduits:
1. Metallic raceways in floors below grade or outside are to have conduit threads painted with corrosion inhibiting compound before couplings are assembled. Draw up coupling and conduit sufficiently tight to ensure watertightness.
 2. For floors-on-grade, install PVC externally coated rigid steel conduit under concrete slabs. Provide only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduit.
 3. Install underground conduits a minimum of 24 inches below finished grade.
- D. Conduits in Concrete Slabs:
1. Place conduits between bottom reinforcing steel and top reinforcing steel.
 2. Place conduits either parallel or at 90 degrees to main reinforcing steel.
 3. Separate conduits by not less than the outside diameter of the largest conduit to ensure proper concrete bond.
 4. Conduits crossing in slab must be reviewed for proper cover by the Owner's Representative.
 5. Embedded conduit outside diameter shall not exceed 1/3 of slab thickness.
- E. Install conduits so as not to damage or run through solid structural members. Avoid horizontal or cross runs in building partitions or side walls.
- F. Exposed Conduits:
1. Install exposed conduits and extensions from concealed conduit systems neatly and parallel with or at right angles to walls of building or structure.
 2. Install exposed conduit work so as not to interfere with ceiling inserts, windows, doors, lights, ventilation ducts or outlets.
 3. Support exposed conduits by use of hangers, clamps, or clips. Support conduits on each side of bends and on spacing not to exceed NEC requirements.
 4. Run conduit for outlets on waterproof walls exposed. Set anchors for supporting conduit on waterproof wall in waterproof cement.
 5. Above requirements for exposed conduits also apply to conduits installed in space above suspended ceilings and in crawl spaces.
- G. Nonmetallic Conduits:
1. Provide only where indicated. Do not install in hazardous locations.
 2. Make solvent cemented joints in accordance with recommendations of manufacturer.
 3. Install PVC conduits in accordance with NEC and in compliance with local utility practices.

4. All duct banks shall be a minimum of 3 feet below grade. Conduit in duct banks shall have a minimum of 3 inches of concrete cover in all directions. There shall be a minimum of 2 inches of concrete separation between all conduit.
 5. All conduit risers from buried conduit or duct banks shall be made with (internally urethane coated and) externally PVC coated galvanized rigid steel conduit elbows.
- H. Conduit Fittings:
1. Provide locknuts for securing conduit to metal enclosures with a sharp edge for digging into metal and ridged outside circumference for proper fastening. Standard locknuts are not acceptable.
 2. Provide threaded, nylon insulated bushings for terminating conduits which have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation.
 3. Provide threaded, grounding bushings of insulated type with copper set screw clamp type lay-in grounding terminal where required by NEC, where indicated or specified.
 4. Provide miscellaneous fittings such as reducers, close nipples, 3 piece unions, split couplings, and plugs as required which are specifically designed for their particular application.
 5. Provide grounding in accordance with Section 16060 – Grounding and Bonding.
 6. Provide raintight hubs on all outdoor conduit that are terminated in a nonthreaded enclosure hole.
 7. Provide identification of all raceways as specified in Section 16075 - Electrical Identification.
 8. EMT shall have galvanized compression type box connectors at all boxes.
 9. Provide raceway sealing fittings at suitable, approved, accessible locations and fill them with UL listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to adjacent wall plate or surfaces. Provide sealing fittings where:
 - a. Conduit enters or leaves hazardous locations.
 - b. Where conduit passes from warm locations to cold locations, such as boundaries of refrigerated spaces and air-conditioned spaces.

3.03 INSTALLATION OF SURFACE METAL RACEWAYS AND WIREWAYS

- A. General: Mechanically assemble metal enclosures and surface metal raceways for conductors to form continuous electrical conductor, and connect to electrical boxes, fittings, and cabinets to provide effective electrical continuity and rigid mechanical assembly.
1. Provide only where indicated. Avoid use of dissimilar metals throughout system to eliminate possibility of galvanic corrosion. Where dissimilar metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.
 2. Install expansion fittings in all raceways, surface metal raceways, and wireways wherever structural expansion joints are crossed.
 3. Make changes in direction of surface metal raceway and wireway with proper fittings supplied by raceway manufacturer. No field bends of surface metal raceway or wireway sections will be permitted.

4. Properly support and anchor surface metal raceways for their entire length with structural materials. Surface metal raceways are not to span any space unsupported.
5. Use boxes as supplied by surface metal raceway manufacturer wherever junction, pull or devices boxes are required. Standard electrical "handy" boxes, etc. shall not be permitted for use with surface metal raceway installations.
6. Provide identification of all raceways as specified in Section 16075 – Electrical Identification.
7. Provide tap location nameplates for wireways when used as auxiliary gutters as specified in Section 16075 – Electrical Identification.
8. Ground wireways at 10-foot intervals per Section 16060 – Grounding and bonding.

3.04 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS:

- A. General: Install electrical boxes, bushings, locknuts, nipples, connectors, sealing hubs, and fittings as required, indicated, in accordance with applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.
- C. Provide weatherproof boxes for interior and exterior locations exposed to weather or moisture.
- D. All boxes containing emergency power and lighting circuits shall be identified as specified in Section 16075 – Electrical Identification.
- E. Provide (oil-tight) knockout closures to cap unused knockout holes where blanks have been removed.
- F. Install electrical boxes in only those locations which ensure ready accessibility to enclosed electrical wiring.
- G. Maximum box size in a fire-rated wall shall be 4 inches by 4 inches square. Do not install boxes back-to-back in walls. In nonfire-rated and nonacoustic- rated walls, provide not less than 6 inches (150 mm) horizontal separation between boxes installed in opposite sides of wall. Provide not less than 24 inches (610 mm) horizontal separation between boxes installed in opposite sides of fire-rated and acoustic- rated walls.
- H. Do not install aluminum products in concrete.
- I. Position recessed outlet boxes accurately to allow for surface finish thickness.
- J. Set floor boxes level and flush with finish flooring material.
- K. Fasten electrical boxes firmly and rigidly to the surfaces to which attached, structural surfaces to which attached, or solidly embed them in concrete or masonry.
- L. Provide electrical connections for installed boxes.
- M. Subsequent to installation of boxes, protect boxes from construction debris and damage.

3.05 GROUNDING

- A. Properly ground electrical boxes and demonstrate compliance with NEC requirements. Bond all non-isolated equipment grounding conductors to all electrical boxes.

3.06 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.

- B. Comply with NECA VE-2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07, Section "Joint Sealants".
 - b. b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Aboveground, Exterior-Wall Penetrations: Seal penetrations using [steel] [cast-iron] pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- F. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.07 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION 16130

SECTION 16140 – WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section specifies the following:
 - 1. Receptacles.
 - 2. Wall Plates.
 - 3. Telephone/Power/Data Poles.

1.03 RELATED REQUIREMENTS

- A. Section 16060 – Grounding and Bonding for Electrical Systems: Grounding for Safety and Electrical Systems.
- B. Section 16130 - Raceways, Boxes, Sleeves, Seals, and Fittings for Electrical Systems: for back boxes and floor boxes.
- C. Section 16075 - Identification for Electrical Systems: Electrical identification requirements for identification to be engraved on wall plates.
- D. Section 16145 - Lighting Control Devices: Controls for dimmers other than those covered by this Section.

1.04 REFERENCE STANDARDS:

- A. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- B. National Electrical Manufacturers Association (NEMA):
 - 1. FB-11 - Plugs, Receptacles and Connectors of the Pin and Sleeve Type for Hazardous Locations.
 - 2. WD-1 - General Color Requirement for Wiring Devices.
 - 3. WD-6 - Dimensions for Wiring Devices.
- C. National Fire Protection Association (NFPA):
 - 1. - National Electrical Code (NEC).
 - 2. 99 - Healthcare Facilities.
- D. Underwriters Laboratories (UL):
 - 1. 20 - General Use Snap Switches.
 - 2. 94 - Standard for Safety of Flammability of Plastic Materials for Parts in Devices and Appliances Testing.
 - 3. 486A-486B - Wire Connectors.
 - 4. 498 - Electrical Attachment Plugs and Receptacles. Supplement SD - Hospital Grade Devices, SE - Weather-Resistant Devices.
 - 5. 514D - Cover Plates for Flush-Mounted Wiring Devices.
 - 6. 943 - Ground-Fault Circuit Interrupters.
 - 7. 1010 - Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.
 - 8. 1310 - Class 2 Power.
 - 9. 1449 - Standard for Surge Protection Devices.

- 10. 1917 - Standard for Solid-State Fan Speed Controls.
- 11. 60601-1 - Medical Electrical Equipment, PART 1: General Requirements for Safety.
- E. National Electrical Contractors Association (NECA):
 - 1. NECA 1 - Standard for Good Workmanship in Electrical Construction.
 - 2. NECA 130 - Standard for Installing and Maintaining Wiring Devices.
- F. Federal Specifications (FS):
 - 1. W-C-596 - Connector, Electrical, Power, General Purpose.
 - 2. W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted.
- 1.05 SUBMITTALS:
 - A. Refer to Division 01 for administrative and procedural requirements for submittals.
 - B. Includes, but not limited to, the following:
 - 1. Product data for each type of product specified.
- 1.06 QUALITY ASSURANCE:
 - A. Conform to the requirements of NFPA 70.
 - B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum 3 years documented experience.
- 1.07 DELIVERY, STORAGE, AND PROTECTION:
 - A. Store in a clean, dry space in original manufacturer's packing until ready for installation.
- 1.08 SEQUENCE AND SCHEDULING:
 - A. Schedule installation of wall plates after the surface upon which they are installed has received the final finish.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS:
 - A. Subject to compliance with requirements, provide wiring devices from the following:
 - 1. Cooper Industries.
 - 2. Pass & Seymour, a brand of Legrand North America.
 - 3. Hubbell Inc.
 - 4. Leviton.
 - B. Source Limitation: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.
- 2.02 WIRING DEVICES:
 - A. General: Provide wiring devices, in types, characteristics, heavy duty, specification grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD-1, WD-6, and other applicable UL standards. Provide wall plates as specified (except emergency power receptacle wall plates shall be red nylon, and surge suppression receptacle wall plates shall be blue nylon) except as otherwise indicated.
 - B. Receptacles: As scheduled in Specifications and on Drawings. Provide commercial grade receptacles, 20A, 125 VAC, 2-pole, 3-wire duplex conforming to NEMA WD 6 and NEMA 5-20R or as indicated on drawings.

2.03 WIRING DEVICE ACCESSORIES:

- A. Wall Plates: One-piece cover, single and combination, types shall match corresponding devices. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates. Provide wall plates with engraved legend where indicated. Conform to requirements of Section 16075 - Electrical Identification.

2.04 TELEPHONE/POWER/DATA POLES:

- A. Description:
 - 1. Factory-assembled and -wired single service power and telephone and data poles of types, sizes, and ratings indicated. Units to extend service from above ceiling to devices or outlets in pole.
 - 2. Poles: Nominal square cross section as provided by manufacturer, with height to extend from floor to 6 inches (150 mm) above ceiling, and with separate channels for power wiring and voice/data communications cabling.
 - 3. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling support; with pole foot [and carpet pad attachment].
 - 4. Finish: Manufacturer's standard painted finish and trim combination
 - 5. Wiring Devices: Provide duplex, 20A, commercial grade receptacles complying with requirements in this Section.
 - 6. Provide RJ-45 jacks complying with requirements in DIVISION 17 as indicated.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Perform Work in a neat and workmanlike manner in accordance with NECA 1 and NECA 130, including mounting heights listed in the standards, unless otherwise indicated.
- B. Coordinate with other trades:
 - 1. Protect installed devices and boxes from damage. Do not place wall finish materials over device boxes. Do not cut holes for boxes with routers that are guided by riding against outside of boxes. Replace damaged items prior to final acceptance.
 - 2. Keep outlet boxes free of debris, dirt, plastic, dry wall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. When installing wiring device in brick or block wall, install shelf that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices in accordance with manufacturer's instruction and after wire pulling and wall penetrations are complete.
 - 5. Install wall plate after painting work is complete.
- C. Install wiring devices and accessories as indicated in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to fulfill Project requirements.
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.

3. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
 4. Do not connect more than one conductor to wiring device terminals.
 5. Connect wiring devices by wrapping conductor clockwise 2/3 to 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-activated binding.
 6. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 7. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
 8. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
 9. When conductors larger than No. 12 AWG are installed on 15 or 20A circuits, splice No. 12 AWG pigtails for device connections.
 10. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plate in lieu of meeting this requirement.
- D. Coordinate with other work, including painting, electrical boxes, and wiring installations, as necessary to interface installation of wiring devices with other work.
- E. Coordinate locations of outlet boxes provided as required for installation of wiring devices provided under this Section.
1. Receptacles: 18 inches (450 mm) above finished floor; 6 inches (150 mm) above counter.
- F. Install telephone/power/data poles in accordance with final furnishings arrangement plan, plumb, true, and secure.
- G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A-486B. Use properly scaled torque-indicating hand tool.

3.02 IDENTIFICATION:

- A. Comply with Section 16075 - Electrical Identification.
- B. Identify each receptacle with panelboard identification and circuit number. Use hot stamped or engraved machine printing with Black-filled lettering on face of plate and durable wire markers or tags inside outlet boxes.
- C. Controlled receptacles shall be identified with controlled receptacle marking symbol complying with requirements in NFPA 70.

3.03 FIELD QUALITY CONTROL:

- A. Testing: Prior to energizing circuits, test wiring for electrical continuity and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements.
- B. Test each receptacle with a receptacle tester to ensure proper polarity. Insure that the phase rotation is identical on all multiphase receptacles of each rating type.
- C. Inspect each wiring device for damage and defects.

3.04 CLEANING:

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 16140

SECTION 16145 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Types of lighting control equipment specified in this Section include the following:
 - 1. Time controlled switches.

1.03 RELATED REQUIREMENTS

- A. DIVISION 16 Sections for wires/cables, electrical boxes, fittings, and wiring devices which are required in conjunction with lighting control equipment work.
- B. SECTION 16442 for lighting distribution panels with integral lighting control.
- C. SECTION 16140 - WIRING DEVICES.

1.04 REFERENCE STANDARDS

- A. Applicable Standards: Comply with applicable requirements of following standards.
 - 1. Electronic Industries Association (EIA):
 - a. RS-232 - Interface between data terminal and equipment data communication equipment employing serial binary data interchange.
 - b. RS-453 - Dimensional, Mechanical, and Electrical Characteristics Defining Phone Plugs and Jacks.
 - 2. National Electrical Manufacturers' Association (NEMA):
 - a. Pub. No. 250 - Enclosures for Electrical Equipment (1,000V Maximum).
 - 3. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code (NEC): Comply with applicable local electrical code requirements of the authority having jurisdiction and NEC as applicable to construction and installation of lighting control and communications equipment.
 - 4. Underwriters Laboratories (UL): Provide lighting control equipment and components which are UL-listed and labeled.
 - a. 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.

1.05 SUBMITTALS

- A. Refer to DIVISION 01 for administrative and procedural requirements for submittals.
- B. Includes, but not limited to, the following:
 - 1. Product Data: Submit manufacturer's data on lighting control equipment and components.
 - 2. For modular dimming controls; include elevation, dimensions, features, characteristics, ratings, and labels.

3. Device plates and plate color and material.
 4. Ballasts and lamp combinations compatible with dimmers.
 5. Wiring Diagrams: Power, signal, and control wiring.
 6. Shop Drawings: Submit dimensioned drawings of lighting control equipment and components including, but not necessarily limited to, programmable controllers, transceivers, printers, relays, sensors, contactors, and switches. Provide floor plans that clearly identify each controlled zone, including the address code of each zone.
 7. Wiring Diagrams: Submit wiring diagrams for lighting control equipment and components showing control wiring and interconnection wiring, including connections to equipment components and electrical power. Differentiate between portions of wiring that are manufacturer factory installed and portions that are field installed.
 8. Agreement to Maintain: Prior to time of final acceptance, the Contractor shall submit four copies of an agreement for continued service and maintenance of lighting control equipment for Owner's possible acceptance. Offer terms and conditions for furnishing parts and providing continued testing and servicing, including replacement of materials and equipment, for a one year period with an option for renewal of the Agreement by the Owner.
 9. Operation and Maintenance Manuals: Furnish maintenance manuals which contain equipment cuts, operating instructions, shop drawings, wiring diagrams, troubleshooting procedures, and spare parts list for equipment. Ensure that the manual includes operating instructions in addition to instructions for revising the system's software package.
- C. Samples for Initial Selection: For master and remote-control stations, and faceplates with factory-applied color finishes and technical features.
 - D. Samples for Verification: For master and remote-control stations, and faceplates with factory-applied color finishes and technical features.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver lighting control equipment and components in factory-fabricated type containers or wrappings that properly protect equipment from damage.
- B. Store lighting control equipment in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. Handle lighting control equipment carefully to prevent physical damage to equipment and components. Do not install damaged equipment; remove from site and replace damaged equipment with new.

1.07 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide lighting control equipment of one of the following (for each type of equipment):
1. Cestron.
 2. Cooper Industries, Inc.
 3. Cutler-Hammer.
 4. Eaton Corporation.
 5. General Electric Co.
 6. Hubbell Building Automation, Inc.
 7. Intermatic, Inc.
 8. Leviton Manufacturing Company, Inc.
 9. Lighting Control and Design; Acuity Lighting Group, Inc.
 10. Lightolier Controls.
 11. Lithonia Lighting; Acuity Lighting Group, Inc.
 12. Lutron Electronics, Inc.
 13. RAB Lighting.
 14. Sensor Switch, Inc. Square D Co.; a brand of Schneider Electric.
 15. NSi Industries LLC; TORK Products.
 16. Watt Stopper.

2.02 TIME SWITCHES:

- A. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Contact Configuration: DPST
 3. Contact Rating: 20-A ballast load, 120/240Vac.
 4. Programs: Two on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
 5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
 6. Astronomic Time: Selected channels.
 7. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

2.03 CONDUCTORS AND CABLES:

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in SECTION 16120 – CONDUCTORS AND CABLES
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in SECTION 16120 - CONDUCTORS AND CABLES.
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in SECTION 16120 - CONDUCTORS AND CABLES.

2.04 GENERAL DIMMING DEVICE REQUIREMENTS:

- A. Compatibility: Dimming control components shall be compatible with other elements of lighting fixtures, ballasts, transformers, and lighting controls.
- B. Dimmers and Dimmer Modules: Comply with UL 508.
 - 1. Audible Noise and Radio-Frequency Interference Suppression: Solid-state dimmers shall operate smoothly over their operating ranges without audible lamp or dimmer noise or radio-frequency interference. Modules shall include integral or external filters to suppress audible noise and radio-frequency interference.
 - 2. Dimmer or Dimmer-Module Rating: Not less than 125% of connected load unless otherwise indicated.

PART 3 - EXECUTION

3.01 SENSOR INSTALLATION:

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- B. Install and aim sensors in locations to achieve not less than 90% coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.02 WIRING INSTALLATION:

- A. Wiring Method: Comply with SECTION 16120 - CONDUCTORS AND CABLES. Minimum conduit size is 1/2 inch (13 mm).
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.03 GROUNDING:

- A. Provide equipment ground connections for lighting control equipment. Tighten connectors to comply with tightening torques specified in UL 486A to assure permanent and effective grounding.

3.04 IDENTIFICATION:

- A. Provide equipment grounding connections for lighting control equipment. Tighten connectors to comply with tightening torques specified in UL 486A to assure permanent and effective grounding.
- B. Identify components and power and control wiring according to SECTION 16075 – ELECTRICAL IDENTIFICATION.
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- C. Label time switches and contactors with a unique designation.
- D. Label each dimmer module with a unique designation.
- E. Label each scene control button with approved scene description.

3.05 FIELD QUALITY CONTROL:

- A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. Continuity tests of circuits.
 - 2. Operational Test: Set and operate controls to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
 - a. Include testing of modular dimming control equipment under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.
 - 3. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Lighting control devices will be considered defective if they do not pass tests and inspections.
- D. Remove and replace malfunctioning modular dimming control components and retest as specified above.
- E. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.
- F. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.

3.06 ADJUSTING:

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.07 DEMONSTRATION:

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems
- B. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

3.08 PERSONNEL TRAINING:

- A. Building Operational Personnel on-site Training: Train Owner's building operating personnel on-site in procedures for starting-up, testing, operating, trouble shooting, servicing and preventive maintenance of the lighting control system equipment for a minimum period of eight hours.

END OF SECTION 16145

SECTION 16289 – SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section specifies Surge Protection Devices (SPD) of 1,000V or less of the following UL 1449 3rd Edition Types/Locations:
 - 1. Type 2: Located on load side of service disconnect.
- B. The specified units shall be of the multi-stage parallel design and shall provide high energy transient voltage suppression, surge current diversion, high frequency attenuation, and line control for all electrical modes of equipment connected downstream from the units.
- C. The devices shall be designed and manufactured by a qualified manufacturer of SPDs. The qualified manufacturer shall have been engaged in the commercial design and manufacture of such products for a minimum of three years.

1.03 RELATED REQUIREMENTS:

- A. SECTION 16140 - WIRING DEVICES for wiring devices.

1.04 REFERENCE STANDARDS:

- A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. C62.11, "Metal-Oxide Surge Arresters for AC Power Circuits (>1 kV)".
 - 2. C62.41, "IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits".
 - 3. C62.45, "IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage (1,000V and Less) AC Power Circuits".
 - 4. IEEE 1100 Emerald Book, "Recommended Practice for Powering and Grounding Electronic Equipment".
- B. Canadian Standards Association (CSA).
- C. National Electrical Manufacturers Association (NEMA)
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70, "National Electric Code (NEC)".
 - 2. NFPA 75, "Standard for the Protection of Electronic Computer/Data Processing Equipment".
 - 3. NFPA 780, "Standard for the Installation of Lightning Protection Systems".
- E. Underwriters Laboratories (UL):
 - 1. UL 1283, "UL Standard for Safety Electromagnetic Interference Filters".
 - 2. UL 1449, "UL Standard for Safety Surge Protective Devices", 3rd Edition.
- F. Military Standard (MIL-STD):
 - 1. MIL-STD-220C, "Method of Insertion Loss Measurement".
- G. The devices shall be UL 1449 (3rd Edition) Listed, CSA Approved and UL 1283 (5th Edition) Listed as Electromagnetic Interference Filters.

- 1.05 DEFINITIONS:
- A. MCOV: Maximum Continuous Operating Voltage
 - B. MOV: Metal Oxide Varistors
 - C. SAD: Silicon Avalanche Diodes
 - D. SCCR: Short Circuit Current Rating
 - E. SPD: Surge Protection Device
 - F. VPR: Voltage Protection Rating
- 1.06 SUBMITTALS:
- A. Refer to DIVISION 01 for administrative and procedural requirements for Submittals.
 - B. Includes, but is not limited to, the following:
 - 1. The manufacturer shall provide Equipment catalog data, technical information, specifications, installation manuals, start-up and operating instructions.
 - 2. Copies of documentation stating the surge protection device is UL 1283 and UL 1449 tested and listed.
 - 3. Copies of actual let through voltage data in the form of oscilloscope results for both IEEE C62.41 Category C3 (combination wave) and B3 (Ring wave) tested in accordance with IEEE C62.45.
 - 4. Copies of Noise Rejection testing. Noise rejection is to be measured between 50 kHz and 100 MHz verifying the devices noise attenuation. Must show multiple attenuation levels over a range of frequencies.
 - 5. Copies of UL test reports, which verify the suppressor components can survive published surge current rating on a per mode basis using the IEEE C62.41 impulse waveform C3 (8 by 20 microsecond, 20 kV/10 kA). Test data on an individual module is not acceptable.
 - 6. Copy of warranty statement clearly establishing the terms and conditions to the building/facility owner/operator.
- 1.07 WARRANTY:
- A. The manufacturer shall provide a ten-year limited warranty on defective material and workmanship from the date of shipment when installed in compliance with applicable national/local electrical codes, and the manufacturer's installation, operation, and maintenance instructions.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS:
- A. Subject to compliance with requirements, provide SPD units manufactured by one of the following:
 - 1. Eaton/Innovative Technology.
 - 2. Thomas & Betts/Current Technology.
 - 3. Smiths Power/LEA International.
 - 4. Advanced Protection Technologies (APT).
- 2.02 GENERAL:
- A. SPD units shall be compatible with the electrical system, voltage, current, and distribution configuration indicated. Service entrance rated units shall contain an integral fused disconnect switch. Indoor unit enclosures shall be NEMA Type 1. The

unit shall include an engineered suppression system, using arrays of individually fused nonlinear voltage dependent metal oxide varistors (MOVs) with matched operating characteristics.

1. The suppression system shall not use gas tubes, spark gaps, or silicon avalanche diodes (SADs).
 2. The modules shall be constructed in a manner that ensures surge current sharing.
 3. All internal connections associated with the suppression filter system and subject to surge currents shall use low-impedance copper bus bar and appropriately sized copper wire.
 4. Internal connections associated with the suppression filter system and subject to surge currents shall be made with solderless compression type lugs and shall be bolted to the bus bars in order to reduce overall system impedance.
 5. No plug-in component modules, quick-disconnect terminal, nonfield replaceable fusing, or printed circuit boards shall be used in surge current carrying paths.
- B. Unit Status Indicators:
1. The unit shall include externally visible LED visual status indicators that monitor the on-line status of each phase of the unit.

2.03 SPD PERFORMANCE AND TESTING:

- A. Declared Maximum Continuous Operating Voltage (MCOV) shall be greater than 115% of the nominal system operating voltage and in compliance with test and evaluation procedures outlined in the nominal discharge surge current test of UL 1449 3rd Edition, Section 37.7.3. MCOV values claimed based on the component's value or on the 30-minute 115% operational voltage test, Section 38 in UL 1449 will not be accepted.
- B. Protection Modes: In accordance with NEMA standard LS 1, the unit shall provide protection in all modes. Wye configured systems shall provide Line-to-Neutral, Line-to-Ground, Line-to-Line, and Neutral-to-Ground protection. Delta configured systems shall provide Line-to-Line protection in ungrounded systems, and Line-to-Line and Line-to-Ground protection in grounded systems.
- C. Peak Surge Current Rating: Based on IEEE C62.41, the tested peak surge current rating shall be no less than as follows:
 1. Branch Panelboards: 50kA per mode, 100 kA per phase.
- D. Minimum Repetitive Surge Current Capacity: The Service Entrance SPD shall be capable of surviving 1,000 category C3 (10 kA) surge currents as described in IEEE C62.41.
- E. Unit shall have not more than 10% deterioration or degradation of the UL 1449 3rd Edition Voltage Protection Rating (VPR) due to repeated surges. All voltage protection requirements in the following table shall be met:

System Voltage	Mode	B3 Ringwave	B3/C1 Comb. Wave	C3 Comb. Wav	UL 1449 3rd Edition VPR
208Y/120	L-G	480	690	1300	800
	N-G	340	620	1240	800
	L-L	610	1010	1420	1200

- F. The UL 1449 Nominal Discharge Surge Current Rating shall be 20 kA.
- G. The short circuit current rating (SCCR) shall be 200 kAIC without requiring an upstream protection device for safe operation.
- H. High Frequency Extended Range Power Filter:
 - 1. The unit shall include a high frequency extended range power filter and shall be UL 1283 listed as an Electromagnetic Interference Filter.
 - 2. The filter shall reduce fast rise-time, high frequency, error-producing transients, and electrical line noise to harmless levels, thus eliminating disturbances which may lead to electronic system upset.
 - 3. The system shall be tested to MIL-STD 220C for electrical line noise attenuation per 50 ohm insertion loss measurement method of RF frequencies up to 100 MHz.
 - 4. Noise attenuation for electric noise shall be 33 dB at 100 kHz and no more than 32 dB at all other frequencies.
- I. Overcurrent Protection: All components, including suppression, filtering, and monitoring components, shall be individually fused and rated to allow maximum specified surge current capacity.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Install the SPD with insulated copper conductors sized per the manufacturer's recommendations.
- B. Conductors connecting the SPD to the system shall be connected directly to a feeder/branch circuit breaker to allow the unit to be isolated for removal and/or repair.
- C. The conductors shall be as short and straight as possible. Panelboard phase, neutral and ground buses and circuit breaker serving the SPD shall be arranged for a maximum external-mounted SPD lead length of six inches. SPDs shall be mounted integral in service-entrance switchboards and lead length shall not exceed six inches. If lead length must exceed six inches, notify the Engineer.
- D. The conductors shall be twisted together to reduce the SPD system input impedance.
- E. The SPD shall be installed following the SPD manufacturer's recommended practices and in compliance with all applicable codes.
- F. The UL 1449 Voltage Protection Rating (VPR) shall be permanently affixed to the SPD unit.
- G. The SPD manufacturer's technician shall perform a system checkout and start-up in the field to assure proper installation, operation and to initiate the warranty of the system. The technician shall do the following:
 - 1. Verify voltage clamping levels.
 - 2. Verify N-G connection.
 - 3. Record information to product signature card for each product installed.

END OF SECTION 16289

SECTION 16442 - PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section specifies panelboards, including cabinets and boxes, as indicated by drawings and schedules, and as specified herein.
- B. Types of panelboards and enclosures required for the project include the following:
 - 1. Lighting and appliance branch-circuit panelboards.

1.03 RELATED REQUIREMENTS:

- A. Wires/cables, electrical boxes, fittings, and raceways required in conjunction with the installation of panelboards and enclosures: Other DIVISION 16 Sections.
- B. SECTION 16060 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS for grounding.
- C. SECTION 16075 - IDENTIFICATION FOR ELECTRICAL SYSTEMS for electrical identification.

1.04 REFERENCE STANDARDS:

- A. National Electrical Manufacturers Association (NEMA):
 - 1. 250 - Enclosures for Electrical Equipment (1,000V Maximum).
 - 2. PB1 - Panelboards.
 - 3. PB1.1 - Instructions for Safe Installation, Operation, and Maintenance of Panelboards Rated 600V or Less.
 - 4. PB2.2 - Application Guide for Ground-Fault Protective Devices for Equipment.
- B. National Fire Protection Association (NFPA):
 - 1. 70 - National Electrical Code (NEC): Comply with applicable local code requirements of the authority having jurisdiction and NEC as applicable to installation and construction of electrical panelboards and enclosures.
- C. Underwriters Laboratories (UL): Provide panelboard units which are UL listed and labeled.
 - 1. 50 - Electrical Cabinets and Boxes.
 - 2. 67 - Electrical Panelboards.
 - 3. 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.
 - 4. 489 - Molded Case Circuit Breakers and Circuit Breaker Enclosures.
 - 5. 869A - Service Equipment.
 - 6. 1053 - Ground-Fault sensing and Relaying Equipment.
 - 7. 1283 - Electromagnetic Interference Filters.
 - 8. 1449 - Transient Voltage Surge Suppressors.
- D. Federal Specification (FS) Compliance: Comply with applicable requirements of the following standards.
 - 1. FS W-C-375 Series - Molded-Case Circuit-Breakers, Branch Service and Circuit.

1.05 SUBMITTALS:

- A. Refer to DIVISION 01 for administrative and procedural requirements for submittals.

- B. Includes, but not limited to, the following:
 - 1. Product Data: Submit manufacturer's data on panelboards and enclosures.
 - a. Panelboard dimensions and weight.
 - b. Complete data on circuit breakers and fuses. Submit time - current characteristic curves of all devices.
 - c. Panelboard short-circuit interrupting capacity, and information on buses: phase, neutral, and ground.
 - d. Information on whether panelboard is fed from top or bottom.
 - e. Data on maximum and minimum incoming and outgoing feeder and branch circuit wire size.
 - f. Data on door, locks, and mounting: surface or flush.
 - g. Data on total number of poles and number of unused poles that are available for future use.
- 1.06 MAINTENANCE MATERIAL SUBMITTALS:
 - A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Two spares for each type of panelboard cabinet lock.
 - 2. Circuit Breakers: Two spares for each panelboard.
 - 3. Fuses for Fused Switches: Equal to 10% of quantity installed for each size and type, but no fewer than three of each size and type.
 - 4. Fuses for Fused Power-Circuit Devices: Equal to 10% of quantity installed for each size and type, but no fewer than three of each size and type.
- 1.07 QUALITY ASSURANCE:
 - A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
 - B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
 - C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - D. Comply with NEMA PB 1.
 - E. Comply with NFPA 70.
- 1.08 DELIVERY, STORAGE, AND HANDLING:
 - A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
 - B. Handle and prepare panelboards for installation according to NEMA PB 1.
- 1.09 PROJECT CONDITIONS:
 - A. Environmental Limitations:
 - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

- a. Ambient Temperature: Not exceeding -23°F to +104°F.
 - b. Altitude: Not exceeding 6,600 feet.
 - B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
 - 1. Ambient temperatures within limits specified.
 - 2. Altitude not exceeding 6,600 feet.
 - C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of electric service.
 - 2. Do not proceed with interruption of electric service without Owner's written permission.
 - 3. Comply with NFPA 70E.
- 1.10 COORDINATION:
- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- 1.11 WARRANTY:
- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS:
- A. Subject to compliance with requirements, provide panelboard and mini-power center products of one of the following (for each type and rating of panelboard and enclosure):
 - 1. Cooper Crouse-Hinds.
 - 2. Eaton Cutler-Hammer.
 - 3. General Electric Company.
 - 4. Siemens-Energy and Automation, Inc.
 - 5. Square D, a brand of Schneider Electric.
- 2.02 GENERAL REQUIREMENTS FOR PANELBOARDS:
- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in SECTION 16074 - SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS.
 - B. Except as otherwise indicated, provide panelboards, enclosures, and ancillary components of types, size, and ratings indicated, which comply with manufacturer's standard materials and with the design and construction in accordance with published product information.
 - C. Where types, sizes, or ratings are not indicated, comply with NEC, UL, and established industry standards for those applications indicated.

- D. Equip with proper number of panelboard switching and protective devices as required for complete installation.
- E. Provide ground fault circuit interrupter type circuit breakers where indicated.
- F. Enclosures: Flush- and surface-mounted cabinets as indicated.
 - 1. Provide enclosures fabricated by same manufacturer as panelboards which mate and match properly with panelboards.
 - 2. Rated for environmental conditions at installed location. Provide NEMA type as described below, unless indicated or specified otherwise.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - 3. Materials: Galvanized sheet steel cabinet type enclosures, in sizes required. Provide code gage (minimum 16-gage) thickness steel.
 - 4. Front: Secured to box with adjustable, concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 5. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Front doors shall have flush locks with three keys per panelboard, all panelboard enclosures keyed alike.
 - 6. Finishes:
 - a. Color: Baked gray enamel finish over a rust inhibitor coating.
 - b. Panels and Trim: Galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - c. Back Boxes: Galvanized steel.
 - d. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
 - 7. Directory Card: Inside panelboard door, equip with interior circuit directory frame and removable card with clear plastic covering.
- G. Phase, Neutral, and Ground Buses:
 - 1. Bus shall be braced to withstand available short circuit currents as indicated.
 - 2. Provide suitable lugs on neutral bus for incoming and outgoing feeders requiring neutral connections.
 - 3. Equipment Ground Bus: Bare, uninsulated, adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
 - 4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box. Provide as indicated.
 - 5. Extra-Capacity Neutral Bus and Lugs: Neutral bus and lugs rated 200% of phase bus and UL listed as suitable for nonlinear loads. Provide as indicated.
 - 6. Material: Tin-plated aluminum.
 - 7. Ground Lugs and Bus-Configured Terminators: Compression type.
 - 8. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 9. Gutter-Tap Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 10. Extra-Capacity Neutral Lugs: Rated 200% of phase lugs mounted on extra-capacity neutral bus.
 - 11. Provide terminals UL rated for 75°C (Minimum) conductors.
- H. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected short-circuit rating by an NRTL.

- I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals as indicated.
- 2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT: PANELBOARDS:
- A. Panelboards: NEMA PB 1, dead front, safety type, 208Y/120V (voltage rating as required), 3 phase, 4 wire, 60 hertz with full-sized neutral bus, lighting and appliance branch-circuit type as indicated with switching and protective devices in quantities, ratings, types, and arrangements shown.
 - B. Incoming Mains Location: Top or Bottom as required.
 - C. Branch Overcurrent Protective Devices:
 - 1. Bolt-on, molded-case circuit breakers.
 - 2. Molded-case circuit breakers shall have toggle handles that indicate when tripped.
 - 3. Where multiple pole breakers are indicated, provide with common trip so overload on one pole will trip all poles simultaneously.
 - 4. Circuit breakers shall be replaceable without disturbing adjacent units.
 - D. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
 - 1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
 - 2. External Control-Power Source: 120V branch circuit
 - E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
 - F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.04 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489 and NEMA AB 3.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits as required.
 - 2. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Factory assembled, bolt-on, standard frame sizes, trip ratings, and number of poles.
 - b. Size breaker as required for the continuous current rating of the circuit. Provide breaker class as required.
 - c. Provide sufficient interruption capacity of the panel and lighting branch circuit breakers, to successfully interrupt the maximum short-circuit current imposed on the circuit at the breaker terminals.
 - d. Provide circuit breaker interrupting capacities with a minimum of 10,000 amperes that conform to NEMA AB 3.

2.05 PANELBOARD SUPPRESSORS:

- A. Surge Protection Device: IEEE C62.41-compliant, integrally mounted, solid-state, parallel-connected, non-modular type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the panelboard short-circuit rating, and with the following features and accessories:

PART 3 - EXECUTION

- 3.01 EXAMINATION:
- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
 - B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
 - C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
 - D. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 INSTALLATION OF PANELBOARDS:
- A. Install panelboards as indicated, providing NEC required working space, in accordance with manufacturer's written instructions, applicable requirements of NEC and in compliance with recognized industry practices to ensure that products fulfill requirements.
 - B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A.
 - C. Fasten enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically anchored.
 - D. Provide properly wired electrical connections for panelboards within enclosures.
 - E. Install numbers on all circuit breakers and type the panelboard's circuit directory card upon completion of installation work. Clearly identify the load on each circuit and the circuit number.
 - F. Insert fuses if any, of ratings indicated, within installed panelboards.
 - G. Provide circuit breaker handle locks on all circuits that supply night lights, exit signs, emergency lights, emergency power, public address system panels, energy management and control system (EMCS) panels, and fire alarm panels.
 - H. Provide filler plates in all unused spaces.
 - I. Provision for future circuits at all flush mounted panelboards (unless indicated otherwise): Extend four 1-inch empty conduit from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Extend four 1-inch conduit into raised floor space or below floor slab (not required for slabs on grade or basement floor slabs).
 - J. Provision for future circuits at all flush mounted panelboards (unless indicated otherwise): Extend four 1-inch empty conduit from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Extend four 1-inch conduit into raised floor space or below floor slab (not required for slabs on grade or basement floor slabs).
- 3.03 GROUNDING:
- A. Provide equipment grounding connections for panelboard enclosures as indicated and as required by NEC. Tighten connections to comply with tightening torques specified in UL 486A to assure permanent and effective grounds. Provide grounding as specified in SECTION 16060 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- 3.04 IDENTIFICATION:
- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with SECTION 16075 – ELECTRICAL IDENTIFICATION.

- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in SECTION 16075 – ELECTRICAL IDENTIFICATION.
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified SECTION 16075 – ELECTRICAL IDENTIFICATION.

3.05 FIELD QUALITY CONTROL:

- A. Provide test equipment, labor, and personnel as required to perform the tests as specified.
- B. Perform tests and inspections.
- C. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- D. Tests and Inspections:
 - 1. Conduct continuity tests using a dc device with buzzer
 - 2. Demonstrate each panelboard enclosure key operates the enclosure locks in the presence of the Contracting officer.
 - 3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 4. Prior to energization of electrical circuitry, check all accessible connections to manufacturer's tightening torque specifications.
 - 5. Prior to energization, check panelboard circuits for short circuits, electrical continuity of circuits, enclosure grounding and neutral grounding at service entrance and at incoming derived source transformer.
 - 6. Prior to energization of panelboards, check with insulation resistance tester: phase-to-phase and phase-to-ground insulation resistance levels of each phase bus to ensure requirements are fulfilled. Record and submit test results.
 - 7. Panelboards will be considered defective if they do not pass tests and inspections.
 - 8. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.06 ADJUSTING AND CLEANING:

- A. Set all adjustable trip settings to values provided by the [Engineer][Manufacturer].
- B. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.

3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 4. Tolerance: Difference exceeding 20% between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.
- D. Upon completion of installation, clean interior and exterior of panelboards. Remove paint splatters, spots, dirt and debris.
 - E. Touch-up scratched or marred surfaces to match original finishes.
 - F. Adjust transformer taps of mini-power centers.
- 3.07 PROTECTION:
- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.
- 3.08 DEMONSTRATION:
- A. Subsequent to wire and cable hook-ups, energize panelboards and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.
- 3.09 PROTECTION:
- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 16442

SECTION 16511 – INTERIOR LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section specifies interior lighting fixture work as indicated on drawings and schedules.
- B. Types of interior lighting fixtures in this Section include the following:
 - 1. Light Emitting Diode (LED)

1.03 REFERENCE STANDARDS:

- A. Applicable Standards: Comply with applicable requirements of the following standards.
 - 1. Energy Policy Act of 1992 (EPACT). Provide incandescent and fluorescent lamps that are in compliance with these efficiency standards.
 - 2. American National Standards Institute (ANSI)/Institute of Electrical and Electronic Engineers (IEEE):
 - a. IEEE C62.41-1991 - Recommended Practice for Surge Voltages in Low-Voltage A.C. Power Circuits.
 - b. ANSI C82.4 - 1985 Standard for Ballasts for High-Intensity Discharge Lamps.
 - 3. National Electrical Manufacturers Association (NEMA):
 - a. LE-2 - Lighting System Noise Criterion (LS-NC) Ratings.
 - 4. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code (NEC). Comply with applicable local code requirements of the authority having jurisdiction and the NEC.
 - 5. Underwriters Laboratories (UL): Provide interior lighting fixtures and components which are UL-listed and labeled.
 - a. 57 - Electric Lighting Fixtures.
 - b. 506 - Specialty Transformers.
 - c. 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.
 - d. 676 - Underwater Lighting Fixtures.
 - e. 844 - Electric Lighting Fixtures for Use in Hazardous Locations.
 - f. 1598 – Luminaires
 - g. 8750 – UL Standard for Safety Light Emitting Diode (LED) Equipment for use in Lighting Products

1.04 SUBMITTALS:

- A. Refer to Division 01 for administrative and procedural requirements for submittals.
- B. Includes, but not limited to, the following:
 - 1. Product Data: Submit manufacturer's product data and installation instructions on each type of interior building lighting fixture, lamp, and component.
 - 2. Shop Drawings: Submit fixture shop drawings in booklet form with a separate sheet for each fixture, assembled in "luminaire type" alphabetical or numerical

- order, with proposed fixture, lamp type, and accessories clearly indicated on each sheet. Submit details indicating compatibility with ceiling grid system.
3. Wiring Diagrams: Submit wiring diagrams for interior lighting fixtures showing connections. Differentiate between portions of wiring which are manufacturer factory-installed and portions which are field-installed.
 4. Maintenance Data: Submit maintenance data and parts list for each interior lighting fixture and accessory; include "trouble-shooting" maintenance guide. Include in this data, product data and shop drawings in a maintenance manual, in accordance with general requirements of Division 01.
- 1.05 DELIVERY, STORAGE AND HANDLING:
- A. Deliver interior lighting fixtures in factory-fabricated containers or wrappings that properly protect fixtures from damage.
 - B. Store interior lighting fixtures in original packaging. Store inside well-ventilated area, protected from weather, moisture, soiling, extreme temperatures, humidity. Lay flat and block off of floor.
 - C. Handle interior lighting fixtures carefully to prevent damaging, breaking, or scoring finishes. Do not install damaged units or components; replace with new.
- 1.06 SEQUENCING AND SCHEDULING:
- A. Sequence interior lighting installation with other work to minimize possibility of interference with pipes, ductwork, and conduit. Protect light fixtures from damage and soiling during remainder of construction.
- 1.07 MAINTENANCE:
- A. Extra stock:
 1. Furnish stock or replacement lamps amounting to 15%, but not less than four lamps in each case, of each type and size lamp used in each type of fixture on the project. Deliver replacement stock, as directed, to Owner's storage space and obtain receipt.

PART 2 - PRODUCTS

PRODUCTS

- 2.01 MANUFACTURERS:
- A. Subject to compliance with requirements, provide products of one of the following (for each type of interior lighting fixture):
 1. Fixtures:
 - a. Abolite Lighting, Inc.
 - b. American Lighting.
 - c. Benjamin Div.; Thomas Industries Inc.
 - d. CPM Lighting, Inc. (Columbia-Prescolite-Moldcast).
 - e. Day-Brite Lighting Div.; Emerson Electric Co.
 - f. Dual-Lite Mfg. Inc.
 - g. General Electric Co.
 - h. GTE Products Corp.
 - i. Guth Lighting Div.; General Signal Corp.
 - j. Halo Lighting Div.; McGraw-Edison Co.
 - k. Hazlux.

- l. Holophane Div.; Johns-Manville Sales Corp.
 - m. Hubbell Inc.
 - n. Infinity.
 - o. KIM Lighting Inc.
 - p. Kirlin Company.
 - q. Kurt Verson
 - r. Lightolier Inc.
 - s. Lithonia Lighting Div.; National Service Industries Inc.
 - t. Marco Lighting.
 - u. Omega Lighting Div.; Emerson Electric Co.
 - v. O.Z. Gedney.
 - w. Wide-Light Corp.
 - x. Williams.
2. Lamps:
- a. General Electric.
 - b. Osram Sylvania.
 - c. Venture.
 - d. Philips.

2.02 FIXTURES:

- A. General: Provide lighting fixtures of sizes, types, and ratings indicated, complete with, but not limited to, housings, high power factor ballasts, energy-efficient lamps, lamp holders, reflectors, energy efficient ballasts, starters, and wiring. Light fixture catalog numbers indicated in the light fixture schedule do not necessarily denote required mounting hardware, equipment or accessories. Provide mounting hardware, equipment and accessories as required. Ship fixtures factory-assembled, with those components required for a complete installation. Design fixtures with concealed hinges and catches, with metal parts grounded as common unit, and constructed to dampen ballast generated noise. All equipment and materials shall bear the UL label.

1. Provide luminaires complete with power supplies (drivers) and light sources. Provide design information including lumen output and design life in luminaire schedule on project plans for LED luminaires. LED luminaires must meet the minimum requirements:

Luminaire Type	Minimum Luminaire Efficacy (LE)	Minimum Color Rendering Index (CRI)
LED Troffer – 1x4 2x2 2x4	90 LPW	80
LED Linear Ambient	80 LPW	80

2. LED luminaires must also meet the following minimum requirements:
- a. Luminaires must have a minimum 10 year manufacturer's warranty
 - b. Luminaires must have a minimum L70 lumen maintenance value of 50,000 hours as calculated by IES TM-21, with data obtained per IES LM-80 requirements.
 - c. Luminaire drive current value must be identical to that provided by test data for luminaire in question.

- d. Luminaires must be tested to IES LM-79 and IES LM-80 standards, with the results provided as required in the Submittals paragraph of this Specification.
 - e. Luminaires must be listed with the Design Lights Consortium "Qualified Products List" when falling into category of "General Application" luminaires.
 - f. Provide Department of Energy "Lighting Facts" label for each luminaire.
- B. Interior Lighting Fixture Types:
- 1. General: Various fixture types required are listed on the fixture schedule on the drawings. Fixtures must comply with minimum requirements as stated herein. Review architectural drawings and specifications to verify ceiling types, modules, suspension systems appropriate to installation.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Examine the mounting surface for supporting lighting fixtures and the areas and conditions under which lighting fixtures are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF INTERIOR LIGHTING FIXTURES:

- A. (Light fixture locations indicated on electrical drawings are approximate. Architectural reflected ceiling plans and floor plans define exact locations of light fixtures.) Install interior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of IEEE C2, NFPA 70, NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices, to ensure that lighting fixtures fulfill requirements.
- B. Install luminaires and lighting controls to meet the requirements of ASHRAE 90.1 – IP and ASHRAE 189.1. To encourage consistency and uniformity, install luminaires of the same manufacturer and model number when residing in the same facility or building.
- C. Install flush mounted fixtures properly to eliminate light leakage between fixture frame and finished surface.
- D. Provide plaster frames for recessed fixtures installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
- E. Fasten fixtures securely to structural supports and ensure that pendant fixtures are plumb and level.
- F. All recessed light fixtures supported by suspended ceilings shall be securely attached (from a minimum of 4 points) to the structural steel above by four diagonally opposite, adequately sized safety chains.
- G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and the National Electrical Code.
- H. Support surface mounted fixtures greater than 2 feet in length at a point in addition to the outlet box fixture stud.

3.03 LIGHT SOURCES

- A. NEMA ANSLG C78.377, NEMA SSL 3. Provide type and wattage as indicated in luminaire schedule on project plans.
- B. Correlated Color Temperature (CCT) of no greater than 4100 degrees K.
- C. Minimum Color Rendering Index (CRI) R9 value of 80.
- D. High power, white light output utilizing phosphor conversion (PC) process.
- E. RoHS compliant.
- F. Provide light source color consistency by utilizing a binning tolerance within a 4 step McAdam ellipse.

3.04 FIELD QUALITY CONTROL:

- A. Refer to Division 01 for the replacement/restoration of lamps in interior lighting fixtures where used for temporary lighting prior to Date of Substantial Completion.

3.05 ADJUSTING AND CLEANING:

- A. Clean interior lighting fixtures of dust, dirt, and construction debris upon completion of installation. Clean fingerprints and smudges from lenses.
- B. Protect installed fixtures from damage during the remainder of the construction period.
- C. All light fixtures which can be aimed (flood lights, etc.) shall be aimed as indicated and shall be reaimed as directed by the Engineer during nighttime lighting demonstrations. Redemonstrate lighting at night after all adjustments have been made.

3.06 GROUNDING:

- A. Provide equipment grounding connections for interior lighting fixtures as indicated and specified. Tighten connections to comply with tightening torques specified in UL 486A to assure permanent and effective grounds.

3.07 DEMONSTRATION:

- A. Upon completion of the installation of interior lighting fixtures, and after building circuitry has been energized, apply electrical power to demonstrate capability and compliance with requirements. All interior lighting shall be demonstrated during nighttime lighting demonstrations. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

END OF SECTION 16511

SECTION 16521 – EXTERIOR LIGHTING FIXTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

- A. This Section specifies exterior lighting fixture work as indicated by drawings, schedules, and as specified herein.
- B. Types of exterior lighting fixtures in this Section include the following:
 - 1. Light-Emitting Diode (LED)
- C. Applications of exterior lighting fixtures required for this Project include the following:
 - 1. Outdoor security lighting.

1.03 REFERENCE STANDARDS:

- A. Applicable Standards: Comply with applicable requirements of the following standards.
 - 1. Illuminating Engineering Society (IES):
 - a. IES HB-10: (2011) IES Lighting Handbook
 - b. IES LM-80: (2008) Measuring Lumen Maintenance of LED Light Sources
 - c. IES RP-16: (2010; Addendum A 2008; Addenda B&C 2009) Nomenclature and Definitions for Illuminating Engineering
 - d. IES TM-15: (2011) Luminaire Classification System for Outdoor Luminaires
 - e. IES TM-21: (2011) Projecting Long Term Lumen Maintenance of LED Light Sources
 - 2. National Electrical Manufacturers' Association (NEMA): Comply with applicable requirements of NEMA Stds Pub/No. LE2 pertaining to lighting equipment.
 - 3. National Fire Protection Association (NFPA):
 - a. 70 - National Electrical Code (NEC). Comply with applicable local code requirements of the authority having jurisdiction and the NEC.
 - b. 780 - Lightning Protection Code. Comply with applicable requirements pertaining to installation of exterior lighting fixtures.
 - 4. Underwriters Laboratories (UL): Provide exterior lighting fixtures and components which are UL listed and labeled. Comply with applicable requirements of the following standards:
 - a. 1598 – Luminaires
 - b. 8750 – Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products

1.04 SUBMITTALS:

- A. Refer to Division 01 for administrative and procedural requirements for Submittals.
- B. Includes, but not limited to, the following:
 - 1. Product Data: Submit manufacturer's product data and installation instructions on each type of exterior building lighting fixture.

2. Shop Drawings: Submit fixture Shop Drawings in booklet form with a separate sheet for each fixture, assembled in "luminaire type" alphabetical or numerical order with proposed fixture, lamp type, voltage, complete illumination data (as specified below), and accessories clearly indicated on each sheet.
 3. Wiring Diagrams: Submit wiring diagrams for exterior lighting fixtures showing connections. Diagrams shall differentiate between portions of wiring which are manufacturer factory-installed and portions which are field installed.
 4. Illumination Data: Provide fixture lumen efficiency. Provide recommended maximum spacing-to-mounting height. Provide isofootcandle (isolux) plot diagram of footcandles on horizontal pavement surface which shows composite values of illuminance projected from the arrangement of light sources from indicated fixture locations and heights. Show on the graphic plots the locations, spacings, and heights of luminaires. Provide candlepower distribution curves (drawn to scale such that candlepower can be scaled at different angles) or provide candlepower data in tabular form at 10 degree increments. When the Contractor proposes a light fixture substitution other than the one the Engineer used for design, the Contractor shall also submit a computer printout of the area with horizontal and vertical maintained footcandles (and aiming criteria where applicable) indicated on a 10 foot x 10 foot grid for the exterior space being illuminated.
 5. Maintenance Data: Submit maintenance data and parts list for each exterior lighting fixture and accessory, including "troubleshooting" maintenance guide. Include in this data, product data and shop drawings in a maintenance manual in accordance with requirements of Division 01.
- 1.05 DELIVERY, STORAGE, AND HANDLING:
- A. Deliver exterior lighting fixtures in factory-fabricated containers or wrappings which properly protect fixtures from construction debris and physical damage.
 - B. Store exterior fixtures in original wrappings in a clean dry space. Protect from weather, dirt, fumes, water, construction debris, and damage.
 - C. Handle exterior lighting fixtures carefully to prevent damage, breaking, and scoring. Do not install damaged fixtures or components; remove units from Site and replace with new.
- 1.06 SEQUENCING AND SCHEDULING:
- A. Sequence exterior lighting installation with other work to reduce possibility of damage and soiling of fixtures during the remainder of construction period.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS:
- A. Subject to compliance with requirements, provide products of one of the following (for each type of exterior lighting fixture):
 1. Exterior Lighting Fixtures:
 - a. Abolite Lighting, Inc.
 - b. Appleton Electric Co.

- c. Crouse-Hinds Lighting Products Div; Cooper Industries Inc.
- d. Devine Lighting Div; Kidde & Co., Inc.
- e. Dual-Lite Mfg. Inc.
- f. General Electric Co.
- g. GTE Sylvania, Inc.
- h. Guth Lighting Div; General Signal Corp.
- i. Holophane Div; Johns-Manville Corp.
- j. Hubbell, Inc.
- k. KIM Lighting, Inc.
- l. Lithonia Lighting Div; National Services Industries, Inc.
- m. Sylvania.
- n. Trimblehouse.
- o. Wide-Light Corp.

2.02 EXTERIOR LIGHTING FIXTURES:

- A. General: Provide lighting fixtures of sizes, types, and ratings indicated; complete with, but not limited to, housings, high power factor ballasts, energy efficient ballasts, lamps, starters, and wiring. All equipment and materials shall bear the UL label.
- B. LED Luminaires
 - 1. LED luminaire housings shall be die cast or extruded aluminum. Housings for luminaires other than LED shall be die cast, extruded, or fabricated aluminum. Fabricated aluminum housings shall have all seams and corners internally welded to resist weathering, moisture and dust.
 - 2. LED luminaires shall be rated for operation within an ambient temperature range of minus 22 degrees F to 104 degrees F.
 - 3. 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.
 - 4. LED luminaires shall produce a minimum efficacy of 60 lumens per watt for exterior wall-mounted area luminaires, tested per IES LM-79. Theoretical models of initial raw LED lumens per watt are not acceptable.
- C. Lamps:
 - 1. Deluxe white mercury vapor lamps in wattages indicated. Provide with self-extinguishing mechanism to stop lamp operation if envelope fails.
 - 2. (Clear) (Phosphor) coated metal halide lamps in wattages indicated. Provide with self-extinguishing mechanism to stop lamp operation if envelope fails.
 - 3. (Clear) (Diffuse) high pressure sodium lamps in wattages indicated.
 - 4. Fluorescent lamps in wattages required, with lamp color as indicated on the light fixture schedule.
- D. Provide integral 2-50 footcandle adjustable photocell control when indicated. Photo control shall have internal 2-minute time delay.

2.03 EXTERIOR LIGHTING FIXTURE TYPES:

- A. General: Various fixture types are indicated on the fixture schedule on the drawings. Fixtures shall comply with the minimum requirements as stated on the schedule.

2.04 EXTRA STOCK:

- A. Furnish stock or replacement lamps amounting to 15% of the total number of lamps (but not less than four lamps in each case) of each type and size lamp used on the Project. Deliver replacement lamps as directed to Owner's storage space and obtain a receipt.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Examine areas and conditions under which lighting fixtures are to be installed and the substrate which will support lighting fixtures. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF EXTERIOR LIGHTING FIXTURES:

- A. Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.
- B. Install exterior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.
- C. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and the National Electrical Code.
- D. Fasten electrical lighting fixtures and brackets securely to structural supports, including poles/standards; ensure that installed fixtures are plumb and level.
- E. All exterior lighting shall be demonstrated during night-time tests.

3.03 GROUNDING:

- A. Provide equipment grounding connections for exterior lighting fixtures as indicated. Tighten connections to comply with tightening torques specified in UL 486A to assure permanent and effective grounds.

3.04 FIELD QUALITY CONTROL:

- A. Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Conduct an operating test after 100 hours of burn-in time to show that the equipment operates in accordance with the requirements of this section.

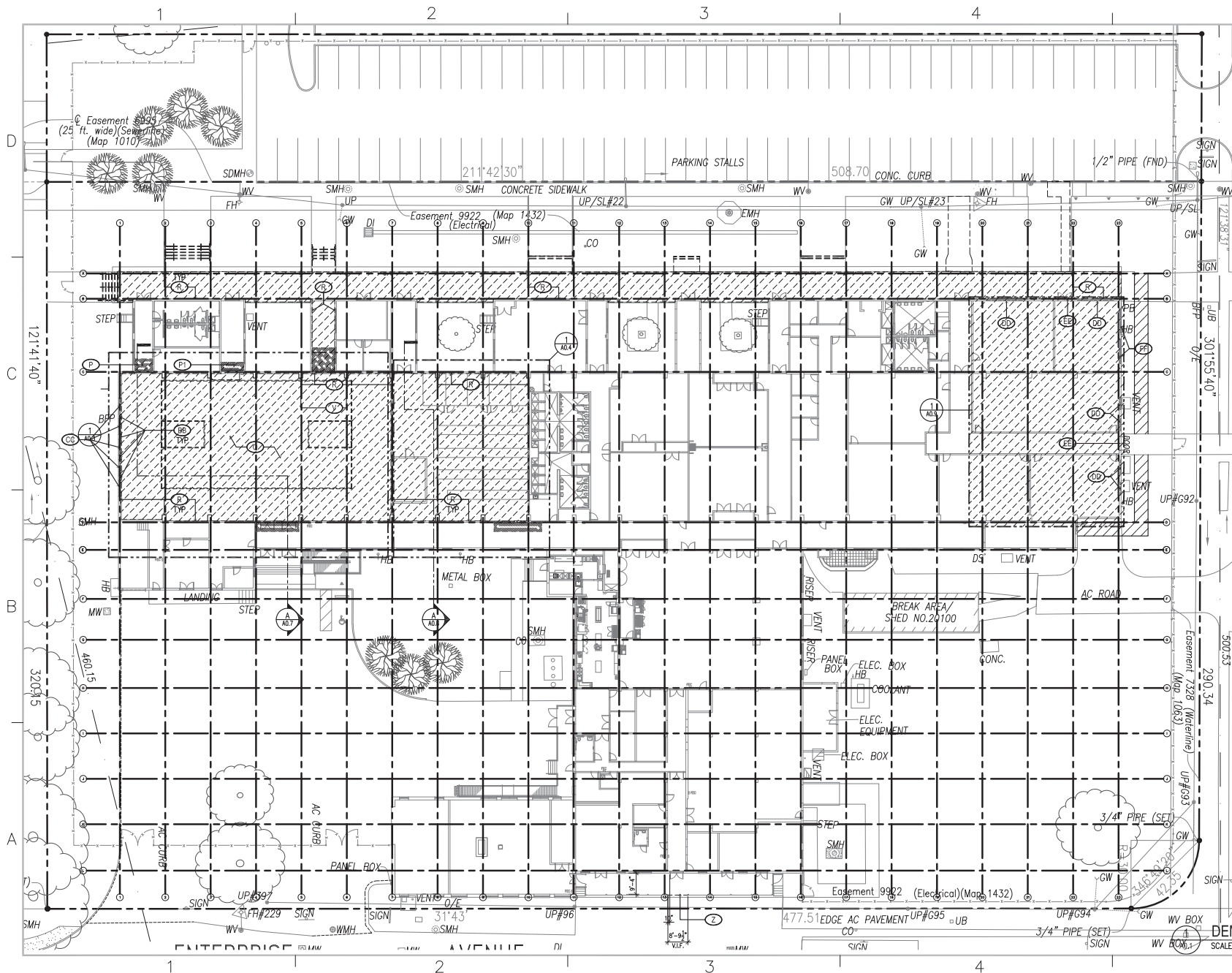
3.05 ADJUSTING AND CLEANING:

- A. Aim adjustable lighting fixtures and lamps in night test of system. Verify that measured illuminance values comply with submitted isolux plot diagram values.
- B. Clean lighting fixtures of dirt and debris upon completion of installation.
- C. Protect installed fixtures from damage during construction period.
- D. Aim switch according to manufacturer's recommendations or beside each luminaire when switch is provided in cast weatherproof. Set adjustable window slide for footcandles photocell turn-on.

3.06 DEMONSTRATION:

- A. Upon completion of installation of exterior lighting fixtures and associated electrical supply circuitry, apply electrical power to circuitry to demonstrate capability and compliance with requirements. All exterior lighting demonstrations shall be performed at night. Verify light fixture grouping (verify circuiting as indicated on Drawings) and controls. Where possible, correct malfunctioning units at Site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

END OF SECTION 16521



- LEGEND:**
- INDICATES EXISTING CONDITION TO REMAIN.
 - INDICATES EXISTING CONDITIONS AND/OR ELEMENTS TO BE REMOVED ON THE DEMOLITION SITE & FLOOR PLAN.
 - INDICATES EXTENT OF EXIST. CONDITIONS AND/OR ELEMENTS TO BE REMOVED AND/OR PREPARED ON THE DEMOLITION SITE & FLOOR PLAN.
- INTERIOR DEMOLITION KEYNOTES:**
- (P) DEMO & REMOVE EXIST. CONCRETE RAMP, CLEAN & PREP FLOOR FOR NEW RAMP. DEMO & REMOVE EXISTING 9x9 CERAMIC FLOOR TILE PER NEW LOCATION OF RAMP.
 - (PI) REMOVE WOODEN RAMP, DEMO & REMOVE EXISTING 9x9 CERAMIC FLOOR TILE PER NEW LOCATION OF RAMP. CLEAN & PREP FLOOR FOR NEW CONC. RAMP.
 - (O) EXIST. CONC. FLOOR TO REMAIN. DEMO & REMOVE MULT. PURPOSE ROOM STRIPPING, PREP & CLEAN SURFACE FOR NEW STRIPPING.
 - (R) CLEAN, PREPARE & PATCH (DAMAGES TO) WALLS, COLUMNS, BEAMS & CEILINGS.
 - (L) REMOVE BUILDING SIGNAGE AFFIXED TO WALLS.
 - (A) REMOVE PLASTER PADDING & STORE FOR RE-INSTALLATION.
 - (Z) DEMO FENCE AND PREP FOR NEW LOCKABLE SLIDING GATE.
 - (BD) DEMO & REMOVE CERAMIC TILE WANDSCOT & RESURF EXISTING WALL SURFACE. CLEAN AND PREP WALL FOR NEW PAINT. SEE INT. ELEV. FOR EXTENTS.
 - (CD) DEMO & REMOVE INSECT SCREENS WHERE NEW SECURITY SCREENS TO BE INSTALLED. SEE A2.4 FOR LOCATIONS.
 - (DD) DEMO & REMOVE EXISTING ALUM. FRAME WINDOW AND PREP OPENING FOR NEW ANTI-TERRORIST FORCE PROTECTION (ATFP) (SEE A2.1 & A2.2 FOR LOCATIONS).
 - (ED) DEMO & REMOVE EXISTING ALUM. FRAME DOORS AND PREP OPENING FOR NEW ALUM. FRAME DOORS. (SEE A2.1 & A2.2 FOR LOCATIONS).
 - (FD) DEMO & REMOVE EXISTING ALUM. FRAME WINDOWS & WOOD PANELS AND PREP OPENING FOR NEW ANTI-TERRORIST FORCE PROTECTION (ATFP) WINDOW (SEE A2.1 & A2.2 FOR LOCATIONS).





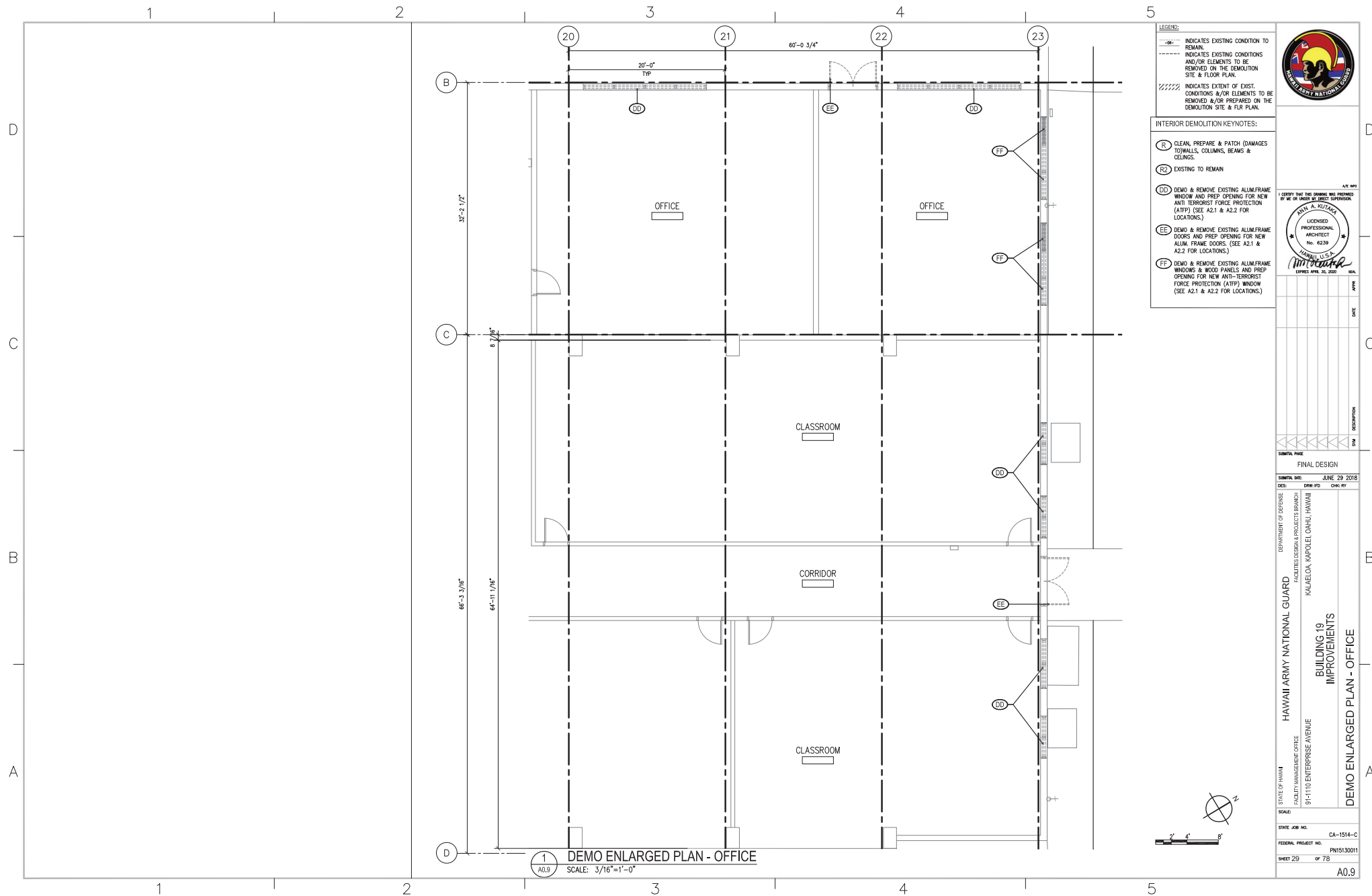
STATE OF HAWAII
HAWAII ARMY NATIONAL GUARD
FACILITIES DESIGN & PROJECTS BRANCH
KAWAEO, KAPOLEI, OAHU, HAWAII

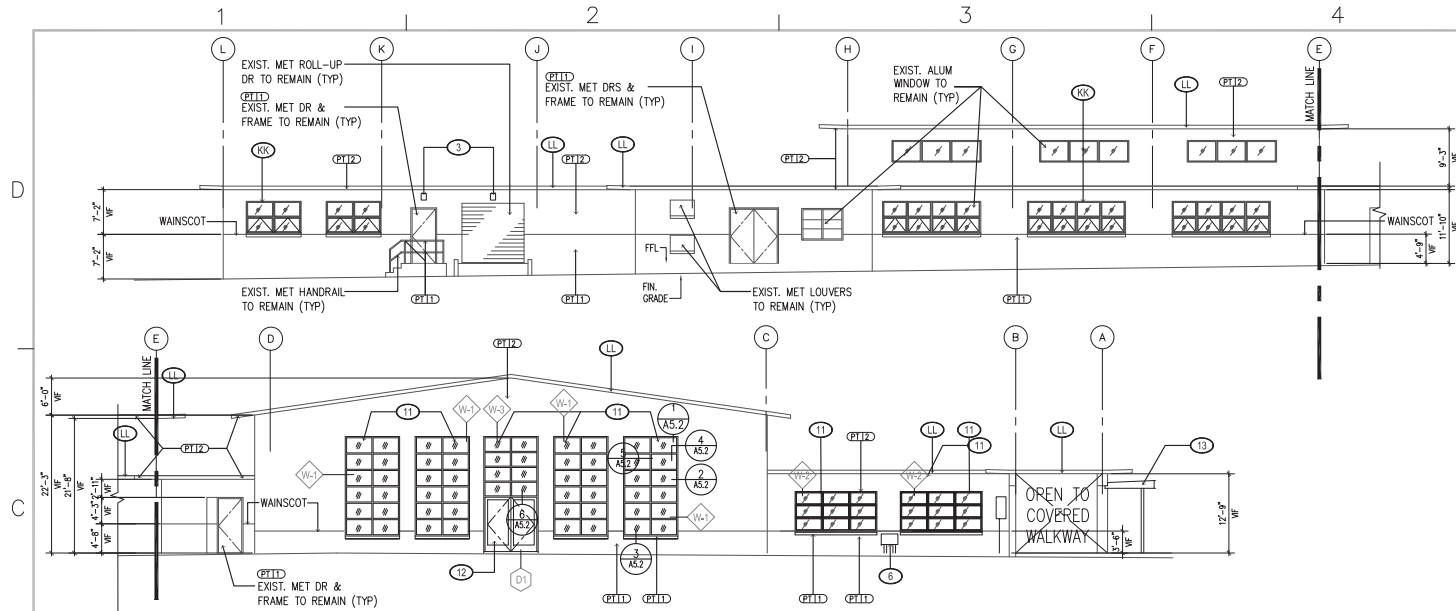
**BUILDING 6I
IMPROVEMENTS**

DEMOLITION FLOOR PLAN

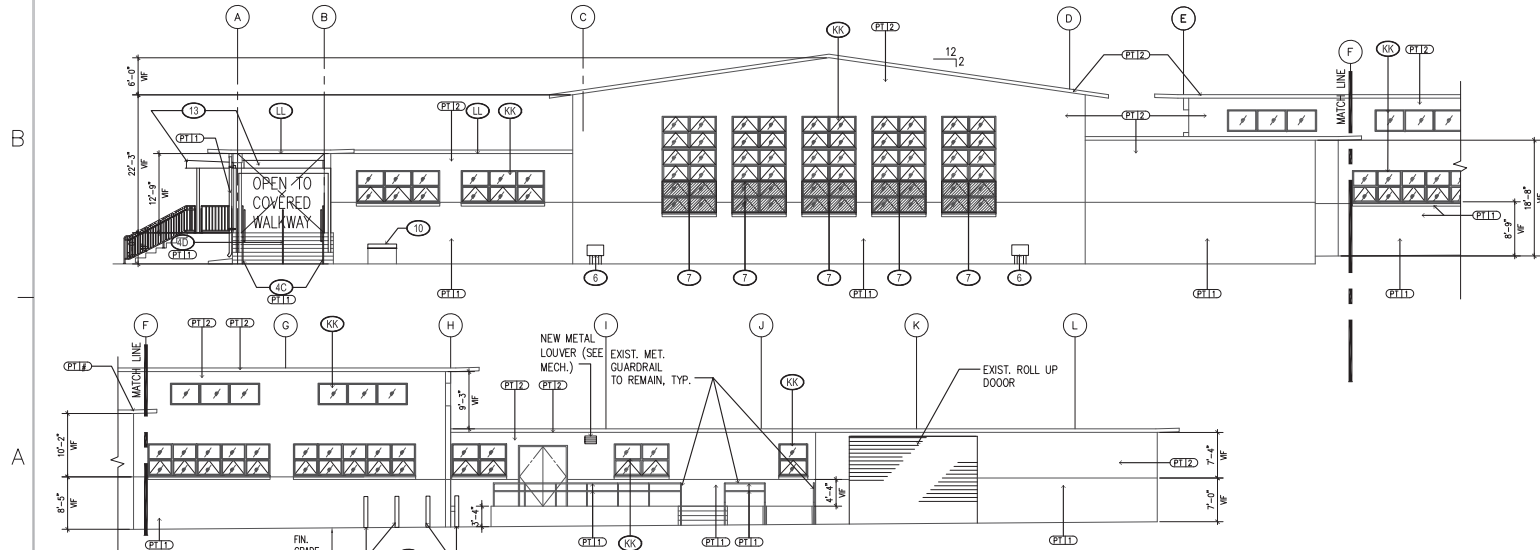
DATE: JUNE 29 2018
DESIGNER: DRW: JTD
CHECKER: CHN: RY

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SHEET 21 OF 75





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



2 SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

NOTES:
1. ALL DOORS AND WINDOWS ARE EXISTING TO REMAIN
U.O.M.
2. MATCH ALL HEIGHTS OF EXISTING PAINT ON WALLS

EXTERIOR NEW CONSTRUCTION KEYNOTES:

- (KK) EXISTING ALUM. FRAMED WINDOWS TO REMAIN, TYP.
- (LL) EXISTING METAL FLASHING, TO REMAIN, TYP.
- (MM) EXISTING COPPER GUTTER TO REMAIN, TYP.
- 1. INSTALL EXHAUST FAN AT NOTED LOCATION, TYP. SEE MECH. DWGS.
- 2. NEW SLIDING GATE, GC TO CONFIRM OPENING WIDTH PRIOR TO ORDERING.
- 3. NEW WALL MOUNTED EXTERIOR LIGHT FIXTURES, SEE ELEC. DWGS.
- 4. NEW RAMP AND STAIR
- 4A. NEW GALVANIZED STEEL GUARDRAIL SYSTEM
- 4B. NEW GALVANIZED STEEL RAILING SYSTEM
- 4C. NEW GALVANIZED STEEL GUARDRAIL & HANDRAIL SYSTEM
- 4D. NEW GALVANIZED STEEL HANDRAIL SYSTEM
- 5. NEW CAST IRON DOWNSPOUT TO MATCH EXISTING DOWNSPOUT.
- 6. NEW HOSE BIB (HB), SEE MECH. DWGS.
- 7. IN-OPERABLE WINDOWS, SEE INTERIOR ELEVATIONS
- 8. REPAIR EXISTING WATER LINES, SEE CIVIL & MEP DWGS.
- 9. NEW 6" x 48" (MIN.) GALVANIZED STEEL BOLLARD, SEE CIVIL DWGS.
- 10. NEW CRASH SPACE HATCH, SEE DETAILS ON A5.1
- 11. NEW ALUM. FRAME ATFP WINDOW
- 12. NEW ALUM. FRAME STORE FRONT DOORS
- 13. DEDUCTIVE ALTERNATE 1:
MET FRAME CANOPY (SEE SHT A-4.6)

LEGEND:	
---	INDICATES EXISTING CONDITION REMAIN.
---	OR
---	INDICATES EXISTING CONDITIONS AND/OR ELEMENTS TO BE REMOVED ON THE DEMOLITION SITE & FLOOR PLAN.
---	INDICATES NEW CONDITION AND/OR NEW ELEMENTS, OR BOUNDARIES OF NEW CONSTRUCTION.



HAWAII ARMY NATIONAL GUARD

BUILDING 19 IMPROVEMENTS

EXTERIOR ELEVATION

STATE OF HAWAII
FACILITY MANAGEMENT OFFICE
91-110 ENTERPRISE AVENUE
KAHALA, KAPOLEI OAHU, HAWAII

DEPARTMENT OF DEFENSE
FACILITIES DESIGN & PROJECTS BRANCH

DATE: **JUNE 29 2018**
DESIGNER: **DRM: JTD** CHECKER: **RY**

PROJECT NO.: **CA-1514-C**
FEDERAL PROJECT NO.: **PN15130011**
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A2.2

