REQUEST FOR PROPOSAL

ELECTRICAL UPGRADE

RFP No.
HHSC FY 18-10

FOR

HAWAII HEALTH SYSTEMS CORPORATION
Kauai Region
Kauai Veterans Memorial Hospital

Kauai Veterans Memorial Hospital
4643 Waimea Canyon Drive
Waimea, HI 96796

Hawaii Health Systems Corporation
An Agency of the State of Hawaii

TABLE OF CONTENTS

SECTION 1: ADMINISTRATION

1.1 INTRODUCTION

This Request for Proposal (hereinafter "RFP") is issued by the Kauai Region of the Hawaii Health Systems Corporation (hereinafter "HHSC"), a public body corporate and politic and an instrumentality and Agency of the State of Hawaii.

Thank you for your interest in submitting a proposal for this solicitation. The rationale for this competitive sealed RFP is to promote and ensure the fairest, most efficient means to obtain the **best value** to HHSC, i.e, the proposal offering the greatest overall combination of service and price. Hereinafter, organizations interested in submitting a proposal in response to this RFP shall be referred to as "OFFEROR".

In order for HHSC to evaluate OFFEROR's response in a timely manner, please thoroughly read this RFP and follow instructions as presented.

1.2 PROCUREMENT TIMETABLE

The timetable as presented represents HHSC's best estimated schedule. If an activity of the timetable, such as "Closing Date for Receipt of Proposals" is delayed, the rest of the timetable dates may be shifted. OFFEROR will be advised, by addendum to the RFP, of any changes to the timetable. Contract start date will be subject to the issuance of the Notice to Proceed.

	ACTIVITY	SCHEDULED DATES
1.	RFP Public Announcement	04/20/18
2.	Closing Date for Receipt of Questions	05/04/18
3.	Addendum for HHSC Response to Offeror's Questions	05/11/18
4.	**Closing Date**	**3:00pm on Monday, 05/21/18**

1.3 MANDATORY PRE-PROPOSAL CONFERENCE

*Questions and request for clarifications must be submitted in writing to the Contracting Manager via email or fax no later than **May 4, 2018**.* Subsequent answers from HHSC that affect the scope of this project will be contained in a written response to questions and clarification requests.

1.4 RFP ORGANIZATION

This RFP is organized into five sections:

SECTION 1: ADMINISTRATIVE
Provides information regarding administrative requirements.

SECTION 2: SCOPE OF SERVICES

Provides a detailed description of goods and/or services to be provided and delineates HHSC and CONTRACTOR responsibilities.

SECTION 3: PROPOSALS
Describes the required format and content for submission of a proposal.

SECTION 4: EVALUATION
Describe how proposals will be evaluated and lists the "value weight percentages" of the evaluation categories.

SECTION 5: AWARD OF CONTRACT
Describes procedures for selection and award of contract.

1.5 HEAD OF PURCHASING AGENCY (HOPA)

The HOPA for HHSC, or designee, is authorized to execute any and all Agreements (Contracts), resulting from this RFP.

The HOPA for this RFP is:
Lance Segawa
Regional CEO – Kauai Region

1.7 DESIGNATED OFFICIALS

The officials identified in the following paragraphs have been designated by the HOPA as HHSC's procurement officials responsible for execution of this RFP, award of Agreement and coordination of CONTRACTOR's satisfactory completion of contract requirements.

1.8 ISSUING OFFICER

The Issuing Officer is responsible for administrating/facilitating all requirements of the RFP solicitation process and is the **sole point of contact** for OFFEROR from date of public announcement of the RFP until the selection of the successful OFFEROR. The Issuing Officer will also serve as the Contract Manager responsible for contractual actions throughout the term of the contract.

The Issuing Officer is:

Cora Shirai, Contract Manager
HHSC/Kauai Veterans Memorial Hospital
4643 Waimea Canyon Drive, P. O. Box 337
Waimea, HI 96796
Phone: 338-9454
email: cshirai@hhsc.org

1.9 HHSC ORGANIZATIONAL INFORMATION

1.9.1 CHARTER

HHSC is a public body corporate and politic and an instrumentality and agency of the State of Hawaii. HHSC is administratively attached to the Department of Health, State of Hawaii and was created by the legislature with passage of Act 262, 1996 Session Laws of Hawaii. Act 262 affirms the State's commitment to provide quality health care for the people in the State of Hawaii, including those served by small rural facilities.

1.9.2 STRUCTURE AND SERVICES

HHSC oversees the operation of twelve public health facilities throughout the Hawaiian Island chain, including Oahu, Lanai, Kauai and Hawaii. HHSC is organized into four operational regions and provides a broad range of healthcare services including acute, long term, rural and ambulatory health care services. As the fourth largest public health system in the country, HHSC is the largest provider of healthcare in the Islands, other than on Oahu, and is the only acute care provider on the Islands of Maui and Lanai. This solicitation includes Kauai Veterans Memorial Hospital on the island of Kauai.

1.9.3 MISSION

The mission of HHSC is to provide and enhance accessible, comprehensive health care services that are quality-driven, customer-focused and cost-effective.

1.9.4 FACILITY INFORMATION

Detailed information pertaining to HHSC Facilities is located at http://www.hhsc.org.

1.10 SUBMISSION OF QUESTIONS

Relevant questions must be submitted in writing via electronic mail or facsimile to the Issuing Officer no later than the "Closing Date for Receipt of Questions", identified in paragraph 1.2 in order to generate an official answer. All written questions will receive an official written response from HHSC and become addenda to the RFP.

- IMPORTANT -

OFFEROR may request changes and/or propose alternate language to the DAGS Interim General Terms and Conditions during this phase only. All requests will be presented to the HHSC Legal Department for review. No requests to change the DAGS Interim General Terms and Conditions will be entertained after the proposals have been submitted or during the contracting process.

HHSC reserves the right to reject or deny any request(s) made by OFFEROR.

Responses by HHSC shall be due to the OFFEROR no later than the dates for initial questions and final questions stipulated in Section 1.2.

Impromptu, un-written questions directed to the Issuing Officer are permitted and verbal answers will be provided during pre-proposal conferences and other occasions, but are only intended as general direction and shall not represent the official HHSC position and shall not be relied upon by OFFEROR. The only official position of HHSC is that which is stated in writing and issued in the RFP as addenda thereto.

Any communication other than that described in this Section 1.10, whether oral or written, shall not be construed as a formal or official response/statement and may not be relied upon. Please send questions to the Issuing Officer, Cora Shirai (cshirai@hhsc.org) and Maia Guirao (mguirao@hhsc.org).

1.11 SOLICITATION REVIEW

OFFEROR should carefully review this solicitation for defects and questionable or objectionable matter. Comments concerning defects and questionable or objectionable matter, **excluding requests to revise the General or Special Conditions**, must be made in writing and should be received by the Issuing Officer, Cora Shirai, no later than the "Closing Date for Receipt of Questions" as identified in Section 1.2. This will allow issuance of any necessary amendments to the RFP. It will also assist in preventing the opening of proposals upon which award may not be made due to a defective solicitation package.

1.12 RFP AMENDMENTS

HHSC reserves the right to amend the RFP any time prior to the ending date for the proposal evaluation period. RFP Amendments will be in the form of addenda and posted on the Kauai Region Procurement website. It is the OFFERORS responsibility to check the website located at http://kvmh.hhsc.org/procurement/open-solicitations/ to ensure that any and all Amendments are incorporated into their RFP response.

1.13 CANCELLATION OF RFP

The RFP may be canceled when it is determined to be in the best interests of HHSC.

1.14 PROTESTS

An actual or prospective OFFEROR who is aggrieved in connection with the solicitation or award of the contract may submit a protest. Any protest shall be submitted in writing to the HOPA as noted below.

A protest based upon the content of the solicitation shall be submitted in writing within five (5) working days **after** the OFFEROR knows or should have known of the facts giving rise thereto; provided, however, that the protest shall not be considered unless it is submitted in writing prior to and not later than the Closing Date for Receipt of Proposals identified in Section 1.2.

A protest of an award or proposed award shall be submitted within five (5) working days after the posting of award of the contract, provided that a protest following a debriefing shall be submitted within five (5) working days after the debriefing is completed. The

notice of award, if any, resulting from this solicitation shall be posted on the Kauai Veterans Memorial Hospital website at: http://kvmh.hhsc.org/procurement/open-solicitations/
.

Any and all protests shall be submitted in writing to the HOPA, as follows:

Lance Segawa
Regional Chief Executive Officer – Kauai Region
Hawaii Health Systems Corporation
4643 Waimea Canyon Drive, P.O. Box 337
Waimea, HI 96796

SECTION TWO
SCOPE OF SERVICES

2.1 INTRODUCTION

The purpose of this competitive sealed solicitation is to award a single, fixed price Agreement to an Offeror for the electrical upgrade at Kauai Veterans Memorial Hospital. The Offeror must be able to demonstrate experience with similar projects and proven compliance with all the project's federal, state and county requirements. Renovations shall occur within the required guidelines for OSHA, Joint Commission and Infection Control.

2.2 SCOPE OF WORK:

1. Base Bid shall include the replacement of the exterior lights and parking lot lights

2. Option #1 shall include the replacement of the exhaust fans.

Please refer to Specifications (EXHIBIT A) for details on scope of work.

Anticipated project start date shall commence on the Notice to Proceed date. Project completion shall be coordinated with the Regional Director of Facilities. Liquidated damages shall be assessed in the amount of TWO HUNDRED FIFTY DOLLARS ($250.00) per day.

2.3 WORKING HOURS

1. All work shall be conducted during normal work hours, 7:30 a.m. to 4:00 p.m. Monday through Friday, excluding State Holidays. Noise restrictions do apply. Work performed outside of the hours above shall be approved by HHSC Technical Representative prior to work being performed. If work needs to be performed after normal work hours, the contractor shall be responsible for any cost the hospital incurs to provide necessary personnel to comply with its operations requirements.

2. The Contractor may be given approval to work beyond the regular hours including Saturdays, Sundays, State Holidays, night work, or after hours upon the pre-approval of the HHSC Technical Representative.

2.4 TECHNICAL REPRESENTATIVES

Technical Representative has the right to oversee the successful completion of contract requirements, including monitoring, coordinating and assessing CONTRACTOR performance; placing requests for services; and, approving completed work/services with verification of same for CONTRACTOR's invoices. Technical Representative will also serve as point of contact for "technical" matters throughout the term of the agreement. The Technical Representative is Mr. John Pimental, Regional Facilities Director.

SECTION 3
PROPOSALS

3.1 INTRODUCTION

One of the objectives of the RFP is to make proposal preparation easy and efficient, while giving OFFEROR ample opportunity to highlight their proposal. When an OFFEROR submits a proposal, it shall be considered a complete plan for accomplishing the requirements described in this RFP.

3.2 PROPOSAL PREPARATION

OFFEROR shall prepare a written proposal in accordance with requirements of this Section.

The Technical and Price proposals shall be distinct documents and readily separable for review. Proposals shall include all data and information requested to qualify proposals for evaluation and consideration for award. Non-compliance may be deemed sufficient cause for disqualification of a proposal.

Prepare proposals in three-ring binders, organized into distinctive sections, with tabs corresponding with the technical and price categories and other categories, as appropriate. The development of overly elaborate proposals and presentation material, not required and/or related to RFP requirements, is **HIGHLY DISCOURAGED**. This procedure will facilitate proposal evaluations.

Additionally, proposals shall include and address, at a minimum:

- The information identified below in Section 3.5;
- The pricing information outlined in Section 3.8;
- Proposal Transmittal Cover Sheet, Appendix A
- Proposal Submission Checklist, Appendix B;
- Bid Security Bond 5%
- Certificate of Compliance from the Hawaii State Department of Labor and Industrial Relations; and
- Certificate of Good Standing from the Department of Commerce and Consumer Affairs Business Registration Division

3.3 COSTS FOR PROPOSAL PREPARATION

Any and all costs incurred in the development of proposals, i.e., preparing and submitting, on-site product/service demonstrations, on-site visits, oral presentations, travel and lodging, etc. shall be the sole responsibility of OFFEROR.

3.4 DISQUALIFICATION OF PROPOSALS

HHSC reserves the right to consider as acceptable only those proposals submitted in accordance with all requirements set forth in the RFP and which demonstrate an understanding of the Scope of Services. HHSC reserves the right to ask for clarification of any item in the proposal.

- ATTENTION -

Any proposal offering any other set of terms and conditions contradictory to those included in the RFP may be disqualified without further notice. Please refer to Section 1.10.

An OFFEROR will be disqualified and the proposal automatically rejected for any one or more of the following reasons:

- Proof of collusion among OFFERORS, in which case all proposals involved in the collusive action will be rejected.
- The OFFEROR'S lack of responsibility and cooperation as shown by past work or services.
- The proposal shows any noncompliance with applicable law.
- The proposal is conditional, incomplete, or irregular in such a way as to make the proposal incomplete, indefinite, or ambiguous as to its meaning.
- The proposal has any provision reserving the right to accept or reject award, or to enter into a contract pursuant to an award, or provisions contrary to those required in the solicitation.
- Proof of exclusion from participation in federal health care programs, as defined in the Social Security Act (section 1128 and 1128A), and other federal laws and regulations relating to health care.

3.5 SUBMISSION OF PROPOSALS

Each OFFEROR may submit only one (1) written proposal (which includes a technical proposal and a price proposal). Alternate proposals will not be accepted. The Issuing Officer must receive one (1) original and two (2) copies **and one copy in electronic format** of the proposal no later than the "Closing Date for Receipt of Proposals", identified in Section 1, paragraph 1.1. **Proposals received after this time/date may be rejected.** The original shall be clearly marked "ORIGINAL" and copies shall be clearly marked "COPY". Mail or deliver proposals to the following address:

Cora Shirai, Contract Manager
Maia Guirao, Procurement Specialist
Re: RFP No. 18-10
Kauai Veterans Memorial Hospital
4643 Waimea Canyon Drive, P. O. Box 337
Waimea, HI 96796

The outside cover of the package containing the proposal should be noticeably marked, as follows:

Proposal Submitted in Response to: RFP # 18-1

3.6 PROPOSAL INFORMATION

OFFERORs are hereby notified that evidence of the authority of the person(s) signing the offer document is required to be included with the offer documents. Failure to comply with this requirement will be cause for rejection of an offer as being non-responsive.

Each OFFEROR is to submit its proposal with the required number of copies in the format as contained in this RFP. The material should be in sequence and related to the RFP. HHSC will not provide any reimbursement for the cost of developing or presenting

proposals in response to this RFP. Failure to include the requested information may have a negative impact on the evaluation of the OFFEROR's proposal. The proposal should include at least the following information:

3.7 TECHNICAL PROPOSAL

The technical proposal shall include the following categories:

1. Technical Summary (See Section 3.11.1)
2. Background, Qualification and Experience
3. Technical Proposal
4. Personnel Organization and Staffing; and
5. Management and Control

3.7.1 TECHNICAL SUMMARY

Clearly, concisely and briefly summarize and highlight the contents of the technical proposal in such a way to provide HHSC with a broad understanding and the unique, most promising aspects of the proposal.

3.7.2 BACKGROUND, QUALIFICATION AND EXPERIENCE

Provide explicit details on Company's background, qualifications, and experience relative to performing requirements set forth in the Scope of Services, including but not limited to:

a. Background of Company, i.e. services offered, size, resources, years in business, location, State of Hawaii presence, state of incorporation, etc.
b. Brief description of Company's qualifications to perform Scope of Services requirements.
c. Brief description of three (3) past and/or present contracts demonstrating Company's qualifications, experience, and performance. Include customer name, contact name and telephone number. If not available, provide contact name and telephone number of three (3) references that can discuss your Company's qualifications, experience, and performance.
d. Identification of litigation currently impacting the Company, if any. State "NONE", if none.

3.7.3 TECHNICAL PROPOSAL

Provide details on your technical proposal addressing how you will comply with the Statement of Work.

3.7.4 PERSONNEL ORGANIZATION AND STAFFING

Provide explicit details on the Company's personnel organization and staffing relative to performing requirements set forth in the Scope of Services, as follows:

a. Company's managerial organizational chart and resumes of key positions.
b. Key personnel identified to perform services, including: name, years of experience, years with the Company, qualifications and verifiable references (with contact telephone numbers), if any.

3.7.5 MANAGEMENT AND CONTROL

Provide a detailed summary of the methodology relative to performing requirements set forth in the Scope of Services, as follows:

a. Assignment and management of personnel.
b. Coordination of requirements with HHSC personnel.
c. Problems anticipated, if any.

3.8 PRICE PROPOSAL

While price is a consideration, the overall value of the proposal is a critical factor in the evaluation. The Offeror shall provide material and labor cost and others (if applicable) using the Bid Form, APPENDIX F.

3.9 PROPOSAL TRANSMITTAL COVER LETTER

OFFEROR is required to submit the proposal with a transmittal cover letter. The transmittal cover letter must be on the OFFEROR'S official business letterhead; signed by an individual authorized to legally bind the OFFEROR; affixed with the corporate seal or notarized; and minimally include information, as written/requested, on the "sample" letter in Section 5, APPENDIX A.

3.10 PUBLIC INSPECTION

Proposals shall not be opened publicly, but shall be opened in the presence of two or more procurement officials. The register of proposals and OFFERORS' proposals shall be open to public inspection after the contract is executed by all parties.

OFFEROR shall request in writing the nondisclosure of designated trade secrets or other proprietary data to be confidential. Such data shall accompany the proposal and shall be readily separable from the proposal in order to facilitate eventual public inspection of the non-confidential portion of the proposal. The proposals are subject to disclosure rules set forth in Chapter 92F, HRS. The OFFEROR bears the burden of establishing that the designated data is exempted from the disclosure requirements set forth in Chapter 92F.

All proposals and other material submitted by OFFEROR become the property of HHSC and may be returned only at HHSC's option.

3.11 TECHNICAL SECTION

Any proposal offering a significantly non-compliant Technical Section may be disqualified without further notice.

3.11.1 TECHNICAL SUMMARY

Clearly, concisely and briefly summarize and highlight the contents of the technical proposal in such a way to provide HHSC with a broad understanding and the unique, most promising aspects of the proposal. This shall be placed at the beginning of the technical proposal.

3.12 NON APPLICABLE PROPOSAL REQUIREMENT

Excluding HHSC Special Conditions and DAGS Interim General and Conditions, and any objectionable or defective RFP matters, if any proposal requirement, as describe in this

Section, is not applicable to the OFFEROR and therefore will/cannot be provided, list the requirement(s) and provide detailed explanation of the reasons why the requirement(s) is not applicable. HHSC reserves the right to consider as acceptable only those proposals submitted in accordance with all requirements set forth in this Section.

3.13 NON ACCEPTANCE OF ANY RFP REQUIREMENT

If any RFP requirement, as described in this RFP, is not acceptable to the OFFEROR, list the requirement(s) and provide a detailed explanation of the reasons why the requirement(s) is not acceptable and provide a recommended revision, if applicable. HHSC reserves the right to consider as acceptable only those proposals submitted in accordance with all requirements set forth in the RFP.

- ATTENTION -

Any proposal offering any other set of terms and conditions contradictory to those included in the RFP will be disqualified without further notice. Please refer to Section 1.10.

3.14 PROPOSAL SUBMISSION CHECKLIST

The proposal submission checklist is designed to be used as a tool to ensure that all required documents and information are being submitted with OFFEROR'S proposal; and, as a supplementary means of performing evaluation of the "Mandatory Requirements", as set forth in Section 4, paragraph 4.3.1. The checklist is required to be completed by each OFFEROR and included (as the last document) in the proposal package. The proposal submission checklist is in Section 5, APPENDIX B.

SECTION 4
EVALUATIONS

4.1 INTRODUCTION

The evaluation of proposals shall be conducted comprehensively, fairly, and impartially. Structural, quantitative scoring techniques will be utilized to maximize the objectivity of the evaluation.

4.2 PROPOSAL EVALUATION COMMITTEE

An evaluation committee will be selected from HHSC to perform all evaluation requirements. The committee will be composed of individuals with experience in, knowledge of, and program responsibility for the requirements identified in the RFP. HHSC reserves the right to request information from OFFEROR to clarify the OFFEROR'S proposal.

4.3 EVALUATION PHASES

Evaluation phases will be conducted as follows:

Phase 1.....Evaluation of Mandatory Requirements
Phase 2.....Technical Proposal Evaluation
Phase 3.....Price Proposal Evaluation
Phase 4….Determination of Priority List of OFFERORS
Phase 4.....Proposal Discussions by Priority-List **(optional)**
Phase 5.....Best and Final Offers by Priority List **(optional)**
Phase 6.....Recommendation for Contract Award

4.3.1 PHASE 1 – EVALUATION OF MANDATORY REQUIREMENTS

The evaluation of the mandatory requirements, as listed below, shall be based upon a "Pass/No Pass" basis. The purpose of this phase is to determine whether an OFFEROR'S proposal is sufficiently responsible and responsive to RFP requirements to permit a complete evaluation, i.e., responsible in terms of "Does the OFFEROR have the capability to perform fully the Scope of Services requirements"; and, "Were proposal documents, as identified below, received by HHSC and do they contain the required information?" Failure to meet any mandatory requirement will be grounds for deeming the proposal non-responsible, non-responsive or both and disqualification ("No Pass") thereof.

Proposal "Mandatory Requirements"

- Proposal Transmittal Cover Sheet
- Proposal in response to solicitation
- Pricing Schedule & Compensation
- Proposal Submission checklist
- Certificate of Compliance
- Certificate of Good Standing
- Bid Security (5% of lump sum proposal amount)

4.3.2 PHASE 2 TECHNICAL PROPOSAL EVALUATION

Evaluation of OFFEROR'S technical proposal shall be conducted using the technical proposal categories and the value weight percentages identified in paragraph 4.4 and the evaluation scoring system identified in paragraph 4.5.

4.3.3 PHASE 3 PRICE PROPOSAL EVALUATION

Evaluation of the price proposal shall be conducted using the price proposal category and the value weight percentages identified in paragraph 4.4.

4.3.4 PHASE 4 PROPOSAL DISCUSSIONS WITH PRIORITY LISTED OFFERORS (OPTIONAL)

At its discretion, following the Mandatory Requirements Phase, HHSC may develop a Priority List of Offerors based on the evaluation of OFFERORS' Technical and Price proposals. This Priority List may be asked to conduct discussions with HHSC. OFFEROR'S proposal may be accepted without Discussions. In the event that HHSC elects to hold Discussions, HHSC shall inform Priority-Listed OFFERORS of specific Discussion topics and issues; and schedule Discussion proceedings.

4.3.5 PHASE 5 BEST AND FINAL OFFERS (OPTIONAL)

OFFEROR may be requested to submit a Best and Final offer. Best and Final offers shall be evaluated and scoring of the OFFEROR'S proposal adjusted, accordingly. If a Best and Final offer is requested but not submitted, the previous submittal shall be construed as the Best and Final offer.

4.3.6 PHASE 6: RECOMMENDATION FOR CONTRACT AWARD

The Evaluation Committee shall prepare a report summarizing proposal evaluation findings/rankings and provide recommendation for award of contract to the HOPA.

4.4 EVALUATION CATEGORIES AND VALUE WEIGHT PERCENTAGES

Mandatory Requirements	**Pass/No Pass**
Technical Proposal	**Value Weight**
Cost	25%
Background, Qualifications and Past Performance	45%
Personnel Organization & Staffing	30%
TOTAL.....	**100%**

4.5 EVALUATION SCORING SYSTEM

The maximum number of points available for scoring is one thousand (1000) per evaluator. The proposal receiving the highest number of points is considered statistically the best proposal and the **best value** to HHSC; and, will be recommended for award of contract, unless otherwise determined and justified by the evaluation committee.

The evaluation categories are assigned a value weight percentage, as determined by HHSC, totaling 100%. Each category will be rated between one (1) and ten (10), with ten being the highest (the best rating) by each member of the evaluation committee. The OFFEROR'S total score (see note below) will be determined by: a) multiplying the assigned weight value of each category by the numerical rating provided by the evaluation committee member to determine the score for each category; b) totaling the score for all

categories of each evaluation committee member; and, c) totaling the score of all evaluators.

Note: In determining the total score, the OFFEROR'S price proposal with the lowest price will receive the highest available rating allocated to price. Each proposal that has a higher price than the lowest will have a lower rating for price. The points allocated to higher-priced proposals will be equal to the lowest proposal price multiplied by the maximum points available for price, divided by the higher proposal price.

SECTION 5
AWARD OF CONTRACT

5.1 AWARD OF CONTRACT

Award of contract shall be made to the most responsible and responsive OFFEROR whose proposal is determined by the Evaluation Committee to provide the best value to HHSC, considering all evaluation reviews and results. The Contract award may be awarded in whole or in part based on the availability of funds.

5.2 CONTRACT AWARD NOTIFICATION

The notice of award, if any, resulting from this solicitation shall be posted on the HHSC/Kauai Veterans Memorial Hospital website. This will serve as the official notification to all OFFERORS. In addition, the Issuing Officer will inform the successful OFFEROR of contract award selection by an official "notice of award" letter.

At its discretion and as a courtesy to the OFFEROR the Issuing Officer may issue a "Notice of Posting of Award" to the unsuccessful OFFERORS. However a delay in issuing the notice or the inadvertent omission of such courtesy notice will not extend the protest filing time.

5.3 CONTRACT AWARD DEBRIEFING

If requested, HHSC shall provide a contract award debriefing. The purpose of a debriefing is to inform the non-selected OFFEROR of the basis for the source selection decision and contract award. A written request to the Issuing Officer for a debriefing shall be made within three (3) working days after receipt of non-award of contract letter from HHSC and/or posting of the award of the contract.

5.4 CONTRACT DOCUMENT

The contract will be awarded by executing an **"Agreement for Goods or Services Based Upon Competitive Sealed Proposals"** (hereinafter "CONTRACT") by HHSC and the successful OFFEROR (hereinafter "CONTRACTOR"). This document will serve as the official, legal contractual instrument between both parties. This document will incorporate (by attachments or reference) the RFP, with any and all addendums; GENERAL CONDITIONS and any SPECIAL CONDITIONS; and the CONTRACTOR's accepted proposal, with any and all addendums, changes, negotiated agreements, all of which becomes part and whole of the CONTRACT.
A "sample" CONTRACT is located at APPENDIX C. Please DO NOT complete or execute the "sample" CONTRACT.

5.5 GENERAL AND SPECIAL CONDITIONS

The DAGS Interim General Conditions are applicable and shall be apart and whole but are not physically included in these documents, but are included by reference. Copies of the Interim General Conditions may be obtained from the Division of Public Works,

Department of Accounting and General Services, State of Hawaii at the following website: http://pwd.hawaii.gov/wp-content/uploads/2014/12/InterimGeneralConditions1999Edition.pdf.

In the event of a conflict between the General Conditions and the Special Conditions, the Special Conditions shall control.

5.6 GENERAL EXCISE/USE TAX

Work to be performed under this solicitation is a business activity taxable under Chapter 237, Hawaii Revised Statutes (HRS), and Chapter 238, HRS, where applicable. Both out-of-state and Hawaii CONTRACTOR are advised that the gross receipts derived from this solicitation are subject to the general excise tax imposed by Chapter 237, HRS, and where applicable to tangible property imported into the State of Hawaii for resale, subject to the use tax imposed by Chapter 28, HRS.

Pursuant to Section 237-9, HRS, the CONTRACTOR is required to obtain and/or possess a valid General Excise Tax License from the Hawaii State Department of Taxation (DOTAX) prior to executing a contractual agreement with a State Agency.

The **General Excise Tax License** shall be obtained from the DOTAX offices in the State of Hawaii or the DOTAX Web Site and by mail or FAX. Refer to the next paragraph for procedures in obtaining DOTAX forms and information.

5.7 CERTIFICATE OF COMPLIANCE

The CONTRACTOR is required to obtain/possess a valid **Certificate of Compliance** from the Hawaii State Department of Labor and Industrial Relations (DLIR) prior to executing a contractual agreement with a State Agency. The certificate is valid for six months from the date of issue and must be valid on the date it is received by HHSC.

The **Certificate of Compliance** shall be obtained on the State of Hawaii, DLIR APPLICATION FOR CERTIFICATE OF COMPLIANCE WITH SECTION 3-122-112, HAR, Form LIR #27, which is available at **www.hawaii.gov/labor** (open "Get a Form"; then open "LIR#27) or at the neighbor island DLIR District Offices. The application for the certificate is the responsibility of the OFFEROR and must be submitted directly to the DLIR and not to HHSC. The DLIR will return the form to the CONTRACTOR who in turn shall submit the form to HHSC.

5.8 CERTIFICATE OF GOOD STANDING

a. 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. As evidence of compliance, the CONTRACTOR shall obtain/possess **Certificate of Good Standing** issued by the Department of Commerce and Consumer Affairs Business Registration Division (BREG). A "Hawaii Business" that is a sole proprietorship, however, is not required to register with the BREG, and therefore not required to submit the certificate. A CONTRACTOR's status as sole proprietor and its business street address as indicated on the proposal transmittal cover letter

(APPENDIX A) will be used to confirm that the CONTRACTOR is a Hawaii Business.

b. 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. As evidence of compliance, the CONTRACTOR shall obtain/possess **Certificate of Good Standing** issued by the Department of Commerce and Consumer Affairs Business Registration Division (BREG).

c. The **Certificate of Good Standing** can be obtained by phone (call (808) 586-2727, Monday thru Thursday 7:45-4:30 HST) or by mail (Department of Commerce and Consumer Affairs, Business Registration Division, P.O. Box 40, Honolulu, Hawaii 96810). The certificate is valid for six (6) months from date of issue and must be valid on the date it is received by HHSC.

5.9 HAWAII COMPLIANCE EXPRESS

Alternatively, OFFEROR may apply and obtain proof of compliance with the above agencies electronically through the Hawaii State Procurement Office's "Hawaii Compliance Express website at **http://vendors.ehawaii.gov**

One interface covers all the forms for all state agencies and partners. Easy to read instructions and context sensitive help make compliance safe, fast and efficient. Using the Wizard will file with Department of Taxation and optionally with the Business Registration Division of the DCAA. If you have or will have employees, the Wizard will also file with Department of Labor and Industrial Relations.

OFFERORS who elect to use the services will be required to pay an annual fee.

5.10 PERFORMANCE AND PAYMENT BOND

Upon the acceptance of the proposal by HHSC, the CONTRACTOR must enter into and execute a contract and furnish a Performance and Payment bond, as required by law.

5.11 Certification for Safety and Health Programs for Offers in excess of $100,000

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

5.12 LABOR AND WAGE CERTIFICATION

In accordance with HRS 104 Wages and Hours of Employment on Public Works Construction Projects in excess of $2000, by submitting this proposal, the Offeror will comply with the requirements of chapter 104 and certifies that:

a. Individuals engaged in the performance of the contract on the job site shall be paid not less than wages that the Director of Labor and Industrial Relations shall have determined to be prevailing for corresponding classes of laborers and mechanics employed on public works projects including any periodic adjustments to the prevailing wages during the performance of the contract;

b. Overtime compensation shall be at one and one-half times the basic hourly rate plus fringe benefits for hours worked on Saturday, Sunday, or legal holiday of the State or in excess of eight hours on any other day; and

c. All applicable laws of the federal and state governments relating to workers' compensation, unemployment compensation, payment of wages, and safety shall be fully complied with.

5.13 For offers of $25,000 or more , the bidder shall comply with the following chapters of the Hawaii Revised Statutes (HRS): Chapter 237 HRS (general excise tax); Chapter 383 HRS (employment security - unemployment insurance); Chapter 386 HRS (workers compensation); Chapter 392 (temporary disability insurance); Chapter 393 HRS (pre-paid health care); and shall be incorporated or organized under the laws of the State, or be registered to do business in the State as a separate branch or division that is capable of fully performing under the contract. Offeror shall complete the CERTIFICATION OF COMPLIANCE form (APPENDIX F) and submit it with the proposal.

5.14 CONTRACT EXECUTION

Upon receipt of the CONTRACT document, the CONTRACTOR shall have ten (10) business days to execute and return the CONTRACT to the Issuing Officer. Explicit execution instructions will accompany the CONTRACT. A copy of the fully executed CONTRACT will be provided the CONTRACTOR within seven (7) business days of CONTRACT execution.

Award of CONTRACT may be withdrawn if the CONTRACTOR is unable to meet CONTRACT execution requirements.

5.15 CONTRACT COMMENCEMENT DATE

Upon completion of CONTRACT execution requirements, a **"Notice to Proceed"** letter will be provided the CONTRACTOR specifying the "Commencement" (start work) date of the CONTRACT. No work is to be undertaken by the CONTRACTOR prior to the commencement date specified in the Notice to Proceed letter. HHSC is not liable for any work, contract, costs, expenses, loss of profits, or any damages whatsoever incurred by the CONTRACTOR prior to the official, notice to proceed "Commencement" date.

5.16 HEALTH AND HR REQUIREMENTS

a. Health, Insurance and Confidentiality requirements: If applicable, Offeror must ensure that personnel have the required health clearances and that all health, insurance and confidentiality requirements are maintained. Each individual performing on site work must be cleared with the Hospital's Human Resources and Employee Health Departments before starting work to include:

1. Facility will perform or Contractor will provide evidence of:
   a) If Facility performs the State and Federal background checks, the cost is $20 per individual billable to the Contractor. The Facility will bill the Contractor for the amount of checks performed. The Contractor should make prior arrangements with the Facility's HR Department to coordinate the checks and continued work is contingent upon satisfactory clearance of the background checks.

   b) OIG/GSA clearance.

2. Contractor will provide satisfactory evidence of the following:
   a) TB clearance – 2 step TST or historical documentation of a 2-step TST and a current skin test within 30 days of start date, or in the case of a positive TST, Chest X-ray with no evidence of active TB within the past (12) months. TB clearance shall be provided annually.

Drug screen – 10 panel drug screen, marijuana, cocaine, opiates, amphetamines [including crystal methamphetamine, phencyclidine (PCP), barbiturates, propoxyphene, methaquolone, benzodiazephine, and methadone] which is required within 30 days of start.

APPENDIX A

SAMPLE
PROPOSAL TRANSMITTAL COVER LETTER

Ms. Shirai:

(Name of Business) proposes to provide any and all goods and services as set forth in the "Request for Proposals for Competitive Sealed Proposals" to provide the **"ELECTRICAL UPGRADE"** Kauai Veterans Memorial Hospital, **RFP #18-10** , for which fees/costs have been set. The fees/costs offered herein shall apply for (Please insert applicable period of time).

It is understood and agreed that (Name of Business) have read HHSC's Scope of Services described in the RFP and that this proposal is made in accordance with the provisions of such Scope of Services. By signing this proposal, (Name of Business) guarantee and certify that all items included in this proposal meet or exceed any and all such Scope of Services.

(Name of Business) agree, if awarded the contract, to provide the goods and services set forth in the RFP; and comply with all terms and conditions indicated in the RFP; and at the fees/costs set forth in this proposal. The following individual(s) may be contacted regarding this proposal:

_____

_____

Other information:

Business Phone #:		Federal Tax ID #:	
Facsimile #:		Hawaii GET Lic. ID #:	
E-mail address:			

(Name of Business) is a: ☐ Sole Proprietor ☐ Partnership ☐ Corporation ☐ Joint Venture Other (Specify) _____

State of Incorporation is: (Specify) _____

The exact legal name of the business under which the contract, if awarded, shall be executed is:

_____

Business Address: _____

(Authorized Bidder's Signature, Printed Name/Title; Corporate Seal or Notarized)

Encl: Proposal

APPENDIX B

PROPOSAL SUBMISSION CHECKLIST

*Please Check Off Items Submitted	For HHSC Use	
	☐	Proposal Received "On-Time"
☐	☐	One Original; two copies; one electronic copy of Proposals
☐	☐	Proposal Transmittal Cover Letter:
☐	☐	Official Business Letterhead
☐	☐	Authorized Signature
☐	☐	Corporate Seal or Notarized
☐	☐	Required Information
		Technical Proposal
☐	☐	Technical Summary
☐	☐	Background, Qualification & Experience
☐	☐	Technical Proposal
☐	☐	Personnel Organization and Staffing
☐	☐	Management & Control
☐	☐	Cost Proposal
☐	☐	Certificate of Compliance
☐	☐	Certificate of Good Standing
☐	☐	Bid Security (5% of Total Lump Sum Proposal Amount)
☐	☐	All Data and Information Required of the RFP
☐	☐	Proprietary Documents (optional)
☐	☐	Others (optional)
☐	☐	Proposal Submission Checklist
☐	☐	General Excise License

APPENDIX C

HAWAII HEALTH SYSTEMS CORPORATION
AGREEMENT FOR GOODS OR SERVICES
BASED UPON COMPETITIVE SEALED PROPOSALS

AGREEMENT NO: FY_____

THIS AGREEMENT, by and between Kauai Region, a division of the Hawaii Health Systems Corporation, a public body corporate and politic and an instrumentality and agency of the State of Hawaii (hereinafter "HHSC"), by its Regional Chief Executive Officer (hereinafter "RCEO"), whose address is 4643 Waimea Canyon Drive, Waimea, Hawaii 96796, and _____, (hereinafter "CONTRACTOR"), a _____, under the laws of the State of _____ whose business address and taxpayer identification number are as follows:

RECITALS

A. The HHSC is in need of the goods or services, or both, described in this Agreement and its attachments.

B. The HHSC has issued a request for competitive sealed proposals, and has received and reviewed proposals submitted in response to the request.

C.

D. The CONTRACTOR has been identified as the responsible and responsive offeror whose proposal is the most advantageous for the HHSC, taking into consideration price and the evaluation factors set forth in the request.

E. The HHSC desires to retain and engage the CONTRACTOR to provide the goods or services, or both, as the case may be, and the CONTRACTOR is agreeable to providing said goods or services, or both.

NOW, THEREFORE, in consideration of the promises contained in this Agreement, the HHSC and the CONTRACTOR agree as follows:

1. **Scope of Services.** The CONTRACTOR shall, in a proper and satisfactory manner as determined by the HHSC, provide all the services set forth in the request for competitive sealed proposals, **RFP #18-10** ("REQUEST"), and the CONTRACTOR's accepted proposal, including any and all revisions/addendum's/negotiated agreements thereto (collectively "PROPOSAL"), both of which, even if not physically attached to this Agreement, are hereby made a part of this Agreement.

2. **Time of Performance.** The performance required of the CONTRACTOR under this Agreement shall be executed in accordance with the time period set forth in Attachment S2.

3. **Compensation.** The CONTRACTOR shall be compensated for goods supplied or services performed, or both, under this Agreement in a total amount not to exceed _____DOLLARS ($ _____), including taxes, at the time and in the manner set forth in the RFP and CONTRACTOR's proposal.

4. **Bonds.** The CONTRACTOR (is) required to provide a (performance and payment) bond.

5. **Standards of Conduct Declaration.** The Standards of Conduct Declaration of the CONTRACTOR, is attached and is made a part of this Agreement.

6. **Other Terms and Conditions.** The DAGS Interim General Conditions and any Special Conditions are attached hereto and made a part of this Agreement. In the event of a conflict between the DAGS Interim General Conditions and the Special Conditions, the Special Conditions shall control. In the event of a conflict among the documents, the order of precedence shall be as follows: (1) Agreement, as may be amended by supplemental amendments from time to time, (2) Special Conditions, (3) DAGS Interim General Conditions, (4) Request, including all attachments and addenda; and (3) Proposal.

7. **Liquidated Damages.** Liquidated damages shall be assessed in the amount of TWO HUNDRED FIFTY DOLLARS ($250.00) per day.

8. **Notices.** Any written notice required to be given by any party to this Agreement shall be (a) delivered personally, or (b) sent by United States first class mail, postage prepaid. Notice required to be given to the RCEO shall be sent to: HHSC, Head of Purchasing Agency (HOPA) / CEO, 4643 Waimea Canyon Drive, Waimea, Hawaii 96796. Notice to the "head of the purchasing agency" and/or "Agency Procurement Officer" as denoted in the General Conditions shall be sent to: HHSC, Attn: Procurement Office, 4643 Waimea Canyon Drive, Waimea, Hawaii 96796. Notice to the CONTRACTOR shall be sent to the CONTRACTOR's address as indicated in this Agreement. A notice shall be deemed to have been received three (3) days after mailing or at the time or actual receipt, whichever is earlier. The CONTRACTOR is responsible for notifying the HHSC in writing of any change of address.

[**REMAINDER OF PAGE INTENTIONALLY LEFT BLANK. SIGNATURES APPEAR ON THE FOLLOWING PAGE.**]

IN VIEW OF THE ABOVE, the parties execute this Agreement by their signatures, on the dates below, to be effective as of the date first above written.

HHSC _____
(Signature)

Lance Segawa
(Printed Name)

Regional Chief Executive Officer - Kauai
(Title)

_____
(Date)

***CONTRACTOR** _____
(Signature)

_____
Printed Name:

_____
(Title)

_____
(Date)

*** Evidence of authority of the CONTRACTOR's representative to sign this Agreement for the CONTRACTOR must be attached.**

STATE OF HAWAII

CONTRACTOR'S ACKNOWLEDGMENT

STATE OF _____)
) SS.
_____ COUNTY OF _____)

On this _____ day of _____, _____ before me appeared _____ and _____, to me known, to be the person(s) described in and, who, being by me duly sworn, did say that he/she/they is/are _____ and _____ of _____, the CONTRACTOR named in the foregoing instrument, and that he/she/they is/are authorized to sign said instrument on behalf of the CONTRACTOR, and acknowledges that he/she/they executed said instrument as the free act and deed of the CONTRACTOR.

(Notary Stamp or Seal)

_____
(Signature)

_____
(Print Name)

Notary Public, State of _____

My commission expires: _____

Doc. Date: _____ # Pages: _____

Notary Name: _____ _____ Circuit

Doc. Description: _____

_____

_____

(Notary Stamp or Seal)

_____ _____
Notary Signature Date

NOTARY CERTIFICATION

STANDARDS OF CONDUCT DECLARATION

For the purposes of this declaration:

"Controlling interest" means an interest in a business or other undertaking which is sufficient in fact to control, whether the interest is greater or less than fifty percent (50%).

"Employee" means any nominated, appointed, or elected officer or employee of the State or HHSC, including members of boards, commissions, and committees, and employees under contract to the State or of the constitutional convention, but excluding legislators, delegates to the constitutional convention, justices, and judges.

On behalf of _____, CONTRACTOR, the undersigned does declare, under penalty of perjury, as follows:

1. CONTRACTOR (is) (is not) a legislator or an employee or a business in which a legislator or an employee has a controlling interest.*

2. CONTRACTOR has not been assisted or represented by a legislator or employee for a fee or other compensation to obtain this Agreement and will not be assisted or represented by a legislator or employee for a fee or other compensation in the performance of the Agreement, if the legislator or employee had been involved in the development or award of the Agreement.

3. CONTRACTOR has not been assisted or represented for a fee or other compensation in the award of this Agreement by a State or HHSC employee or, in the case of the Legislature, by a legislator.

4. CONTRACTOR has not been represented or assisted personally on matters related to the Agreement by a person who has been an employee of the State or HHSC within the preceding two (2) years and who participated while in state office or employment on the matter with which the Agreement is directly concerned.

5. CONTRACTOR has not been represented or assisted on matters related to this Agreement, for a fee or other consideration by an individual who, within the past twelve (12) months, has been a State or HHSC employee, or in the case of the Legislature, a legislator.

6. CONTRACTOR has not been represented or assisted in the award of this Agreement for a fee or other consideration by an individual who, 1) within the past twelve (12) months, served as a State or HHSC employee or in the case of the Legislature, a legislator, and b) participated while an employee or legislator on matters related to this Agreement.

CONTRACTOR understands that the Agreement to which this document is attached is voidable on behalf of the State or HHSC if this Agreement was entered into in violation of any provision of chapter 84, Hawaii Revised Statutes, commonly referred to as the Code of Ethics, including the provisions which are the source of the declarations above. Additionally, any fee, compensation, gift, or profit received by any person as a result of a violation of the Code of Ethics may be recovered by the State or HHSC.

CONTRACTOR

By:_____
Title:_____
Date:_____

*Reminder to FACILITY: if "is" is circled, YOUR FACILITY is required, under section 84-15, Hawaii Revised Statutes, to file with the State Ethics Commission, ten (10) days before the Agreement is entered into, a written justification as to why the Agreement was not required to be competitively bid.

ATTACHMENT 1

Scope of Services

A. The CONTRACTOR shall provide services for the "ELECTRICAL ROOM UPGRADE" as specified in the Request for Proposal ("RFP") No. 18-10, at Kauai Veterans Memorial Hospital.

B. RFP No. 18-10 inclusive of all addendums and the Proposal, although not physically attached, is incorporated herein and made a part of this Agreement.

C. The Kauai Region Technical Representative shall have the right to oversee the successful completion of contract requirements, including monitoring, and coordinating and assessing CONTRACTOR performance, and approving completed work/services with verification of same prior to the approval of a CONTRACTOR invoice. The Technical Representative also services as the point of contact for the CONTRACTOR for "Technical" matters (non-contractual) from award to contract completion. The Kauai Region Technical Representative John Pimental, Regional Director of Facilities.

ATTACHMENT 2

Time of Performance

A. This Agreement shall commence on the Notice to Proceed Date as set for the in the RFP #18-10 and continue for period of one (1) year unless sooner terminated or extended as provided in the Agreement.

B. This Agreement may be extended for two (2) one (1) year terms, subject to mutual written agreement between Kauai Region and the CONTRACTOR prior to the end of the then current contract period. A supplemental agreement shall be executed by the CONTRACTOR and Kauai Region to exercise any and all extensions.

ATTACHMENT 3

Compensation

A. In full consideration for the services to be performed by the CONTRACTOR under this Agreement, the HHSC agrees, subject to appropriation and allotments, to pay to the CONTRACTOR a total sum of money not to exceed _____ **DOLLARS ($000,000.00),** including all applicable taxes and expenses incurred, and in accordance with the following:

1. Base bid: $_____

B. The CONTRACTOR shall submit invoices to the Facility's Technical Representative for approval and payment. Invoices shall reference the Agreement number and include, at a minimum, an itemized account of all compensation due.

SPECIAL CONDITIONS

A. These Special Conditions are attached to the Agreement and incorporated by reference. In the event there is a conflict between the terms of the documents, or an ambiguity exists among the terms of the documents, the following order of priority shall prevail, with "1" being given the highest priority:

1. HHSC Special Conditions
2. DAGS Interim General Conditions
3. The solicitation documents and all addenda [indicate: RFP; IFB; or other].
4. CONTRACTOR's Terms and Conditions.
5. CONTRACTOR's proposal and best offer.

B. The State of Hawaii Department of Accounting and General Services ("DAGS") Interim General Conditions, dated August 1999, as may be amended from time to time (the "Interim General Conditions"), shall be read by the CONTRACTOR as they form a part of this Agreement. The Interim General Conditions are not physical included in these specifications, but are included by reference. Copies of the Interim General Conditions may be obtained from the Division of Public Works, DAGS, State of Hawaii at the following website:
https://pwd.hawaii.gov/wp-content/uploads/2014/12/InterimGeneralConditions1999Edition.pdf

C. The Interim General Conditions are hereby amended as follows:

1. The following terms specified in Section 1 are hereby defined as follows:
   a) "Bidder" shall have the same definition as CONTRACTOR.
   b) "Comptroller" shall be the Chief Financial Officer of the HHSC Kauai Region or his authorized representative.
   c) "Department" shall be HHSC or its designee.
   d) "Engineer" shall be the person so designated by Kauai Region
   e) "State" shall be HHSC or its designee.

2. Section 1.20 and 1.25 replace "State of Hawaii" with "State".

3. The last two sentences of the third paragraph of Section 2.1.1.2, of the Interim General Conditions is deleted and replaced with the following:
   If the notice is faxed, the time of receipt by the RCEO's fax machine shall be official.

4. Section 2.1.2.1 is amended by deleting the second sentence in its entirety.

5. The address specified in Section 2.6.1 of the Interim General Conditions shall be changed to HHSC Kauai Region, 4643 Waimea Canyon Drive, Waimea, Hawaii 96796

6. Section 2.10 through 2.11 is hereby deleted in their entirety.

7. Section 3.8.1 is amended to read as follows:

   The contract shall be signed and forwarded to HHSC, by the successful bidder all within three (3) days of receipt of the contract. The performance and payment bonds shall be received by HHSC within (10) calendar days after the bidder is awarded the contract. No proposal or contract shall be considered binding upon the State until the contract has been fully and properly executed by all parties thereto.

8. Section 3.9.2 is amended by replacing "ten (10) calendar days after such award or within such further time as the Comptroller may allow" with "the time allowed in the previous section".

9. Section 4.1 is amended by deleting the words "accepted bid" from the first sentence.

10. Section 4.9.3 is amended by replacing the words "submission of bids" with "execution of this contract"..

11. Sections 5.5 is amended by deleting the last sentence and replacing it in its entirety as follows:

    In the event of conflict among the Contract Documents, the order of precedence is listed in Section 6 of this Agreement and as further detailed in the following subparagraphs:

12. Section 5.5.1 and 5.5.2 are hereby deleted in their entirety.

13. Section 5.8.1 is amended by replacing "twenty-four (24)" with "three (3)".

14. Section 5.11 is hereby deleted in its entirety.

15. Section 5.12.4 is hereby deleted in its entirety.

16. Section 7.3.7.4, subparagraphs a. and b. are amended by replacing the words "State University System, The University of Hawaii" with "HHSC".

17. Section 7.4.1 is hereby deleted in its entirety and replaced with the following:

    The Contractor shall prepare, process, obtain, and pay for all permits necessary for the proper execution of the work.

18. Sections 7.14.2, 7.19.2, and 7.19.4 are hereby amended by deleting the words "Departments and Agencies and their" and insert "directors" between "officers" and "representatives".

19. A new Section 7.14.4 is hereby added as follows:

CONTRACTOR warrants that it and none of its employees, agents or subcontractors performing services or providing goods pursuant to this Agreement are excluded from participating in federal health care programs, as defined in the Social Security Act (section 1128 and 1128A), and other federal laws and regulations relating to health care. HHSC reserves the right to verify that the above warranty is true and to immediately cancel this Agreement in the event is violated.

20. Section 7.15 is amended by deleting the words "and its Departments and Agencies".

21. Section 7.21.8.6 is amended by deleting the word "bad" from the words "weather day conditions."

22. Section 7.35.1 is amended by replacing the word "earlier" with the word "later".

23. A new Section entitled Corporate Compliance Program is hereby added to the Interim Special Conditions:

CORPORATE COMPLIANCE PROGRAM. A description of the Corporate Compliance Program is posted on the HHSC internet (www.hhsc.org). The CONTRACTOR, by signing this contract, acknowledges that it has read said description, and that the CONTRACTOR knows of the fact and substance of the Corporate Compliance Program, which governs operations at all facilities of the HHSC. The CONTRACTOR understands and agrees that employees, agents, and contractors performing any services at any of the HHSC facilities shall be fully subject to such Corporate Compliance Program, as may be amended from time to time, as well as all federal program requirements and applicable policies and procedures of HHSC and its facilities. The Corporate Compliance Program requires periodic training, including an orientation program, of all people who provide financial, business office, personnel, coding, medical records information systems and clinical services in the facility. The CONTRACTOR agrees to cause its employees, agents, and contractors who provide any services at any financial, business office, personnel, coding, medical records information systems and clinical services at any of the HHSC facilities to participate in the orientation and training programs.

24. A new Section entitled Confidentiality of Material is hereby added to the Interim Special Conditions as follows:

CONFIDENTIALITY OF MATERIAL.

a. All material given to or made available to the CONTRACTOR by virtue of this Agreement, which is identified as proprietary or confidential information, will be safeguarded by the CONTRACTOR and shall not be disclosed to any individual or organization without the prior written approval of the HHSC. It is acknowledged and agreed that all the trade secrets, business plans, marketing plans, know how, data, contracts,

including this Agreement, documents, scientific and medical concepts, billing records, personnel records, medical records of any kind, and referral sources for existing or future services, products, operations, management, business, pricing, financial status, valuations, business plans, goals, strategies, objectives and agreements of HHSC an any of its facilities, affiliates or subsidiaries, and all patient information in any form, whether written, verbal or electronic are confidential ("Confidential Information"); provided, however, that Confidential Information, with the exception of patient information, shall not include information that is in the public domain.

b. All information, data, or other material provided by the CONTRACTOR to the HHSC is subject to the Uniform Information Practices Act, chapter 92F, HRS, as modified by chapter 323F HRS.

25. A new Section entitled Contractor Exclusion from Federal Programs is hereby added to the Interim Special Conditions as follows:

CONTRACTOR EXCLUSION FROM FEDERAL PROGRAMS. CONTRACTOR warrants that it and none of its employees, agents or subcontractors performing services or providing goods pursuant to this Agreement are excluded from participation in federal health care programs, as defined in the Social Security Act (section 1128 and 1128A), and other federal laws and regulations relating to health care. HHSC reserves the right to verify that the above warranty is true and to immediately cancel this Agreement in the event it is violated.

26. A new Section entitled Campaign Contributions is hereby added to the Interim Special Conditions as follows:

CAMPAIGN CONTRIBUTIONS. CONTRACTOR acknowledges that it is unlawful under Section 11-355, Hawaii Revised Statutes, unless specifically permitted under that law, for CONTRACTOR at any time between the execution of this Agreement through the completion of the Agreement to: (a) directly or indirectly make any contribution or to promise expressly or impliedly to make any contribution to any political party, committee or candidate or to any person for any political purpose or use; or (b) knowingly solicit an contribution from any person for any purpose during any period.

APPENDIX D

SPECIALIZED EXPERIENCE
CONSTRUCTION OR PRIME CONTRACTOR

Provide the following information to show examples of projects your company constructed within the last five years indicating experience with projects of similar type and scope. Use one form per project. Each project shall not exceed 2 pages.

Your Firm's Name: _____

Name of Project: _____

Location of Project: _____

Owner: _____

General Scope of Construction Project:

_____

_____

_____

_____

Your Role (Prime, Joint Venture, or Subcontractor, etc.)

_____

Construction cost: _____

Extent and type of work you subcontracted out: _____

_____

_____

Dates Construction: Began _____ Completed _____
A/E name if Design Assist/Build: _____

Were you terminated or assessed liquidated damages? _____
If either yes, please explain _____

Owner's point of contact for reference
Name: _____
Company: _____
Phone: _____

APPENDIX E

CERTIFICATION OF COMPLIANCE

_____ certifies it is in compliance with all laws
(Company Name)

governing entities doing business in the State, including the following:

1. Chapter 237 HRS (General Excise Tax)
2. Chapter 383 HRS (Hawaii Employment Security Law - Unemployment Insurance)
3. Chapter 386 HRS (Workers' Compensation Law)
4. Chapter 392 HRS (Temporary Disability Insurance)
5. Chapter 393 HRS (Prepaid Health Care Act)
6. Offeror / Bidder is incorporated or organized under the laws of the State or is registered to do business in the State as a separate branch or division that is capable of fully performing under the contract.

Furthermore, _____ acknowledges that
(Company Name)
making a false certification shall cause its suspension from further offerings or awards.

Signature: _____ Date:_____

Print Name: _____

Title: _____

APPENDIX F

BID FORM

FOR

FURNISHING LABOR, MATERIALS, EQUIPMENT AND OTHER TOOLS

REQUIRED FOR

KAUAI VETERANS MEMORIAL HOSPITAL

ELECTRICAL UPGRADE
RFP NO. 18-10

TAX MAP KEY: 1-2-06: PARCEL 35, LOT 14

WAIMEA, KAUAI, HAWAII
FOR THE
HAWAII HEALTH SYSTEMS CORPORATION
STATE OF HAWAII

After carefully examining the bid documents, drawings and specifications identified above, the Offeror proposes to furnish at its own expenses all necessary labor, materials, tools and equipment to complete the work according to the true intent and meaning of the drawings and specifications, all for the Lump Sum Base Bid of:

_____DOLLARS ($_____)

(Schedule of Values shall be submitted in bid)
In addition, please submit pricing for:

Option #1: $_____

Submitted By:

_____ _____
Signature / Printed Name Date

_____
Title

_____(Name of Business) is a: ☐ Sole Proprietor

☐ Partnership ☐ Corporation ☐ Joint Venture Other (Specify)_____
Business Address: _____
Business Phone Number: _____
E-mail address: _____
Federal TAX ID #: _____
Hawaii GET Lic ID #: _____

State of Incorporation is: (Specify)_____.

The exact legal name of the business under which the contract, if awarded, shall be executed is:_____

_____

RECEIPT OF ADDENDA

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

Addendum No. 1 _____	Addendum No. 4 _____
Addendum No. 2 _____	Addendum No. 5 _____
Addendum No. 3 _____	Addendum No. 6 _____

It is understood that failure to receive any such addendum shall not relieve the Bidder from any obligations under this Proposal as submitted.

ALL JOINT CONTRACTORS OR SUBCONTRACTORS TO BE ENGAGED ON THIS PROJECT

The Bidder agrees that following is a complete listing of all joint contractors or subcontractors covered under Chapter 444 HRS, who will be engaged by the Bidder on this project to perform the required work. The Bidder certifies that it and its listed subcontractors or joint contractors together hold all licenses necessary to complete the Work, and understands that failure to comply with this requirement may be just cause for rejection of the bid.

'A' General Engineering Contractors and 'B' General Building Contractors are reminded that due to the Hawaii Supreme Court's January 28, 2002 decision in Okada Trucking Col, 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. Although the 'A' and 'B' Contractor may still bid on and act as the "Prime Contractor" on an 'A' or 'B' project *(See, HRS § 444-7 for the definitions of an "A" and "B" project.)*, respectively, the 'A' and 'B' contractor may only perform work in the areas in which they have the appropriate contractor's license *(An 'A' or 'B' Contractor obtains 'C' specialty contractor's license either on its own, or automatically under HAR § 16-77-32)*. The remaining work must be performed by appropriately licensed entities. It is the sole responsibility of the Contractor to review the requirements of this Project and determine the appropriate licenses that are required to complete the Project.

The Bidder shall provide the complete firm name, license number and nature and classification description by each joint contractor or subcontractor. For projects with Alternate(s), Bidders shall fill out the supplementary schedule and list the Joint Contractor or Subcontractor who will be engaged for the respective Alternate Work. Do not include any Joint Contractor or Subcontractor previously listed.

Bidders shall list only joint contractor or subcontractor per required specialty contractor's license.

Class	Classification Description	License	Complete Firm Name Joint Contractor or Subcontractor

Enclosed herewith:

1. Surety Bond (*1)
2. Legal Tender (*2)
3. Cashier's Check (*3)
4. Certificate of Deposit (*3)
5. Certified Check (*3)
6. Official Check (*3)
7. Share Certificate (*3)
8. Teller's Check (*3)
9. Treasurer's Check (*3)

_____DOLLARS ($_____) as required by law.

(*5) NOTES:
1. Surety bond underwritten by a company licensed to issue bonds in this State;
2. Legal tender; or
3. A certificated of deposit; share certificate; or cashier's, treasurer's, teller's, or official check drawn by, or certified check accepted by, and payable on demand to the State by a bank, or 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.
4. 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.
5. Fill in all blank spaces with information asked for or bid may be invalidated. PROPOSAL MUST BE INTACT, MISSING PAGES MAY INVALIDATE YOUR BID.

CERTIFICATION OF COMPLIANCE

_____ certifies it is in compliance with all laws
(Company Name)

Governing entities doing business in the State, including the following:

1. Chapter 237 HRS (General Excise Tax)
2. Chapter 383 HRS (Hawaii Employment Security Law – Unemployment Insurance)
3. Chapter 386 HRS (Worker's Compensation Law)
4. Chapter 392 HRS (Temporary Disability Insurance)
5. Chapter 393 HRS (Prepaid Health Care Act)
6. OFFEROR / Bidder is incorporated or organized under the laws of the State or is registered to do business in the State as a separate branch or division that is capable of fully performing under the contract.

Furthermore, _____ acknowledges that making a
(Company Name)
false certification shall cause its suspension from further offerings or awards.

_____ _____

Signature Date

_____

Printed Name

_____

Title

(NOTARIZATION)

END OF BID FORM

EXHIBIT A

KAUAI VETERANS MEMORIAL HOSPITAL
ELECTRICAL UPGRADES DESIGN PHASE (LN #18-0250)
KAUAI, HAWAII

Prepared for:
Hawaii Health Systems Corporation (HHSC)
Honolulu, Hawaii

TECHNICAL SPECIFICATIONS

BID SET

APRIL 2018

INSYNERGY ENGINEERING INC

828 Fort Street Mall, Suite 500 • Honolulu, Hawaii 96813
Tel: 808 521-3773

TABLE OF CONTENTS

SECTION 01715 - EXISTING CONDITIONS - ASBESTOS / LEAD / HAZARDOUS MATERIAL SURVEY

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the results of the State's survey for Asbestos Containing Materials, Lead-Containing Paint, and other hazardous materials and is provided for the Contractor's information.

B. Related Sections include the following:

1. SECTION 13281 – ASBESTOS ABATEMENT for requirements of all work which disturbs asbestos containing materials. Also, refer to the drawings.

2. SECTION 13282 – LEAD- CONTAINING PAINT CONTROL MEASURES for requirements of all work which disturbs LCP. Also, refer to the drawings

3. SECTION 13286 – ARSENIC CONTROL MEASURES for requirements of all work which disturbs arsenic containing materials. Also, refer to the drawings.

2. SECTION 13288 - TESTING AND AIR MONITORING for requirements of all work which disturbs LCP. Also, refer to the drawings.

1.02 ASBESTOS

A. The structure or structures to be renovated or modified under this contract were surveyed for the presence of asbestos containing building materials (ACBM), using AHERA requirements. A copy of the initial survey report, as well as any subsequent supplemental survey report(s) if performed, are included in this Section.

1. The report(s) are included, even when no ACBM was found, for the Contractor's information. Review the attached report(s) for the basis on which the negative ACBM finding was made. Contractor may perform further surveys at its own expense, if ACBM not shown in the report(s) is suspected in the areas of the building(s) in which work will be performed. If ACBM is found, notify the Contracting Officer immediately. The State will reimburse the Contractor for the testing cost if ACBM is found.

2. If there is ACBM outside of the areas in which work will be performed, this ACBM shall not be disturbed in any way.

B. If applicable, notify employees, Subcontractors and all other persons engaged on the project of the presence of asbestos in the existing buildings in accordance with the requirements of Chapter 110, Article 12-110-2 (f) (1) (B) of the Occupational Safety and Health Standards, State of Hawaii.

C. In the event that work is required in any building or buildings on the site other than the one(s) designated within this project scope, request copies of the asbestos survey report(s) for such building(s) from the Contracting Officer. Based on the information contained in the additional survey(s), notify affected personnel per paragraph 1.02 B.

1.03 LEAD CONTAINING PAINT

A. Inform employees, Subcontractors and all other persons engaged in the project that lead containing paints (LCP) is present in the existing building(s) and at the job site. Follow the requirements of Title 12 (Department of Labor and Industrial Relations), Subtitle 8 (Division of Occupational Safety and Health), Chapter 148 (Lead Exposure in Construction), Hawaii Administrative Rules.

B. Review the attached lead testing data which identify locations LCP was found. Lead testing was for design purposes only, and the results do not satisfy any of the requirements of Chapter 12-148.

1.04 ARSENIC-CONTAINING MATERIAL

A. Inform employees, Subcontractors, and all other persons engaged in the project that arsenic containing materials are present in other areas of the existing building(s) and at the job site. If arsenic containing materials are disturbed, follow the requirements of Title 12 (Department of Labor and Industrial Relations), Subtitle 8 (Division of Occupational Safety and Health), Chapter 60 (General Safety and Health Requirements), Hawaii Administrative Rules.

B. Review the attached survey inspection data which denotes that arsenic containing materials are present in the areas surveyed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 SURVEY attached, 47 pages, dated September 2017, prepared by Environmental Risk Analysis LLC.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09900 PAINTING

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

A. Drawings and other provisions of contract, including General and Supplementary Conditions and other Division I specifications apply to this section.

1.02 SUMMARY

A. The work includes painting and finishing of exterior and interior items and surfaces throughout the project, whether scheduled or not, except as otherwise indicated. Painting shall include new work and existing new surfaces made bare or damaged during construction. Surface preparation, priming, and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of the work and is included in this Section.

B. The work includes field painting of exposed bare and covered pipes and conduits (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under the electrical work, such as junction boxes, raceways, and cabinets, except as otherwise indicated.

C. “Paint” as used herein means all coating systems materials, including primers, enamels, sealers, stain, varnish, and fillers, and other applied materials whether used as prime, intermediate, or finish coats, except as specifically noted herein.

D. Paint all exposed surfaces whether or not colors are designated in “schedules”. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color orfinish is not designated, the Engineer will select these from standard colors available for the materials systems specified.

1.03 PAINTING NOT INCLUDED

A. The following categories of work are not included as part of the field-applied finish work, or are included in other sections of these specifications.

1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for miscellaneous metal, hollow metal work, and similar items. Also, for fabricated components such as shop fabricate or factory-built mechanical and electrical equipment or accessories.
2. Electrical Work: The prime coat for electrical work is specified in DIVISION 16 - ELECTRICAL. Finish coats are as specified herein.
3. Concealed Surfaces (Present and Future): Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, and pipe spaces.
4. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, and similar finished materials will not require finish painting, unless otherwise indicated.
5. Labels: Do not paint over any code-required labels, such as Underwriters' Laboratories, or any equipment identification, performance rating, name, or nomenclature plates.

1.04 SUBMITTALS

A. Schedule of Finishes: Submit sets of the proposed painting finish schedule to the Engineer for acceptance. The schedule shall indicate the wet film thickness (mils) at which the proposed paints/coatings will be applied that are necessary to achieve the final dry film thickness indicated on the Schedule of Finishes under item entitled "SCHEDULE OF FINISHES" hereinbelow.

B. Color Samples: All colors shall match existing. Color samples are not required. Contractor shall be responsible for tinting colors to match existing as found in the field.

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

D. Warranty: Submit warranty as stipulated in item entitled "WARRANTY" hereinbelow.

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

F. Manufacturer's Product Data Sheets: Submit copies of the manufacturer's product data sheets for the primers, paints, coatings, solvents, sealing and patching materials, sealants and caulking, and other materials being

used. Data sheets shall indicate thinning and mixing instructions, required film thickness (mil) and application instructions.

G. Manufacturer's Material Safety Data Sheets (MSDS): Submit copies of the manufacturer's material safety data sheets for coatings, solvents, and other hazardous materials.

1.05 ANALYZING AND TESTING

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

B. All rejected material shall be removed from the job site immediately. Surfaces painted with the rejected material shall be redone at no additional cost to the Owner.

C. Where the required paint thickness is deficient, the affected surface(s) shall be recoated as necessary to provide the required paint thickness at no additional cost to the Owner.

1.06 QUALITY ASSURANCE

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

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

Description	Units at 60 Degrees	Units at 85 Degrees
Matte or Flat	0 to 5	10 max
Velvet	0 to 10	10 to 35
Eggshell	10-25	10 to 35
Satin	20 to 35	35 min
Semi-Gloss	35 to 70	
Glss	70 to 85	
High Gloss	More than 85	

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

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

1.07 WARRANTY

A. The Contractor shall warrant that the work performed under this Section conforms to the contract requirements and is free of any defect in the materials used and workmanship performed by the Contractor. Such warranty shall continue for a period of one year from the project acceptance date and the Contractor shall remedy any such defect which is discovered during that period at no cost to the Owner.

B. The Owner will notify the Contractor in writing within a reasonable time after discovery of any failure or defect.

C. C, Should the Contractor fail to remedy any failure or defect described in Paragraph A above within 10 working days after receipt of notice thereof, the Owner shall have the right to repair or otherwise remedy such failure or defect and charge the Contractor for the cost of same.

1.08 SPECIAL REQUIREMENTS

A. Codes: The Contractor shall comply with the State OSHL (Occupational Safety and Health Law) and all pollution control regulations of the State Department of Health.

B. Safety methods used during coating application shall comply with SSPC-PA Guide 3.

C. Protection:
   1. Persons:
      a. The Contractor shall take all necessary precautions to protect public pedestrians, including tenants from injury.
      b. The Contractor shall provide, erect, and maintain safety barricades around scaffolds, hoists, and wherever Contractor's operation create hazardous conditions in order to properly protect the public and workmen.
   2. Completed Work: The Contractor shall provide all necessary protection for wet paint surfaces.
   3. Protective Covering: The Contractor shall provide and install protective covering over equipment, floor, and other areas that are not scheduled for treatment. Protective covering shall be clean, sanitary drop cloth or plastic sheets. Paint applied to surfaces not scheduled for treatment shall be completely removed and surfaces shall be returned to original condition.

4. Safeguarding of Property: The Contractor shall take whatever steps may be necessary to safeguard his work and also the property of the Owner and other individuals in the vicinity of the work area during the execution of this Contract. Contractor shall be responsible for and make good on any and all damages and for losses to work or property caused by his or his employee's negligence. Where the damaged property cannot be cleaned and restored to its original condition (i.e. prior to being damaged) it shall be replaced with a new product of equal quality. No proration or use of Husedhi products will be permitted.
5. Fire Safety: The Contractor shall direct his employees not to smoke in the vicinity and to exercise precautions against fire at all times. Waste rags, plastic (polyester sheets), empty cans, etc., shall be removed from the site at the end of each day.

D. Right of Rejection: The Engineer will have the right to reject all work which is not in compliance with the plans and specifications. Rejected work will be redone at no additional cost to the Owner. In addition, the Engineer will have the right to require the immediate removal of any paint applicator who demonstrates negligence, lack of competence or repeated non-compliance with the contract requirements.

E. Sequence of Operations: The sequence of operations shall divide the surfaces into work areas and present a schedule for:
1. Surface preparation and spot prime.
2. Prime coat.
3. First finish coat.
4. Second finish coat.

F. Inspection and Acceptance: The Contractor shall obtain written acceptance from the Engineer upon completion of each phase of work (phases of work are surface preparation and spot prime, prime, first finish coat, and second finish coat) before proceeding into the next phase of work. The Contractor shall give the Engineer one day (24 hours minimum) advance notice of completion of any phase of work for a work area only when he deviates from the previously submitted work schedule. The Contractor shall provide necessary access to areas to be inspected. Failure to obtain acceptance of any phase of work for a work area may result in redoing the operation at no cost to the Owner.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint materials to the job site in original unopened containers with original labels intact.

B. No paint material, empty cans and paint brushes and rollers, drop cloths and rags, may be stored in buildings, but shall be stored in separate storage facilities away from the buildings. Receiving, opening, and mixing of painting materials shall be done in this area.

C. The Contractor may furnish a job site storage facility. Such facility shall comply with requirements of the local Fire Department. The storage area shall be kept clean and facility shall be locked when not in use or when no visual supervision is possible.

D. Ensure the safe storage and use of paint materials and the safe storage or disposal of waste at the end of each work day.

E. Handle manufactured materials as recommended by the manufacturer.

PART 2- PRODUCTS

2.01 MATERIALS

A. Asbestos Prohibition: All paint shall be asbestos-free.

B. Lead Prohibition: All paint shall be lead-free.

C. Mercury Prohibition: All paint shall be mercury-free.

D. Chromate Prohibition: All paint shall be free of zinc-chromate and/or strontiumchromate.

E. Cadmium Prohibition: All paint shall be cadmium-free.

F. Material shall be equal in quality to that specified under the Schedule of Finishes and any given finish shall be as labeled by one manufacturer.

G. All materials shall be delivered to the job site in undamaged original containers bearing the manufacturer’s label and shall be stored in such a manner as to prevent damage. All rejected materials shall be removed from the job site immediately.

H. Paints shall be as manufactured by Benjamin Moore, Carboline, Dupont, Devoe, Devoe Coatings, Glidden, Glidden Professional, PPG Protective & Marine Coatings, Pittsburg, Sherwin-Williams, Tnemec, or accepted equivalent.

I. Thinning of paint shall be done using material recommended by the manufacturer. Mix proprietary products according to manufacturer’s

printed specifications. Compound thinner, mineral oil, kerosene, refined linseed oil, or gasoline shall not be used for thinning.

J. Except for metal primers, all paint shall contain maximum amount of mildewcide per gallon of paint permitted by the mildewcide manufacturer without adversely affecting the quality of the paint.

K. The supplier shall submit a signed certificate indicating the amounts of mildewcide added by both the paint manufacturer and the paint supplier. Mercurial fungicide shall not be used.

2.02 SCHEDULE OF FINISHES

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

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

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

D. Exterior Painting: Spread rates are approximate.
1. Concrete:
Prime Coat: N068 Super Spec Masonry
Interior/Exterior Acrylic High Build Masonry Primer
1.2 mils DFT @ 425 sf/gal
2nd and
3rd Coats: N448 Ultra Spec Ext Satin Finish
1.5 mils DFT @ 403 sf/gal/coat
2. Typical Coating System for Steel: Follow SSPC-SP-1 for solvent cleaning, for maximum protection follow SSPC-SP-10 near white metal blast.

Producer	Coat	Products	DFT (mils)	Min. Time to Recoat	Max. Time to Recoat
Corotech	1st	V175*	1.5-2.1	2 hours	2 weeks exterior 3 months interor
Corotech	2nd	V150	2.2-2.8	8 hours	4 weeks
Corotech	3rd	V500	2.3-3.3	8 hours	3 days

*for galvanized surfaces

E. Interior Paints: Use low VOC/low odor paint to maximum extent possible. Spread rates are approximate.
   1. Gypsum Wallboard and Concrete:
      Prime Coat: N372 Eco Spec WB Interior Latex Primer
      1.2 mils DFT @ 577 sf/gal
      2nd and
      3rd Coats: N374 Eco Spec WB Interior Latex Eggshell Finish
      1.4 mils DFT @412 sf/gal/coat
      or
      N376 Eco Spec WB Interior Latex Semi-Gloss Finish
      1.5 mils DFT @ 428 sf/gal/coat

2.03 COMPATIBILITY OF PAINTING SYSTEMS AND SUBSTRATES

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

B. Field Tests for Alkyd or Latex Paints: The Contractor shall perform the following field tests for compatibility of substrates to new paint systems prior to ordering paint:
   1. Latex films will dissolve when wiped with rubbing alcohol; alkyd films will not.
   2. When sanded, latex films will TTcIog 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 Engineer in writing of any incompatible systems specified and submit a revised Schedule of Finishes for acceptance when necessary. With the acceptance of the revised Schedule of Finishes, the Contractor shall make any corrections and/or revisions necessary to resolve the discrepancies and/or inconsistencies. The Contractor shall not proceed with any painting systems that are incompatible, although specified otherwise, until all incompatible conditions detrimental for the proper application and performance of the painting systems have been corrected. The failures due to the application of the incompatible paint systems shall be corrected at no additional cost to the Owner. Proceeding with the work shall imply acceptance of the specified Schedule of Finishes and the compatibility with the existing painted surfaces by the Contractor.

PART 3- EXECUTION

3.01 SURFACE PREPARATION

A. General:
1. Surface preparation shall be in accordance with the Painting and Decorating Contractors of America, “Architectural Specification Manual”, methods are applicable to all substrates.
2. Scrub surfaces with stiff nylon bristle brush and Trisodium Phosphate (TSP) solution at rate of 3/4 cup TSP per gallon of warm water to remove accumulated film of wax, oil, grease, smoke, dust, dirt, chalky, or other foreign matter which would impair bond or bleeding through new finish. Thoroughly sponge wipe surfaces with clean water. Allow surfaces to thoroughly dry before priming, painting, calking, or sealing. Following sponge wiping, the surfaces shall be allowed to dry for a minimum of 24 hours.
3. Cracks and openings found at joints and where different materials abut each other shall be sealed with a caulking compound compatible with the substrate and primer/paint. The caulking shall be applied and allowed to set in accordance with the manufacturer’s recommendations and instructions.

B. The Painting Contractor shall be wholly responsible for the finish of his work and shall not commence any part of it until surfaces are in proper condition. If Painting Contractor considers any surfaces unsuitable for

proper finish of his work, he shall notify the Engineer of this fact in writing and he shall not apply any material until the unsuitable surfaces have been made satisfactory, or until the Engineer has instructed him to proceed. Major defects shall be restored by the proper trades. In general, follow paint manufacturer's directions for surface preparation for the paint to be applied.

C. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface- applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.

D. Puttying of nail holes, cracks, and blemishes shall be done after priming coat has become hard and dry and before second coat is applied.

E. Concrete surfaces shall be wire brushed and cleaned to remove all dust and loose mortar.

F. Surfaces adjacent to areas being finished shall be protected and left clean of paints, stains, etc. Clean drop cloths shall be used until completion of job.

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

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

I. Gypsum Board Surfaces:

1. Surface Cleaning: Surfaces shall be dry. Remove loose dirt and dust by brushing with a soft brush or rubbing with a dry cloth prior to application of the first coat material.

2. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.

3.02 PAINT APPLICATION

A. General:
   1. Apply coating materials in accordance with SSPC-PA 1. SSPC-PA I methods are applicable to all substrates, except as modified herein. Thoroughly work coating materials into joints, crevices, and open spaces, Touch-up damaged coatings before applying subsequent coats.
   2. Work shall be done in a workmanlike manner by skilled and experienced mechanics and shall conform to the best painting practices.
   3. Materials shall be applied in accordance with the manufacturer's specifications and the finished surfaces shall be free from runs, sags, drips, ridges, waves, laps, streaks, brush marks, and variations in color, texture, and finish (glossy or dull). The coverage shall be complete and each coat shall be so applied as to produce a film of uniform thickness. No paint, varnish or enamel shall be applied until the preceding coat is thoroughly dry and acceptance.
   4. No exterior painting of unprotected surfaces shall be done in rainy, damp weather. Coats shall be applied only to surfaces that are thoroughly dry.
   5. Interior areas shall be broom clean and dust free before and during the application of coating material.
   6. Mixing shall be done outside the building.

B. Application:
   1. Paint application shall be by brush or roller or combination thereof or as required by manufacturer.
   2. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying. Provide each coat in specified condition to receive the next coat.
   3. Primers and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by the manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry. longer than recommended by manufacturers of subsequent coatings. Each coat shall cover the surface of the preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.
   4. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in selected colors.

C. Colors: Colors shall match existing or as selected by the Engineer.

D. Finish Film Thickness: Apply primer, intermediate, and finish coats to not less than 1.5 mils dry film thickness, 4 mils wet unless recommended otherwise in writing by the manufacturer, for each coat and in accordance with the manufacturer's recommendations. Verify mil thickness by use of a suitable wet film gauge. Use a Tooke or other dry film gauge to test for total dry film thickness.

3.03 MISCELLANEOUS

A. Installation of Removed Items: After completion of final paint coat, removed items shall be reinstalled.

B. At the completion of other trades, touch-up damaged surfaces.

3.04 CLEAN-UP

A. During the progress of the work, all debris, empty crates, waste, drippings, etc., shall be removed by the Contractor and the grounds about the areas to be painted shall be left clean and orderly at the end of each work day.

B. Upon completion of the work, staging, scaffolding, containers, and all other debris shall be removed from the site. All paint, shellac, oil or stains splashed or spilled upon adjacent surfaces not requiring treatment (hardware, fixture, floor) shall be removed and the entire job left clean and acceptable.

END OF SECTION

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13281 - ASBESTOS ABATEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. In performing this project, all possible safeguards, precautions and protective measures shall be utilized to prevent exposure of any individual to asbestos particulates.

1.02 DESCRIPTION OF WORK

A. Furnish all labor, materials, equipment, and services, necessary to carry out the safe removal and disposal of asbestos-containing material in compliance with these specifications, EPA, OSHA, State of Hawaii regulations, and any other applicable Federal and State regulations. Whenever there is a conflict or overlap of the above references, the most stringent shall apply. The asbestos work, if applicable, shall generally include:

1. Removal/Penetration and disposal of skim coat/paint.

2. All work is to be completed after business hours or when the area is vacated.

3. Contractor to coordinate all work with the Engineer and the Contractor's hired Qualified Consultant. Contractor is responsible to satisfy himself as to the total extent of all work, including to but not limited to the quantity, location, thickness, layers, accessibility, etc. of all material prior to commencement of any work.

B. In general, the principal items of the asbestos removal work shall be as follows:

1. Worker Protection

2. Decontamination Enclosure System

3. Preparation of Work Area

4. Removal of asbestos-containing materials

5. Removal of protective sheeting

6. Disposal

C. Cleaning shall include areas within and immediately around the work area affected by the abatement work and all areas contaminated by the Contractor's work.

D. The asbestos abatement work shall include removal of all asbestos-containing materials within the work area as specified herein and noted on the drawing.

E. Contractor shall comply with all regulations pertaining to asbestos removal. If there is a conflict with the specifications, the more stringent requirement shall apply.

1.03 COORDINATION WITH OTHER SECTIONS

A. Prior to commencement of work, an annotated description of all existing damaged and missing items shall be submitted to the Engineer. It will be the Contractor's responsibility to repair and/or replace to the Engineer satisfaction all items identified as damaged and/or missing that cannot be proven to have been in this condition prior to the commencement of this project.

1.04 SUBMITTALS PRIOR TO WORK

A. Final payment will not be made until copies of all submittals have been furnished to and accepted by Owner. Submit 6 copies of the submittal package, no later than 10 consecutive working days from award notice, which will include the items listed below.

B. Notices: As early as possible but prior to commencement of work, as regulated by each agency and before commencement of any on-site project activity, send a courtesy 10-day notice in accordance with 40 CFR Part 61.145 of Subpart M, of the proposed asbestos abatement work with copies to the Engineer and to the following agencies:
   1. The Administrator of the Environmental Protection Agency (EPA) Regional Office having jurisdiction over the project.
   2. State of Hawaii, Department of Health, "Notification of Demolition and Renovation" form. Send to: Noise, Radiation and Indoor Air Quality Branch, Asbestos Abatement Office, State Department of Health, P.O. Box 3378, Honolulu, Hawaii 76801-9984.

C. Permits & Licenses: Copies of all permits, licenses (C-19) and arrangements for removal, transportation and disposal of asbestos-containing materials and waste water, no later than 20 consecutive working days from notice of award unless otherwise instructed in writing by the Engineer.

D. Insurance: Proof of insurance for Workman's Compensation and General Liability that covers asbestos, lead, and pollution.

E. Qualifications of the Qualified Consultant

F. Manufacturer's Data: Copies of manufacturer's specifications, installation instructions and field test procedures for each material and all equipment related to asbestos handling and abatement and include other data as may be required to show compliance with these specifications and proposed uses.

G. Samples: Samples of the following items for approval prior to ordering materials:
   1. Surfactant: copies of manufacturer's literature including all laboratory data, mixing and application instructions.
   2. Tapes and Adhesives: copies of manufacturer's literature including all laboratory data.
   3. Warning Labels and Signs: copies of examples of all required signage.
   4. Protective Clothing: copies of manufacturer's literature on all protective clothing and one sample of each item which will be returned to the Contractor.
   5. Respirator Equipment: copies of manufacturer's literature on all respirator equipment and one sample of each item which will be returned to the Contractor.
   6. Asbestos Encapsulant(s): copies of manufacturer's literature including all laboratory data, application instructions.

H. Work Plan: Submit a project Work Plan for the asbestos-containing material disturbance work written and signed by the Contractor's State of Hawaii, Department of Health certified Asbestos Project Designer. The Contractor shall also provide detailed information concerning:
   1. Preparation of the work area including erecting a negative pressure enclosure system for the removal of interior floor tiles/adhesives and exterior paint/coat.
   2. Personal protective equipment including respiratory protection and protective clothing.
   3. Decontamination procedures for the personnel who may be exposed to asbestos.

4. Handling and disposal methods and procedures to be used.
5. Required air monitoring procedures and sampling protocols.
6. Procedures for final cleanup.
7. A sequence of work and performance schedule in coordination with other trades.
8. Emergency procedures.

I. Shop Drawings: Submit shop drawings for the following items as a minimum:
1. Descriptions of any equipment to be employed not discussed in this section.
2. Security provisions, if any, in and around the project area.
3. Outline of work procedures to be employed.
4. Location and construction of all airtight barriers including temporary air tight negative pressure enclosure containment system for the removal of exterior paint and coating material
5. Location of waste dumpster.
6. Staging of the work, the sequence
7. Entrances and exits to the work place
8. Location and construction of worker decontamination units
9. Water filtration system for all contaminated water. Description of water disposal and copy of water disposal permit from the County of Kauai, Environmental Services *Temporary Industrial Wastewater Discharge* Permit.
10. Proposed method of attaching plasticizing (polyethylene sheeting) shall be approved in advance to minimize damage to equipment and surfaces. Method of attachment may include any combination of duct tape or other approved waterproof tape, furring strips, spray glue, staples, nails screws or other effective procedures capable of sealing adjacent sheets of polyethylene sheeting and capable of sealing polyethylene to dissimilar finished or unfinished surfaces both under wet and dry conditions (including amended water).
11. Proposed method of patching and repairing all damage to existing finishes from the attachment of polyethylene sheeting (as applicable).

J. Documentation for Instruction: Submit documentation that each and every individual, including foremen, supervisors, and other company personnel or agents and any other individual who may be exposed to airborne asbestos fibers, who may be responsible for any aspect of abatement activities, or who is allowed or permitted to enter areas where such exposure may occur has currently attended and passed the Abatement Worker and/or Abatement Contractor/Supervisor course whichever is relevant to that workers responsibilities as specified in 40 CFR Part 763, “Asbestos Materials in Schools”. These courses shall be

EPA-approved or approved by a State Accreditation Program in the most current listing of the Federal Register. No worker shall be allowed on site if they are found to have either an expired accreditation certificate or does not comply with the requirements set forth in 40 CFR Part 763 on training. All workers shall be certified for asbestos related work in accordance with Department of Health, Chapter 11-504, Hawaii Administrative Rules, *Asbestos Abatement Certification Program*.

The Contractor shall be responsible for keeping the documentation up to date and subsequent submittals to the Engineer before any additional employee or individual, not currently on the list, is allowed within the project site.

Submit completed and signed "Employee Acknowledgment of Instruction and Release" forms. A sample "Employee Acknowledgment of Instruction and Release" form is provided at the end of this section.

K. Documentation from Physician: Submit documentation from a physician that all employees or agents who may be exposed to airborne asbestos have been provided with an opportunity to be medically monitored to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects. In addition, document that all individuals permitted within the project site have received medical monitoring or had such monitoring made available to them as required in OSHA 29 CFR 1926.1101, and HIOSH 12-145.1. The Contractor must be aware of and provide information to the examining physician about unusual conditions in the workplace environment (e.g. high temperatures, humidity, chemical contaminants) that may impact on the employee's ability to perform work activities. The Contractor shall keep and make available to all affected individuals a record and the results of such examinations.

L. HEPA Vacuums: Submit manufacturer's certification that vacuums conform to ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems as applicable to this project.

M. Rental Equipment: When rental equipment is to be used in abatement areas or to transport asbestos contaminated waste, a written notification concerning intended use of the rental equipment must be provided to the rental agency with a copy submitted to the Engineer.

N. Emergency Planning Procedures: Contractor shall submit for review and acceptance by the Engineer, an emergency plan prior to abatement initiation.

1. Emergency procedures shall be in written form and prominently posted adjacent to the Worker Protection Notices specified hereinafter. Everyone prior to entering the work area must read and sign these procedures to acknowledge receipt of emergency exits and emergency procedures.
2. Emergency planning shall include notification of police, fire, and emergency medical personnel of planned abatement activities work schedule, and layout of the work area, particularly barriers that may affect response capabilities.
3. Emergency planning shall include considerations of fire, explosion, toxic atmospheres, electrical hazards, slips, trips and falls, and heat related injury. Written procedures shall be developed and employee training procedures shall be provided in Contractors plan.

1.05 SUBMITTAL AFTER WORK IS COMPLETED

A. At the completion of the work, a final report shall be prepared by the Contractor for acceptance by the Engineer. Six copies of the report shall be submitted and shall include the items listed below.

B. The project name, Abatement Contractor, Abatement Contractor license number, notification form to the Hawaii Department of Health and EPA, work duration, material removed, respiratory protection employed, asbestos waste manifest, total quantity of waste, employee exposure air sample results, and results of the most current PAT round results for the laboratory or laboratories conducting the employee exposure, ambient, and TEM air sample analysis (if applicable).

C. Certification of the Abatement Contractor's employees.

D. Visitor/Worker Entry Log: The daily log of all personnel including the Contractor's employees and agents who enter the work area while asbestos abatement operations are in progress, until final clearance is received that the work area is asbestos free. The log shall contain the listed information as a minimum and shall be certified by the Qualified Consultant.
   1. Date of visit/worker entry
   2. Visitor/Worker's name, employer, business address and telephone number
   3. Time of entry and exit from work area
   4. Purpose of visit
   5. Type of protective clothing and respirator worn
   6. Certificate of release signed and filed with the contractor

E. Clearance certifications received from the Qualified Consultant.

F. A statement signed by the Asbestos Abatement Contractor that all asbestos abatement and disposal was completed in compliance with this specification, Federal and State regulations, and the approved Work Plan.

1.06 PRODUCT HANDLING

A. Delivery and Storage of Materials: Deliver materials to the site in original packages, containers or bags fully identified with manufacturer's name, brand and lot number. Store materials in a dry well-ventilated space, under cover, off the ground and away from surfaces subject to dampness or condensation as approved by the Engineer. Material that becomes contaminated with asbestos shall be disposed of in accordance with applicable regulations. Replacement materials shall be stored outside the contaminated work area until abatement is completed.

1.07 PROTECTION

A. Site Security: The work area is to be restricted only to authorized, trained, and protected personnel. These may include the Contractor's employees, employee's of subcontractors, the Engineer and its representatives, State and local inspectors and any other designated individuals. A list of authorized personnel shall be established prior to job start.

1. Entry to the work area by unauthorized individuals shall not be permitted without the express approval of the Engineer and any such entry shall be reported immediately to the Engineer by the Contractor.

2. A Visitor/Worker Entry Log shall be maintained.

3. The Contractor shall have control, subject to approval of the Engineer, of security in the work area and in proximity of Contractor's equipment and materials.

B. Site Protection and Safety: As a minimum follow the requirements of EPA, HIOSH (State of Hawaii), OSHA and NIOSH. Take all necessary precaution to ensure there is no asbestos contamination to those areas not included in the work schedule.

C. Protective Covering: The Contractor shall provide and install protective covering on an "as required" or "upon request" by the Qualified

Consultant. Protective covering shall be clean plastic sheets minimum thickness of 6-mil.

D. Safeguarding of Property: The Contractor shall take whatever steps necessary to safeguard his work and also the property of the Owner and other individuals in the vicinity of his work area during the execution of this Contract. He shall be responsible for and make good on any and all damages by his employees negligence. Do not load structure with weight that will endanger the structure.

E. Completed Work: The Contractor shall provide all necessary protection for surfaces encapsulated under this section.

1.08 ABBREVIATIONS

A. ANSI: American National Standards Institute, Inc.

B. CFR: Code of Federal Regulations

C. HIOSH: Division of Occupational Safety and Health, Department of Labor and Industrial Relations, State of Hawaii

D. EPA: U.S. Environmental Protection Agency

E. NESHAP: National Emission Standards for Hazardous Air pollutants

F. NIOSH: National Institute for Occupation Safety and Health

G. OSHA: Occupational Safety and Health Administration

1.09 GENERAL REQUIREMENTS

A. Contractor shall examine and have at all times in his possession at his office (one copy) and in view at each job site office (one copy) a current issue of the following publications:
   1. State of Hawaii: Occupational Safety and Health Standards; Title 12, Subtitle 8, Chapter 145.1, Asbestos
   2. State of Hawaii, Department of Health, Title 11, Chapter 501-1, Asbestos Requirements
   3. State of Hawaii, Department of Health, Title 11, Chapter 501-2, Asbestos Containing Materials in Schools
   4. State of Hawaii, Department of Health, Title 11, Chapter 501-4, Asbestos Abatement Certification Program

5. Title 29, Code of Federal Regulations, Section 1910.134 - General Industry Standard for Respiratory Protection, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor
6. Title 29, Code of Federal Regulations, Section 1926.1101 - Asbestos, Construction Industry, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor
7. Title 29, Code of Federal Regulations, Section 1910.2 - Access to Employee Exposure and Medical Records, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor
8. Title 29, Code of Federal Regulations, Section 1910.1200 - Hazard Communication, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor
9. Title 40, Code of Federal Regulations, Part 61, Subparts A and M (Revised Subpart B), National Emission of Standards for Hazardous Air Pollutants, U.S. Environmental Protection Agency (EPA)
10. Guidance for Controlling Asbestos-Containing Materials in Buildings, EPA 560/5-85-024 (Purple Book), U.S. Environmental Protection Agency (EPA)
11. Title 34, Code of Federal Regulations, Part 231, Appendix C, Procedures For Containing and Removing Building Materials Containing Asbestos, U.S. Environmental Protection Agency (EPA)
12. Title 29, Code of Federal Regulations, Section 1910.145 Specifications for Accident Prevention, Signs and Tags, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor
13. ANSI Z88.2-80 Practice for Respiratory Protection
14. EPA, Final Response to the Asbestos Hazard Emergency Response Act (AHERA), 40 CFR, Part 763, Subpart E.

B. The Contractor shall comply with the above requirements and any applicable State and County of Kauai regulations. Where conflict or any inconsistency among requirements or with this specification exists, the more stringent requirements shall apply. Ignorance of the above requirements and any applicable State and County of Kauai regulations resulting in additional cost to the Contractor shall be solely the Contractor's responsibility.

C. All regulations shall govern over these specifications, except that any more stringent specification or specification providing greater protection against asbestos exposure, injury, loss or liability, shall control to the extent permitted by regulation. Any question regarding conflict or inconsistency between specification and/or regulations should be directed to the Engineer.

D. Whenever approval of the Engineer is required prior to proceeding with other work, the following shall be complied with:

1. The Contractor shall allow the Engineer 72 hours from notification to respond to the request for inspection.

2. The Contractor shall designate one person (either a foreman or superintendent) who will be authorized to request for inspections. The name of the designated person shall be submitted in writing to the Engineer prior to commencing with the work. Request from any other person will not be considered an official request.

3. The designated person when requesting for inspection shall provide the following information:

a. Name of caller.

b. Building and rooms to be inspected (as applicable).

c. Work phase of inspection, as specified.

1.10 DEFINITIONS

A. Abatement: Procedure to control fiber release from asbestos-containing building materials.

1. Removal: All herein specified procedures necessary to remove asbestos-containing materials at an approved site in an acceptable manner.

2. Post-Removal Surface Encapsulation: Procedures necessary to coat surfaces from which asbestos-containing materials have been removed and where designated on the drawings to control any residual fiber release.

B. Air Monitoring: The process of measuring the fiber content of a specific, known, volume of air in a stated period of time.

C. Amended Water: Water to which a surfactant has been added to reduce water surface tension and thereby provide a more rapid penetration.

D. Authorized Visitor: the Engineer, the Qualified Consultant, his representatives, air monitoring personnel, or a representative of any regulatory or other agency having jurisdiction over the project.

E. Holding Area: A secure area used for the storage of double-bagged asbestos containing material before removal from the project site to an approved disposal site.

F. Fixed Object: A unit of equipment or furniture in the work area which cannot be removed from the work area without dismantling.

G. Friable Asbestos: Asbestos containing material which can be crumbled to dust, when dry, under hand pressure.

H. HEPA Filter: A High Efficiency Particulate Absolute filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 micron in length.

I. HEPA Vacuum Equipment: Vacuuming equipment that utilizes a High Efficiency Particulate Absolute (HEPA) filter.

J. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

K. Post-Removal Encapsulation: A liquid material which can be applied to surfaces from which asbestos-containing material has been removed to control the possible release of residual fibers, either by creating a membrane over the surface (bridging encapsulant) or by penetrating in to the material and binding its components (penetrating encapsulant). Selected product shall be compatible with the existing finishes including wood, metal, and plastic.

L. Qualified Consultant: Consultant hired by the Contractor who will perform air monitoring and inspection during abatement work and shall have the authority to initiate engineering controls. The Qualified Consultant will be accredited as a State of Hawaii Department of Health accredited Asbestos Building Inspector, Contractor Supervisor, Project Monitor; and NIOSH 582 certified.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plastic Sheeting: Minimum thickness is 6-mil polyethylene film.

B. Plastic Bags: Minimum thickness 6-mil polyethylene film labeled as specified hereinafter.

C. Tapes: Tape shall be capable of sealing joints of adjacent sheets of polyethylene and for attaching polyethylene sheets to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including the use of amended water. Silver cloth duct tape, minimum 2 inches wide; red or NATO orange tape, minimum 2 inches wide for exit arrows; and double faced foam tapes, by Nashua, 3-M, Arno, or approved equal.

D. Adhesives: Adhesives (3-M #76, #77, or approved equal) shall be capable of sealing joints of adjacent sheets of polyethylene and for attachment of polyethylene sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.

E. Surfactant (Wetting Agent): 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether, or equivalent, and shall be mixed with water to provide a concentration of one ounce, or more as needed, of surfactant to 5 gallons of water. (An equivalent surfactant shall be understood to mean material with a surface tension of 29 dynes/cm as tested in its properly mixed concentration, using ASTM method D 1331-56 (R 1980), "Surface and Interfacial Tension of Solutions of Surface-Active Agents.")

F. Warning Labels and Signs: As required by OSHA regulations 29 CFR 1926.1101 and HIOSH 12-145.1. Permanent signage for access panels and areas with encapsulated asbestos-containing materials shall be as specified hereinafter. Signage shall be as approved by the Engineer.

G. Protective Clothing: As specified hereinafter. The Contractor shall have all the required sets of coveralls required for this project on island prior to the start of work. There will be no time extension for the unavailability of coveralls or related equipment.

H. Post-Removal Encapsulation: The encapsulant shall be applied to surfaces from which asbestos-containing material has been removed to control the possible release of residual fibers, either by creating a membrane over the surface (bridging encapsulant) or by penetrating in to the material and binding its components (penetrating encapsulant) and shall be compatible with the existing finishes including wood, metal, and plastic.

I. Other Materials: Provide all other materials, such as, but not limited to lumber, plywood, nails, fasteners, metal studs, hardware, foam sealants,

and caulking which may be required to properly prepare and complete this project.

2.02 TOOLS AND EQUIPMENT

A. General: Provide and fabricate suitable tools for the asbestos abatement procedures.

B. Water Sprayer: Airless or a pressure sprayer for amended water application as applicable.

C. Air Purification Equipment: High Efficiency Particulate Absolute (HEPA) filtration systems.

D. Paint/Encapsulant Sprayer: Airless type.

E. Other tools and equipment as necessary.

2.03 PERSONNEL PROTECTION REQUIREMENTS

A. The contractor acknowledges he alone is responsible for instruction and for enforcing personnel protection requirements and that these specifications provide only a minimum acceptable standard.

B. Provide workers with sufficient sets of disposable protective full body clothing consisting of material impenetrable by asbestos fibers and of the proper size for each individual to accommodate movement without tearing. Such clothing shall consist of full body coveralls, footwear, gloves and headgear. Provide hard hats as required by applicable safety regulations. Disposable clothing shall not be allowed to accumulate and shall be disposed of as asbestos contaminated waste. Protective clothing shall be worn by all personnel within the work area from the start of the removal and post-removal encapsulation work until the work area has received its final clearance.

C. Insulated non-skid rubber boots or an approved equal shall be required for all individuals entering the work area. Protective full body clothing without elastic at sleeves and legs shall require separate elastic or taped protection to seal the opening. Visitors shall be provided full body protective clothing.

D. No visitors shall be allowed in work areas, except as authorized by the Engineer. Visitors must supply their own respiratory protection and show proof training in accordance with DOH 11-501-504.

Provide authorized visitors with suitable disposable protective full body clothing consisting of material impenetrable by asbestos fibers and of the proper size for each individual to accommodate movement without tearing. Such clothing shall consist of full body coveralls, footwear, gloves and headgear including hard hat when required and insulated rubber boots or equal. The Contractor shall include in his Bid the expense of a total of 4 changes of clothing per day for each day of asbestos abatement work for visitor's use. The quantity shall accumulate and may be used at any time during asbestos abatement work at the discretion of the Engineer.

E. All electrical systems used for asbestos abatement operations shall as a minimum be protected with "Ground Fault Circuit Interrupters" selected and installed in strict accordance with the manufacturer's instructions, the National Electric Code and all other pertinent codes.

F. Additional safety equipment (e.g. hardhats meeting the requirements of ANSI Z-89.1-1981, eye protection meeting the requirements of ANSI Z87.1-1979, safety shoes meeting the requirements of ANSI Z41.1-1967, disposable PVC gloves), as necessary, shall be provided to all workers and authorized visitors.

PART 3 - EXECUTION

3.01 SEPARATION OF WORK AREAS FROM NON WORK AREAS

A. Visual Separation: Visual separation shall be accomplished at all glazed areas using opaque polyethylene. This separation shall not be incorporated within the other seals required on this project.

B. Air Systems: Shut down and isolate all ventilation air systems to prevent contamination and fiber dispersal to other areas of the building. During the abatement operations, air intake vents within the work area shall all be sealed with tape and two layers of 6-mil polyethylene sheeting.

C. Penetrations: Ceiling and wall penetrations, windows and doors, shall be sealed with two layers of 6-mil poly sheeting and secured with duct tape.

D. For exterior paint/coating removal work, the Contractor shall construct an air-tight negative pressure mini enclosure.

E. Emergency Exits: Designate and maintain emergency and fire exits from the work area in accordance with local codes and regulations. Provide knockout/cut away panels in the barriers in the direction of emergency

egress. Properly mark the knockout/cut away panels, seal them airtight, and on a continuing basis instruct workers and authorized personnel as to their locations. Post a diagram in each Clean Room and Equipment Room locating the emergency exits. In case of fire while doing work in the work areas, emergency exit procedures have priority over normal work exiting procedures.

F. Inspection: The Contractor shall inspect all barriers at least twice a day (once prior to the start of each day's abatement operations and following the day's abatement operations). Document the inspections and observations in a daily project log.

3.02 DECONTAMINATION ENCLOSURE SYSTEMS

A. General: The Contractor shall construct the decontamination enclosure system or use portable units acceptable to the Qualified Consultant and as described in the approved Work Plan.

B. Personnel Decontamination Unit: As deemed necessary by the Qualified Consultant, provide a personnel decontamination enclosure system contiguous to the work area consisting of three totally enclosed chambers as follows:

1. An Equipment Room with two curtained doorways, one to the work area and one to the shower.

2. A Shower Room with two curtained doorways, one to the Equipment Room and one to the Clean Room. The Shower Room shall contain at least one shower. Careful attention must be paid to the shower enclosure to insure against leakage of any kind. Ensure a supply of soap at all times in the shower. Drainage from the shower shall be disposed of as contaminated waste water or filtered as specified hereinafter.

3. A Clean Room with one curtained doorway to the Shower Room and one entrance/exit door to non-contaminated area. The Clean Room shall have sufficient space for storage of worker's street clothes and personal effects, towels, and other non-contaminated items.

C. Maintenance of Decontamination Units: At the beginning of each work shift and throughout abatement operations, all seals and curtained doorways shall be inspected and if not found in proper condition, repaired

immediately. All areas shall be kept clean at all times. Ensure that drainage filtering systems are kept clean and operational at all times.

1. Personnel Decontamination Unit:

    a. The Contractor shall maintain Clean Room and shall repair and sanitize respirator equipment after each use.

    b. Soap and shampoo shall be in the showers at all times.

    c. Fresh towels shall be available at all times.

    d. Provide a disposal bag for contaminated filters in the Shower Room at all times.

    e. Provide storage for wet and dry towels.

    f. Provide a fine bristle brush outside the Equipment Room in the work area.

    g. At the end of each work shift the shower shall be thoroughly disinfected, the filter bag (if applicable) shall be returned to the Equipment Room for disposal, and the Equipment Room shall be thoroughly HEPA vacuumed and wet cleaned. The decontamination enclosures shall be sealed and removed (as necessary) and area restored after each work day.

D. Worker Protection Notice: Post the following notice in each Clean Room and Equipment Room:

1. Workers and authorized personnel, in order to enter the work area, shall:

    a. Remove all clothing, unless it is to remain in the Equipment room for eventual disposal.

    b. Don the appropriate respiratory protection, follow all training procedures and manufacturer's instructions. Once all of the above has been completed, proceed to the shower. Check the equipment out for proper operation before proceeding any further.

    c. Don protective clothing (full body coveralls, gloves, boots, headgear etc.) after donning respirator.

2. All workers and authorized personnel, in order to leave the work area, shall:

   a. Remove gross (visible) contamination from themselves and their equipment. Brush off dust with a fine bristle brush and leave the brush outside the Equipment Room in the work area.

   b. Enter the Equipment Room and, keeping your respirator in place, remove all protective clothing, including full body coveralls, gloves, boots, and headgear. Place contaminated clothing in the bag(s) provided. Store reusable gloves and boots in their respective areas in the Equipment Room.

   c. Respirator still in place, move into the Shower Room and rinse off thoroughly.

   d. Accomplish complete showering, thoroughly soaping and shampooing.

   e. Proceed to the Clean Room: Dry off, get dressed and return respirator to its proper place.

   f. No smoking, eating, drinking shall be allowed inside the work area or the decontamination enclosures.

3.03 WASTE WATER FILTERING SYSTEM

A. Prior to any waste water disposal into the sanitary sewer system, the Contractor shall be responsible for obtaining from the County of Kauai, Environmental Services *Temporary Industrial Wastewater Discharge* Permit.

B. Filter: All waste water that will be discharged into the sanitary sewer system shall be treated as contaminated with asbestos and shall be filtered using two in-line filter cartridges with 2" inlets and outlets. The outlet of the first cartridge shall connect to the inlet of the second cartridge. The first cartridge shall contain six 100-micron prefilters and a second cartridge shall contain six 0.5-micron filters or equal staging according to type filtering unit.

C. One spare set of 100-micron prefilters shall be maintained at the site at all times to replace prefilters during cleaning. Maintain at least one set of 0.5-micron or equal filters at the site at all items form replacement as necessary.

D. When prefilters become clogged, replace with spares, and wash out the prefilters in the Shower Room, allowing drainage from the cleaning operation to go through the filtering system.

E. When the final filters become clogged, remove the filters, replace with new, and dispose of the clogged filters as contaminated waste.

F. Provide a holding tank for contaminated waste water as required to prevent backup of water into the shower when the amount of water generated exceeds the flow rate of the filters.

3.04 COMMUNICATIONS

A. Provide a communications system suitable to monitor all activities within the work area and to readily transfer messages from one location to another.

3.05 WORK AREA PREPARATION

A. Work by the Asbestos Abatement Contractor:

1. Step 1:

a. Posting of Danger Signs: Post danger signs in and around the work area to comply with 29 CFR 1926.1101, HIOSH 12-145.1 and all other Federal, State and local requirements. Signs shall be posted at a distance sufficiently far enough away from the work area to permit a person to read the sign and take the necessary protective measures to avoid exposure.

b. Inspect the Building Openings: At the beginning of each work day, the Contractor shall inspect and ensure that all doors, windows and other openings of affected building(s) and all surrounding buildings are closed and locked (as applicable).

c. Barrier Enclosures: Cover all openings between the work area and the occupied portions of the building with opaque plastic. Construct all general and separation barriers.

d. Sealing Openings: Seal all openings including but not limited to ducts, vents, electrical penetrations, and any other penetrations of the work areas, with plastic sheeting sealed with tape.

e. Erect an air tight negative pressure enclosure containment system attached to the exterior surfaces for the removal of paint/coating material.

2. Step 2:

a. Provide Decontamination Units where appropriate: Personnel Decontamination Unit(s) specified hereinafter shall be required.

b. Air Filtration Units: Install sufficient number of HEPA air filtration units to create a minimum of four air changes per hour and create a negative pressure differential of 0.2 inches of water. Contractor to monitor the pressure differential for the duration of the project using a portable manometer. Contractor will keep one spare unit at the job site for the duration of the work.

c. Pre-cleaning/Wet-wiping:

1) Preclean fixed object within the work area, first using HEPA vacuum equipment and then wet cleaning methods as appropriate and separately enclose with minimum 6-mil plastic sheeting sealed with tape. Fixed objects shall include, but not be limited to exposed electrical conduits and all other permanently fixed items.

3. Step 3:

a. Plasticizing: Objects which may be contaminated during abatement or difficult to clean shall be taped and sealed in a minimum of 6-mil polyethylene plastic sheeting. A minimum of 2 layers of 6-mil polyethylene plastic sheeting shall be used for preparation of critical barriers and containments.

b. When sealing (plasticizing), plastic sheet shall be protected against damages by sharp edges, projections, etc. Provide 2" squares of duct tape at all sharp projections prior to applying plastic sheet to prevent puncture and tearing.

c. NOTE: Combining lower mil thickness sheets to total the minimum mil thickness is not acceptable.

d. Marking Exits: Maintain and mark both normal and emergency exits from the work areas to include large tape or spray painted orange arrows in the direction of egress and at curtained doorways which side of plastic sheeting to access first. One arrow marking shall be visible from every work location. Establish a color or designation system to distinguish normal exiting to the personnel decontamination unit and emergency exiting when life safety conditions prevail.

4. Step 4: Temporary utility services:

a. Temporary Electricity and Lighting:

1) Existing electrical service to the building may be used for temporary electrical power during abatement and replacement work; however, the electrical power to the work area will be shut down during abatement work.

2) The Contractor shall verify the locations(s) of available electrical service outside the work areas and shall tie into the existing system at a location approved by the Engineer.

3) Install circuit and branch wiring, with area distribution boxes located so that power is available throughout the project by use of construction type power cords. All lighting shall be three wire with a ground fault interrupter.

4) Provide a minimum of 35 foot-candles of illumination on surface for finishing operation and 100-foot candles for removal operations. Provide 24 volt safety lighting.

b. Temporary Water:

1) Existing domestic water service to the building may be used for temporary water during construction. Location of tie-in shall be approved by the Engineer.

2) Install branch piping as necessary throughout the construction area.

c. Temporary Fire Protection:

1) Provide and maintain temporary fire protection equipment during the asbestos abatement operations.

2) Equipment shall be of the appropriate type to fight fires associated with the existing building materials and those materials used during the construction operations.

3) The Contractor shall clearly mark the location of all fire extinguishers.

5. Step 5: After the sealing and temporary facility work is completed, notify the Qualified Consultant and get his approval prior to proceeding with abatement.

3.06 REMOVAL/PENETRATION OF PAINT/SKIM COATING

A. A minimum of 4-mil polyethylene shall be laid beneath the area where the paint/skim coat will be removed.

B. The chemical peel will be applied to the paint in accordance to the manufactures directions. After the recommended contact time the chemical peel will be removed using painters spatulas or hand razors. The peel will be removed and placed directly into waste disposal bags. The process will be repeated until a surface free of paint and coating material is obtained to allow for the safe installation of new electrical system including all associated conduits.

C. In the event mechanical removal becomes necessary, Desco deck crawlers will be used. The Desco units will be attached to a HEPA vacuum to collect all emissions generated by the units.

D. It shall be the responsibility of the Contractor to verify the thickness of the material and satisfy himself as to the total work and/or effort to remove said material. No additional payment will be considered by the State for any deviations of the actual thickness from the thickness noted on the drawings.

E. The Contractor is prohibited from using methods of removal that create excessive amounts of dust and debris.

F. The Contractor shall take whatever steps necessary to safeguard and protect the surrounding areas during the execution of this Contract. He shall be responsible for any and all damages including contamination of surrounding areas caused by the compromised containment and/or safeguards.

G. Exposed raw surface edges will be completely sealed using an appropriate encapsulant.

3.07 EQUIPMENT CLEANING

A. All contaminated equipment and tools used for removal work shall be washed and cleaned in the work area prior to removing them from the work area. No washing of contaminated equipment and tools will be allowed outside the work area.

3.08 ASBESTOS-CONTAINING WASTE HANDLING

A. Collect and bag all asbestos debris and any other contaminated debris found in the work area. Clean the visible residual by HEPA vacuuming.

B. Clean fixed object within the work area, using HEPA vacuum equipment. Fixed objects shall include, but not be limited to pipes, wiring and all other permanently fixed items. Do not use methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not use HEPA vacuum equipment on wet surfaces.

C. Debris shall be bagged and sealed in 6-mil plastic bags immediately after removal. All gross debris created by the removal process shall be bagged and sealed at the end of each removal day.

D. The bags containing the asbestos waste material shall be checked for evidence of waste material attached to the outside of the bags. If dirty, the bags shall be washed down in the work area. The bags are then moved to the Holding bin. Bags and containers shall be marked with OSHA label prescribed by the Hawaii OSHA regulations referenced in these specifications. Label shall state, "DANGER – CONTAINS ASBESTOS FIBERS – AVOID CREATING DUST – CANCER AND LUNG DISEASE HAZARD." Additionally, label bags in accordance with OSHA 40 CFR 61.150; or EPA 40 CFR 763 if more restrictive. Labeling shall include the name of the waste generator and the site where the waste was generated.

E. Asbestos contaminated waste with sharp edges (e.g. nails, screws, metal lath, etc.) will tear the polyethylene bags and sheeting and therefore shall be placed in drums or enclosed with cardboard and double wrapped and sealed with plastic.

F. During the removal process, if plastic sheeting tears, or the duct tape loosens from the surface, the Abatement Contractor shall immediately stop work, cleanup loose asbestos–containing materials, and then reseal

the surface by taping over the torn or loosened surface, before commencing again.

G. Protect the plastic sheeting against tearing caused by sharp projection, corners, edges, etc., of all equipment being used in the removal process. However, if the plastic sheeting tears, the Abatement Contractor shall follow repair procedure specified above.

H. Any housing or penetration concealing asbestos–containing materials shall be removed and protected to provide access to the materials. Replacement or reattachment of these shall be in a manner such that function and appearance is equal or exceeds the original condition.

3.09 CLEANING AND CLEARANCE OF THE WORK AREA

A. Should the Contractor fail to commence work to clean-up and make the work area asbestos free within one working day after the clean-up thereof has been requested by the Engineer, and thereafter to expeditiously complete the said clean-up, Engineer may without further notice and without termination of contract, have the clean-up done and deduct the cost thereof from the contract.

B. Visual Clearance of Removal Work Areas: Remove all visible accumulation of asbestos-containing materials and debris by HEPA vacuums, sponging, and wet-wiping. The work areas shall be totally visibly clean and remaining material encapsulated. The Contractor, in the presence of the Qualified Consultant, shall make a complete visual inspection of the work area to ensure dust-free conditions.

C. Once the Qualified Consultant verifies that the work areas are essentially clean of visible asbestos-containing debris, the Qualified Consultant will collect post abatement PCM air clearance samples.

D. For interior removal work, air clearance samples will be collected by the Qualified Consultant until an air clearance level of 0.01 fibers/cc is obtained.

E. Should the Contractor fail to achieve the respective clearance level lower than 0.01 f/cc in the removal work area. The Contractor will re-clean the area at no additional cost to the State and all additional fees to perform the sampling and analysis by the Qualified Consultant shall be paid for by the Contractor.

F. After achieving a respective clearance level lower than 0.01 f/cc, the work area will be cleared of all remaining containment enclosure sheeting and

released to the Engineer. Signage applicable to job site safety and the performance of the remaining portions of the work shall remain as applicable.

3.10 DISPOSAL OF ASBESTOS-CONTAINING MATERIAL

A. Painted asbestos-containing waste shall be TCLP tested by the Contractor prior to disposal to determine if the asbestos-containing waste must be disposed of as hazardous waste or as asbestos-containing waste. If painted asbestos-containing waste passes the TCLP test, the waste may be disposed of as asbestos-containing waste. If the painted asbestos-containing waste fails the TCLP test, the waste must be disposed of as hazardous waste.

B. As the work progresses asbestos-containing waste is generated the Contractor shall transport all waste generated on a pre-scheduled day to the State of Hawaii, Department of Health's authorized disposal site, or as specifically approved by the Engineer to delay a disposal operation. Transport all waste to the predesignated disposal site in accordance with EPA regulations and specific landfill requirements.

Contaminated material shall be double–bagged in bags with OSHA label prescribed by the HIOSH regulations referenced in these specifications. Label shall state, "DANGER – CONTAINS ASBESTOS FIBERS – AVOID CREATING DUST – CANCER AND LUNG DISEASE HAZARD." Additionally, label bags in accordance with OSHA requirement 29 CFR 1926.1101, HIOSH 12–145.1 or EPA 40 CFR 61.150 if more restrictive. Labeling shall include the name of the waste generator and the site where the waste was generated.

C. Mark vehicles used to transport asbestos-containing waste material during the loading and unloading of the waste so that the signs are visible. The marking must be displayed in such a manner and location that a person can easily read the legend. Refer to 40 CFR Part 61.149 for lettering size, fonts and wording of sign requirements. For all loading and unloading activities, the sign referred to in 40 CFR Part 61.150 (b) (3) shall be displayed prominently.

D. Vehicles used for transporting waste to the disposal sites shall have a completely enclosed, lockable storage compartment. Storage compartments shall be plasticized and sealed with a minimum of one layer of 6 mil polyethylene sheeting on the sides and top and two layers of 6 mil polyethylene on the floor (bed). Waste materials, except those with sharp edges (metal lath, screws, nails, metal suspension system, etc.), properly double bagged may be transported to the disposal site

without being placed in drums if the transporting vehicle is prepared as specified above in addition to any more stringent requirements by HIOSH. The compartments shall be thoroughly wet–cleaned and/or HEPA vacuumed following the disposal of each load at the disposal sites at an approved location with electrical power as required. At the conclusion of the asbestos abatement, or before transport vehicles are used for other purposes, the polyethylene sheeting shall be properly removed and disposed of as contaminated waste. After this has been accomplished, compartments shall once again be wet–cleaned and HEPA vacuumed in order to eliminate all debris.

E. At the landfill, upon delivery of the waste for disposal, the Contractor shall notify the Scale Attendant and Landfill Spotter that the waste to be disposed of is asbestos material.

F. Workers unloading bags at the disposal sites shall be dressed in full body protective clothing and dual cartridge respirators.

G. Waste disposal manifest forms shall be properly completed to assure custody and disposal of all asbestos–containing material and asbestos contaminated waste at approved disposal sites. Forms shall be kept on file as directed by the Engineer with copies submitted to the Qualified Consultant the next working day after each trip.

NOTE: IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASSURE THAT ANY LANDFILL USED FOR DISPOSAL OF ASBESTOS–CONTAINING OR ASBESTOS CONTAMINATED WASTE IS APPROVED FOR THAT PURPOSE.

H. Bags must be placed in the hole for burial. Dumping of bags from the containers will not be allowed. However, if a bag is torn and if acceptable by the landfill, the entire container may be buried.

I. Liquid waste for disposal shall be filtered as specified herein.

J. The Contractor shall pay the waste disposal charge and any special handling charges at the landfills. All expenses for landfills shall be the complete responsibility of the Contractor. The bagged material shall be loaded in drums except as noted previously and transported to a landfill authorized by the State Department of Health to accept material containing asbestos. In the event the bag is torn, the tear shall be immediately mended with duct tape and the bag placed into another bag and sealed, and the wrapped material covered with another wrap and sealed. The Contractor shall make all prior arrangements with the landfill.

3.11 LOCK DOWN

A. After clean-up of gross contamination and final visual inspection, a compatible post removal (lockdown) encapsulant shall then be spray applied to all surfaces. The removal area shall include but not to be limited to constructed enclosures, barriers, polyethylene sheeting that covers any equipment articles to be discarded, critical barriers, air locks, load out units for bag removal, and on-site constructed decontamination unit.

TEN DAY NOTICE FORM
(sample)
page 1

This two page form is to be filled in and filed with both state and regional officials a minimum of ten (10) working days before start of the asbestos abatement contract.

State of Hawaii
DEPARTMENT OF HEALTH

For Office Use Only
Record No.

NOTIFICATION OF DEMOLITION AND RENOVATION

Ref: Title 40 CFR 61
National Emission Standards for Hazardous Air Pollutants
Asbestos NESHAP Revision; Final Rule, November 20, 1990

MAIL ORIGINAL #1 TO:
State Department of Health
Noise, Radiation &
Indoor Air Quality Branch
Asbestos Abatement Office
591 Ala Moana Boulevard
Honolulu, Hawaii 96813

COPY #2 TO:
Asbestos Notification EPA
NESHAP Region IX
75 Hawthorne St., A-3-3
San Francisco, CA 94105
Phone: (415) 744-1253

COPY #3:
Contractor's Copy

OFFICE USE ONLY: Operator Project # _____ Postmark Date _____ Date Received _____

Notification/Record # _____ Date Entered/Initials _____

I. **NOTIFICATION TYPE:** **O** - Original ***R** - Revised **C** - Cancelled: _____
*If **R** (Revision), please complete Sections III and V in full as shown on your original and make changes **only where applicable** on this form.

II. **OPERATIONS:** **D** - Demo **O** - Ordered Demo **R** - Renovation **E** - Emer. Renovation: _____

III. **FACILITY INFORMATION:** (Owner, Removal Contractor, Other Operator)

A. **OWNER NAME:** _____
Address _____ City _____
State _____ Zip _____ Contact _____ Telephone (____) _____

B. **REMOVAL CONTRACTOR:** _____
Address _____ City _____
State _____ Zip _____ Contact _____ Telephone (____) _____

C. **OTHER OPERATOR:** _____
Address _____ City _____
State _____ Zip _____ Contact _____ Telephone (____) _____

IV. **IS ASBESTOS PRESENT?** (YES/NO) _____

V. **FACILITY DESCRIPTION:** (Including building name, number, floor and/or room number)
Building Name: _____
Address _____
City _____ State _____ County _____
Site Location: _____
Building Size: (Sq. ft.) _____ (No. of Floors) _____ Age in Years: _____
Present Use: _____ Prior Use: _____

VI. **PROCEDURE, INCLUDING ANALYTICAL METHOD, IF APPROPRIATE, USED TO DETECT THE PRESENCE OF ASBESTOS MATERIAL:**

VII. **APPROXIMATE AMOUNT OF ASBESTOS, INCLUDING:** 1. Regulated ACM to be removed 2. Category I ACM not removed 3. Category II ACM not removed	RACM To Be Removed	Nonfriable Asbestos Material Not To Be Removed		Indicated Unit of Measurement Below	
		CAT I	CAT II	Unit	
Pipes				LnFt:	Ln m:
Surface Area				SqFt:	Sq m:
Vol RACM off Facility Component				CuFt:	Cu m:

Nature of materials: (e.g. VAT, roofing, etc.) _____

VIII. **SCHEDULED DATES ASBESTOS REMOVAL:** (MM/DD/YY) Start: ____/____/____ Complete ____/____/____

IX. **SCHEDULED DATES DEMO/RENOVATION:** (MM/DD/YY) Start: ____/____/____ Complete ____/____/____

PAGE 1 OF 2

IMPORTANT: continued on page 2

TEN DAY NOTICE FORM
(sample)
page 2

This form is to be filled in and filed with both state and regional officials a minimum of ten (10) working days before start of the asbestos abatement contract.

NOTIFICATION OF DEMOLITION AND RENOVATION, Continued

X. **DESCRIPTION OF PLANNED DEMOLITION/RENOVATION WORK & METHOD(S) TO BE USED:**

_____
_____
_____

XI. **DESCRIPTION OF WORK PRACTICE AND ENGINEERING CONTROLS TO BE USED TO PREVENT EMISSIONS OF ASBESTOS AT THE DEMOLITION/RENOVATION SITE:**

_____
_____
_____

XII. **PROJECT SUPERVISOR:** Name _____
Certification #: _____ Course Provider: _____

XIII. **WASTE TRANSPORTER: #1**
Name _____
Address _____ City _____ State _____ Zip _____
Contact Person: _____ Telephone (____) _____
WASTE TRANSPORTER: #2
Name _____
Address _____ City _____ State _____ Zip _____
Contact Person: _____ Telephone (____) _____

XIV. **WASTE DISPOSAL SITE:**
Name _____
Location _____ City _____ State _____ Zip _____
Telephone (____) _____

XV. **IF DEMOLITION ORDERED BY A GOVERNMENT AGENCY, IDENTIFY THE AGENCY BELOW:**
Name _____ Title _____
Authority: _____
Date of Order (MM/DD/YY): ____/____/____ Date Ordered to Begin (MM/DD/YY): ____/____/____

XVI. **DESCRIPTION OF PROCEDURES TO BE FOLLOWED IN THE EVENT THAT UNEXPECTED ASBESTOS IS FOUND, OR PREVIOUSLY NONFRIABLE ASBESTOS MATERIAL BECOMES CRUMBLED, PULVERIZED, OR REDUCED TO POWDER.**

_____
_____
_____

XVII. **I CERTIFY THAT AN INDIVIDUAL TRAINED IN THE PROVISION OF THIS REGULATION (40 CFR PART 61, SUBPART M) WILL BE ON-SITE DURING THE DEMOLITION OR RENOVATION, AND EVIDENCE THAT THE REQUIRED TRAINING HAS BEEN ACCOMPLISHED BY THIS PERSON WILL BE AVAILABLE FOR INSPECTION DURING NORMAL BUSINESS HOURS (required 1 year after promulgation).**

_____ _____
Signature of Owner/Operator *Date*

XVII. **I CERTIFY THAT ALL INFORMATION PROVIDED IS CORRECT.**

_____ _____
Signature of Owner/Operator *Date*

XIX. **FOR EMERGENCY RENOVATIONS:** Date & Hour of Emergency (MM/DD/YY): ____/____/____
Description of the sudden, unexpected event: _____
_____
_____
Explanation of how the event caused unsafe conditions or would cause equipment damage or an unreasonable financial burden:
_____
_____
_____

OFFICIAL USE ONLY:

BY: _____ TITLE: _____ DATE APPROVED/DISAPPROVED: _____

PAGE 2 OF 2 ASB 10/92

VISITOR/WORKER ENTRY LOG
(Sample)

DATE

PROJECT

ALL PERSONNEL MUST SIGN-IN AND SIGN-OUT EVERY TIME THEY ENTER/EXIT THE WORK AREA. PLEASE PRINT CLEARLY. ATTACH EMPLOYEE RELEASE FORM FOR ALL VISITORS.

NAME	EMPLOYER Name, *Address, *Phone	TIME IN	TIME OUT	*PURPOSE OF VISIT	**TYPE OF PPE ISSUED

*NOT required of Contractor's employees

** Type of PPE (Personal Protective Equipment) Issued to include list of protective clothing worn and type of respirator used (Type "C", half-face dual cartridge, etc.

EMPLOYEE ACKNOWLEDGMENT OF INSTRUCTION AND RELEASE FORM
(sample)

Employee Name:

Employee Address:

Employee Telephone No.:

DOH Asbestos Certification Number:

Classification of Worker:

Have you had in the past, or present, any respiratory problems?

Yes No

Have you worked in the past with asbestos or fiberglass type materials?

Yes No

The project you will be working on involves the use of asbestos and the removal of the asbestos from the building. Asbestos is considered a health hazard.

The company is supplying all necessary safety clothing and working conditions required and necessary for your protection from asbestos hazard.

You shall be instructed a commencement of the job on the required use of safety equipment, clothing, working conditions and procedures. These must be rigidly adhered to. Smoking is not permitted in the work areas. Disregarding of safety instructions shall result in instant dismissal.

I acknowledge that safety instructions have been given to me by the company at my work commencement and I am thoroughly conversant with them and have answered the above questions truthfully.

Signed:
Employee

Date:

ASBESTOS DISPOSAL FORM
(sample)

Date: .

Owner or Operator of Landfill

Name

Address

City State Zip

Phone:

Name of Landfill

Name

Address

City State Zip

Phone:

Hauler

Approximate Volume of Asbestos Received

Type of Container Asbestos in

Asbestos Container Labeled? YES NO

I certify that the above statements are true and that the landfill has been approved for the disposal of asbestos. The delivered material will be covered within 6 inches (15 cm.) of non-asbestos material within 24 hours.

signed
Landfill Owner-Operator

END OF SECTION

SECTION 13282 - LEAD-CONTAINING PAINT CONTROL MEASURES

PART 1 - GENERAL

1.01 SUMMARY

A. In performing the handling of building components with lead-containing paint, all possible safeguards, precautions and protective measures shall be utilized to prevent exposure of any individual to lead particulates.

1.02 SCOPE

A. Furnish all labor, materials and equipment necessary to carry out the safe removal, clean-up, handling, transportation and disposal of lead paint and associated debris in compliance with all applicable laws and regulations concerning lead, including all incidental and pertinent operations. Penetrations through the existing structure for conduits and piping will be required for the renovation activities. Coordinate all work with the Engineer.

B. Lead-containing paint testing conducted on the surfaces affected by the demolition and/or renovation activities identified the following surfaces with lead-containing paint:
- White paint
- Beige paint
- Off-white paint
- Tan paint
- Green paint
- Brown paint

C. All untested paints encountered will be assumed to contain lead.

D. The Contractor shall inform his employees, Subcontractors and all other persons performing work in this project, that interior and exterior surfaces of existing buildings at the site are assumed to be painted or stained with a lead-containing paint or stain. The Contractor, his employees, Subcontractors, etc. shall initiate and maintain all programs necessary to execute the work in accordance with the contract documents, federal, state and local laws, codes, rules and regulations.

E. The Contractor shall be responsible for ensuring that all work generating lead-containing paint containing debris conforms to the following applicable federal, state and local laws, codes, rules and regulations.

1. Occupational Safety and Health Administration (OSHA); Hawaii Occupational Safety and Health (HIOSH) standards and rules.
2. Environmental Protection Agency (EPA), Toxic Substance Control Act (TSCA), 40 CFR Part 745, Lead, Requirements for Lead-Containing Paint Activities in Target Housing and Child Occupied Facilities.
3. Environmental Protection Agency (EPA), Resource Conservation and Recovery Act (RCRA) of 1976, amended in 1980 and 1984.

F. The Contractor shall be responsible for initiating and maintaining all safety precautions and programs necessary to keep the work place safe for his employees and Subcontractors; and ready for safe reoccupancy of the work area and building by the buildings occupants.

1.03 COORDINATION WITH OTHER SECTIONS

A. The Contractor shall coordinate all of his lead paint removal activities with the Engineer and the Contractor's hired Third party independent industrial hygienist.

1.04 CONTRACTOR RESPONSIBILITIES

A. The Contractor acknowledges that he alone is responsible for the instruction and for enforcing personnel protection requirements and that these specifications provide only a minimum acceptable standard. Contractor shall comply with all requirements of 29 CFR 1926.62 and HIOSH 12-148.1. The Contractor shall also be responsible for complying with all applicable EPA regulations in regards to lead-containing materials.
   1. Respirators: Use appropriate respirators and filters which meet all requirements of OSHA 29 CFR 1926.62 and HIOSH 12-148.1.
   2. Protective Clothing: Use appropriate personal protective clothing (disposable suits, eye protection, gloves, etc.) as required by OSHA 29 CFR 1926.62 and HIOSH 12-148.1.

1.05 GENERAL REQUIREMENTS

A. The work specified herein shall include the handling of components painted or coated with lead-containing paint, transportation and disposal procedures as required of lead-containing materials by persons with at least EPA Lead Training. This work must be performed in compliance with all applicable federal, state, and local regulations and be performed by workers who are capable of and willing to perform the work of this contract.

B. Applicable Standards and Guidelines: All work under this contract, and any other trade work conducted with the project, shall be done in strict accordance with all applicable federal, state and local regulations, standards and codes governing lead-containing paint removal, transportation and disposal of lead materials.

The most recent edition of any relevant regulation, standard, document or code shall be in effect.

C. Specific Statutory and Regulatory Requirements:
1. Title 29, Code of Federal Regulations, section 1926.62, entitled "Lead Exposure in Construction; Interim Final Rule".
2. Department of Labor and Industrial Relations: State of Hawaii, Occupational Safety and Health Standards; Title 12, Subtitle 8, Chapter 148.1, (also known as chapter 12-148.1, Hawaii Administrative Rules, entitled "Lead Exposure in Construction".
3. Title 29 Code of Federal Regulations Part 1910.134, Respiratory Protection.
4. Federal Register: Vol. 54, No. 131; Tuesday, July 11, 1989. Department of Labor, Occupational Safety and Health Administration; 29 CFR Parts 1910, 1915, 1917, and 1918; Occupational Exposure to Lead; Statement of Reasons; Final Rule.
5. Title 40 Code of Federal Regulations Part 61, National Emissions Standards for Hazardous Air Pollutants
6. Title 40 Code of Federal Regulations Part 745, Lead; Requirements for Lead-Based Paint Activities in Target Housing and Child Occupied Facilities; Final Rule
7. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing.

1.06 DEFINITIONS

A. Action Level (AL): Employee exposure averaged over an 8-hour period, without regard to the use of respirators, to a particular airborne concentration. OSHA requirements become effective at this level. Lead: 30 micrograms per cubic meter of air.

B. Air Monitoring: The process of measuring the content of a specific, known, volume of air in a stated period of time. For this project, NIOSH 7082 method for lead monitoring.

C. Authorized Visitor: The Engineer, Contractor hired Third party independent industrial hygienist, their representatives, air monitoring personnel, or a representative of any regulatory or other agency having jurisdiction over the project.

D. Contaminated Area: An area where unwanted toxic or harmful substances exists.

E. HEPA Filter: A High Efficiency Particulate Absolute filter capable of trapping and retaining 99.97 percent of particulates greater than 0.3 micron in length.

F. Lead: Metallic lead, all inorganic lead compounds, and inorganic lead soaps. Excluded are all other organic lead compounds.

G. Monitoring Specialist: A person under the supervision of the Contractor's hired Third party independent industrial hygienist who is trained in health and safety requirements for lead exposure and air-monitoring in accordance with 40 CFR 745, 29 CFR 1926.62 and HIOSH 12-148.1.

H. Permissible Exposure Limit (PEL): The employer shall ensure that no employee is exposed to concentrations greater than the PEL as determined from an 8-hour time weighted average. Lead: 50 micrograms per cubic meter.

I. Personal Monitoring: Contractor's sampling of lead in air concentrations within the breathing zone of an employee to determine the 8-hour time weighted average. The samples shall be representative of the employee's work tasks. The breathing zone shall be considered an area within 12 inches of the nose or mouth of an employee.

J. Contractor's Third Party Independent Industrial Hygienist: Person hired by the Contractor, who is educated and trained in recognizing and evaluating work place hazards and stress (in this instance, lead-containing paint removal and related work in accordance with 40 CFR 745, 29 CFR 1926.62 and HIOSH 12-148.1) and providing guidance on the methods and means of removing or correcting such hazards and stresses within the work environment.

1.07 ABBREVIATIONS

A. CFR - Code of Federal Regulations

B. HIOSH - Department of Occupational Safety and Health, Department of Labor and Industrial Relations, State of Hawaii

C. EPA - U.S. Environmental Protection Agency

D. NIOSH - National Institute for Occupational Safety and Health

E. OSHA - Occupational Safety and Health Administration

F. NESHAP - National Emissions Standards for Hazardous Air Pollutants

G. LCP - Lead-Containing Paint

H. TCLP - Toxicity Characteristic Leaching Procedure

1.08 SUBMITTALS PRIOR TO WORK

A. Final payment will not be made until copies of all submittals have been furnished to and accepted by the Owner. Submit 8 copies of the submittal package no later than 10 work days from the notice of award unless otherwise specified in this section. The submittal package will include the items listed below.

B. Detailed Work Plan: The Contractor shall submit a project work plan for the lead-containing paint disturbance work. The Plan shall be prepared by the Certified Industrial Hygienist. The Contractor shall also provide detailed information concerning:
   1. Preparation of the work area.
   2. Personal protective equipment including respiratory protection and protective clothing.
   3. Employees who will participate in the project: include documentation of experience, documented proof of lead removal training based on 29 CFR 1926.62, HIOSH 12-148.1 and/or the proposed EPA Model Accreditation for Lead-based Paint Removal Work Training, in addition to any current EPA regulatory requirements, and assigned responsibilities during the project.
   4. Decontamination procedures for the personnel who may be exposed to lead-containing paint.
   5. Lead-containing paint treatment, handling and disposal methods and procedures to be used.
   6. Required air monitoring procedures and sampling protocols.
   7. Procedures for final cleanup.
   8. A sequence of work and performance schedule in coordination with other trades.
   9. Emergency procedures.

C. Shop Drawings: Submit shop drawings for the following items as a minimum:
   1. Descriptions of any equipment to be employed not discussed in this section.
   2. Security provisions, if any, in and around the project area.

3. Outline of work procedures to be employed.
4. Location of the waste storage area.
5. Staging of the work, the sequence
6. Entrances and exits to the work place
7. Location and construction of worker decontamination units
8. Water filtration system for all contaminated water. Description of water disposal and copy of water disposal permit from the County of Kauai Environmental Services *Temporary Industrial Wastewater Discharge* Permit.

D. Notices: The Contractor shall obtain a Generator's EPA Identification number (if necessary) for the lead-containing waste material generated from the project that is determined to be hazardous.

E. Insurance: Proof of insurance for Workman's Compensation and General Liability which covers asbestos, lead, and pollution.

F. Qualifications of the Third party Independent Industrial Hygienist.

G. Manufacturer's Data: Copies of manufacturer's specifications, installation instructions and field test procedures for each material and all equipment related to lead handling and abatement and include other data as may be required to show compliance with these specifications and proposed uses.

H. Documentation for Instructions:
1. Submit documentation satisfactory to the Engineer that the Contractor's *employees*, including foremen, supervisors, and any other company personnel or agents who will be exposed to airborne lead dust or who shall be responsible for any aspects of the lead-containing paint removal work activities, have received training in accordance with this specification, 29 CFR 1926.62, HIOSH 12-148.1, (OSHA Lead Awareness or the EPA Model Accreditation for Lead-based Paint Removal Work Training) and any current EPA regulatory requirements.
2. Submit to the Engineer a written respiratory protection program meeting the requirements of 29 CFR 1910.134(b)(d)(e) and (f), documentation that all employees using respirators have received training, and documentation of respirator fit-testing for all Contractor employees and agents who will enter the work area wearing negative pressure respirators. The Contractor shall be solely responsible for his employee's personal protection.

I. Documentation From Physician: Before exposure to lead dust or fumes, the Contractor shall provide workers with a comprehensive medical

examination as required by HIOSH 12-148.1 and 29 CFR 1926.62, or whichever is stricter. This examination will not be required if adequate records show the employees have been examined as required by the aforementioned regulations within the last year.

J. Respirators: Submit document NIOSH approvals for all respiratory protective devices used on site. Include manufacturer certification of HEPA filtration capabilities for all cartridges and filters.

K. Emergency Planning Procedures:
   1. The Contractor shall submit an emergency evacuation plan for the Engineer's acceptance prior to the commencement of work. This plan shall include consideration of fire explosion, toxic atmospheres, electrical hazards, slips, trips and falls, confined spaces and heat related injury. In non-life threatening situations, the injured or incapacitated employee shall decontaminate following normal procedures, with assistance from co-workers if necessary, before exiting the work area to obtain proper medical treatment. In life threatening situations, worker decontamination shall take least priority after measures to stabilize the injured worker, remove the injured worker from the work area, and secure proper medical treatment.
   2. Emergency Response and Evacuation: The Contractor shall provide and document training in emergency response and evacuation procedures to all workers entering the work area.

L. Weekly Submittals During the Lead-containing Paint Disturbance Work: Copies of the following:
   1. Contractor's weekly job progress reports detailing lead-containing paint disturbance, handling, transportation, and disposal activities. In the job progress reports, the Contractor shall include information on the review of progress concerning previously established milestones and schedules, major problems and action taken, injury reports, equipment breakdown, and bulk material and air sampling results.
   2. Work site entry logbooks with information on worker and visitor access.
   3. Daily logs documenting filter changes on respirators, HEPA vacuums, and other engineering controls.
   4. Waste disposal manifest forms for all lead-containing waste material removed from the lead-containing paint removal site and transported to the disposal site. The papers will include a chain-of-custody form with the names and addresses of the facility, the Contractor, the landfill operator, as well as the estimated quantity of lead-containing waste material, and the number and type of

containers used. The form shall be signed and dated by the Owner, the Contractor, and the landfill operator as the material changes custody. If a separate hauler is employed, their name, address, telephone number, and signature also shall appear on the form.

M. Waste Disposal and Landfill Requirements: Contractor shall separate lead-containing paint chips and debris from non-hazardous waste materials such as used plastics, disposable tools, etc. Contractor shall clean all bulk lead-containing debris and waste from non-hazardous plastic, tools, suits, etc. prior to disposal.
   1. If Toxic Characteristic Leaching Procedure (TCLP) test results of the containers of waste material are below the EPA limit the lead-containing waste materials (paint chips, contaminated materials, etc.) shall be disposed of at a landfill approved for such purposes. The Contractor shall submit to the Engineer, documentation that the lead-containing waste material removed from the work area has been accepted by the landfill Owner.
   2. If the TCLP test results are above the EPA limit or if materials are identified as hazardous waste, the lead-containing waste materials shall be disposed of at an EPA approved facility capable of accepting such hazardous waste.
   3. The Contractor shall submit to the Engineer, documentation that disposal of the lead-containing waste material at the selected landfill is approved by the State of Hawaii, or the EPA approved mainland facility for hazardous lead-containing waste material.

1.09 SUBMITTAL AFTER WORK IS COMPLETED

A. Final Report: At the completion of the work, a final report shall be prepared by the Contractor for acceptance by the Engineer. The report shall be submitted and shall include the items listed below.
   1. The project name, Abatement Contractor, Abatement Contractor license number, EPA waste generator nimber, work duration, material removed, respiratory protection employed, waste manifest signed by the Contractor, waste transporter, and ladnfill operator, and total quantity of waste, TCLP lead reports, employee exposure air sample results, and results of the most current PAT round results for the laboratory conducting the employee exposure air sample analysis.
   2. Certification of the Abatement Contractor's employees.
   3. Visitor/Worker Entry Log: The daily log of all personnel including the Contractor's employees and agents who enter the work area while lead abatement operations are in progress, until final clearance is received from the Third party independent industrial hygienist. The log shall contain the listed information as a minimum and shall be

certified by the Contractor hired Third party independent industrial hygienist.
   a. Date of visit/worker entry
   b. Visitor/Worker's name, employer, business address and telephone number
   c. Time of entry and exit from work area
   d. Type of protective clothing and respirator worn
   e. Certificate of release signed and filed with the contractor
4. Clearance certifications received from the Contractor hired Third party independent industrial hygienist.
5. A statement signed by the Lead Abatement Contractor that all lead abatement and disposal was completed in compliance with this specification, Federal and State regulations, and the approved Work Plan.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 POTENTIAL LEAD HAZARD

A. The disturbance or dislocation of lead-containing materials may cause lead-containing dust to be released into the atmosphere, thereby creating a potential health hazard to the workers and the general public. Apprise all workers, supervisory personnel, subcontractors, consultants, authorized visitors, occupants and neighbors who will be at or near the job site of the seriousness of the hazard and of proper work and protective procedures which must be followed (such as informing affected individuals as required by 40 CFR 745, keeping windows and doors closed; and air conditioning and ventilation units shut down during removal work).

B. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants who may encounter, disturb, or otherwise function in the immediate vicinity of any identified lead-containing materials, take appropriate continuous measures as necessary to protect all workers and the general public from the potential hazard of exposure to respirable airborne lead dust. Such measures shall include the procedures and methods described in the regulations of applicable federal, state and local agencies.

C. Paint in good condition need not be removed prior to selective demolition/renovation activities except where the activities create airborne

dust such as drilling, saw cutting, or surface preparation for repainting (cracking, peeling, flaking). 6 mil polyethylene must be placed in the work areas where these types of activities may occur to capture and contain the paint waste. Removal of lead-containing paint shall follow wet methods to minimize dust and no chemical stripping of paint using methylene chloride shall be allowed. All paint waste must be containerized (DOT drum) and characterized for proper disposal (see Section 3.03.A).

3.02 WORK AREA PREPARATION

A. Protect occupants, and surrounding area from possible contamination. Inform occupants of the removal work involving lead.

B. Treatment of Surfaces: During disturbance work, acceptable industry standard dust control methods shall be used to control dust (such as wetting items to be disturbed, by misting; provide dust screens; remove items in large, whole pieces; avoid crushing and pulverizing removal methods; encapsulate material prior to disturbace; use amended water; and containerize wet waste material). Prevent contamination spreading to the surrounding public and residential area.

C. Barriers: Standard barriers such as construction warning tape, fencing, etc. shall be used to prevent the general public access on to the work site. Seal any penetrations to the affected work area with 6 mil polyethylene plastic sheeting and duct tape.

D. NESHAP Compliance: Compliance with the requirements of EPA's NESHAP regulation is required for this project. Proper notification of the renovation of the building to the Department of Health shall be the Contractor's responsibility.

E. Ensure that all personnel working on site during the removal work are properly trained and protected as required by law.

3.03 CLEANUP AND TESTING

A. Wet clean and HEPA vacuum clean surfaces and surrounding ground within the lead control area daily. Do not allow lead painted/coated debris, paint chips, and dust to accumulate. Restrict the spread of dust and debris. Keep waste from being distributed over the general area. Do not dry sweep or use compressed air to clean the area. When the removal operation has been completed, the area will be cleaned of all visible lead paint contamination by vacuuming with a High Efficiency

Particulate Absolute (HEPA) filtered vacuum cleaner followed by wet mopping where applicable.

B. The paint chip/debris (separated out or mixed with other construction debris) must be TCLP (Toxicity Characteristic Leachability Product) by the contractor to determine if it should be disposed of as hazardous waste or regular construction debris. If determined to be hazardous waste, then the waste manifest must be signed by the Engineer's Environmental Health and Safety Office's Hazardous Materials Manager before disposal. For the purposes of bidding, the contractor shall include the cost of the TCLP testing and disposal costs as as regular construction debris. Should the TCLP test fail and the debris is considered hazardous waste, the Engineer will issue a change order to the contractor to dispose of as hazardous waste.

C. The Contractor’s Third party independent industrial hygienist (a third party independent industrial hygiene cosultant hired by the General Contractor and not affiliated with the abatement contractor) shall conduct visual inspection of the lead abatement area to ensure that the area is clean and free of visible lead dust.

D. All non-hazardous waste shall be removed from the site by the completion of the project. The Contractor, in the preseance of the Third party independent industrial hygienist, shall collect representative samples of the waste stream for TCLP lead analysis (as noted above). All hazardous waste shall be removed from the site to an EPA approved disposal facility within 90 days of the removal work.

E. Do not remove the lead control area or roped-off perimeter and warning signs prior to the receipt of the Third party independent industrial hygienist's lead clearance certification.

F. All wastewater shall be treated as lead contaminated and shall be properly filtered so as not to allow large visible particles of paint debris from accumulating in the water. Lead-contaminated waste water shall be tested and disposed of in compliance with the County of Kauai, Environmental Services, *Temporary Industrial Wastewater Discharge* Permit for the disposal of filtered waste water into the sanitary sewer system. Waste water shall be tested by the Third party independent industrial hygienist to determine if it is a hazardous waste and disposed of in accordance with current regulations and guidelines and as specified herein. Disposal of waste water in the County of Kauai's sanitary sewer must be tested to be <0.6 mg/L lead in water. Wastewater will not be discharged into the storm drain system unless an appropriate NPDES permit has been obtained.

3.04 TRANSPORTATION AND DISPOSAL

A. Disposal of Hazardous Waste and Non-hazardous Waste: Contractor shall separate potentially non-hazardous waste material (i.e. plastic sheeting, disposable protective suits, etc.) from hazardous waste material prior to testing. All other debris, scraps, waste materials, rubbish and trash contaminated with lead-containing paint and contaminated dust from the immediate work area and place in UN approved (49 CFR 178) and appropriately labeled containers and store on site for TCLP lead testing. The Contractor shall be responsible for collecting and paying of all TCLP testing.
   1. Local waste landfill facilities do not accept any RCRA hazardous waste. All hazardous waste must be disposed of at an EPA approved mainland U.S. RCRA hazardous waste disposal facility. Hazardous waste must be disposed of within 90 days of the waste being created.
   2. Non-hazardous lead waste and debris may be disposed of at the local waste landfill facility that is State approved to accept such waste.
      a. Notify Non-hazardous Waste Landfill Operator: The Contractor shall advise the Non-hazardous Waste landfill operator, at least twenty-four (24) hours prior to transportation, of the material to be delivered.
      b. Provide the Non-hazardous Waste Landfill Operator with applicable TCLP results which indicate that the waste material is non-hazardous.

B. Disposal of Non-Hazardous Painted Construction Debris (TCLP for Lead Not Exceeding EPA Limits): Remove non-hazardous lead waste including, debris, scraps, waste materials, rubbish, and trash from the site and disposed of at a landfill approved for disposal.

C. The Contractor shall submit disposal manifest and receipts showing acceptance of all waste material by the approved waste disposal site to the Contractor's hired Third party independent industrial hygienist. The shipping papers shall include a chain-of-custody form and include names and addresses of the Owner, the Contractor, and the Landfill Operator and information on the type and number of waste containers.

3.05 CLEARANCE CRITERIA

A. Visual clearance of the work area will be performed by the Third Party Industrial Hygienist. The clearance criteria shall be based on the latest Housing and Urban Development (HUD) "Guidelines for the

Evaluation and Control of Lead-Based Paint Hazards in Housing" publication. Any additional clearance inspection, sampling and analysis initiated by the Contractor or required due to failure of the first set of clearance inspection and sampling, shall be at the Contractor's expense.

3.06 TESTING AND AIR MONITORING

A. The Contractor’s hired Third party independent industrial hygienist shall have the authority to instigate engineering controls during the project.

B. Testing, daily area (environmental) air monitoring and final clearance inspections shall be provided by the Contractor’s hired Third party independent industrial hygienist, for the purpose of:
   1. verifying compliance with the specifications and the applicable regulations listed in this section;
   2. ensuring that the documentation required by these specifications and by law is collected and reported to the Engineer;
   3. instigating engineering control during the project.

3.07 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall be responsible for all TCLP lead testing and alaysis.

B. The Contractor shall be responsible for his employees' personnel protection, personal air monitoring and necessary records as required by OSHA, Hawaii State Law and all other applicable laws and as required in these specifications. The Contractor shall provide all required documentation to the Engineer. Contractor shall collect daily personal air samples on at least 25 percent of the personnel performing removal work with the most exposure for the duration of the project.

C. The Contractor shall procure legally required reports for air monitoring as part of the contract. All air monitoring reports shall included all field data, laboratory reports, test results and other pertinent information about the daily work activities.

D. Contractor’s hired Third party independent industrial hygienist shall make available, one copy of daily area air monitoring reports for the Contractor's use. The Contractor may accept such reports as they are offered at his own risk. Availability of additional copies of the reports during the work or at any future time shall not be considered a part of the contract. The Contractor shall be responsible for his own personnel air monitoring as required by law and these specifications.

E. Air monitoring and testing which becomes necessary in order to follow up on work by the Abatement Contractor, rejected as not conforming to the requirements shall be the responsibility of the Abatement Contractor. The full cost of such additional monitoring shall be borne by the Abatement Contractor, and shall not be a part of the final contract payment.

F. The Abatement Contractor shall be responsible for the proper required notifications to the State of Hawaii Department of Health.

3.08 MONITORING RESULTS

A. Airborne lead levels in areas adjacent to the work area or in any part of the work site impacted by the removal activities shall not exceed 30 micrograms per cubic meter of air or 1.5 micrograms per cubic meter of air.

B. If the above ambient concentrations and/or the PEL's are exceeded, the Contractor shall cease all work immediately in any work area causing or contributing to such a condition. The Contractor shall take remedial action (e.g. misting with more water, encapsulation, provide dust screens, etc.) to reduce concentrations to acceptable levels.

C. The Contractor is solely responsible for monitoring his personnel in compliance with all OSHA and HIOSH requirements.

END OF SECTION

SECTION 13286 - ARSENIC CONTROL MEASURES

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, and services, necessary to carry out the safe removal of arsenic-containing material in compliance with these specifications, EPA, OSHA, State of Hawaii regulations, and any other applicable Federal and State regulations. Whenever there is a conflict or overlap of the above references, the most stringent shall apply.

B. Contractor to coordinate all work with the General Contractor and the Qualified Consultant. Contractor shall verify the existing locations, conditions, layers, and thickness of all materials prior to commencement of any work. The arsenic work shall generally include:

Removal and disposal of arsenic containing ceiling material. Ceiling material including any substrate shall be removed and disposed of as arsenic containing material.

C. The Contractor shall be responsible for testing, handling, transporting and disposal of arsenic containing materials from the subject property.

D. Contractor is responsible to satisfy himself as to the total extent of all work, including to but not limited to the quantity, location, thickness, layers, accessibility, etc. of all material prior to commencement of any work.

E. During any removal involving arsenic containing materials, the following shall apply:

1. The Contractor shall delineate regulated areas in which workers may be exposed to levels of inorganic arsenic in excess of the OSHA PEL. Access to such regulated areas shall be limited to authorized personnel.

2. All workers within arsenic regulated areas shall be supplied with a respirator selected according to 29 CFR 1910.1018(h).

3. All workers within arsenic regulated areas shall be supplied with personal protective equipment selected according to 29 CFR 1910.10180).

4. Whenever arsenic containing materials are being disturbed, the Contractor shall monitor worker exposure to arsenic dust.

5. The Qualified Consultant shall perform area air monitoring to ensure that no arsenic particulates migrate from regulated areas to non-regulated areas.

1.02 CONTRACTOR RESPONSIBILITIES

A. The Contractor acknowledges that he alone is responsible for the instruction and for enforcing personnel protection requirements and that these specifications provide only a minimum acceptable standard. Contractor shall comply with all requirements of 29 CFR 1910.1018 and provide daily personnel air monitoring. The Contractor shall also be responsible for complying with all applicable EPA regulations in regards to arsenic-containing materials:

1. Respirators: Use appropriate respirators and filters which meet all requirements of OSHA 29 CFR 1910.134.

2. Protective Clothing: Use appropriate personal protective clothing (disposable suits, eye protection, gloves, etc.) as required by OSHA 29 CFR 1910.1018.

1.03 APPLICABLE STANDARDS AND GUIDELINES

A. All work under this contract, and any other trade work conducted with the project, shall be done in strict accordance with all applicable federal, state and local regulations, standards and codes governing arsenic-containing material, transportation and disposal. The most recent edition of any relevant regulation, standard, document or code shall be in effect.

B. Compliance with the specific statutory and regulatory requirements shall include but not limited to:

1. Title 29 Code of Federal Regulations Part 1910.1018, Inorganic Arsenic

2. Title 29 Code of Federal Regulations Part 1910.134, Respiratory Protection.

3. Title 40 Code of Federal Regulations Part 61, National Emissions Standards for Hazardous Air Pollutants

4. Title 40 Code of Federal Regulations Part 261, Identification and Listing of Hazardous Waste
5. Title 40 Code of Federal Regulations Part 262, Generators of Hazardous Waste
6. Title 40 Code of Federal Regulations Part 263, Transporters of Hazardous Waste
7. Title 40 Code of Federal Regulations Part 264, Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
8. Title 40 Code of Federal Regulations Part 265, Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
9. Title 40 Code of Federal Regulations Part 268, Land Disposal Restrictions
10. Title 49 Code of Federal Regulations Part 172, Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
11. Title 49 Code of Federal Regulations Part 178, Shipping Container Specification

1.04 DEFINITIONS

A. Abatement: Procedure to control fiber release from arsenic containing building materials.

1. Removal: All herein specified procedures necessary to remove arsenic containing materials from an area and disposal of the material at an approved site in an acceptable manner.
2. Air Monitoring: The process of measuring the fiber content of a specific, known volume of air in a period of time.

B. Authorized Visitor: the Engineer, the Qualified Consultant, his representatives, air monitoring personnel, or a representative of any regulatory or other agency having jurisdiction over the project.

C. Contractor: The firm hired by the General Contractor to remove and dispose of the arsenic-containing materials.

D. Fixed Object: A unit of equipment or furniture in the work area which

cannot be removed from the work area without dismantling.

E. Holding Area: A secure area used for the storage of double-bagged arsenic containing material before removal from the project site to an approved disposal site.

F. Qualified Consultant: A third party independent consultant hired by the General Contractor who will perform air monitoring and inspection during abatement work and shall have the authority to initiate engineering controls.

1.05 ABBREVIATIONS

A. CFR: Code of Federal Regulations

B. HIOSH: Department of Occupational Safety and Health, Department of Labor and Industrial Relations, State of Hawaii

C. EPA: U.S. Environmental Protection Agency

D. NIOSH: National Institute for Occupational Safety and Health

E. OSHA: Occupational Safety and Health Administration

F. NESHAP: National Emissions Standards for Hazardous Air Pollutants

G. TCLP: Toxicity Characteristic Leaching Procedure

1.06 COORDINATION WITH OTHER SECTIONS

Prior to commencement of work, an annotated description of all existing damaged and missing items shall be submitted to the Engineer. It will be the Contractor's responsibility to repair and/or replace to the Engineer's satisfaction all items identified as damaged and/or missing that cannot be proven to have been in this condition prior to the commencement of this project.

1.07 GENERAL REQUIREMENTS

A. Worker Training: Contractor employees assigned to work at the site must have successfully completed either the 40 hour basic HAZWOPER or the refresher course, as stipulated in 29 CFR 1910.120, within the last year.

B. Supervisor Training: Field managers and supervisors who are directly

responsible for, or who supervise employees engaged in hazardous waste site operations, must have successfully completed either the 40 hour basic HAZWOPER and additional 8-hour supervisor training, or the refresher courses, as required by 29 CFR 1910.120, within the last year.

C. Field Experience: Each employee assigned to work at the site must also have a minimum of three days of field experience under the direct supervision of trained, experienced personnel. The field experience, at a minimum, must have included hands-on training in the proper use and calibration of field instruments, waste cleanup, spill control and containment, and general site safety.

D. First-Aid and CPR Training: A minimum of two Contractor personnel with current Basic First Aid and CPR training must be on site at all times. Valid documentation in the form of a Red Cross or American Heart Association card must be submitted to the Engineer prior to performing any work.

E. Medical Surveillance: Employees and subcontractors who are assigned to work at the site are required to have medical clearance satisfying 29 CFR 1910.120 and 1910.134. A physician must have examined the employee or subcontractor within the past twelve months and must certify that the employee or subcontractor is physically fit to wear a respirator and perform work at hazardous waste sites. Individuals, whose medical clearance is not current will not be allowed to work at the site.

1.08 SUBMITTALS

A. Submittals shall be submitted in the order listed herein. Failure to do so will result in automatic rejection of submittals.

1. Arsenic Removal Work Plan: Submit arsenic job-specific work plan. The work plan shall itemize the work procedures to be used in the removal and disposal of arsenic-containing material prior to the start of work. The work plan shall also include interfacing with other trades, sequencing of arsenic-related work; a disposal plan; a liquid and solid waste storage plan, a containerization plan; a daily personnel air sampling plan; respirators; protective equipment; worker training certification; an emergency plan; and a detailed description of the measures to be employed to control pollution and security provisions. The personal air-sampling portion of the plan shall include sampling training and strategy, the estimated number of air samples to be taken per day, and the sampling methodology. At the conclusion of the project, the Contractor and the Qualified Consultant shall submit a co-signed certification stating that the removal of arsenic-containing material was completed in

accordance with the Contractor's accepted Arsenic Work Plan and in accordance with all applicable specifications, rules, and regulations.

2. Manufacturer's Catalog Data: Submit copies of manufacturer's specifications, installation instructions and field test materials for all chemicals and equipment related to arsenic containing materials, including any other data that may be required to demonstrate compliance with these Specifications and proposed uses. This includes, but is not limited to, data for respirators.

3. Material Safety Data Sheets: Submit copies of the Material Safety Data Sheets for all chemicals used.

4. Respiratory Protection Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Respiratory Protection Program prepared in accordance with all applicable laws. The Contractor shall also submit fit test records on all employees to be used on this project who may be required to wear a respirator.

5. Hazard Communication Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Hazard Communication Program prepared in accordance with all applicable laws.

6. Safety Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Health and Safety Plan prepared in accordance with all applicable laws.

7. Certification of medical examinations: The Contractor shall submit documentation from a physician that all employees or agents who may be required to wear a respirator have been medically monitored to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects.

8. Employee training certifications: Submit documentation within 10 consecutive calendar days of award , satisfactory to the Engineer that the Contractor's employees , including foreman , supervisors and any other company personnel or agents who may be responsible for any aspects of removal and disposal of miscellaneous hazardous materials, have received training in accordance with Section 1.06 of this specification.

9. Emergency Planning Procedures: Emergency planning shall be developed prior to initiation of work and approved by the Contractor and the Engineer. It shall include, but not be limited to, considerations of fire, explosion, electrical hazards, slips, trips and falls and heat related injuries. The Contractor shall develop written emergency procedures and provide employee emergency training.

10. Notification: Notify the Engineer 10 working days prior to the start of any removal work.

11. Waste Disposal Manifest Forms: Submit copies of all transport manifests, trip tickets and disposal receipts for all hazardous waste removed from the work area and disposed of at a disposal facility during the work process.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS

Furnish the Qualified Consultant two complete sets of personal protective equipment daily, as required herein, for entry to and inspection of the arsenic control area. The personal protective equipment shall include but not limited to gloves, eye-protection, hardhat, boots and disposable protective whole body covering. The personal protective equipment shall remain the property of the Contractor.

A. Respirators: Select respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. Respirators shall comply with the requirements of 29 CFR 1910.1018. For this project, respirators shall be worn at all times throughout the removal process or as deemed necessary by the QC.

B. Protective Clothing: Furnish personnel exposed to arsenic dust with disposable protective whole body clothing, eye-protection, head covering, gloves, and foot coverings. Furnish disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after approval from the Qualified Consultant. For this project, respirators shall be worn at all times throughout the removal process or as deemed necessary by the Qualified Consultant.

C. Warning Signs and Labels: Provide warning signs at approaches to the arsenic control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Provide and affix labels to impermeable bags, arsenic waste drums,

and other containers containing arsenic materials, scrap, waste, or debris. Signs and labels shall comply with the requirements of 29 CFR 1910.1018. Warning signs and labels shall be provided throughout the entire project and as deemed necessary by the Qualified Consultant.

D. Tools: Filters on vacuums and exhaust equipment shall be High Efficiency Particulate Absolute (HEPA) filters and UL 586 labeled.

PART 3 - EXECUTION

3.01 POTENTIAL ARSENIC HAZARD

A. The disturbance or dislocation of arsenic-containing materials may cause arsenic-containing dust to be released into the atmosphere, thereby creating a potential health hazard to the workers and the general public. Apprise all workers, supervisory personnel, subcontractors, consultants and authorized visitors who will be at the job site of the seriousness of the hazard and of proper work procedures which must be followed.

B. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants who may encounter, disturb, or otherwise function in the immediate vicinity of any identified arsenic-containing materials, take appropriate continuous measures as necessary to protect all workers and the general public from the potential hazard of exposure to respirable airborne arsenic dust. Such measures shall include the procedures and methods described in the regulations of applicable federal, state and local agencies.

3.02 WORK AREA PREPARATION

A. Area Requirements: Establish an arsenic control area with warning signs and appropriate barriers. Only authorized personnel shall be allowed within the control area.

B. Barriers:

1. Standard barriers such as construction warning tape, fencing, etc. shall be used to prevent the general public access on to the work site.

2. Warning signs in compliance with 29 CFR 1910.1018 and 29 CFR 1926.62 shall be posted at all sides of the work area.

3. Seal windows, door openings, roof vents and other penetrations to the removal area with 6 mil polyethylene plastic sheeting, duct tape, spray adhesive, foam sealant, etc.

3.03 WORK PROCEDURE

A. Perform arsenic-related work as specified herein.

1. Personnel shall wear and use protective clothing and equipment as specified herein.

2. Eating, smoking, or drinking shall not be permitted in the arsenic control area.

3. No one will be permitted in the arsenic control area unless the person is provided with appropriate training and protective equipment. The Contractor shall be responsible for providing their personnel with the appropriate training and the necessary protective equipment while they are performing arsenic-related work.

4. Removal methods shall be limited to HEPA vacuum and wet wipe methods; and bagging the wet material in 6 mil polyethylene bags. Properly containerize bagged arsenic waste for disposal as hazardous waste in accordance with 49 CFR 172 and 49 CFR 178.

5. Avoid creating dust at all times. Absolutely no dust creating method shall be utilized during the arsenic-containing material removal.

6. The removal area shall be clean of all visible arsenic-containing debris prior to final visual inspection by the Contractor and QC.

7. The Contractor is solely responsible for complying with any and all regulations concerning his employees' safety and health and the requirements specified herein.

B. Arsenic Control Area Requirements: Establish an arsenic control area by roping off the area or providing curtains, portable partitions or other enclosures to maintain the concentration of arsenic below 5 micrograms per cubic meter of air and visible dust beyond the boundaries. No one will be permitted in the arsenic control area unless the person is provided with appropriate training and protective equipment. During the arsenic-

containing material removal operation, when the employees need to exit the controlled area, they will be required to remove all visible dust from themselves using a HEPA vacuum and wet wiping; remove their disposable coveralls; place them in an approved impermeable container; as a minimum wash face and hands with soap and water; and then exit the area. All arsenic-contaminated waste water shall be collected and tested prior to proper disposal.

C. NESHAP Compliance: Compliance with the requirements of EPA's NESHAP regulation is required for this project. Proper notification of the demolition of the building to the EPA and Department of Health shall be the Contractor's responsibility.

D. Ensure that all personnel working on site during the demolition work is properly trained and protected as required by law.

E. At the completion of the removal work, ensure that all arsenic-containing debris is removed from the site. Hazardous arsenic waste must be disposed of off-island at a continental U.S., EPA approved hazardous waste disposal site within 90 days of the removal work. The Contractor shall comply with all applicable transport and disposal regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 268, 49 CFR 172 and 49 CFR 178.

3.04 TRANSPORTATION AND DISPOSAL

A. Disposal of Non-Hazardous Waste: Remove non-hazardous arsenic waste including, debris, scraps, waste materials, rubbish, and trash from the site and dispose of at a landfill approved for such purposes within 90 days of the removal work. If Toxic Characteristic Leaching Procedure (TCLP) test results of the containers of waste material are below the EPA limit the arsenic containing waste materials shall be disposed of at a landfill approved for such purposes. The Contractor shall submit to the Engineer, documentation that the lead-containing waste material removed from the work area has been accepted by the landfill Owner.

B. If the TCLP test results are above the EPA limit or if materials are identified as hazardous waste, the arsenic containing waste materials shall be disposed of at an EPA approved facility capable of accepting such hazardous waste. Local waste landfill facilities do not accept any hazardous waste. All hazardous waste must be disposed of at an EPA approved mainland U.S. hazardous waste disposal facility.

C. The Contractor shall submit disposal manifest and receipts showing acceptance of all waste material by the approved waste disposal site to

the Engineer. The shipping papers shall include a chain-of-custody form and include names and addresses of the Facility Owner, the Contractor, and the Landfill Operator and information on the type and number of waste containers.

3.05 TESTING AND MONITORING RESULTS

A. Airborne arsenic levels in areas adjacent to the work area or in any part of the work site impacted by the demolition activities shall not exceed 5 micrograms per cubic meter of air. The clearance criteria for arsenic shall be <5 micrograms per cubic meter of air.

B. If the above ambient concentrations and/or the PEL is exceeded, the Contractor shall cease all work immediately in any work area causing or contributing to such a condition. The Contractor shall take remedial action (i.e. increase misting, utilize less dust creating methods of demolition, etc.) to reduce concentrations to acceptable levels.

C. The Contractor is solely responsible for personal monitoring and providing personal protective equipment including respiratory protection for his personnel in compliance with all OSHA and HIOSH requirements.

D. The Qualified Consultant shall inspect the site upon the conclusion of the demolition and clean up, to determine if the site is essentially clean of visible arsenic-containing ceiling tiles and board.

END OF SECTION

SECTION 13288 – TESTING AND AIR MONITORING

PART 1 - GENERAL

1.01 SUMMARY

A. In performing this project, all possible safeguards, precautions and protective measures should be utilized to prevent exposure of any individual to hazardous substances.

These specifications are based upon procedures and standards derived from U.S. regulatory agencies (EPA, OSHA, NIOSH) and the Hawaii State Division of Occupational Safety and Health as well as from industry and sound industrial hygiene practice. They must be followed to ensure that no measurable amount of lead is released to the uncontrolled work and public areas.

B. Testing, daily area air monitoring and visual inspections shall be provided by the third party independent industrial hygienist for the purpose of:

1. Verifying compliance with the specifications and the applicable regulations listed in SECTION 13281 - ASBESTOS ABATEMENT, SECTION 13282 - LEAD-CONTAINING PAINT CONTROL MEASURES, and SECTION 13286 – ARSENIC CONTROL MEASURES;

2. Ensuring that the documentation required by these specifications and by law is collected and reported to the Contracting Officer;

3. Providing engineering control during the project.

1.02 DEFINITIONS

A. Building representative(s): The person or persons designated by the users of the building to act on their behalf.

B. Contractor: The construction firm engaged to remove, encapsulate and/or dispose of the hazardous materials.

C. Industrial Hygienist: An individual trained in air monitoring and project supervision. A member of the construction management team who enters the work area to set up the air monitoring device and then collects the various air samples to be sent to the laboratory for analysis.

D. Project Manager: The State employee responsible for administering the construction contract and ensuring that the work of the contractor is conducted according to the contract documents and in compliance with applicable laws, regulations, ordinance, etc.

E. Third Party Independent Industrial Hygienist: The State shall hire an independent third party qualified environmental Industrial Hygienist who is a State of Hawaii certified Project Monitor licensed to perform work in Hawaii (and employed by a company licensed to perform work in Hawaii). The Third Party Independent Industrial Hygienist will perform air monitoring and inspection during abatement work and shall have the authority to initiate engineering controls.

1.03 COORDINATION

A. Coordinate with the State's Inspector for the testing/air monitoring requirements included in SECTION 13281 - ASBESTOS ABATEMENT, SECTION 13282 - LEAD-CONTAINING PAINT CONTROL MEASURES, and SECTION 13286 – ARSENIC CONTROL MEASURES for testing/air monitoring consultants or inspectors, and all applicable Federal, State and local regulations.

1.04 SUBMITTAL AFTER WORK IS COMPLETED

A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.

B. At the completion of the work, a final report shall be prepared by the Contractor for acceptance by the Contracting Officer. The report shall be submitted and shall include daily testing records and post-construction reports as noted in SECTION 13281 - ASBESTOS ABATEMENT, SECTION 13282 - LEAD-CONTAINING PAINT CONTROL MEASURES, and SECTION 13286 – ARSENIC CONTROL MEASURES.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall be responsible for his employees' personnel protection, personal air monitoring and necessary records as required by OSHA (29 CFR 1926.1101), Hawaii State Law (12-145.1) and all other

applicable laws and as required in these specifications. The Contractor shall provide all required documentation to the Contracting Officer. Contractor shall collect daily personal air samples on at least 25% of the personnel performing removal work with the most exposure for the duration of the project.

B. The Contractor shall procure legally required reports for air monitoring as part of the contract. All air monitoring reports shall include all field data, laboratory reports, test results and other pertinent information about the daily work activities.

C. Third party independent industrial hygienist shall make available, one copy of daily area air monitoring reports for the Contractor's use. The Contractor may accept such reports as they are offered at his own risk. Availability of additional copies of the reports during the work or at any future time shall not be considered a part of the contract. The Contractor shall be responsible for his own personnel air monitoring as required by law and these specifications.

D. Air monitoring and testing which becomes necessary in order to follow up on work by the Abatement Contractor, rejected as not conforming to the requirements shall be the responsibility of the Abatement Contractor. The full cost of such additional monitoring shall be borne by the Abatement Contractor, and shall not be a part of the final contract payment.

3.02 TESTING/AIR MONITORING

A. The third party independent industrial hygienist shall have the authority to implement engineering controls during the project.

B. Daily area air monitoring shall be performed to detect airborne fiber concentrations in and outside the work area for the duration of the project.

1. On-site environmental air monitoring as required by EPA, OSHA, and the project specifications.

2. Laboratory analysis by PCM analysis using NIOSH 7400 method of asbestos, by atomic absorption using NIOSH 7900 for arsenic, and flame atomic absorption spectrometry analysis using NIOSH 7082 method for lead.

3. Monitoring of decontamination procedures at site entry/exit.

4. Monitoring of containment maintenance by visual and instrumental inspection.

5. Interface with project inspectors, building representatives, representatives of regulatory agencies, and project designers during site visits.

6. Ensure that proper respiratory protection is utilized by all persons at the project site.

7. Relay to the Contracting Officer any discrepancies in contractor's action with provisions of project specifications.

8. Act quickly in case of emergencies with appropriate response.

C. Any testing above and beyond what is specified and initiated by the Contractor shall be paid for by the Contractor at no additional cost to the Contracting Officer.

D. Air monitoring will be conducted according to the method prescribed by PCM analysis using NIOSH 7400 method of asbestos, by atomic absorption using NIOSH 7900 for arsenic, and flame atomic absorption spectrometry analysis using NIOSH 7082 method for lead. Final visual clearance inspection will be performed by the third party independent industrial hygienist together with the Abatement Contractor's foreman.

3.03 SAMPLING DESIGN

The following is a typical sampling design per containment area during the actual abatement. The number of samples and volume quantities may vary, depending on each project's specifications.

A. Work Area Samples: Low volume samples (as per NIOSH 7400, NIOSH 7082 and NIOSH 7900) shall be taken in the work areas. Ambient air samples shall be taken in the work area for comparison to barrier samples in an effort to ensure that containment systems are secure and that the persons entering the work area are wearing proper respiratory protection. If monitoring inside and outside the abatement work area shows airborne concentrations have reached the predetermined specified TWA, the third party independent industrial hygienist shall stop all work, notify the Contracting Officer immediately, have the Contractor correct the condition(s) causing the increase and ensure that the Contractor obtains the Contracting Officer's approval prior to restarting the removal work.

B. Barrier Samples: Monitoring outside the temporary barriers determines if leakage is occurring outside the work area due to loss of negative pressure or faulty seals.

C. Outside Environmental Samples: Each removal area shall be sealed so that airborne fibers cannot escape into occupied areas. Air is forcibly drawn from the removal area by a negative air machine, filtered and exhausted to the outside environment. High volume samples shall be taken at the negative air unit exhaust to ensure compliance with the levels required by the project specifications and/or any applicable regulations. One sample per 8-hour day per containment area shall be taken.

D. Final Clearance Samples: After air in containment has been exchanged by High Efficiency Particulate Absolute (HEPA) filtration at least 72 times, (air clearance) samples shall be taken to determine if air is cleaned below the specified rate. If not, the area must be cleaned again and a second set of clearance samples run. When the fiber count is below the specified level, a final set of samples shall be collected for analysis by transmission electron microscopy or phase contrast microscopy depending on the size of the abatement area. If these tests reveal that the air has been cleaned to the acceptable standards, the area may be opened for re-occupancy. Lead and arsenic clearance will be a visual clearance only.

3.04 LABORATORY ANALYSIS

A. The third party independent industrial hygienist shall maintain testing facilities in the vicinity of the project site. An industrial hygiene monitoring setup with low-volume pumps, calibrators and all filtering needs, in addition to a fully-equipped laboratory for rapid sample analyses to the field, shall be included in this facility.

3.05 DAILY TESTING RECORDS

A. At the conclusion of every day's testing, the third party independent industrial hygienist shall have available copies of all air monitoring records of each containment area for the Contracting Officer.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15000 - GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

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

B. The Contractor shall completely examine the Contract Documents and shall report to the Engineer any error, inconsistency or omission he discovers prior to submitting a bid.

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

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

E. The Contractor shall warrant that all materials and equipment furnished under this Contract will be new and that all work will be good quality, free from faults and defects and in conformance with Contract Documents for a guaranteed period of one year.

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

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

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

1.02 SUBMITTALS

A. Submit shop drawings, manufacturers' data and certificates for equipment, materials, finish and pertinent details for each system and have them approved before procurement, fabrication or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. Partial submittal for long lead equipment shall be accepted prior to complete submittal. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable industry and technical society publication references and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.

B. Shop Drawings: Drawings shall be 22 inches by 34 inches in size, except as specified otherwise. Drawings shall include floor plans, sectional views, installation details of equipment; and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, accessories, piping and other items that must be shown to assure a coordinated installation. Drawings shall indicate adequate clearance for operation, maintenance and replacement of operating equipment devices. If equipment is disapproved, drawings shall be revised to show acceptable equipment and be resubmitted.

The Contractor shall review, stamp with his approval and submit, all Shop Drawings required by the Contract Documents or subsequently by the Owner as covered by modifications. At the time of submission, the Contractor shall inform the Engineer in writing of any deviation in the Shop Drawings from the requirements of the Contract Documents. By approving and submitting Shop Drawings, the Contractor certifies that he has determined and verified all field measurements and obstructions, field construction criteria, materials, catalog numbers and similar data, that he has checked and coordinated each Shop Drawing with the requirements of the work and of the Contract Documents and that all equipment fits within designated spaces.

C. Manufacturers' Data: Submittals for each manufactured item shall be manufacturers' descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves and catalog cuts. Submittals shall include equipment certification terms and conditions, applicable self-diagnostic testing and start-up procedures. Equipment submittals shall specifically indicate the specified equipment assembly configurations with all specified standard and optional features, above and beyond general catalog products technical literature.

D. Standards Compliance: When materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA) and Underwriters Laboratories (UL), American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) proof of such conformance shall be submitted to the Owner for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu of the label or listing, the Contractor shall submit a certificate from an independent testing organization, which is competent to perform acceptable test and is approved by the Owner. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product and the referenced standard and shall simply state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the referenced standards listed.

E. Certified Test Reports: Before delivery of materials and equipment, certified copies of all test reports specified in the individual section shall be submitted for approval. Furthermore, submit a written certificate, dated and signed by an authorized corporate officer of the Contractor who is either a full-time employee, principal, or a full-time partner delegated with the authority to bind the Contractor in all matters relating to its professional work of the Contractor, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Corporate credentials shall be furnished concurrently with applicable written certificates. Whenever a regulatory agency performs inspections or tests of any portion of the work, a written certificate shall be furnished by the Contractor to validate the results from the respective inspection test.

F. Certificates of Conformance or Compliance: Submit all certificates applicable to all specified equipment assemblies and parts for the Engineer's approval prior to equipment delivery and commencement of equipment on-site installation. A certification from the manufacturer attesting that materials and equipment to be furnished for this project complies with the requirements of this specification and of the referenced publications. Preprinted certifications will not be acceptable; certifications shall be in the original. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as "as good as"; "achieve the same end use

and result as materials formulated in accordance with the referenced publication," "equal or exceed the service and performance of the specified material." The certification shall simply state that the product conforms to the requirements specified. Furthermore, submit a written certificate, dated and signed by an authorized corporate officer of the Contractor who is either a full-time employee, principal, or a full-time partner delegated with the authority to bind the Contractor in all matters relating to its professional work of the Contractor, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Corporate credentials shall be furnished concurrently with applicable written certificates. Whenever a regulatory agency performs inspections or tests of any portion of the work, a written certificate shall be furnished by the Contractor to validate the results from the respective inspection test.

G. Manufacturers' Certified Full Standard Product Warranty: Submit the manufacturer's certified Full Standard Product Warranty terms and conditions applicable to all specified equipment assemblies and parts for the Engineer's approval prior to equipment delivery and commencement of equipment on-site installation, as approved by the Engineer. All manufacturers' Full Standard Product Warranty certificates are to be provided to the Owner at the time of equipment delivery and prior to the commencement of equipment on-site installation.

Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from project acceptance.

H. Operation and Maintenance Manuals: Submit manuals on all equipment and the overall system upon successful completion of equipment on-site installation and start-up and prior to final inspection, as approved by the Engineer.

I. Manufacturers' factory trained and certified service personnel: Prior to the equipment on-site installation, submit to the Owner documentation as evidence of the respective manufacturers' certification of all personnel responsible for installation, testing, and start-up of the equipment.

1.03 FIELD POSTED AS-BUILT DRAWINGS

A. Maintain and submit for all work as specified.

1.04 LAWS, REGULATIONS AND CODES

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

B. The following shall govern where applicable; the State Building Code (2006 IBC, as adopted), State of Hawaii Department of Health

Regulations, the State Fire Code (2006 NFPA 1, as adopted), Applicable National Fire Protection Association Standards, OSHA, ASHRAE Standards, Rules and Regulations and all other codes and standards referenced in these specifications. Where requirements differ in these codes and standards, the more stringent shall apply.

1.05 TRADE NAME

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

1.06 PERMITS AND INSPECTIONS

A. The Contractor shall pay for all necessary permits and fees.

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

1.07 DISCREPANCIES

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

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

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

1.08 WORKMANSHIP AND MATERIALS

A. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. The Contractor shall

furnish the services of an experienced superintendent, who will be constantly in charge of the erection of the work, until completed and accepted.

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

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

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

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

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

1.09 MANUFACTURER'S RECOMMENDATIONS

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

1.10 INSPECTION OF SITE

A. This Contractor shall visit the site and examine the conditions affecting his work before submitting his proposal. The submission of the proposal shall be considered evidence that the Contractor has visited the site and no extra payments will be allowed to the Contractor on account of extra work made necessary by his failure to visit the site. If there are any questions or discrepancies in the design, the Contractor shall bring it to the attention of the Engineer before submitting his proposal.

1.11 CONTINUITY OF SERVICES, PHASING

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

B. Examine all Drawings and Specifications (i.e. work from other trades) and become familiar with the types and systems of construction to be used. Determine how such types and systems will affect the installation of mechanical work.

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

1.12 OPENINGS, CUTTING AND REPAIRING

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

B. Any drilling or cutting required for the performance of work under this Section shall be the responsibility of this Contractor and the cost shall be borne by him.

C. Holes in Concrete: The Contractor shall pay all costs for cutting holes. All holes through existing concrete shall be either core drilled or saw cut. All holes required shall have the approval of the Engineer prior to cutting and drilling.

D. It shall be the responsibility of this Contractor to ascertain that all openings are properly located.

PART 2 - PRODUCTS

2.01 MATERIALS

A. As specified in all sections of DIVISION 15 - MECHANICAL.

B. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be the manufacturer's latest design that complies with the specifications requirements. Materials and equipment shall be duplicate items that have been in satisfactory commercial or industrial use at least 2 years prior to bid opening. Where two or more items of the same class of equipment are required these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of

the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number and serial number on the nameplate.

C. The Contractor shall provide all necessary options and/or accessories to comply with the applicable equipment specification requirements. Installation of the options and/or accessories shall be in accordance with the manufacturer's requirements and the complete assembly shall be warranted by the respective equipment manufacturer.

D. The Contractor shall provide certified manufacturer's representatives and/or service technicians for any field modification to mechanical equipment. The Contractor shall ensure that any modification to the equipment will not invalidate the manufacturer's warranty.

2.02 SUBSTITUTIONS

A. The materials, products, and equipment described in these specifications establish a standard of required function, quality, dimension, capacity, performance and appearance to be met by any proposed substitution.

B. Specific product listings in these specifications shall not preclude alternative product selections of equivalent or superior quality. Contractor may make reasonable substitutions, provided that these are submitted to the Engineer for acceptance in accordance with the SPECIAL CONDITIONS and the GENERAL CONDITIONS. The Contractor shall be responsible for design changes to accommodate the substituted product, at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

A. Provide competent and qualified manufacturer's factory trained and certified field service personnel on-site to be responsible for execution of all diagnostic testing in accordance with equipment manufacturer's installation and start-up certification requirements and warranty terms and conditions. Perform work using adequate numbers of personnel skilled in the appropriate trades, and provide adequate supervision and management of the work.

B. All workmanship shall be of the highest standard.

3.02 PROTECTION OF MATERIALS AND EQUIPMENT

A. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical injury. Upon completion of all work the materials

and equipment shall be thoroughly cleaned, repainted as required, adjusted and operated.

3.03 CUTTING AND PATCHING

A. The Contractor shall arrange for all cutting, fitting and patching necessary to accommodate the work as the job progresses and such cutting and patching shall be done by that trade experienced in the particular type of work required.

3.04 EQUIPMENT IDENTIFICATION

A. Identify all equipment with symbol and service conforming to that indicated on the drawings. Identification shall be on 1-1/4 inch by 3 inch laminated plastic nameplates securely fastened to the equipment. Leave manufacturer's nameplate clean, legible, and unpainted.

3.05 COORDINATION OF WORK AS SPECIFIED IN OTHER SECTIONS

A. The Contractor is responsible for coordination with the General Contractor to assure proper layout, size, and location of mechanical equipment. Contractor shall ensure that power and control wiring are provided and installed.

3.06 INSPECTIONS

A. All work and materials are subject to field observation at any and all times by the Engineer.

B. Contractor shall notify the Engineer a minimum of two days prior to testing any system which must be witnessed and approved before they are covered up or enclosed. Should the Contractor fail to notify the Engineer at the times prescribed, it shall then be the Contractor's responsibility to make accessible any concealed lines, or demonstrate the acceptability of any part of the system. Any extra cost caused by the removal of such work shall be borne by the Contractor.

C. If observer finds any material or work not conforming to these Specifications, Contractor within three days of being notified shall remove said materials from the premises and replace with approved material, at no cost to the Owner.

3.07 OPERATIONAL ACCEPTANCE TESTS

A. The Contractor shall perform all tests of the installed work and shall provide all services, labor, equipment, materials and instruments needed for the tests. During pressure tests all items in the system to be tested, not designed for test pressures, shall be removed or isolated from the

system and shall be reconnected or unblocked after tests are completed. Should operating tests require the presence of manufacturers' representatives, the Contractor shall cooperate with them and shall place at their disposal all assistance, materials and services required to perform such test. The Contractor shall certify in writing that all work has passed all required tests.

3.08 POSTED OPERATING INSTRUCTION

A. Furnish approved operating instructions for each principal item of equipment for the use of the operation and maintenance personnel. Operating instruction shall be printed or engraved and shall be framed under glass or in approved laminated plastic and posted where directed by the Engineer. Operating instructions shall be attached to or posted adjacent to each principal item of equipment including start up, procedure in the event of equipment failure and other items of instruction as recommended by the manufacturer of each item of equipment. Operating instructions exposed to the weather shall be made of weather-resistant materials or shall be suitably enclosed and weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

3.09 LOCAL TECHNICAL SUPPORT

A. The mechanical equipment supplier shall have a Hawaii office staffed with factory trained engineers fully capable of providing instruction, routine maintenance and emergency maintenance service on all system components.

B. The control system supplier shall have a Hawaii office staffed with factory trained engineers fully capable of providing instruction, routine maintenance and emergency maintenance service on all system components.

3.10 SAFETY REQUIREMENTS

A. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys and other rotating parts located so that any person can come in close proximity thereto shall be fully enclosed or properly guarded. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of a type as specified herein.

Items such as catwalks, ladders and guardrails shall be provided where required for safe operation and maintenance of equipment.

3.11 CLEANUP AND REPAIRS

A. Debris shall not be allowed to accumulate as a result of this work. Upon completion of this work or as necessary, remove all debris and excess materials, tools, etc. resulting from this work from the jobsite and leave the location of this work broom-clean in a manner acceptable to the Owner.

B. This Contractor shall clean all equipment set by him of oil, grease, stains, etc. All plates, trim, etc. shall be polished.

3.12 FINAL INSPECTION

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

3.13 GUARANTEE

A. The Contractor shall guarantee the installation for a period of one year after 30 consecutive days of trouble-free operation after the date of acceptance of the project by the Owner. A against any defects due to faulty materials, equipment, workmanship or installation. Upon notice of defect, the Contractor shall correct; replace defective item at no additional cost to the Owner.

3.14 ONE-YEAR GUARANTEE AND YEARLY MAINTENANCE SERVICE CONTRACT

A. In addition to the Guaranty on materials and workmanship, the Installer shall submit seven (7) copies of the Maintenance Service Contract, countersigned by the Contractor, that will validate the Guaranty.

B. The Guarantee shall extend for a period of one year and the maintenance service may extend for a period of up to five years after 30 consecutive days of trouble-free operation after the Project Acceptance Date, or the Equipment Acceptance Date if earlier than the Project Acceptance Date, and shall include all labor, materials, equipment and parts necessary to service the complete system so as to assure proper operation and function of the system. All costs for the periodic maintenance, including emergency calls, shall be borne by the Contractor. This maintenance period and the Guaranty period shall run concurrently (same start and end dates).

Trouble-free operation is defined as a non-disabling condition or a non-recurring failure or disruption and the following:

1. The system shall be free of all discrepancies, contamination and debris which require correction in excess to those described for the monthly service which is included in the Schedule of Maintenance.
2. The system is maintaining operational conditions and other parameter as measured during acceptance tests.

C. The Installer shall include a listing of the following items along with the Maintenance Service Contract:
   1. Names of the servicing contractor.
   2. Service contract expiration date.
   3. Inspection schedule for the maintenance period.
   4. Itemized listing of the equipment covered under the service contract, including a description of the equipment identified, its model and serial number(s) and manufacturer's name(s).

   Maintenance service contractor shall have a local office, staffed with competent and qualified manufacturer's factory trained and certified field service personnel and stocked with full inventory of replacement repair parts, to perform specified service and maintenance tasks on all equipment in accordance with the Maintenance Service Contract and terms and conditions of all equipment manufacturer's warranties and recommendations. Field service personnel shall be fully capable of providing technical assistance instruction, routine maintenance and emergency maintenance service on all system equipment components.

D. Schedule of Maintenance Service: All service performed by the Contractor shall include applicable items listed but shall not be limited to the following maintenance tasks:
   1. Exhaust Fans (Semi-Annual Service)
      a. Check motor-controlled and back-draft damper for proper operation; lubricate linkage for free movement.
      b. Lubricate fan motors and bearings.
      c. Adjust fan belts, pulleys, drive bearings, vibration isolators and housing. Replace as needed. Replace fan belts if showing signs of deterioration.
      d. Check sheaves for wear, replace as needed.
      e. Check fan collar, bearings and shaft for wear, repair or replace as needed.
      f. Check and clean fan wheels and housings of dust, dirt, and grease. Properly dispose of grease.
      g. Repair or replace deteriorated bird screens.
      h. Certify performance of semi-annual fan maintenance service and correct and report all discrepancies.
      i. Check temperature interlock controls for elevator room exhaust fans and repair or replace as needed.

E. Work Schedule: All maintenance work shall be performed between the hours of 8:00 a.m. to 4:00 p.m., on normal working days, Monday through

Friday, excluding State Holidays.

F. Trouble Calls: Emergency service and repairs required between regular service calls shall be rendered within 24 hours after the Contractor is notified, non-work days excluded.

G. Maintenance Report/Checklist: The Contractor shall prepare and maintain a maintenance service report/checklist which shall include the following:
1. Date maintenance service was performed.
2. The name of the mechanic who performed said maintenance.
3. The type and cost (labor, materials, parts and equipment) of repair work performed on the unit, if any.
4. Documents and other data pertaining to the maintenance performed.

It will be the responsibility of the Contractor to maintain the report/checklist by recording the above noted data after each scheduled maintenance and emergency repairs, and have the checklist available for inspection at the building site. The report shall be sufficiently detailed to properly reflect the past maintenance history of the equipment.

H. Cleanup and Work Practices: The Contractor shall keep the job site free of debris, litter, discarded parts, etc. and shall clean all oil drippings during the daily progress of work. The Contractor shall remove all tools, parts and equipment from the service areas upon completion of the work. The Contractor shall exercise caution during the progress of his maintenance and repair work to prevent damage to the ceilings, roofing and other building structure. The Contractor shall restore all damages, caused by his negligence, to its original condition at his own expense.

I. All costs for periodic maintenance services shall be included in the bid price.

J. Charges for emergency situations, increases and changes in preventive maintenance services shall be submitted on a separate invoice and will be paid for by a separate purchase order.

K. The Maintenance Service Contract does not include repairs resulting from vandalism, negligent use or misuse of equipment.

L. Operation and Maintenance Manual: Submit five (5) CD and five (5) hard bound copies of the Operating and Maintenance Manual on all equipment and the system as a whole. The manual shall identify project name and number, contractor, consultant, date and all equipment provided, It shall include the equipment manufacturer's name, model and serial number, tag no., capacity, quantity of units, their location and area (room) served and shall include the manufacturer's operation and maintenance manuals

including control and wiring diagrams and source of service and replacement parts. When standard manufactures' brochures are used, adequately indicate (highlight, arrow, etc.) the project related information and delete (X or cross-out) the non applicable information.

END OF SECTION

SECTION 15650 - VENTILATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provide complete and operating exhaust ventilation systems. "Provide" shall mean "Furnish and Install" when used herein. The ventilation systems shall include all equipment and all related items necessary to complete the work as shown on the drawings and herein specified. The work shall include the following:
   1. Removal of existing materials and equipment.
   2. Ductwork and accessories.
   3. Exhaust/Ventilation fans.
   4. Adjusting, balancing and testing.
   5. Manufacturer's literature, shop drawings, record drawings.
   6. Operating and maintenance instructions.

1.02 SUBMITTALS

A. Submittals shall be provided in accordance with SECTION 15000 - GENERAL MECHANICAL REQUIREMENTS.

B. Comply with provisions in Division 1.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. SECTION 15000 – GENERAL MECHANICAL REQUIREMENTS

B. DIVISION 16 - ELECTRICAL

1.04 GENERAL REQUIREMENTS

A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions or discrepancies in the plans and specifications, the Contractor shall call the attention of the Owner to such omissions and discrepancies in advance of the date of bid opening so that the necessary corrections can be made. Otherwise the Contractor shall furnish and install the omissions or discrepancies as if the same were specified and provided for.
   1. Standards:
      a. All work shall be done in accordance with applicable ordinances and codes of the County of Kauai and in accordance with State Department of Health regulations.

b. Work shall comply with applicable regulations of the State of Hawaii, National Fire Protection Association (NFPA) Pamphlet No. 90A, and American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 15-1978.
c. Contractor shall obtain all permits, licenses and certificates and pay for all fees.

2. Drawings and Specifications:
   a. The drawings and specifications are intended to cover the complete installation of systems to function as described. The omission of reference to any necessary item of labor or material shall not relieve the Contractor from providing such labor or material. Drawings do not attempt to show exact details of equipment or ductwork. Provide offsets as necessary to avoid local obstructions or interferences with other trades.
      1) Contract Drawings: Mechanical plans are essentially diagrammatic, showing locations of ducts, and other mechanical equipment. Where locations are not dimensioned, they are approximate, and before installing, Contractor shall study existing conditions and make installation in most logical manner.
      2) Shop Drawings: As soon as practical, and within 30 days after award of contract and before commencement of installation of any materials and equipment, six sets of shop drawings shall be submitted. Submittals shall consist of a complete list of equipment and materials, including manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions. Incomplete and partial submittals will be returned unreviewed. Shop drawings shall also be submitted which contain layout drawings of ductwork and piping showing locations of hangers and supports, capacity curves or ratings to assure balanced refrigeration at the design conditions, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Where piping and equipment are to be supported other than as indicated, the details shall include loadings and types of frames, brackets, stanchions, or other supports. Control diagrams shall be submitted which identify each component and show all interconnected or interlocked components and the control sequence.
      3) Record Drawings: Contractor shall keep a record set of drawings available at the jobsite on which all changes and additions in the Mechanical Work are shown. Contractor shall furnish to the Owner with reproducible

drawings of each installation showing the exact location of all items which are different from the original drawings.

1.05 WARRANTY

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

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

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials delivered to the job site and installed shall be new, best of their respective grades and as specified on the drawings. Materials shall be of the same brand or manufacturer throughout for each class of material or equipment.
   1. Ductwork and Accessories:
      a. Sheet Metal Ductwork: Galvanized steel sheets, ASTM A527. Construction, gages, and reinforcement shall comply with SMACNA HVAC Duct Construction Standards, 1995 Edition.
      b. Fittings: Vaned elbows, take-offs, branch connections, transitions, and flexible connections shall comply with SMACNA standards. Dampers shall be opposed blade type with locking quadrant. Provide turning vanes in all elbows and where indicated.
      c. Supports: Galvanized steel straps or hanger rods in accordance with SMACNA Duct Construction Standards.
      d. Flexible Connections: Neoprene coated glass fabric weighing approximately 30 ounces per square yard.
      e. Backdraft Damper: Backdraft damper shall be factory fabricated unit with delicately balanced blades that open automatically when the fan starts and close by gravity when the fan stops. Edges of blades shall be provided with felt or rubber strips to prevent rattling and insure a tight seal.

f. Birdscreens: Two by two mesh, 0.063 inch diameter aluminum wire or .031 inch diameter stainless steel wire, with frame.
g. Registers: Fixed pattern, surface mounted, all aluminum, 45 degree deflection, adjustable, volume control opposed blade damper.
h. Roof Cap Gooseneck: Hood shall be 16 gage aluminum housing with birdscreen.
i. Roof Curbs: Prefabricated, galvanized steel or aluminum with fiberglass insulation.
j. Adapters and Reducers for Roof Curbs: Welded galvanized steel or aluminum.

2.02 EQUIPMENT

A. The ventilation equipment shall be designed, constructed, and rated tested in accordance with ARI Standard 210. Units shall be ARI certified.
1. Equipment fabricated from ferrous metals that do not have a zinc coating conforming to ASTM A386 or a duplex coating of zinc and paint shall be treated for prevention of rust with a factory coating or paint system that will withstand 125 hours in a saltspray fog test except that equipment located outdoors shall be tested for 500 hours. The saltspray fog test shall be in accordance with ASTM B117 using a 20 percent sodium chloride solution. Immediately after completion of the test, the coating shall show no signs of blistering, wrinkling or cracking, no loss of adhesion, and the specimen shall show no signs of rust creepage beyond 1/8 inch on either side of the scratch mark. The film thickness of the factory coating or paint system applied on the equipment shall be not less than film thickness used on the test specimen.

2. All fans shall bear the AMCA Sound and Air Performance seal. Each fan shall bear a permanently affixed manufacturer's engraved metal nameplate containing the model number and individual serial number for future identification.

B. Exhaust/Ventilation Fans:

1. Direct Drive Axial Roof Exhaust: The fan propeller shall be constructed of aluminum with a swept, steeply pitched blade. A standard setscrew shall lock the propeller to the motor shaft. Propellers shall be statically and dynamically balanced. The fan housing shall be constructed of heavy-gauge aluminum with a rigid internal support structure and a birdscreen. Motors shall be permanently lubricated, heavy-duty type, carefully matched to the fan load and furnished at the specified RPM, voltage, phase, and

enclosure. Motors shall be readily accessible for maintenance. A disconnect switch shall be included from the factory and wiring shall be run from the fan motor to a junction box within the motor compartment. A conduit chase shall be provided through the curb cap to the motor compartment for ease of electrical wiring.

2. Centrifugal In-Line Ceiling Mounted: Centrifugal direct-drive type. Fan housing shall be constructed of heavy-gauge galvanized steel. Fans shall include acoustically insulated housing. Outlet duct collar shall include a polypropylene backdraft damper and spring loaded aluminum backdraft damper. Outlet shall be adaptable for horizontal or vertical discharge. Grilles shall be constructed of high-impact polystyrene or aluminum and shall be non-yellowing. Access for wiring shall be external. The motor disconnect shall be internal and of the plug-in type. The motor shall be mounted on vibration isolators. The fan wheel shall be of the forward-curved centrifugal type and dynamically balanced.

3. Downblast Direct Drive: Spun aluminum downblast exhaust fan direct drive type. The fan wheel shall be centrifugal non-overloading backward-inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. The fan shall have sleeve bearing motors, carefully matched to the fan load, and furnished at specified voltages, phase, and enclosure. 3-speed motor shall be mounted on true vibration isolators, out of the airstream. True vibration isolators shall be double-studded with no metal-to-metal contact. The fan housing shall consist of the motor cover, shroud, curb cap and lower windband, and shall be constructed of heavy gauge aluminum. Housing shall have rigid internal support structure and leakproof design. The fan shroud shall be one piece with a rolled bead for extra strength which directs exhaust air downward. The lower windband shall be one piece with formed edges for added strength and the curb cap shall include prepunched mounting holes to ensure correct attachment. A disconnect switch is a positive electrical shutoff and shall be wired from the fan motor to a junction box installed within the motor compartment. Fan discharge openings shall be provided with a galvanized mesh birdscreen. Provide backdraft damper shipped loose with fan.

4. Centrifugal Upblast Roof Direct Drive type: The fan wheel shall be centrifugal backward-inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced. The fan housing shall be constructed of heavy-gauge aluminum with a rigid internal support structure. The windband shall

be one-piece and 100% continuously welded to the one-piece aluminum curb cap. Motors shall be mounted on vibration isolators, out of the airstream. Fresh air for motor cooling shall be drawn into the motor compartment through a ten-square-inch tube free of discharge contaminants. Motors and drives shall be readily accessible for maintenance. A disconnect switch shall be factory-installed and wired from the fan motor to a junction box within the motor compartment. A conduit chase shall be provided through the curb cap to the motor compartment for ease of electrical wiring. Provide backdraft damper shipped loose with fan.

5. Centrifugal Upblast Sidewall Direct Drive type: Spun aluminum exhaust fans shall be upblast centrifugal direct drive type. The fan wheel shall be centrifugal backward-inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced. The fan housing shall be constructed of heavy-gauge aluminum with a rigid internal support structure. Motors shall be mounted on vibration isolators, out of the airstream. Fresh air for motor cooling shall be drawn into the motor compartment through a ten-square-inch tube free of discharge contaminants. Motors and drives shall be readily accessible for maintenance. A disconnect switch shall be factory-installed and wired from the fan motor to a junction box within the motor compartment. A conduit chase shall be provided through the curb cap to the motor compartment for ease of electrical wiring. A leakproof fan housing shall be constructed with a one-piece windband with an integral rolled bead for added strength. Fan shall be provided with a mounting plate, which is to be attached and sealed to the wall prior to locating the entire unit. Provide backdraft damper shipped loose with fan.

6. Motors and Motor Starters: Motors and motor starters shall conform to NEMA MG-1 and NEMA ICS. Motors shall not exceed 1800 rpm, unless otherwise indicated and shall be open, dripproof enclosure type. Motor starters shall be magnetic across-the-line type with general purpose enclosure.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Necessary supports and vibration isolators shall be provided for equipment and appurtenances as required. Equipment shall be installed in accordance with manufacturer's instructions

3.02 DUCTWORK INSTALLATION

A. Ductwork installation shall be in accordance with SMACNA Duct Construction Standards, 1995 Edition. Ducts shall be installed leaktight so that no leakage of air can be detected. Provide turning vanes at all elbows and tees and extractors at all branch connections.
   1. Sizes, runs, and connections of ducts shall be as indicated. Adhere to drawings as closely as possible. Install ductwork in adherence to heights permitted by the structure and consult with other trades, and in conjunction with them, establish necessary space requirements for each trade. Duct sizes shown on drawings are net size.
   2. Openings through construction required for ductwork shall be provided; prepare shop drawings locating such duct openings, and obtain approval in ample time to meet building construction schedule. Ductwork specified herein shall have rectangular cross section unless otherwise indicated.
   3. Details of construction, metal gauges, reinforcement and materials not specified herein shall be in accordance with SMACNA Low Velocity Duct Construction Standards, NFPA 90A or as approved. Fabricate ductwork in first class manner with airtight joints, presenting smooth surface on the inside, neatly finished on the outside.
   4. Where square elbows are used, provide fixed double radius turning vanes. Construct, brace and support ducts in such a manner that they will not sag or vibrate when fans are operating.

B. During construction, keep openings in ductwork closed with sheet metal to prevent injury and take all possible precautions to keep interior of ducts, air intake chambers and fan housings free from dirt or dust.

C. Support galvanized horizontal ducts and at changes of direction with hangers in accordance with SMACNA Duct Construction Standards.

D. All duct openings to exterior shall be weatherproofed with sheet metal blocking. Thoroughly seal all exterior duct openings and joints with silicone sealant.

E. Cleaning of Duct System: After completing installation of ductwork, entire system shall be cleaned of rubbish, plaster, dirt, and any other debris. After installation of equipment and connection are made on fan, and before any grilles, outlets or registers are installed, entire system shall be blown out with dampers and outlets wide open.

3.03 ADJUSTING, BALANCING, AND TESTING:

A. Cleaning and Adjusting: Inside of ducts and equipment shall be thoroughly cleaned of all debris and blown free of all small particles of rubbish and dust. Equipment shall be wiped clean with all traces of oil, dust, dirt, or paint spots removed. Fan shall be adjusted to the speed indicated by the manufacturer to meet specified conditions. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer.

B. Tests:
1. Ductwork: Ductwork shall be tested and made substantially airtight at static pressure indicated for the system before covering the insulation. Substantially airtight shall be construed to mean at all duct joints.

C. Performance Tests: Testing and balancing of the systems shall be performed by an independent testing agency, by personnel who are not employees of the installing contractor. Corrections and adjustments shall be made as necessary.

D. Balancing:
1. Duct systems shall be balanced as follows:
a. System (or air moving device) to not less than design cfm.
b. Major duct branches to plus or minus 5 percent.
c. Registers and grilles to plus or minus 10 percent.

E. Test Reports:
1. Typewritten schedules of readings taken during the balancing and testing operations indicating the required or specified reading, and the final balanced reading shall be provided for the following items:
a. Fans: Size, type, speed in rpm, outlet velocity in fpm, static pressure in inches water gage, air quantity in cfm, and motor load in amperes.
b. Air Balance:
1) Air Outlets and Inlets: Size, velocity in fpm, and air quantity in cfm.
2) Ducts: Size, velocity in fpm, and air quantity in cfm.

3.04 ELECTRICAL WORK

A. Electric motor driven equipment specified herein shall be provided complete with motors, motor starters, control wiring and controls. Electrical equipment and wiring shall be in accordance with ELECTRICAL Section. Motor starters shall be provided by Mechanical Contractor complete with properly sized thermal overload protection and other appurtenances necessary for the motor control specified. Manual or automatic control and protective devices required for the operation herein specified and any control wiring required for controls and devices but not shown on the electrical plan shall be provided. Electrical work shall conform to NFPA 70.

END OF SECTION

DIVISION 16 – ELECTRICAL

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

A. Drawings and other general provisions of contract, including General and Supplementary Conditions and other Division 1 specification sections.

1.02 SUMMARY

A. The intent of Division 16 Specifications and Drawings is to provide a complete set and workable facility with complete systems as shown, specified and required by applicable codes. Include all work specified in Division 16 and shown on the drawings, including appurtenances, connections and sundries, in the finished job.

B. The Division 16 specifications and drawings are complementary' what is called for by one is binding, as if called by both. Items shown on the drawings are not necessarily included in the specifications, and vice versa.

C. Imperative language is frequently used in Division 16 specifications. Except as otherwise specified, requirements expressed imperatively are to be performed by the Contractor.

D. The General and Supplemental Conditions apply to this Division, including but not limited to:
1. Drawings and Specifications.
2. Public ordinances, codes and permits.

E. Division 1, General Requirements, apply to this Division.

F. All sections of Division 16, Electrical Specifications, are interrelated. Use Division 16, in its entirety, when interpreting any material, method or direction listed in any Section.

G. Use the more stringent requirements when specified materials or methods exceed the applicable code standards.

H. The drawings that accompany the Division 16 specifications are diagrammatic. They do not show every offset, bend, conduit body, elbow or junction box that may be required to install work in the space provided

and avoid conflicts. Follow the drawing as closely as is practical and install additional bends, offsets and elbows where needed by local job site conditions. Provide necessary junction boxes to meet code regulations for the allowed number of conduit bends. The right is reserved to make minor field order changes in outlet location prior to roughing-in without additional cost to the Owner.

I. Provide the standardized products or systems for Division 16 that are under the National Purchasing Agreement (NPA). Coordinate the NPA-Contractor division of responsibility requirements for products and systems under the Division 16 specifications:

1.03 REFERENCES

A. Publications and standards listed below form a part of this specification to the extent referenced. The publications and standards are referred to in the text by basic designation only.
1. 1997 Uniform Building Code and latest local amendments
2. 2000 Uniform Fire Code and latest local amendments
3. National Fire Protection Association (NFPA)
4. National Electrical Manufacturers Association (NEMA).
5. National Electrical Contractors Association (NECA).
6. American National Standards Institute (ANSI).
7. Institute of Electrical and Electronic Engineers (IEEE).
8. International Seismic Application Technology (ISAT).
9. Underwriters Laboratories (UL).
10. National Electrical Code 2011 (NEC).

1.04 SUBMITTALS

A. Comply with provisions of Division 1.

B. Submit 6 copies of shop drawings, product data, samples, schedules and reports as required by the Division 16 Sections.

C. Where products, equipment, or systems differ by more than 10% in dimension or weight from anchorage details shown in the drawings, submit product data to the Engineer for review.

1.05 QUALITY ASSURANCE

A. Provide materials, equipment and accessories that are new and free from defects.

B. Provide materials and apparatus that comply with NEC, NEMA and ANSI standards.

C. Provide materials and apparatus that bear the UL label where such label is applicable.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Coordinate with the requirements of Division 1.

B. Protect materials from corrosion and breakage. Store materials above grade. Provide appropriate covering.

C. Protect equipment from weather and moisture by appropriate covering. Provide and maintain heating within equipment enclosure in accordance with manufacturer's instructions.

1.07 SITE VISITATION

A. Coordinate with the requirements of Bidding and Contract Requirements, Instruction to Bidders.

B. Visit the site prior to bidding and become familiar with existing conditions and other factors which may affect the execution of work. Include all related costs in the initial bid proposal.

1.08 SCHEDULE OF WORK

A. Coordinate with the requirements of Division 1.

B. Provide full-time supervisory staff to coordinate and maintain work force for project work sequencing requirements.

C. Arrange work to comply with schedule of construction requirements.

1.09 WARRANTY

A. Coordinate with the requirements of Division 1.

B. Provide one year guarantee for installed project materials and equipment unless otherwise indicated in other Division 16 Sections. Guarantee period effective from time of work acceptance.

1.10 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Coordinate with the requirements of Division 1.

B. Provide approved operating and maintenance instructions for testing and commissioning work.

1.11 RECORD DRAWINGS

A. Coordinate with the requirements of Division 1.

B. Provide record drawings that fully represent installed conditions including actual location of outlets, true panelboard connections following phase balancing routines, correct conduit and wire sizing as well as routing, and revised panelboard schedules.

C. Maintain up-to-date record set of electrical prints during the course of construction. The prints are subject to monthly review by the owner's representative to ascertain that they are current. If not current, monthly payments may be withheld.

PART 2 – PRODUCTS

2.01 GENERAL

A. The products specified in some Division 16 sections are a part of the Owner's Standardization program, which includes National Purchase Agreements (NPA). No substitutions are permitted for NPA products.

B. Refer to applicable Division 16 sections for complete product specifications.

C. All equipment to be installed or permanently connected (hardwired) shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL).

2.02 ACCEPTABLE MANUFACTURERS

A. Manufacturers' names and model numbers used for materials, processor or equipment in Division 16 provide the standards of quality, utility and appearance.

B. Products of the first named manufacturer have been used as the basis of the design. If another listed manufacturer is selected, it is the Contractor's responsibility to verify that equipment dimensions, weights, capacities, ratings, environmental requirements, mounting methods, etc., are comparable with the first named manufacturer. Where different, these items shall be submitted to the Engineer for approval. Upon approval, the Contractor shall be responsible for all design changes

required to accommodate the selected products, including permit and approval of the changes by regulatory agencies.

2.03 SUBSTITUTIONS

A. Coordinate with the requirements of Division 1.

B. Products or systems listed as “no substitutions”: Provide as specified.

C. Products or systems noted as “or equivalent”: A product or system of equivalent design, construction and performance will be considered. Submit all pertinent data and product information for review. Provide the specified products or systems if proposed equivalent is found unacceptable.

D. Acceptance of a substitution is not to be considered a release from the Specifications. Correct any deficiencies in an item, even though approved, at Contractor’s expense.

E. Be responsible for installation of approved substitution. Make any changes required for installation of approved substituted equipment, at no increase in Contract Sum.

PART 3 – EXECUTION

3.01 GENERAL WIRING METHODS

A. Examine site related work and surfaces before starting work of any Section.
   1. Report to Engineer, in writing, conditions which will prevent proper execution of this work.
   2. Beginning work of any section without reporting unsuitable conditions to Engineer, constitutes acceptance of conditions by Contractor.
   3. Perform any required removal, repair or replacement of this work caused by unsuitable conditions at no additional cost to Owner.

3.02 CONNECTIONS TO EXISTING WORK

A. Install new work and connect to existing work with minimum interference to existing facilities.

B. Provide temporary shutdowns of existing services only with written consent of Owner. Perform this work at no additional charges and at times that do not interfere with normal operation of existing facilities.

C. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.

D. Do not interrupt alarm and emergency systems without consent of owner.

E. Connect new work to existing work in neat and acceptable manner.

F. Restore existing disturbed work to original condition, including maintenance of wiring and continuity as required.

G. Provide temporary electrical power to temporary facilities as shown on the plans.

3.03 DEMOLITION

A. Coordinate with the requirements as indicated on drawings.

B. Disconnect, remove, or relocate electrical material, equipment and other work noted and required by removal or changes in existing construction.

C. Provide new material and equipment required for relocated equipment.

D. Disconnect load and line end of conductors feeding existing equipment.

E. Remove conductors from existing raceways to be rewired.

F. Remove conductors and cap outlets on raceways to be abandoned.

G. Cut and cap abandoned floor raceways flush with concrete floor or behind walls and ceilings.

H. Remove conductors back to nearest power source; junction box or panelboard.

I. Provide new typewritten panelboard directories.

J. Dispose of removed raceways and wire.

K. Turn over removed electrical equipment to Owner as directed. Dispose of unwanted equipment and accessories.

3.04 INSTALLATION

A. Provide a complete, properly operating system for each item of equipment called for under this work. Installation in accordance to

equipment manufacturer's instructions, the best industry practices, and the contract documents.

B. Make installation in a neat, finished and safe manner, according to the latest published NECA Standard of Installation under competent supervision.

C. Review shop drawings for work done by other trades.

D. Verify all dimensions by field measurements.

E. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.

F. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components as they are constructed.

G. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing in the building.

H. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

I. Install systems, materials, and equipment to comply with approved submittal data, including coordination drawings, to greatest extent possible. Comply with arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.

J. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

K. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Rearrangement or relocation of electrical work that block access to mechanical duct inspection or servicing panels, valves, fire damper actuators and similar apparatus done at Contractors' own expense.

L. Coordinate electrical systems, equipment, and materials installations with other building components.

M. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.05 NOISE CONTROL

A. Perform necessary sound rated wall sealing for the electrical work, per Code.

B. Back to back or straight through boxes are not permitted unless specifically noted on the drawings.

C. Do not install contactors, transformers, starters and similar noise producing devices on walls common to occupied spaces unless specifically noted on the drawings. Where such devices must be mounted on common walls, install using shock mounted or isolated methods to prevent the transmission of device inherent noise to the occupied space.

D. Contractors, starters, transformers, and like equipment, which are found to be noticeably noisier than other similar equipment on the project, will be deemed defective and replaced.

3.06 FIRE WALL PENETRATIONS

A. Perform necessary fire-rated wall sealing for the electrical work in compliance with the Uniform Building Code. Penetrations of pipes, conduits, etc., in walls requiring protected openings shall be fire-stopped. Fire-stop materials shall be a tested assembly approved by the local Fire Marshal.

B. Provide necessary wall material to maintain fire wall rating where flush-mounted panelboards or cabinets are installed.

3.07 EQUIPMENT CONNECTIONS

A. Provide complete electrical connections for all items of equipment requiring such connections, including incidental wiring, materials, devices and labor necessary for a finished working installation.

B. Verify the location and method for connecting to each item of equipment prior to roughing-in. Check voltage and phase of each item of equipment before connection.

C. Make motor connections for the proper direction of rotation.

D. Furnish all code required disconnects under this work, whether specifically shown or not.

3.08 EQUIPMENT SUPPORT

A. Perform necessary equipment seismic anchorage in compliance with the Uniform Building Code and requirements of any local agency having jurisdiction.

B. Securely fasten to the structural floor all free-standing electrical equipment such as transformers, switchboards, distribution boards, transfer switches, and so forth, as shown in the drawings. Where equipment differs by more than 10% in dimension or weight from anchorage details shown in the drawings, submit product data to the Structural Engineer for review.

C. Support all junction boxes, pull boxes or other raceway terminating housings located above the suspended ceiling from the floor above, roof or penthouse floor structure to prevent sagging or swaying.

D. Minimum support capacity: Not less than four times the ultimate weight of the object being supported from the building structure or anchored to the structural floor.

E. For suspended utility systems, utilize engineered brace spacing tables and installation details per the International Seismic Application Technology (ISAT) Design Manual or approved equal.

F. For instances where a pre-approved seismic support detail cannot be used because of field conditions, submit details and calculations signed and stamped by a registered structural engineer in the State of Hawaii for approval by the authority having jurisdiction.

3.09 ALIGNMENT

A. Install panels, cabinets and equipment level and plumb, parallel with structural building lines. Join switchgear, panels and electrical enclosures so that they fit neatly together without gaps, openings or distortion.

B. Fit surface panels, devices and outlets with neat, appropriate trims, plates or covers, without over-hanging edges, protruding corners, or raw edges, to leave a finished appearance.

3.10 CUTTING AND PATCHING

A. Perform necessary cutting and patching for the electrical work in compliance with Division 1.

B. Neatly patch and finish any surface damaged by this work to match adjacent construction surface conditions; for instance, repair surfaces where raceways pass through finished floors or walls. Clean and remove all dirt and debris. Perform this work to the satisfaction of the Engineer.

3.11 COORDINATION OF WORK

A. Coordinate with the requirements of Division 1.

B. Conduct work in a manner to cooperate with all other trades for proper installation of all items of equipment. Consult the Drawings of all other trades or crafts to avoid conflicts with equipment, structural members, mechanical and plumbing work. In general, the architectural drawings govern, but resolve conflicts with the Engineer prior to rough-in.

C. Verify the physical dimension of each item of electrical equipment to fit the available space. The Contractor is responsible for coordinating electrical equipment space requirements with the allotted space provisions, and access routes through the construction area.

D. Coordinate rough-in and wiring requirements for all mechanical equipment with equipment supplier and installer. Make installation in accordance with rough-in and wiring diagrams provided for Contractor’s use.

3.12 PROTECTION OF WORK

A. Coordinate with the requirements of Division 1.

B. Protect all electrical work and equipment installed under this Division against damage by other trades, weather conditions or any other causes. Equipment found damaged or in other than new condition will be rejected as defective.

C. Keep motor control center panels, and all electrical equipment covered or closed to exclude dust, dirt and splashes of plaster, cement or paint so that all shall be free of all such contamination before acceptance. Keep enclosures and trims in new condition, free of rust scratches and other finish defects. If damaged, properly refinish in a manner acceptable to the Engineer.

3.13 ADJUSTING AND CLEANING

A. Coordinate with the requirements of Division 1.

B. Voltage Check:
1. At job completion, check voltage at several points of utilization for power equipment installed under this work. During voltage check, energize installed loads.

3.14 COMMISSIONING AND TESTING

A. Upon job completion, test systems and show that the equipment installed operates as designed and specified, free of faults and unintentional grounds. The system tests may be set up and done for coordination with construction phasing. Perform testing or system operational functions in the presence of the Engineer or his representatives. Schedule work in advance and as directed by the Engineer or his representatives.

B. Provide a minimum of 1 journeyman electrician with required tools during testing or system commissioning work. Provide equipment factory representative for this work when needed.

C. Provide testing and commissioning work for equipment and systems noted in Division 16 specifications and drawings, including but not limited to:
1. Low voltage distribution system.

3.15 PROJECT CLOSEOUT

A. Coordinate with the requirements of Division 1.

B. Special tools or safety equipment: Provide one of each tool or piece of safety equipment required for proper operation and maintenance of equipment installed under this work.

C. Keying: Provide tow keys for each lock furnished under this work.

END OF SECTION

SECTION 16100 - ELECTRICAL WORK

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

A. Drawings and other general provisions of contract, including General and Supplementary Conditions and other Division 1 specification sections.

1.02 RELATED WORK

A. SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS applies to this section with additions and modifications specified herein.

1.03 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications may be referred to in the text by the basic designation only. Unless otherwise indicated, most recent edition of the publication with current revisions and amendments will be enforced.

1. ASTM International (ASTM):

ASTM B1	(2012) Standard Specification for Hard-Drawn Copper Wire
ASTM B8	(2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

2. Institute of Electrical and Electronics Engineers (IEEE):

IEEE 81	(2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5-6 2013) National Electrical Safety Code

3. National Electrical Manufacturers Association (NEMA):

ANSI C80.1	(2005) American National Standard for Electrical Rigid Steel Conduit (ERSC)
ANSI C80.3	(2005) American National Standard for Electrical Metallic Tubing (EMT)
NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA BU 1.1	(2010) General Instructions for Proper Handling, Installation, Operation and Maintenance of Busway Rated 600 V or Less
NEMA ICS 1	(2000; R 2008; E 2010) Standard for Industrial Control and Systems: General Requirements
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 3	(2005; R 2010) Medium-Voltage Controllers Rated 2001 to 7200 V AC
NEMA ICS 6	(1993; R 2011) Enclosures
NEMA KS 1	(2001; R 2006) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)
NEMA MG 1	(2011; Errata 2012) Motors and Generators
NEMA MG 10	(2001; R 2007) Energy Management Guide for Selection and Use of Fixed Frequency Medium AC Squirrel-Cage Polyphase Induction Motors
NEMA MG 11	(1977; R 2012) Energy Management Guide for Selection and Use of Single Phase Motors
NEMA ST 20	(1992; R 1997) Standard for Dry-Type Transformers for General Applications
NEMA TC 3	(2013) Standard for Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA TP 1	(2002) Guide for Determining Energy Efficiency for Distribution Transformers
NEMA VE 1	(2009) Standard for Metal Cable Tray Systems
NEMA WD 1	(1999; R 2005; R 2010) Standard for General Color Requirements for Wiring Devices
NEMA WD 6	(2012) Wiring Devices Dimensions Specifications

NEMA Z535.4 (2011) American National Standard for Product Safety Signs and Labels

4. National Fire Protection Association (NFPA):
   NFPA 70 (2008) National Electrical Code

   NFPA 70E (2012; Errata 2012) Standard for Electrical Safety in the Workplace

   NFPA 780 (2014) Standard for the Installation of Lightning Protection Systems

5. Telecommunications Industry Association (TIA):
   TIA-568-C.1 (2009; Add 2 2011; Add 1 2012) Commercial Building Telecommunications Cabling Standard

   TIA-569 (2012c; Addendum 1 2013; Errata 2013) Commercial Building Standard for Telecommunications Pathways and Spaces

   TIA-607 (2011b) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

6. U.S. National Archives and Records Administration (NARA):
   29 CFR 1910.147Control of Hazardous Energy (Lock Out/Tag Out)

7. Underwriters Laboratories (UL):
   UL 1010 (2006) Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations

   UL 1063 (2006; Reprint Jul 2012) Machine-Tool Wires and Cables

   UL 1203 (2013) UL Standard for Safety Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations

   UL 1242 (2006; Reprint Jul 2012) Standard for Electrical Intermediate Metal Conduit -- Steel

   UL 1283 (2005; Reprint Feb 2013) Electromagnetic Interference Filters

   UL 1449 (2006; Reprint Sep 2013) Surge Protective Devices

UL 1561	(2011; Reprint Sep 2012) Dry-Type General Purpose and Power Transformers
UL 1569	(1999; Reprint Jan 2012) Standard for Metal-Clad Cables
UL 1660	(2004; Reprint Apr 2013) Liquid-Tight Flexible Nonmetallic Conduit
UL 1699	(2006; Reprint Nov 2013) Arc-Fault Circuit-Interrupters
UL 20	(2010; Reprint Feb 2012) General-Use Snap Switches
UL 2043	(2013) Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
UL 360	(2013; Reprint May 2013) Liquid-Tight Flexible Steel Conduit
UL 4	(2004; Reprint Oct 2013) Standard for Armored Cable
UL 44	(2010) Thermoset-Insulated Wires and Cables
UL 467	(2007) Grounding and Bonding Equipment
UL 486A-486B	(2013) Wire Connectors
UL 486C	(2013) Splicing Wire Connectors
UL 489	(2013) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 498	(2012; Reprint Aug 2013) Attachment Plugs and Receptacles
UL 50	(2007; Reprint Apr 2012) Enclosures for Electrical Equipment, Non-environmental Considerations
UL 506	(2008; Reprint Oct 2013) Specialty Transformers
UL 508	(1999; Reprint Oct 2013) Industrial Control Equipment

UL 510	(2005; Reprint Jul 2013) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514A	(2013) Metallic Outlet Boxes
UL 514B	(2012) Conduit, Tubing and Cable Fittings
UL 514C	(1996; Reprint Nov 2011) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 67	(2009; Reprint Jan 2013) Standard for Panelboards
UL 674	(2011; Reprint Jul 2013) Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations
UL 698	(2006) Industrial Control Equipment for Use in Hazardous (Classified) Locations
UL 83	(2008) Thermoplastic-Insulated Wires and Cables
UL 845	(2005; Reprint Jul 2011) Motor Control Centers
UL 854	(2004; Reprint Sep 2011) Standard for Service-Entrance Cables
UL 857	(2009; Reprint Dec 2011) Busways
UL 869A	(2006) Reference Standard for Service Equipment
UL 870	(2008; Reprint Feb 2013) Standard for Wireways, Auxiliary Gutters, and Associated Fittings
UL 877	(1993; Reprint Feb 2013) Standard for Circuit Breakers and Circuit-Breaker Enclosures for Use in Hazardous (Classified) Locations
UL 886	(1994; Reprint Nov 2005) Standard for Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations
UL 943	(2006; Reprint Jun 2012) Ground-Fault Circuit-Interrupters

UL 984 (1996; Reprint Sep 2005) Hermetic Refrigerant Motor-Compressors

1.04 SUBMITTALS

A. Coordinate with the requirements of Division 1.

B. Submit shop drawings and catalog cuts of the following equipment for approval. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. Incomplete submittals and those without summary sheets will be returned without review.

C. Shop Drawings:
1. Panelboards.
2. Overcurrent protection devices.
3. Automatic control devices. (Time switches, photocells, lighting, and control contactors).

D. Submit shop drawings showing feeder raceway layouts on plan in not less than 1/8” = 1’ - 0” scale. Raceway routing shall be coordinated with architectural, structural and mechanical systems and other trades. Submit shop drawings showing plans and elevations of electrical equipment rooms.

E. Field Test Reports: Submit test results for approval in report form:
1. 600 volt wiring test.
2. Grounding system test.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, “shall” or “must” had been substituted for “should” wherever it appears. Interpret references in these publications to the “authority having jurisdiction,” or words of similar meaning, to mean the Engineer. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

B. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have

been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.Where two or more items of t section.

C. Alternative Qualifications: Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

D. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

PART 2 - PRODUCTS

2.01 GENERAL

A. Materials shall be new and those items listed by the Underwriters' Laboratories shall bear "UL" label of approval.

B. Brand names, manufacturer's names and catalog numbers indicate standard of design and quality required. Acceptable manufacturers for electrical apparatus include General Electric, Square D, Siemens-ITE, and Cutler-Hammer. All apparatus supplied shall bear the name of the approved manufacturer on its nameplates. Substitute materials may be used if pre-qualified prior to bidding by the Engineer.

C. Electrical equipment and luminaires shall be supplied through the manufacturer's designated representative by a local distributor.

D. Proof of compliance shall be furnished when shop drawings are submitted.

E. Where two or more similar type items are furnished, all shall be of the same manufacture, e.g., safety switches shall be of the same manufacturer unless otherwise noted.

F. Where electrical apparatus is to be installed outdoors, NEMA 4X type 316 stainless steel housings shall be provided, unless noted otherwise.

2.02 RACEWAYS

A. Rigid Steel Conduit: Rigid steel, zinc-coated inside and outside, for use with threaded fittings. ANSI C80.1.

B. Electrical Metal Tubing (EMT): Thin walled steel tubing, zinc-coated. ANSI C80.3.

C. Flexible Metal Conduit: Flexible steel conduit; zinc-coated inside and outside, smooth inside walls, liquid-tight with factory fittings for liquid-tight installation. Provide bushings with bonding jumper lugs for flexible conduit in excess of six feet in length. UL 360.

D. Rigid Nonmetallic Conduit: Polyvinyl chloride, Schedule 40.

E. Fittings for Metal Conduit, EMT, and Flexible Metal Conduit: UL 514B. Ferrous fittings shall be cadmium- or zinc-coated in accordance with UL 514B.

F. Fittings for Rigid Metal Conduit and IMC: Threaded-type. Split couplings unacceptable.

G. Fittings for EMT: Steel compression type.

H. Fittings for Rigid Nonmetallic Conduit: NEMA TC 3 for PVC and UL 514B.

I. Liquid-Tight Flexible Nonmetallic Conduit: UL 1660.

2.03 OUTLET BOXES AND COVERS

A. UL 514A, cadmium- or zinc-coated, if ferrous metal. UL 514C, if nonmetallic.

2.04 CABINETS, JUNCTION BOXES, AND PULL BOXES

A. Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.

2.05 WIRES AND CABLES

A. Wires and cables shall meet applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Wires and cables manufactured more than 12 months prior to date of delivery to site shall not be used.

B. Conductors: Conductors No. 8 AWG and larger diameter shall be stranded. Conductors No. 10 AWG and smaller diameter shall be solid, except that conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3, shall be stranded unless specifically indicated

otherwise. Conductor sizes and capacities shown are based on copper, unless indicated otherwise. All conductors shall be copper.

1. Equipment Manufacturer Requirements: When manufacturer's equipment requires copper conductors at the terminations or requires copper conductors to be provided between components of equipment, provide copper conductors or splices, splice boxes, and other work required to satisfy manufacturer's requirements.
2. Minimum Conductor Sizes: Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; for Class 2 low-energy, remote-control and signal circuits, No. 16 AWG; and for Class 3 low-energy, remote-control, alarm and signal circuits, No. 22 AWG.

C. Color Coding: Provide for service, feeder, branch, control, and signaling circuit conductors. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one system are installed in same raceway or box, other neutrals shall be white with a different colored (not green) stripe for each. Color of ungrounded conductors in different voltage systems shall be as follows:
   1. 208/120 volt, three-phase:
      a. Phase A - black.
      b. Phase B - red.
      c. Phase C - blue.
   2. 480/277 volt, three-phase:
      a. Phase A - brown.
      b. Phase B - orange.
      c. Phase C - yellow.
   3. 120/240 Volt, Single Phase: Black and red.

D. Insulation: Unless specified or indicated otherwise or required by NFPA 70, power and lighting wires shall be 600-volt, Type THWN/THHN conforming to UL 83 or Type XHHW conforming to UL 44, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits shall be Type TW or TF, conforming to UL 83. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

E. Service Entrance Cables: Service Entrance (SE) and Underground Service Entrance (USE) Cables, UL 854.

2.06 SPLICES AND TERMINATION COMPONENTS

A. UL 486A-486B for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires shall be insulated, pressure-type in accordance with UL 486A-486B or UL 486C

(twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.07 PANELBOARDS

A. General: Panelboards for use as service disconnecting means shall additionally conform to UL 869A. Panelboards shall be circuit breaker-equipped. Design shall be such that individual breakers can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as means of obtaining clearances as required by UL. “Specific breaker placement” is required in panelboards to match the breaker placement indicated in the panelboard schedule on the drawings. Use of “Subfeed Breakers” is not acceptable unless specifically indicated otherwise. Main breaker shall be “separately” mounted from branch breakers. Where “provision for breaker (PFB)” is indicated, make provisions for future installation of breakers. Directories shall indicate load served by each circuit in panelboard. Directories shall also indicate source of service to panelboard (e.g., Panel PA served from Panel MDP). Provide new directories for existing panels modified by this project as indicated. Type directories and mount in holder behind transparent protective covering. Panelboards shall be listed and labeled for their intended use. Panelboard shall have nameplates in accordance with paragraph FIELD FABRICATED NAMEPLATES hereinbelow.

B. Enclosure: Enclosures shall meet the requirements of UL 50. All cabinets shall be fabricated from sheet steel of not less than No. 10 gauge if flush-mounted or mounted outdoors, and not less than No. 12 gauge if surface-mounted indoors, with full seam-welded box ends. Cabinets mounted outdoors or flush-mounted shall be hot-dipped galvanized after fabrication. Cabinets shall be painted in accordance with paragraph FIELD APPLIED PAINTING hereinbelow. Outdoor cabinets shall be of NEMA 4X type 316 stainless steel construction, unless otherwise noted. Front edges of cabinets shall be form-flanged or fitted with structural shapes welded or riveted to the sheet steel, for supporting the panelboard front. All cabinets shall be so fabricated that no part of any surface on the finished cabinet shall deviate from a true plane by more than 1/8 inch. Holes shall be provided in the back of indoor surface-mounted cabinets, with outside spacers and inside stiffeners, for mounting the cabinets with a 1/2 inch clear space between the back of the cabinet and the wall surface. Flush doors shall be mounted on hinges that expose only the hinge roll to view when the door is closed. Each door shall be fitted with a combined catch and lock, except that doors over 24 inches long shall be provided with a three-point latch having a knob with a T-handle, and a cylinder lock. Two keys shall be provided with each lock, and all locks shall be keyed alike. Finished-head cap

screws shall be provided for mounting the panelboard fronts on the cabinets.

C. Panelboard Buses: Support bus bars on bases independent of circuit breakers. Main buses and back pans shall be designed so that breakers may be changed without machining, drilling, or tapping. Provide isolated neutral bus in each panel for connection of circuit neutral conductors. Provide separate ground bus identified as equipment grounding bus per UL 67 for connecting grounding conductors; bond to steel cabinet.

D. Circuit Breakers: UL 489, thermal magnetic-type having a minimum short-circuit current rating equal to the short-circuit current rating of the panelboard in which the circuit breaker shall be mounted. Breaker terminals shall be UL listed as suitable for type of conductor provided. Provide breakers with adjustable trip parameters as indicated.
   1. Multipole Breakers: Provide common trip-type with single operating handle. Breaker design shall be such that overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.
   2. Circuit Breakers for HVAC Equipment: Circuit breakers for HVAC equipment having motors (group or individual) shall be marked for use with HACR type and UL listed as HACR type.

2.08 ENCLOSED CIRCUIT BREAKERS

A. UL 489. Individual molded case circuit breakers with voltage and continuous current ratings, number of poles, overload trip setting, and short circuit current interrupting rating as indicated. Enclosure type as indicated.

2.09 LOCKOUT REQUIREMENTS

A. Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147. Mechanical isolation of machines and other equipment shall be in accordance with requirements of DIVISION 15 - MECHANICAL.

2.10 WIREWAYS

A. UL 870. Material shall be steel galvanized 16 gauge for heights and depths up to 6 by 6 inches, and 14 gauge for heights and depths up to 12 by 12 inches. Provide in length required for the application with screw-cover NEMA 1 enclosure per NEMA ICS 6.

2.11 MANUFACTURER'S NAMEPLATE

A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.12 FIELD FABRICATED NAMEPLATES

A. ASTMD709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, black with white center core. Provide red laminated plastic label with white center core where indicated. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

2.13 WARNING SIGNS

A. Provide warning signs for flash protection in accordance with NFPA 70E and NEMA Z535.4 for switchboards, panelboards, industrial control panels, and motor control centers that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized. Provide field installed signs to warn qualified persons of potential electric arc flash hazards when warning signs are not provided by the manufacturer. The marking shall be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.

2.14 FIRESTOPPING MATERIALS

A. Provide firestopping around electrical penetrations.

2.15 FACTORY APPLIED FINISH

A. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test and the additional requirements as specified herein. Interior and exterior steel surfaces of equipment enclosures shall be thoroughly cleaned and then receive a rust-inhibitive phosphatizing or equivalent treatment prior to painting. Exterior surfaces shall be free from holes, seams, dents, weld marks, loose scale or other imperfections. Interior surfaces shall receive not less than one coat of corrosion-resisting paint in accordance with the manufacturer's standard practice. Exterior

surfaces shall be primed, filled where necessary, and given not less than two coats baked enamel with semi-gloss finish. Equipment located indoors shall be ANSI Light Gray, and equipment located outdoors shall be ANSI Light Gray. Provide manufacturer's coatings for touch-up work and as specified in paragraph entitled "FIELD APPLIED PAINTING" hereinbelow.

2.16 HARDWARE, SUPPORTS, BACKING, ETC.

A. Provide all hardware, supports, backing and other accessories necessary to install electrical equipment. Wood materials shall be treated against termites, iron or steel materials shall be galvanized for corrosion protection, and non-ferrous materials shall be brass or bronze.

B. Bolts, nuts, washers, and screws used for exterior use shall be high quality stainless steel or brass.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces, shall conform to requirements of NFPA 70 and IEEE C2 and to requirements specified herein.

B. Wiring Methods: Provide insulated conductors installed in rigid steel conduit, IMC, rigid nonmetallic conduit, or EMT, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise. Utilize non-wax type lubricants for pulling, chemically neutral to insulation and sheath. Mechanical means for pulling to be tongue-limiting type and not be used for #2 AWG wires and smaller. Grounding conductor shall be separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways. Minimum conduit size shall be 3/4 inch in diameter for low voltage lighting and power circuits. Vertical distribution in multiple story buildings shall be made with metal conduit in fire-rated shafts. Metal conduit shall extend through shafts for minimum distance of 6 inches. Conduit which penetrates fire-rated walls, fire-rated partitions, or fire-rated floors shall be firestopped.
   1. Pull Wire: Install pull wires in empty conduits. Pull wire shall be plastic having minimum 890-N 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.

C. Conduit Installation: Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be visible after completion of project.
   1. Restrictions Applicable to EMT:
      a. Do not install underground.
      b. Do not encase in concrete, mortar, grout, or other cementitious materials.
      c. Do not use in areas subject to severe physical damage including but not limited to equipment rooms where moving or replacing equipment could physically damage the EMT.
      d. Do not use in hazardous areas.
      e. Do not use outdoors, including under open-sided covered lanais, patios, walkways or other similar locations.
      f. Do not use in fire pump rooms.
      g. Do not use exposed below +8’-0” above the finished floor.
   2. Restrictions Applicable to Nonmetallic Conduit:
      a. PVC Schedule 40:
         1) Do not use in areas where subject to severe physical damage, including but not limited to, mechanical equipment rooms, electrical equipment rooms, and other such areas.
         2) Do not use in hazardous (classified) areas.
         3) Do not use in fire pump rooms.
         4) Do not use in penetrating fire-rated walls or partitions, or fire-rated floors.
         5) Do not use above grade, except where allowed in this section for rising through floor slab or indicated otherwise.
   3. Restrictions Applicable to Flexible Conduit: Use only as specified in paragraph FLEXIBLE CONNECTIONS.
   4. Conduit for Circuits Rated Greater Than 600 Volts: Rigid metal conduit or IMC only.
   5. Conduit through Floor Slabs: Where conduits rise through floor slabs, curved portion of bends shall not be visible above finished slab.
   6. Stub-Ups: Provide conduits stubbed up through concrete floor for connection to free-standing equipment with adjustable top or coupling threaded inside for plugs, set flush with finished floor. Extend conductors to equipment in rigid steel conduit, except that flexible metal conduit may be used 6 inches above floor. Where no equipment connections are made, install screwdriver-operated threaded flush plugs in conduit end.
   7. Conduit Support: Support conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by wood screws to wood; by

toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Load applied to fasteners shall not exceed one-fourth proof test load. Fasteners attached to concrete ceiling shall be vibration resistant and shock-resistant. Holes cut to depth of more than 1 1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints shall not cut main reinforcing bars. Fill unused holes. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Conduit and box systems shall be supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts. Installation shall be coordinated with above-ceiling mechanical systems to assure maximum accessibility to all systems. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Where conduit crosses building expansion joints, provide suitable expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. For conduits greater than 2 1/2 inches inside diameter, provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

8. Directional Changes in Conduit Runs: Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.
9. Locknuts and Bushings: Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70. Provide threaded, weatherproof hubs for all raceway connections to boxes and enclosures exposed to the weather.
10. Flexible Connections: Provide flexible steel conduit between 3 and 6 feet in length for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for motors. Install flexible conduit to allow 20 percent slack.

Minimum flexible steel conduit size shall be 1/2 inch diameter. Provide liquid-tight flexible conduit in wet and damp locations for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

D. Boxes, Outlets, and Supports: Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways shall be cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, and when specifically indicated. Boxes in other locations shall be sheet steel, except that aluminum boxes may be used with aluminum conduit, and nonmetallic boxes may be used with nonmetallic conduit system. Each box shall have volume required by NFPA 70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures shall be minimum 4 inches square, or octagonal, except that smaller boxes may be installed as required by fixture configurations, as approved. Boxes for use in masonry-block or tile walls shall be square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature; fixtures shall be readily removable for access to boxes unless ceiling access panels are provided. Support boxes and pendants for surface-mounted fixtures on suspended ceilings independently of ceiling supports. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from building structure or by bar hangers. Where bar hangers are used, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 inches from box. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

1. Boxes: Boxes for use with raceway systems shall be minimum 1 1/2 inches deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets shall be minimum 4 inches square, except that 4 by 2 inch boxes may be used where only one raceway enters outlet. Telecommunications outlets shall be a minimum of 4 11/16 inches square by 2 1/8 inches deep. Mount outlet boxes flush in finished walls.
2. Pull Boxes: Construct of at least minimum size required by NFPA 70 of code-gauge aluminum or galvanized sheet steel, except where cast-metal boxes are required in locations specified herein. Provide

boxes with screw-fastened covers. Where several feeders pass through common pull box, tag feeders to indicate clearly electrical characteristics, circuit number, and panel designation.

E. Mounting Heights: Mount panelboards, enclosed circuit breakers, and disconnecting switches so height of operating handle at its highest position is maximum 78 inches above floor. Mount lighting switches 48 inches above finished floor. Mount receptacles 18 inches above finished floor. Mount other devices as indicated. Measure mounting heights of wiring devices and outlets to center of device or outlet, unless otherwise indicated.

F. Conductor Identification: Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, color coding shall be by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, color coding shall be by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves. Identify control circuit terminations in accordance with manufacturer's recommendations.

G. Splices: Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller diameter with insulated, pressure-type connector. Make splices in conductors No. 8 AWG and larger diameter with solderless connector, and cover with insulation material equivalent to conductor insulation.

H. Covers and Device Plates: Install with edges in continuous contact with finished wall surfaces without use of mats or similar devices. Plaster fillings are not permitted. Install plates with alignment tolerance of 1/16 inch. Use of sectional-type device plates are not permitted. Provide gasket for plates installed in wet locations.

I. Electrical Penetrations: Openings around electrical penetrations (such as conduit penetrations of flush mounted equipment enclosures or junctions boxes) through fire resistance-rated walls, partitions, floors, or ceilings shall be sealed to maintain fire resistive integrity. Use 3M CP25, Type MPP moldable putty or equivalent material to maintain fire resistive integrity for conduit penetration and flush mounted outlet boxes. Use other approved construction methods for larger enclosures.

J. Grounding and Bonding: Provide in accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in metallic and nonmetallic raceways, telecommunications system grounds, and neutral conductor of wiring systems.

K. Equipment Connections: Provide power wiring for the connection of motors and control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specifications but shall be provided under the section specifying the associated equipment.

L. Seismic Bracing: Contractor shall provide seismic bracing for all electrical equipment, apparatus, and raceways. Bracing shall, as a minimum, comply with the County Building Code.

M. Repair of Existing Work: Repair of existing work, demolition, and modification of existing electrical distribution systems shall be performed as follows:
   1. Workmanship: Lay out work in advance. Exercise care where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary for proper installation, support, or anchorage of conduit, raceways, or other electrical work. Repair damage to buildings, piping, and equipment using skilled craftsmen of trades involved.
   2. Existing Concealed Wiring to be Removed: Existing concealed wiring to be removed shall be disconnected from its source. Remove conductors; cut conduit flush with floor, underside of floor, and through walls; and seal openings.
   3. Removal of Existing Electrical Distribution System: Removal of existing electrical distribution system equipment shall include equipment's associated wiring, including conductors, cables, exposed conduit, surface metal raceways, boxes, and fittings, as indicated.

3.02 FIELD FABRICATED NAMEPLATE MOUNTING

A. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.03 WARNING SIGN MOUNTING

A. Provide the number of signs required to be readable from each accessible side. Space the signs in accordance with NFPA 70E.

3.04 FIELD APPLIED PAINTING

A. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.05 FIELD QUALITY CONTROL

A. Furnish test equipment and personnel and submit written copies of test results. Give Engineer 5 working days' notice prior to each test.
   1. Devices Subject to Manual Operation: Each device subject to manual operation shall be operated at least five times, demonstrating satisfactory operation each time.
   2. 600-Volt Wiring Test: Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 500 volts to provide direct reading of resistance. Minimum resistance shall be 250,000 ohms. Submit results to the Engineer.
   3. Transformer Tests: Measure primary and secondary voltages for proper tap settings.
   4. Ground-Fault Receptacle Test: Test ground-fault receptacles with a "load" (such as a plug in light) to verify that the "line" and "load" leads are not reversed.
   5. Grounding System Test: Test grounding system to ensure continuity and that resistance to ground is not excessive. Test each ground rod for resistance to ground before making connections to rod; tie grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Submit written results of each test to Engineer, and indicate location of rods as well as resistance and soil conditions at time measurements were made.

END OF SECTION

SECTION 16301 - UNDERGROUND ELECTRICAL WORK

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes, but is not limited to, the underground electrical infrastructure system. The underground infrastructure system includes the provision for structures, ductlines, and conductors.

1.02 RELATED WORK

A. SECTION 16011 - GENERAL ELECTRICAL REQUIREMENTS applies to this section with additions and modifications specified herein.

1.03 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise indicated, most recent edition of the publication with current revisions and amendments will be enforced.

1. American Association of State Highway and Transportation Officials (AASHTO):

AASHTO M 198	(2010) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

2. Association of Edison Illuminating Companies (AEIC):

AEIC CS8	(2007) specification for Extruded Dielectric Shielded Power Cables Rated 5 Through 46 kV

3. ASTM International (ASTM):

ASTM B1	(2012) Standard Specification for Hard-Drawn Copper Wire
ASTM B3	(2012) Standard Specification for Soft or Annealed Copper Wire
ASTM B496	(2013) Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors

ASTM B8	(2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM C139	(2011) Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C309	(2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C32	(2013) Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C478	(2013) Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C478M	(2013) Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric)
ASTM C857	(2013) Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

4. Institute of Electrical and Electronics Engineers (IEEE):

IEEE 386	(2006; INT 1 2011) Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V
IEEE 400.2	(2013) Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF)
IEEE 404	(2012) Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V to 500,000 V
IEEE 48	(2009) Standard for Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5 kV through 500 kV

IEEE 81	(2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5 2013) National Electrical Safety Code

5. International Electrical Testing Association (NETA):

NETA ATS	(2013) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

6. National Electrical Manufacturers Association (NEMA):

ANSI C119.1	(2011) Electric Connectors - Sealed Insulated Underground Connector Systems Rated 600 Volts
ANSI/NEMA WC 71/ ICEA S-96-659	(1999) Standard for Nonshielded Cables Rated 2001-5000 Volts for use in the Distribution of Electric Energy
NEMA RN 1	(2005) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA WC 74/ ICEA S-93-639	(2012) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy

7. National Fire Protection Association (NFPA):

NFPA 70	(2008) National Electrical Code

8. Telecommunications Industry Association (TIA):

TIA-758	(2012b) Customer-Owned Outside Plant Telecommunications Infrastructure Standard

9. Underwriters Laboratories (UL):

UL 1072	(2006; Reprint Jun 2013) Medium-Voltage Power Cables
UL 1242	(2006; Reprint Jul 2012) Standard for Electrical Intermediate Metal Conduit - Steel
UL 44	(2010) Thermoset-Insulated Wires and Cables

UL 467	(2007) Grounding and Bonding Equipment
UL 486A-486B	(2013) Wire Connectors
UL 510	(2005; Reprint Jul 2013) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514A	(2013) Metallic Outlet Boxes
UL 514B	(2012) Conduit, Tubing and Cable Fittings
UL 6	(2007; reprint Nov 2010) Electrical Rigid Metal Conduit-Steel
UL 651	(2011; Reprint Mar 2012) Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings
UL 83	(2008) Thermoplastic-Insulated Wires and Cables
UL 854	(2004; Reprint Sep 2011) Standard for Service-Entrance Cables

1.04 SUBMITTALS

A. Submit in accordance with SECTION 01330 - SUBMITTAL PROCEDURES.

B. Manufacturer’s Data and Shop Drawings:
   1. Sealing material.
   2. Pulling-in irons.
   3. Cover hold down bolts.
   4. Cable supports (racks, arms and insulators)

C. Manufacturer’s Instructions:
   1. Manufacturer’s directions for use of ground megger with proposed method indicated.
   2. Typical installation instructions for splicing.

D. Test reports as required in paragraph entitle “FIELD TESTS” hereinbelow.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment shall conform to the respective specifications and standards and to the specifications herein. Electrical ratings shall be as indicated.

2.02 CONDUIT, DUCTS, AND FITTINGS

A. Rigid Metal Conduit: UL 6.
1. Rigid Metallic Conduit, PVC Coated: NEMA RN 1, Type A40.

B. Intermediate Metal Conduit: UL 1242.
1. Intermediate Metal Conduit, PVC Coated: NEMA RN 1, Type A40.

C. Plastic Conduit for Direct Burial: UL 651, Schedule 40.

D. Plastic Conduit for Concrete Encasement: UL 651, Schedule 40.

E. Conduit Sealing Compound: Compounds for sealing ducts and conduit shall have a putty-like consistency workable with the hands at temperatures as low as 35 degrees F, shall neither slump at a temperature of 300 degrees F, nor harden materially when exposed to the air. Compounds shall adhere to clean surfaces of fiber or plastic ducts; metallic conduits or conduit coatings; concrete, masonry, or lead; any cable sheaths, jackets, covers, or insulation materials; and the common metals. Compounds shall form a seal without dissolving, noticeably changing characteristics, or removing any of the ingredients. Compounds shall have no injurious effect upon the hands of workmen or upon materials. Inflatable bladders may be used as an option.

F. Fittings:
1. Metal Fittings: UL 514B.

2. PVC Conduit Fittings: UL 514B, UL 651.

2.03 LOW VOLTAGE INSULATED CONDUCTORS AND CABLES

A. Insulated conductors shall be rated 600 volts and conform to the requirements of NFPA 70, including listing requirements. Wires and cables manufactured more than 24 months prior to date of delivery to the site shall not be accepted. Service entrance conductors shall conform to UL 854, type USE.

B. Conductor Types: Cable and duct sizes indicated are for copper conductors and THHN/THWN unless otherwise noted. All conductors shall be copper.

C. Conductor Material: Unless specified or indicated otherwise or required by NFPA 70, wires in conduit, other than service entrance, shall be 600-volt, Type THWN/THHN conforming to UL 83 or Type XHHW conforming to UL 44. Copper conductors shall be annealed copper complying with ASTM B3 and ASTM B8.

D. Jackets: Multiconductor cables shall have an overall PVC outer jacket.

E. In Duct: Cables shall be single-conductor cable.

F. Cable Marking:
1. Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout the cable length.

2. Each cable shall be identified by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, in each manhole, handhole, junction box, and each terminal. Each tag shall contain the following information; cable type, conductor size, circuit number, circuit voltage, cable destination and phase identification.

3. Conductors shall be color coded. Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Conductor identification shall be by color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, heat shrink type sleeves, or colored electrical tape. Control circuit terminations shall be properly identified. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one system are installed in same raceway or box, other neutrals shall be white with a different colored (not green) stripe for each. Color of ungrounded conductors in different voltage systems shall be as follows:
   a. 208/120 volt, three-phase:
      1) Phase A - black.
      2) Phase B - red.
      3) Phase C - blue.
   b. 480/277 volt, three-phase:
      1) Phase A - brown.
      2) Phase B - orange.
      3) Phase C - yellow.
   c. 120/240 Volt, Single Phase: Black and red.

2.04 LOW VOLTAGE WIRE CONNECTORS AND TERMINALS

A. UL 486A-486B. Shall provide a uniform compression over the entire conductor contact surface. Use solderless terminal lugs on stranded conductors.

2.05 LOW VOLTAGE SPLICES

A. Provide splices in conductors with a compression connector on the conductor and by insulating and waterproofing using one of the following methods which are suitable for continuous submersion in water and comply with ANSI C119.1.

B. Heat Shrinkable Splice: Provide heat shrinkable splice insulation by means of a thermoplastic adhesive sealant material which shall be applied in accordance with the manufacturer's written instructions.

C. Cold Shrink Rubber Splice: Provide a cold-shrink rubber splice which consists of EPDM rubber tube which has been factory stretched onto a spiraled core which is removed during splice installation. The installation shall not require heat or flame, or any additional materials such as covering or adhesive. It shall be designed for use with inline compression type connectors, or indoor, outdoor, direct-burial or submerged locations.

2.06 TAPE

A. Insulating Tape: UL 510, plastic insulating tape, capable of performing in a continuous temperature environment of 80 degrees C.

2.07 PULL STRING

A. Shall be plastic or flat pull line (bull line) having a minimum tensile strength of 200 pounds. For empty ducts intended for telephone or cable television cabling, provide mule tape in conformance with the utility company standards.

2.08 GROUNDING AND BONDING

A. Driven Ground Rods: Provide copper-clad steel ground rods conforming to UL 467 not less than 3/4 inch in diameter by 10 feet in length. Sectional type rods may be used for rods 20 feet or longer.

B. Grounding Conductors: Stranded-bare copper conductors shall conform to ASTM B8, Class B, soft-drawn unless otherwise indicated. Solid-bare copper conductors shall conform to ASTM B1 for sizes No. 8 and smaller.

Insulated conductors shall be of the same material as phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Aluminum is not acceptable.

2.09 CAST-IN-PLACE CONCRETE

A. Provide concrete for encasement of underground ducts with 3000 psi minimum 28-day compressive strength. Concrete associated with electrical work for other than encasement of underground ducts shall be 4000 psi minimum 28-day compressive strength unless specified otherwise.

2.10 UNDERGROUND STRUCTURES

A. Provide precast concrete underground structures or standard type cast-in-place manhole types as indicated, conforming to ASTM C857 and ASTM C478M ASTM C478. Top, walls, and bottom shall consist of reinforced concrete. Walls and bottom shall be of monolithic concrete construction. Locate duct entrances and windows near the corners of structures to facilitate cable racking. Covers shall fit the frames without undue play. Form steel and iron to shape and size with sharp lines and angles. Castings shall be free from warp and blow holes that may impair strength or appearance. Exposed metal shall have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete. Install a pulling-in iron in the wall opposite each duct line entrance. Cable racks, including rack arms and insulators, shall be adequate to accommodate the cable.

B. Cast-In-Place Concrete Structures: Construct walls on a footing of cast-in-place concrete except that precast concrete base sections may be used for precast concrete manhole risers.

C. Precast Concrete Structures, Risers and Tops: In lieu of cast-in-place, Contractors, at their option, may provide precast concrete underground structures subject to the requirements specified below, unless otherwise required by utility company standards. Precast units shall be the product of a manufacturer regularly engaged in the manufacture of precast concrete products, including precast manholes.
   1. General: Precast concrete structures shall have the same accessories and facilities as required for cast-in-place structures. Likewise, precast structures shall have plan area and clear heights not less than those of cast-in-place structures. Concrete materials and methods of construction shall be the same as for cast-in-place concrete construction, as modified herein. Slope in floor may be omitted provided precast sections are poured in reinforced steel

forms. Concrete for precast work shall have a 28-day compressive strength of not less than 4000 psi. Structures may be precast to the design and details indicated for cast-in-place construction, precast monolithically and placed as a unit, or structures may be assembled sections, designed and produced by the manufacturer in accordance with the requirements specified. Structures shall be identified with the manufacturer's name embedded in or otherwise permanently attached to an interior wall face.

2. Construction: Structure top, bottom, and wall shall be of a uniform thickness of not less than 6 inches unless otherwise indicated. Thin-walled knock-out panels for designed or future duct bank entrances shall not be permitted. Quantity, size, and location of duct bank entrance windows shall be as directed, and cast completely open by the precaster. Size of windows shall exceed the nominal duct bank envelope dimensions by at least 12 inches vertically and horizontally to preclude in-field window modifications made necessary by duct bank misalignment. However, the sides of precast windows shall be a minimum of 6 inches from the inside surface of adjacent walls, floors, or ceilings. Form the perimeter of precast window openings to have a keyed or inward flared surface to provide a positive interlock with the mating duct bank envelope. Provide welded wire fabric reinforcing through window openings for in-field cutting and flaring into duct bank envelopes. Provide additional reinforcing steel comprised of at least two No. 4 bars around window openings. Provide drain sumps a minimum of 12 inches in diameter and 4 inches deep for precast structures.
3. Joints: Provide tongue-and-groove joints on mating edges of precast components. Shiplap joints are not allowed. Design joints to firmly interlock adjoining components and to provide waterproof junctions and adequate shear transfer. Seal joints watertight using preformed plastic strip conforming to AASHTO M 198, Type B. Install sealing material in strict accordance with the sealant manufacturer's printed instructions. Provide waterproofing at conduit/duct entrances into structures, and where access frame meets the top slab, provide continuous grout seal.

D. Handhole Frames and Covers: Frames and covers of steel shall be welded by qualified welders in accordance with standard commercial practice. Steel covers shall be rolled-steel floor plate having an approved antislip surface. Hinges shall be of stainless steel with bronze hinge pin, 5 by 5 inches by approximately 3/16 inch thick, without screw holes, and shall be for full surface application by fillet welding. Hinges shall have nonremovable pins and five knuckles. The surfaces of plates under hinges shall be true after the removal of raised antislip surface, by grinding or other approved method.

E. Brick for Manhole Collar: Brick shall be sewer and manhole brick conforming to ASTM C32, Grade MS.

F. Composite/Fiberglass Handholes and Covers: Provide handholes and covers of polymer concrete, reinforced with heavy weave fiberglass and as indicated in the drawings. Provide stainless steel hold-down bolts and nuts for handhole covers 2 feet by 4 feet or larger. Bolts shall be unique, requiring a specially-furnished tool such as a hex- head or center-reject nut.

2.11 CABLE SUPPORTS (RACKS, ARMS, AND INSULATORS)

A. The metal portion of racks and arms shall be zinc-coated after fabrication.

B. Cable Racks: The wall bracket shall be 4 inches by approximately 1-1/2 inch by 3/16 inch channel steel, 48 inches long (minimum) in manholes. Slots for mounting cable rack arms shall be spaced at 8 inch intervals.

C. Rack Arms: Cable rack arms shall be steel or malleable iron or glass reinforced nylon and shall be of the removable type. Rack arm length shall be a minimum of 8 inches and a maximum of 12 inches.

D. Insulators: Insulators for metal rack arms shall be dry-process glazed porcelain. Insulators are not required for nylon arms.

2.12 CABLE TAGS IN MANHOLES AND HANDHOLES

A. Provide tags for each power cable located in manholes and handholes. The tags shall be polyethylene. Do not provide handwritten letters. The first position on the power cable tag shall denote the voltage. The second through sixth positions on the tag shall identify the circuit. The next to last position shall denote the phase of the circuit and shall include the Greek "phi" symbol. The last position shall denote the cable size. As an example, a tag could have the following designation: "11.5 NAS 1-8(Phase A)500," denoting that the tagged cable is on the 11.5kV system circuit number NAS 1-8, underground, Phase A, sized at 500 kcmil.

B. Polyethylene Cable Tags: Provide tags of polyethylene that have an average tensile strength of 3250 pounds per square inch; and that are 0.08 inch thick (minimum), non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 170 degrees F. Provide 0.05 inch (minimum) thick black polyethylene tag holder. Provide a one-piece nylon, self-locking tie at each end of the cable tag. Ties shall have a minimum loop tensile strength of 175 pounds. The cable tags shall have black block letters, numbers, and symbols one inch high on a yellow background. Letters, numbers, and

symbols shall not fall off or change positions regardless of the cable tags' orientation.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install equipment and devices in accordance with the manufacturer's published instructions and with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable. In addition to these requirements, install telecommunications in accordance with TIA-758 and RUS Bull 1751F-644.

3.02 CABLE INSPECTION

A. Prior to installation, each cable reel shall be inspected for correct storage positions, signs of physical damage, and broken end seals. If end seal is broken, moisture shall be removed from cable prior to installation in accordance with the cable manufacturer's recommendations.

3.03 UNDERGROUND STRUCTURE CONSTRUCTION

A. Provide standard type cast-in-place construction as specified herein and as indicated, or precast/prefabricated construction as specified herein. Horizontal concrete surfaces of floors shall have a smooth trowel finish. Cure concrete by applying two coats of white pigmented membrane forming-curing compound in strict accordance with the manufacturer's printed instructions, except that precast concrete may be steam cured. Curing compound shall conform to ASTM C309. Locate duct entrances and windows in the center of end walls (shorter) and near the corners of sidewalls (longer) to facilitate cable racking and splicing. Covers for underground structures shall fit the frames without undue play. Steel and iron shall be formed to shape and size with sharp lines and angles. Castings shall be free from warp and blow holes that may impair strength or appearance. Exposed metal shall have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete.

B. Pulling-In Irons: Provide steel bars bent as indicated, and cast in the walls and floors. Alternatively, pipe sleeves may be precast into the walls and floors where required to accept U-bolts or other types of pulling-in devices possessing the strengths and clearances stated herein. The final installation of pulling-in devices shall be made permanent. Cover and seal exterior projections of thru-wall type pulling-in devices with an

appropriate protective coating. In the floor the irons shall be a minimum of 6 inches from the edge of the sump, and in the walls the irons shall be located within 6 inches of the projected center of the duct bank pattern or precast window in the opposite wall. However, the pulling-in iron shall not be located within 6 inches of an adjacent interior surface, or duct or precast window located within the same wall as the iron. If a pulling-in iron cannot be located directly opposite the corresponding duct bank or precast window due to this clearance limitation, locate the iron directly above or below the projected center of the duct bank pattern or precast window the minimum distance required to preserve the 6 inch clearance previously stated. In the case of directly opposing precast windows, pulling-in irons consisting of a 3 foot length of No. 5 reinforcing bar, formed into a hairpin, may be cast-in-place within the precast windows simultaneously with the end of the corresponding duct bank envelope. Irons installed in this manner shall be positioned directly in line with, or when not possible, directly above or below the projected center of the duct bank pattern entering the opposite wall, while maintaining a minimum clear distance of 3 inches from any edge of the cast-in-place duct bank envelope or any individual duct. Pulling-in irons shall have a clear projection into the structure of approximately 4 inches and shall be designed to withstand a minimum pulling-in load of 6000 pounds. Irons shall be hot-dipped galvanized after fabrication.

C. Cable Racks, Arms and Insulators: Cable racks, arms and insulators shall be sufficient to accommodate the cables. Racks in power manholes shall be spaced not more than 3 feet apart, and each manhole wall shall be provided with a minimum of two racks. Racks in signal manholes shall be spaced not more than 16 1/2 inches apart with the end rack being no further than 12 inches from the adjacent wall. Methods of anchoring cable racks shall be as follows:
   1. Provide a 5/8 inch diameter by 5 inch long anchor bolt with 3 inch foot cast in structure wall with 2 inch protrusion of threaded portion of bolt into structure. Provide 5/8 inch steel square head nut on each anchor bolt. Coat threads of anchor bolts with suitable coating immediately prior to installing nuts.
   2. Provide concrete channel insert with a minimum load rating of 800 pounds per foot. Insert channel shall be steel of the same length as "vertical rack channel;" channel insert shall be cast flush in structure wall. Provide 5/8 inch steel nuts in channel insert to receive 5/8 inch diameter by 3 inch long steel, square head anchor bolts.
   3. Provide concrete "spot insert" at each anchor bolt location, cast flush in structure wall. Each insert shall have minimum 800 pound load rating. Provide 5/8 inch diameter by 3 inch long steel, square head anchor bolt at each anchor point. Coat threads of anchor bolts with suitable coating immediately prior to installing bolts.

D. Field Painting: Cast-iron frames and covers not buried in concrete or masonry shall be cleaned of mortar, rust, grease, dirt and other deleterious materials, and given a coat of bituminous paint.

3.04 UNDERGROUND CONDUIT AND DUCT SYSTEMS

A. Depths to top of the conduit shall be in accordance with NFPA 70. Run conduit in straight lines except where a change of direction is necessary. Numbers and sizes of ducts shall be as indicated. Ducts shall have a continuous slope downward toward underground structures and away from buildings, laid with a minimum slope of 3 inches per 100 feet. Depending on the contour of the finished grade, the high-point may be at a terminal, a manhole, a handhole, or between manholes or handholes. Short-radius 90-degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable. The minimum manufactured bend radius shall be 18 inches for ducts of less than 3 inch diameter, and 36 inches for ducts 3 inches or greater in diameter. Otherwise, long sweep bends having a minimum radius of 25 feet shall be used for a change of direction of more than 5 degrees, either horizontally or vertically. Both curved and straight sections may be used to form long sweep bends, but the maximum curve used shall be 30 degrees and manufactured bends shall be used. Ducts shall be provided with end bells whenever duct lines terminate in structures.

B. Treatment: Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made with proper tools and match factory tapers. A coupling recommended by the duct manufacturer shall be used whenever an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid. Plastic ducts shall be stored on a flat surface and protected from the direct rays of the sun.

C. Conduit Cleaning: As each conduit run is completed, for conduit sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. For conduit sizes less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs.

D. Jacking and Drilling Under Roads and Structures: Conduits to be installed under existing paved areas which are not to be disturbed and under roads shall be zinc-coated, rigid steel, jacked into place. Where

ducts are jacked under existing pavement, rigid steel conduit will be installed because of its strength. To protect the corrosion-resistant conduit coating, predrilling or installing conduit inside a larger iron pipe sleeve (jack-and-sleeve) is required. Separators or spacing blocks shall be made of steel, concrete, plastic, or a combination of these materials placed not farther apart than 4 feet on centers.

E. Galvanized Conduit Concrete Penetrations: Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations shall be PVC coated and shall extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

F. Multiple Conduits: Separate multiple conduits by a minimum distance of 2 inches, except that light and power conduits shall be separated from control, signal, and telephone conduits by a minimum distance of 3 inches. Stagger the joints of the conduits by rows (horizontally) and layers (vertically) to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, ties, and locking device on top to provide a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions, but provide a minimum of two spacer assemblies per 10 feet of conduit assembly.

G. Conduit Plugs and Pull Rope: New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weephole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

H. Conduit and Duct Without Concrete Encasement: Provide not less than 3 inches clearance from the conduit to each side of the trench. Grade bottom of trench smooth; where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3 inches, fill and tamp level with original bottom with sand or earth free from particles that would be retained on a 1/4 inch sieve. The first 6 inch layer of backfill cover shall be sand compacted as previously specified. The rest of the excavation shall be backfilled and compacted in 3 to 6 inch layers. Provide color, type and depth of warning tape as indicated in the drawings.
   1. Encasement Under Roads and Structures: Under roads and paved areas, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3 inch concrete cover around ducts. Concrete encasement shall extend at least 5 feet beyond the edges of paved areas and roads.

I. Duct Encased in Concrete: Construct underground duct lines of individual conduits encased in concrete. Do not mix different kinds of conduit in any one duct bank. Concrete encasement surrounding the bank shall be rectangular in cross-section and shall provide at least 3 inches of concrete cover for ducts. Separate conduits by a minimum concrete thickness of 2 inches, except separate light and power conduits from control, signal, and telecommunications conduits by a minimum concrete thickness of 3 inches. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies from floating during concrete pouring. Anchoring shall be done by driving reinforcing rods adjacent to duct spacer assemblies and attaching the rods to the spacer assembly. Provide color, type and depth of warning tape as indicated in the drawings.
   1. Connections to Manholes: Duct bank envelopes connecting to underground structures shall be flared to have enlarged cross-section at the manhole entrance to provide additional shear strength. Dimensions of the flared cross-section shall be larger than the corresponding manhole opening dimensions by no less than 12 inches in each direction. Perimeter of the duct bank opening in the underground structure shall be flared toward the inside or keyed to provide a positive interlock between the duct bank and the wall of the structure. Use vibrators when this portion of the encasement is poured to assure a seal between the envelope and the wall of the structure.
   2. Connections to Existing Underground Structures: For duct bank connections to existing structures, break the structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and extend into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.
   3. Connections to Existing Concrete Pads: For duct bank connections to concrete pads, break an opening in the pad out to the dimensions required and preserve steel in pad. Cut the steel and extend into the duct bank envelope. Chip out the opening in the pad to form a key for the duct bank envelope.
   4. Connections to Existing Ducts: Where connections to existing duct banks are indicated, excavate the banks to the maximum depth necessary. Cut off the banks and remove loose concrete from the conduits before new concrete-encased ducts are installed. Provide a reinforced concrete collar, poured monolithically with the new duct bank, to take the shear at the joint of the duct banks.
   5. Partially Completed Duct Banks: During construction wherever a construction joint is necessary in a duct bank, prevent debris such as mud, and, and dirt from entering ducts by providing suitable conduit plugs. Fit concrete envelope of a partially completed duct bank with reinforcing steel extending a minimum of 2 feet back into

the envelope and a minimum of 2 feet beyond the end of the envelope. Provide one No. 4 bar in each corner, 3 inches from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately one foot apart. Restrain reinforcing assembly from moving during concrete pouring.

6. Removal of Ducts: Where duct lines are removed from existing underground structures, close the openings to waterproof the structure. Chip out the wall opening to provide a key for the new section of wall.

3.05 CABLE PULLING

A. Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables. Pull cables down grade with the feed-in point at the manhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through manhole opening and into duct runs. Do not exceed the specified cable bending radii when installing cable under any conditions, including turn-ups into switches, transformers, switchgear, switchboards, and other enclosures. Cable with tape shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.

B. Cable Lubricants: Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables.

3.06 CABLES IN UNDERGROUND STRUCTURES

A. Do not install cables utilizing the shortest path between penetrations, but route along those walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls, not to interfere with duct entrances, and support on brackets and cable insulators. Support cable splices in underground structures by racks on each side of the splice. Locate splices to prevent cyclic bending in the spliced sheath. Install cables at middle and bottom of cable racks, leaving top space open for future cables, except as otherwise indicated for existing installations. Provide one spare three-insulator rack arm for each cable rack in each underground structure.

B. Cable Tag Installation: Install cable tags in each manhole or handhole as specified, including each splice. Tag wire and cable provided by this contract. Install cable tags over the fireproofing, if any, and locate the tags so that they are clearly visible without disturbing any cabling or wiring in the manholes.

3.07 CONDUCTORS INSTALLED IN PARALLEL

A. Conductors shall be grouped such that each conduit of a parallel run contains 1 Phase A conductor, 1 Phase B conductor, 1 Phase C conductor, and 1 neutral conductor.

3.08 LOW VOLTAGE CABLE SPLICING AND TERMINATING

A. Make terminations and splices with materials and methods as indicated or specified herein and as designated by the written instructions of the manufacturer. Do not allow the cables to be moved until after the splicing material has completely set. Make splices in underground distribution systems only in accessible locations such as manholes, handholes, or aboveground termination cabinets.

3.09 CABLE END CAPS

A. Cable ends shall be sealed at all times with coated heat shrinkable end caps. Cables ends shall be sealed when the cable is delivered to the job site, while the cable is stored and during installation of the cable. The caps shall remain in place until the cable is spliced or terminated. Sealing compounds and tape are not acceptable substitutes for heat shrinkable end caps. Cable which is not sealed in the specified manner at all times will be rejected.

3.10 GROUNDING SYSTEMS

A. Grounding Connections: Make grounding connections which are buried or otherwise normally inaccessible, by exothermic weld or compression connector.
   1. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.
   2. Make compression connections using a hydraulic compression tool to provide the correct circumferential pressure. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.

B. Grounding Conductors: Provide bare grounding conductors, except where installed in conduit with associated phase conductors. Ground cable sheaths, cable shields, conduit, and equipment with No. 6 AWG. Ground other noncurrent-carrying metal parts and equipment frames of metal-enclosed equipment. Ground metallic frames and covers of

handholes and pull boxes with a braided, copper ground strap with equivalent ampacity of No. 6 AWG.

C. Ground Cable Crossing Expansion Joints: Protect ground cables crossing expansion joints or similar separations in structures and pavements by use of approved devices or methods of installation which provide the necessary slack in the cable across the joint to permit movement. Use stranded or other approved flexible copper cable across such separations.

3.11 EXCAVATING, BACKFILLING, AND COMPACTING

A. Provide in accordance with NFPA 70.

B. Reconditioning of Surfaces:
1. Unpaved Surfaces: Restore to their original elevation and condition unpaved surfaces disturbed during installation of duct [or direct burial cable]. Preserve sod and topsoil removed during excavation and reinstall after backfilling is completed. Replace sod that is damaged by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, re-seed the restored surface with the same quantity and formula of seed as that used in the original seeding, and provide topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching.
2. Paving Repairs: Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists, restore such surface treatment or pavement the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces.

3.12 CAST-IN-PLACE CONCRETE

A. Provide concrete in accordance with this specifications.

B. Concrete Slabs for Equipment:
1. Unless otherwise indicated, the slab shall be at least 8 inches thick, reinforced with a 6 by 6 - W2.9 by W2.9 mesh, placed uniformly 4 inches from the top of the slab. Slab shall be placed on a 6 inch thick, well-compacted gravel base. Top of concrete slab shall be approximately 4 inches above finished grade with gradual slope for drainage. Edges above grade shall have 1/2 inch chamfer. Slab shall be of adequate size to project at least 8 inches beyond the equipment.

2. Stub up conduits, with bushings, 2 inches into cable wells in the concrete pad. Coordinate dimensions of cable wells with transformer cable training areas.

C. Sealing: When the installation is complete, the Contractor shall seal all conduit and other entries into the equipment enclosure with an approved sealing compound. Seals shall be of sufficient strength and durability to protect all energized live parts of the equipment from rodents, insects, or other foreign matter.

3.13 FIELD QUALITY CONTROL

A. Performance of Field Acceptance Checks and Tests: Perform in accordance with the manufacturer's recommendations, and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.
1. Grounding System:
a. Visual and Mechanical Inspection: Inspect ground system for compliance with contract plans and specifications
b. Electrical Tests: Perform ground-impedance measurements utilizing the fall-of-potential method in accordance with IEEE 81. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable megohmmeter tester in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test.

B. Follow-Up Verification: Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the contract, the shall be given 5 working days advance notice of the dates and times of checking and testing.

END OF SECTION

SECTION 16530 - EXTERIOR LIGHTING

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

A. Drawings and other general provisions of contract, including General and Supplementary Conditions and other Division 1 specification sections.

1.02 RELATED WORK

A. SECTION 16011 - BASIC ELECTRICAL REQUIREMENTS applies to this section, with the additions and modifications specified herein.

B. Materials not considered to be lighting equipment or luminaire accessories are specified in SECTION 16100 - BASIC ELECTRICAL WORK and SECTION 16301 - UNDERGROUND ELECTRICAL WORK.

1.03 APPLICABLE PUBLICATIONS

A. The publications listed within this specification form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only. Unless otherwise indicated, most recent edition of publication with current revisions and amendments will be enforced.

1. Alliance for Telecommunications Industry Solutions (ATIS):
   ATIS ANSI O5.1 (2008) Wood Poles - Specifications & Dimensions

2. American Association of State Highway and Transportation Officials (AASHTO):
   AASHTO LTS (2013) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals

3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
   ASHRAE 90.1 - IP (2010; Errata 1-4 2011; INT 1-12 2011; Addenda A, B, C, G, H, J, K, O, P, S, Y, Z, BZ, CG, CI and DS 2012; Errata 5-9 2012; INT 13-16 2012; Errata 10-12 2013; INT 17-18 2013) Energy Standard for Buildings Except Low-Rise Residential Buildings

4. American Wood Protection Association (AWPA):

AWPA U1	(2013) Use Category System: User Specification for Treated Wood

5. ASTM International (ASTM):

ASTM A123/A123M	(2012) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B108/B108M	(2012; E 2012) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B117	(2011) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM C1089	(2013) Standard Specification for Spun Cast Prestressed Concrete Poles

6. California Energy Commission (CEC):

CEC Title 24	(2008; Effective Jan 2010) California's Energy Efficiency Standards for Residential and Nonresidential Buildings

7. Illuminating Engineering Society of North America (IES):

IES HB-10	(2011) IES Lighting Handbook

8. Institute of Electrical and Electronics Engineers (IEEE):

IEEE C2	(2012; Errata 2012; INT 1-4 2012; INT 5 2013) National Electrical Safety Code
IEEE C62.41	(1991; R 1995) Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits
IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

9. National Electrical Manufacturers Association (NEMA):

ANSI ANSLG C78.41	(2006) For Electric Lamps--Guidelines for Low-Pressure Sodium Lamps
ANSI ANSLG C78.42	(2009) For Electric Lamps: High-Pressure Sodium Lamps
ANSI C136.13	(2004; R 2009) American National Standard for Roadway Lighting Equipment, Metal Brackets for Wood Poles
ANSI C136.21	(2004; R 2009) American National Standard for Roadway and Area Lighting Equipment - Vertical Tenons Used with Post-Top-Mounted Luminaires
ANSI C136.3	(2005; R 2009) American National Standard for Roadway and Area Lighting Equipment Luminaire Attachments
ANSI C78.1381	(1998) American National Standard for Electric Lamps - 250-Watt, 70 Watt, M85 Metal-Halide Lamps
ANSI C82.4	(2002) American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium (LPS) Lamps (Multiple-Supply Type)
ANSI/ANSLG C78.43	(2013) American National Standard for Electric Lamps - Single-Ended Metal-Halide Lamps
ANSI/NEMA C78.LL 1256	(2003) Procedures for Fluorescent Lamp Sample Preparation and the Toxicity Characteristic Leaching Procedure (TCLP)
NEMA 250	(2008) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ANSLG C78.377	(2011) American National Standard for Electric Lamps— Specifications for the Chromaticity of Solid State Lighting Products
NEMA ANSLG C78.380	(2007) Electric Lamps - High Intensity Discharge Lamps, Method of Designation

NEMA ANSLG C78.44	(2008) For Electric Lamps - Double-Ended Metal Halide Lamps
NEMA ANSLG C82.11	(2011) Lamp Ballasts - High-Frequency Fluorescent Lamp Ballasts
NEMA ANSLG C82.14	(2006) Lamp Ballasts Low-Frequency Square Wave Electronic Ballasts -- for Metal Halide Lamps
NEMA C136.10	(2010) American National Standard for Roadway and Area Lighting Equipment-Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing
NEMA C136.20	(2012) American National Standard for Roadway and Area Lighting Equipment - Fiber Reinforced Composite (FRC) Lighting Poles
NEMA C136.31	(2010) American National for Roadway and Area Lighting Equipment - Luminaire Vibration
NEMA C78.LL 3	(2003) Electric Lamps - Procedures for High Intensity Discharge Lamp Sample Preparation and the Toxicity Characteristic Leaching Procedure
NEMA C82.77	(2002) Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment
NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2011) Enclosures
NEMA IEC 60529	(2004) Degrees of Protection Provided by Enclosures (IP Code)
NEMA WD 7	(2011) Occupancy Motion Sensors Standard

10. National Fire Protection Association (NFPA):
    NFPA 70 (2008) National Electrical Code

11. U.S. Department of Agriculture (USDA):
    RUS Bull 1728F-700 (2011) Specification for Wood Poles, Stubs, and Anchor Logs

12. U.S. National Archives and Records Administration (NARA):
    47 CFR 15 Radio Frequency Devices

    47 CFR 18 (2011) Industrial, Scientific, and Medical Equipment

13. Underwriters Laboratories (UL):
    UL 1029 (1994; Reprint Sep 2012) High-Intensity-Discharge Lamp Ballasts

    UL 1310 (2011; Reprint Apr 2013) UL Standard for Safety Class 2 Power Units

    UL 1598 (2008; Reprint Oct 2012) Luminaires

    UL 773 (1995; Reprint Mar 2002) Standard for Plug-In, Locking Type Photocontrols for Use with Area Lighting

    UL 773A (2006; Reprint Mar 2011) Standard for Nonindustrial Photoelectric Switches for Lighting Control

    UL 8750 (2007; Reprint Oct 2012) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products

    UL 916 (2007; Reprint Jul 2013) Standard for Energy Management Equipment

    UL 935 (2001; Reprint Nov 2011) Standard for Fluorescent-Lamp Ballasts

1.04 SUBMITTALS

A. Data, shop drawings, and reports shall employ terminology, classifications, and methods prescribed by the IES Lighting Handbook.

B. Manufacturer's Data: When data that describe more than one type, size, model, or item is submitted, clearly mark the data to indicate which type, size, model, or item is being provided. Data shall be sufficient to show conformance to specified requirements.
   1. Luminaires.
   2. Lamps.
   3. Poles and bracket arms.

C. Shop Drawings:
   1. Luminaires.
   2. Poles, including dimensions, accessories, installation and construction details.

D. Submittal Requirements:
   1. Poles and Luminaire Mounting Brackets: Include dimensions, wind load determined in accordance with AASHTO LTS2 and as specified in "PRODUCTS" paragraph of this section, pole deflection, pole class, and other applicable information.

E. Field Test Reports: Submit test results as stated in paragraph entitled "FIELD QUALITY CONTROL" hereinbelow.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Do not store poles on ground. Support poles so they are at least one foot above ground level and growing vegetation. Do not remove factory applied pole wrappings until just before installing pole.

1.06 WARRANTIES, GUARANTEES AND INSTRUCTION SHEETS

A. Manufacturers' warranties and guarantees furnished for materials used in the work and instruction sheets and parts lists supplied with materials shall be delivered to the Engineer prior to acceptance of the project. All apparatus and workmanship shall be guaranteed for one year and, should any failure resulting from normal operation occur during that time, the Contractor shall replace the defective equipment or correct the workmanship at no cost to the State. An exception shall be made for lamps, which shall be guaranteed for 50 percent of their rated lamp life.

PART 2 - PRODUCTS

2.01 LED LUMINAIRES

A. UL 1598, NEMA C82.77 and UL 8750. Provide luminaires as indicated in luminaire schedule or details on project plans. Provide luminaires

complete with light sources of quantity, type, and wattage indicated. All luminaires of the same type shall be provided by the same manufacturer.

B. General Requirements:
1. LED luminaire housings shall be die cast or extruded aluminum.
2. Luminaires shall be UL listed for wet locations per UL 1598.
3. Luminaires shall have IES distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans per IES HB-10.
4. Housing finish shall be baked-on enamel, anodized, or baked-on powder coat paint. Finish shall be capable of surviving ASTM B117 salt fog environment testing for 2500 hours minimum without blistering or peeling.
5. Luminaires shall be fully assembled and electrically tested prior to shipment from factory.
6. The finish color shall be as indicated in the luminaire schedule or detail on the project plans.
7. Luminaire arm bolts shall be 304 stainless steel or zinc-plated steel.
8. Luminaire lenses shall be constructed of frosted tempered glass or UV-resistant acrylic.
9. Incorporate modular electrical connections, and construct luminaires to allow replacement of all or any part of the optics, heat sinks, power supply units, ballasts, surge suppressors and other electrical components using only a simple tool, such as a manual or cordless electric screwdriver.
10. Luminaires shall have a nameplate bearing the manufacturer's name, address, model number, date of manufacture, and serial number securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable.
11. Roadway and area luminaires shall have an integral tilt adjustment of plus or minus 5 degrees to allow the unit to be leveled in accordance with ANSI C136.3.
12. Luminaire must pass 3G vibration testing in accordance with NEMA C136.31.
13. All factory electrical connections shall be made using crimp, locking, or latching style connectors. Twist-style wire nuts are not acceptable.

C. Luminaire Light Sources:
1. LED Light Sources:
a. Correlated Color Temperature (CCT) shall be in accordance with NEMA ANSLG C78.377: Nominal CCT: 3000 degrees K.
b. Color Rendering Index (CRI) shall be: Greater than or equal to 70 for 3000 degrees K light sources.

D. Luminaire Power Supply Units (Drivers):
   1. LED Power Supply Units (Drivers): UL 1310. LED Power Supply Units (Drivers) shall meet the following requirements:
      a. Minimum efficiency shall be 80 percent.
      b. Shall be designed to operate on the voltage system to which they are connected, typically ranging from 120 V to 480 V nominal.
      c. Operating frequency shall be: 60 Hz.
      d. Power Factor (PF) shall be greater than or equal to 0.90.
      e. Total Harmonic Distortion (THD) current shall be less than or equal to 20 percent.
      f. Shall be mounted integral to luminaire. Remote mounting of power supply is not allowed.
      g. Power supplies in luminaires mounted under a covered structure, such as a canopy, or where otherwise appropriate shall be UL listed with a sound rating of A.

2.02 EXTERIOR LUMINAIRE CONTROLS

A. Controls shall comply with Section 9 of ASHRAE 90.1 - IP.

B. Photocell: UL 773 or UL 773A. Photocells shall be hermetically sealed, silicon diode light sensor type, rated at 80 watts, 120 volts, 50/60 Hz with single-pole, single-throw contacts. Photocell shall be designed to fail to the ON position. Housing shall be constructed of polycarbonate, rated to operate within a temperature range of minus 40 to 158 degrees F. Provide swivel base type housing. Photocell shall be twist-lock receptacle type conforming to NEMA C136.10. Provide with solid brass prongs and voltage markings and color coding on exterior of housing. Photocell shall turn on at 1-3 footcandles and turn off at 3 to 15 footcandles. A time delay shall prevent accidental switching from transient light sources.

2.03 POLES

A. Provide poles designed for wind loading of 105 miles per hour determined in accordance with AASHTO LTS while supporting luminaires and all other appurtenances indicated. The effective projected areas of luminaires and appurtenances used in calculations shall be specific for the actual products provided on each pole. Poles shall be [embedded] [anchor]-base type designed for use with underground supply conductors. Poles shall have oval-shaped handhole having a minimum clear opening of 2.5 by 5 inches. Handhole cover shall be secured by stainless steel captive screws. Metal poles shall have an internal grounding connection accessible from the handhole near the bottom of each pole. Scratched, stained, chipped, or dented poles shall not be installed.

B. Aluminum Poles: Provide aluminum poles manufactured of corrosion resistant aluminum alloys conforming to AASHTO LTS for Alloy 6063-T6 or Alloy 6005-T5 for wrought alloys and Alloy 356-T4 (3,5) for cast alloys. Poles shall be seamless extruded or spun seamless type with minimum 0.188 inch wall thickness. Provide a pole grounding connection designed to prevent electrolysis when used with copper ground wire. Tops of shafts shall be fitted with a round or tapered cover. Base shall be anchor bolt mounted, made of cast 356-T6 aluminum alloy in accordance with ASTM B108/B108M and shall be machined to receive the lower end of shaft. Joint between shaft and base shall be welded. Base cover shall be cast 356-T6 aluminum alloy in accordance with ASTM B108/B108M. Hardware, except anchor bolts, shall be either 2024-T4 anodized aluminum alloy or stainless steel. Manufacturer's standard provision shall be made for protecting the finish during shipment and installation. Minimum protection shall consist of spirally wrapping each pole shaft with protective paper secured with tape, and shipping small parts in boxes.

2.04 BRACKETS AND SUPPORTS

A. ANSI C136.3, ANSI C136.13, and ANSI C136.21, as applicable. Pole brackets shall be not less than 1 1/4 inch aluminum secured to pole. Slip-fitter or pipe-threaded brackets may be used, but brackets shall be coordinated to luminaires provided, and brackets for use with one type of luminaire shall be identical. Brackets for pole-mounted street lights shall correctly position luminaire no lower than mounting height indicated. Mount brackets not less than 24 feet above street. Special mountings or brackets shall be as indicated and shall be of metal which will not promote galvanic reaction with luminaire head.

2.05 EQUIPMENT IDENTIFICATION

A. Manufacturer's Nameplate: Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

B. Labels: Provide labeled luminaires in accordance with UL 1598 requirements. Luminaires shall be clearly marked for operation of specific light sources and ballasts according to proper light source type. The following light source characteristics shall be noted in the format "Use Only _____":
   1. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires. Markings related to lamp type shall be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when lamps are in place.

2.06 FACTORY APPLIED FINISH

A. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein.

B. Aluminum Poles: Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 90 degrees at the bottom end. Provide ornamental covers to match pole and galvanized nuts and washers for anchor bolts. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit ell. Adjust poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location. Install according to pole manufacturer's instructions. Alterations to poles after fabrication will void manufacturer's warranty and shall not be allowed.

C. Photocell Switch Aiming: Aim switch according to manufacturer's recommendations.

3.02 GROUNDING

A. Ground noncurrent-carrying parts of equipment including luminaires, mounting arms and brackets. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.03 FIELD APPLIED PAINTING

A. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.04 FIELD QUALITY CONTROL

A. Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Conduct an operating test after 100 hours of burn-in time to show that the equipment operates in accordance with the requirements of this section.

3.05 MISCELLANEOUS

A. Upon completion of the work, the Contractor shall submit an “As Built” or corrected plan, or any data therefore required by the Engineer, showing in detail all construction changes.

B. All incidental parts which are not shown on the plans or called for in the proposal or specified herein or in the special provisions and which are necessary to complete the lighting system shall be furnished and installed by the Contractor as though such parts were shown on the plans and/or specified.

END OF SECTION

SECTION 16722 - FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Provide 14 new door holders as shown on the drawings. Door holders shall be powered by 120V and connected on its own circuit breaker and shall integrate with the existing fire alarm system. The existing fire alarm system is Edward Systems with the main panel being an EST QS4.

B. Furnish all labor and materials required to complete fire alarm system work as indicated on the drawings and/or specified herein: The work covered by this section of the Specifications shall include furnishing all labor, materials, equipment and services to construct and install a complete fire alarm system as shown on the accompanying Drawings and specified herein. This work shall include but is not necessarily limited to:
   1. Installation of the new door holders
   2. Complete new wiring system for new door holders
   3. Testing the existing fire alarm system before the start of construction and report any issues to the hospital.
   4. Test the completed system.

1.02 SUBMITTALS

A. All submittals shall be in accordance with Section 01330 - SUBMITTAL PROCEDURES.

B. The following items shall be submitted in accordance with NFPA 72, NEC 70. NFPA 1 2012, and this section
   1. Shop Drawings and Manufacturer's Catalog Cuts:
      a. Door Holder
      b. Relay Modules
      c. Wiring and conduits

1.03 REGULATIONS AND CODES

A. Perform the entire installation in strict accordance with the applicable provisions of the latest edition of the National Electrical Code, other NFPA Standards for Fire Alarm Systems, Local Ordinances, and rules and regulations of the County of Honolulu and utility companies. Furnish any additional material and labor which may be required to comply with the laws, rules, and regulations even though the work is not mentioned in these particular specifications or shown on the drawings.

1.04 WARRANTY

A. All work and materials executed under this Section shall be under warranty to be free from defects of materials and workmanship for one (1) year from date of final acceptance of project as a whole, except lamps, which shall be warranted for 50% of the rated life as published by the manufacturer. All repair and replacement work required, including other work damaged by this work's defects shall be performed without cost to the Owner. Should any equipment or material fail within this period, the Contractor shall replace or repair that item at no cost to the Owner for material and/or services, if such is due to faulty workmanship or quality of material furnished. The Contractor shall be responsible for all damages to any part of the premises caused by failure in the equipment furnished under this section for a period of one year after the final acceptance of the work as a whole.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide fire alarm system equipment manufactured Edward Systems only.

B. Fire Alarm, Detection and Communications System: Provide a complete zoned, closed circuit, microcomputer based, multiplexing, electrically supervised system. Activation of any initiating device activates specified alarm and control functions until manual function acknowledges the alarm conditions, or until system is reset. Assemblies and components must be manufactured by one manufacturer and be complete in every respect. Install complete system in compliance with the most restrictive requirement of each of the referenced standards. All fire alarm devices shall be UL listed and FM approved with the existing fire alarm system.

2.02 FIRE ALARM PANEL

A. The Fire Alarm panel is an existing EST QS4 Fire alarm panel. The existing fire alarm panels shall remain.

2.04 DOOR HOLDERS

A. Electromagnetic Door Holders: Provide door holders complete with mounting hardware. Position the electromagnetic assembly so when door is in open position, it is aligned parallel or the corridor. Where recessed mounting is required, provide special boxes and plates required and adjust projection of electromagnet to attain proper door alignment.

Wire and connect door holders to auxiliary contact to the relay. The realy module shall be UL listed and compatible with the existing fire alarm system. The door holders shall be powered from a separate circuit breaker at 120V. The door holder model shall be EST 1505-AQN5 or similar and shall be UL listed and compatible with the existing fire alarm system.

2.07 WIRING

A. Provide in accordance with \-NFPA 70-\ and \-NFPA 72-\. Conductors shall be copper. Conductors for 120-volt circuits shall be No. 12 AWG minimum; single conductors for low-voltage dc circuits shall be No. 14 AWG minimum. Conductors shall be color-coded. Identify conductors within each enclosure where a tap, splice, or termination is made. Identify conductors by plastic-coated, self-sticking, printed markers or by heat-shrink type sleeves. Wire the alarm initiating and notification signal devices so that removal will cause the system trouble device to sound. Provide wiring in rigid metal conduit, except electrical metallic tubing conduit may be provided in dry locations not enclosed in concrete or where not subject to mechanical damage. Conceal conduit in finished areas of new construction and wherever practical in existing construction.

B. The new conduit being provided, any interior conduit shall be EMT conduit. Any conduit being exposed shall be Rigid Galvanized EMT to prevent corrosion.

C. The wiring for the fire alarm system shall be Class B type wiring and shall be installed in accordance with NFPA 72.

D. All conduits installed in finished areas shall be painted to match existing wall or ceiling finish. All conduits installed in unfinished areas shall have the junction box covers painted red for identification. The conduits in unfinished area are not required to be painted.

E. All Penetrations shall be Fire Stopped with a 1 and 2 hour rated UL listed Firestopping putting.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Equipment, materials, installation, workmanship, inspection, and testing shall be in accordance with NFPA publications and as modified herein.

3.02 PRELIMINARY TESTS

A. Conduct the following tests during installation of wiring and system components. Correct any deficiency pertaining to these requirements prior to formal functional and operational tests of the system.

1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

2. Open initiating device circuits and verify that the trouble signal actuates.

3. Open and short notification appliance circuits and verify that trouble signal actuates.

4. Ground device circuits and verify response of trouble signals.

5. Conduct test on the door holders and confirm that the doors will release upon activation of any initiating devices throughout the hospital.

6. Megger Test: After wiring has been installed, and prior to making any connections to panels or devices, wiring shall be megger tested for insulation resistance, grounds, and/or shorts. Conductors with 300 volt rated insulation shall be tested at a minimum of 250 VDC. Conductors with 600 Volt rated insulation shall be tested at a minimum of 500 VDC. The tests shall be witnessed by the contracting officer and test results shall be recorded.

7. Loop Resistance Test: Measure and record the resistance of each circuit with each pair of conductors in the circuit short-circuited at the farthest point from the circuit origin. The tests shall be witnessed by the contracting officer and test results shall be recorded.

8. Verify that the control unit is in the normal conditions as detailed in the manufacture’s O&M Manual.

9. Before the start of construction, the contractor shall test the existing system and document and report the results of the test including but not limited to the testing procedure, Pass/Fail issues, and current issues with fire alarm system. The report shall be submitted to the hospital.

3.03 MISCELLANEOUS DETAILS

A. Cut, core and patch as required to install electrical system. Repair any surface damaged or marred by notching, coring or any other process necessary for installation of electrical work. Cutting, repairs and refinishing shall be subject to the approval of the Engineer. Need for remedial work determined by the Engineer as attributable to poor coordination and workmanship shall be cause for reconstruction to the satisfaction of the Engineer at no cost to the Owner.

END OF SECTION