

**INVITATION FOR BIDS
AND
CONSTRUCTION DOCUMENTS
FOR**

**JOB NO. 23-09
PAUA VALLEY WELL MOTOR CONTROL
CENTER REPLACEMENT
KAUA'I, HAWAI'I**

October 2023

**DEPARTMENT OF WATER
COUNTY OF KAUAI
LIHU'E, KAUAI, HAWAI'I**

APPROVED:



Chief Procurement Officer



Date

1 ADMINISTRATION

1.1 INVITATION FOR BIDS.

DEPARTMENT OF WATER, COUNTY OF KAUA'I
23-09 PAUA VALLEY WELL MOTOR CONTROL CENTER REPLACEMENT
KAUA'I, HAWAI'I

Pursuant to Chapter 103D, HRS, SEALED TENDERS will be received up to and opened at 2:00 p.m., Hawaiian Standard Time (HST) on **Thursday, November 09, 2023**, in the Administration Office of the Department of Water at 4398 Pua Loke Street, Lihu'e, Kaua'i, Hawai'i ("DOW Admin. Office"). Bids received after the date and time specified above shall be rejected. Facsimile offers will not be accepted or considered.

The schedule set out below represents the Department's best estimate of the schedule that will be followed for this competitive sealed bidding procurement process. If an activity in the schedule is delayed, the dates following the delayed activity may be adjusted by the same number of days. All prospective Offerors will be advised by addendum of any changes to the Procurement Schedule.

Activity	Scheduled Date
Invitation For Bids Issued	October 17, 2023
Pre-Bid Conference	October 24, 2023 at 8:30am HST
Deadline: Receipt of Questions / Comments / Material Substitutions	October 30, 2023
Deadline: Notice of Intent	NOT REQUIRED
Department's Responses to Questions / Comments / Material Substitutions	November 2, 2023
Bid Opening	November 9, 2023
Selection / Award Notification	November 2023
Contract Execution Period	December 2023 – January 2024
Contract Tentative Notice to Proceed Date	February 2024

The Manager and Chief Engineer also reserves the right to reject any or all bids, in whole or in part, if deemed to be in the best interest of the Department of Water.

Bids must be signed in ink by the person or persons duly authorized to sign bids in the space provided for signature on the Offer form. **Bidders shall submit their offer and all related documents as required in this solicitation through Public Purchase at www.publicpurchase.com.**

BIDDERS ARE HEREBY NOTIFIED THAT EVIDENCE OF THE AUTHORITY OF THE PERSON(S) SIGNING THE BID DOCUMENT IS REQUIRED TO BE INCLUDED WITH THE BID DOCUMENTS. FAILURE TO COMPLY WITH THIS REQUIREMENT WILL BE CAUSE FOR REJECTION OF THE BID AS BEING NON-RESPONSIVE.

SCOPE OF WORK: The project's base bid consists of furnishing all materials, labor, tools, equipment, and appurtenances required to remove and install a permanent motor control center (MCC), and appurtenant items, as indicated in the contract drawings and specifications. The project Job No. **23-09 PAUA VALLEY WELL MOTOR CONTROL CENTER REPLACEMENT**

site is located at the existing Paua Valley Well site off Kokee Road. All work shall be in place complete, as indicated in the contract drawings and specifications.

PLANS AND SPECIFICATIONS: The contract documents are to be downloaded electronically. Please email the Department of Water Contracts Officer, Christine Erorita at cerorita@kauaiwater.org for instructions. May be examined and obtained at the DOW Admin. Office. Those who download documents electronically shall be responsible for any and all costs related to printing or reproducing the items as required for offer submission. For inquires on obtaining plans and specifications and all other inquires call the project engineer at (808) 245-5436.

The contract documents may be examined at the following locations:

DOW Admin. Office, Līhu`e, Kaua`i, Hawai`i

Published in: Garden Island Newspaper
 Bid Service Weekly
 General Contractors' Association
 State Procurement Internet website at: <https://hands.ehawaii.gov/hands/welcome>
 DOW website at: www.kauaiwater.org
 DOW electronic procurement system at: www.publicpurchase.com

CONTRACTORS LICENSE: All prospective Bidders must be currently licensed by the State of Hawai`i, Department of Commerce and Consumer Affairs, Division of Professional and Vocational Licensing.

“A” general engineering contractors and “B” general building contractors are reminded that due to the Hawai`i Supreme Court’s January 28, 2002 decision in Okada Trucking Co., Ltd. v. Board of Water Supply, et al, 97 Haw. 450 (2002), they are prohibited from undertaking any work, solely or as part of a larger project, which would require the general contractor to act as a specialty contractor in any area where 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” or “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 licenses 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.

PRE-BID CONFERENCE: A non-mandatory Pre-Bid Conference will be held at the Project site, as indicated on the attached map. If a Pre-Bid Conference is held, all potential interested offerors, subcontractors, and union representatives are invited to attend on the date specified in the Procurement Schedule in Section 1.1 at the DOW Admin. Office. A visit to the site will be conducted following the meeting. The site inspection is not mandatory; however, submission of an offer shall be evidence that the Offeror understands the scope of the project and shall comply with the specifications herein, if awarded the contract and has thoroughly familiarize itself with the existing conditions, rules and regulations, and the extent and nature of work to be performed. No additional compensation, subsequent to bid opening, shall be allowed by reason of any

misunderstanding or error regarding site conditions or work to be performed. All prospective Bidders must make their own transportation arrangements to and from the site. Those interested in attending the pre-bid conference should contact the Procurement Officer. Offerors are advised that anything discussed at the pre-bid conference does not change any part of this solicitation. All changes and/or clarifications to this solicitation shall be done in the form of written addenda.

NOTICE OF INTENTION TO BID: Bidders are not required to submit a Notice of Intent to Bid.

CHIEF PROCUREMENT OFFICER
DEPARTMENT OF WATER
COUNTY OF KAUA'I

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1.2 DEFINITIONS.

This section shall incorporate the definitions not listed below and contained in Hawai'i Revised Statutes (HRS) 103D; the Hawai'i Administrative Rules (HAR), Title 3, Department of Accounting & General Services, Subtitle 11, Procurement Policy Board, Chapters 120 through 131; and the General Provisions for Construction Contracts of the Department of Water, dated April 25, 2016. Terms as used in this solicitation, unless the context requires otherwise, shall have the following meaning:

“Award” means the notification of the Department’s acceptance of a bid or the presentation of a contract to the selected offeror.

“Bid sample” means a sample to be furnished by a bidder to show the characteristics of the item offered in the bid.

“Board” or “Board of Water Supply” shall mean the “Department of Water, County of Kaua‘i”, as provided for in the County Charter which became effective January 2, 1969.

“Contract Administrator” means the person designated to manage the various facets of the Contract to ensure the Contractor’s total performance is in accordance with the contractual commitments and obligations to the Department are fulfilled.

“Department” or “DOW” means the Department of Water, County of Kaua‘i, contracting on behalf of the Board of Water Supply. Wherever the terms “Engineer” or “Owner” are used in any document which forms a part of the Contract, the terms shall mean the Department of Water, County of Kaua‘i and its authorized agents.

“Offer” means the bid, proposal, or quotation.

“Offeror” means any individual, partnership, firm, corporation, joint venture, or other legal entity submitting, directly or through a duly authorized representative or agent, an offer for the good, service, or construction contemplated.

“Opening” means the date set for opening of bids, receipt of unpriced technical offers in multistep sealed bidding, or receipt of proposals in competitive sealed proposals.

“Procurement officer” means any person with delegated authority to enter into and administer contracts and make written determination with respect thereto. The term includes an authorized representative acting within the limits of authority. The delegated authority is received from the chief procurement officer directly or through the head of a purchasing agency or designee to the procurement officer.

“Project” means work to be performed as set forth in the Contract, including furnishing all services, labor, goods, materials, supplies, equipment and other incidentals reasonably necessary for the successful completion of work contemplated under the Contract.

“Quotation” means a statement of price, terms of sale, and description of goods, services, or construction offered by a prospective seller to a prospective purchaser, usually for purchases pursuant to section 103D-305, HRS.

“Special Provisions” means the terms and conditions pertaining to the specific solicitation in which they are incorporated; including but not limited to terms and conditions describing the preparation of solicitations, evaluation of offers, determination of award, plus those applicable to performance by the Contractor.

Additions or revisions to the General Provisions, which shall be considered a part of the General Provisions, setting forth conditions or requirements applicable to the particular project or contract under consideration shall be included in the Special Provisions. Should any Special Provisions conflict with these General Provisions, said Special Provisions shall govern.

“Specifications” mean any description of the physical or functional characteristics, or of the nature of a good, service, or construction item. The term includes descriptions or any requirement for inspecting, testing, or preparing a good, service, or construction item for delivery.

“Standard commercial product” means a product or material, in the normal course of business, is customarily maintained in stock or readily available by a manufacturer, distributor, or dealer for the marketing of the product.

“Successful bidder” means the individual, partnership, firm, corporation, joint venture, or other legal entity that submitted a bid for the Project and was determined to be a responsible, responsive bidder and selected for award of the contract.

1.3 INSTRUCTIONS TO BIDDERS.

THESE INSTRUCTIONS TO BIDDERS SHALL BE CONSIDERED TO BE INCORPORATED INTO THE SPECIAL PROVISIONS.

- 1.3.1 Submission of Bids: Bidders shall read and examine the Special Provisions, Specifications, General Provisions and all other bid documents attached hereto and by reference made a part hereof. Submission of bids shall be deemed a verification of such reading and examination and shall be deemed acknowledgement and agreement to be bound by the terms and conditions, and specifications of such documents. All Bidders shall complete and submit with its bid, the Offer form found in Appendix C via www.publicpurchase.com .

All bids for the construction of this project shall be and marked “**Job 23-09 PAUA VALLEY WELL MOTOR CONTROL CENTER REPLACEMENT.**”

Bidders shall submit their offer and all related documents as required in this solicitation through Public Purchase at www.publicpurchase.com .

- 1.3.2 Bidding Instructions: In addition to these Instructions to Bidders, Bidders are directed to SECTION 2 - BIDDING / PROPOSAL INSTRUCTIONS of the “GENERAL PROVISIONS FOR CONSTRUCTION CONTRACTS OF THE DEPARTMENT OF WATER”, dated April 25, 2016 (hereafter “GENERAL PROVISIONS”), and the General Provisions in its entirety.
- 1.3.3 Offer Form: The attached form of the OFFER is furnished only for the guidance of bidders and is not to be used for actual bidding. An official copy of the Offer on which the bid shall be made will be furnished to the prospective bidder when plans and specifications are obtained.
- 1.3.4 Omission or Erasures; Conditioned Offers: Any Offer which contains any omission or erasure or alteration not properly initialed or any attempt by a bidder to condition the bid or other irregularity, and bid samples or descriptive literature, unless expressly requested, will not be examined or tested, and will not be deemed to vary any of the provisions of this solicitation and are submitted at the Bidder’s risk and may be rejected. Offerors shall not submit their organization’s terms and conditions, standard contracts, or other similar agreements or forms. General reference to such items or attempts to substitute such items for the Department’s **shall** result in the disqualification of the Offeror’s bid as conditioned.
- 1.3.5 Solicitation Review; Submission of Questions and Requests For Clarification:
- 1.3.5.1 Submission of Questions and Requests for Clarification: Offerors are encouraged to submit written questions pertaining to this solicitation. Questions and requests for clarification must be submitted in writing via e-mail or received by post mail to the Procurement Officer not later

than the date specified in the Procurement Schedule in Section 1.1 in order to generate an official answer. All written questions will receive an official written response from the Department and become an addenda to this solicitation. The only official position of the Department is that which is stated in writing and issued in this solicitation as an addenda thereto. All other means of communication, whether oral or written, shall not be formal or official responses/statements and may not be relied upon. **Any addendum issued must be acknowledged by downloading from Public Purchase, signed, and included with offer.**

1.3.5.2 **Solicitation Review:** Offerors should carefully review this solicitation for defects and/or ambiguities. Comments concerning defects and questionable or objectionable matter must be made in writing either via e-mail or post mailed and should be received by the Procurement Officer not later than the date specified in the Procurement Schedule in Section 1.1. This will allow issuance of any necessary amendments to this solicitation. It will also assist in preventing the opening of offers upon which award may not be made due to a defective solicitation package.

1.3.6 **Standard Questionnaire and Financial Statement:** When the Manager and Chief Engineer requires a prospective bidder to file a “Standard Qualification Questionnaire for Prospective Offerors on Department of Water Contracts,” the prospective bidder shall return a completed Standard Questionnaire, on the form provided by the Department, at least 48 hours prior to opening of bids. If this proves satisfactory, the bidder’s Offer will be received.

1.3.7 **Bid Bond:** A bid bond for the value of 5% of the bid shall accompany the bid.

1.3.8 **Performance and Payment Bonds:** If the contract which is awarded exceeds \$25,000 and is for construction, performance and payment bonds shall each be in an amount equal to one hundred per cent of the amount of the contract price.

1.3.9 **Responsibility of Bidders to Study Site:** At the time of opening of bids, the Department shall presume that each Bidder has inspected the project site(s) and has read the Plans, Specifications, and other Contract Documents, including all Addenda and has become thoroughly familiar with them. The failure or omission of any Bidder to receive or examine any form, instrument, or document shall in no way relieve that Bidder from any obligation under the Bid or the Contract.

Each bidder must form an opinion of the character of the work and of the materials to be excavated, from an examination of the project site(s), from studies and inspection of available samples, records and reports and from any other investigations the Bidder may wish to make. Each Bidder must form an

independent opinion of all the conditions affecting the work to be done and the labor and materials to be supplied, in order to make a Bid in sole reliance thereupon. Failure of a Bidder to become completely familiar with the labor and construction conditions under which the work is to be performed will not relieve that Bidder of any obligations to furnish all materials, equipment, and labor necessary to perform the work as set forth in this solicitation and to perform the Contract.

1.3.10 Insurance: Contractor shall procure and maintain, on a primary basis and at its sole expense, at all times during the life of the contract insurance coverages, limits, including endorsements as described Appendix “D” - Insurance, against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work by the Contractor or the Contractor’s agents, representatives, employees, or subcontractors. The requirements contained therein, as well as the Department’s review or acceptance of insurance maintained by the Contractor is not intended to and shall not in any manner limit or qualify the liabilities or obligations assumed by the Contractor. Unless otherwise approved by the Manager and Chief Engineer, the policy or policies of insurance maintained by the Contractor shall provide the minimum limit(s) and coverage(s) as specified in the attached Appendix “D” - Insurance and be placed with an insurance carrier authorized to do business in this state and rated A-VII by A.M. Best.

1.3.11 Tax Clearance: See: Subsection 3.5 - RESPONSIBILITY OF OFFERORS AND TAX CLEARANCE of the GENERAL PROVISIONS in its entirety. Further, the **Bidder shall be required to submit a tax clearance with the bid Offer.** Failure to comply with this provision will be grounds for disqualifying the Bidder. The successful bidder will also be required to submit a current valid tax clearance prior to final payment for this Project.

1.3.12 Preferences: The following preferences are applicable when preceded by a checked box. Information and legal and procedural requirements pertaining to all preferences can be found within the General Provisions:

Reciprocal Preferences: Pursuant to the provisions of Section 103D-1004, HRS and Subchapter 3, Chapter 124, Subtitle 11, Title 3, HAR, the Manager may impose a reciprocal preference against Bidders from those states which apply preferences.

Recycled Products Preference. Pursuant to HRS 103D-1005, Offerors should contact the Procurement Officer for application of this preference.

Tax Payer Preference (Hawai‘i Excise and Use Tax Preference). Pursuant to HRS 103D-1008, any “taxpaying bidder” shall qualify for this preference.

Qualified Community Rehabilitation Programs Preference. Pursuant to HRS 103D-1009, a five per cent preference shall be given to services to be provided by nonprofit corporations or public agencies operating qualified

community rehabilitation programs in conformance with criteria established by the DLIR for all competitive sealed bid and proposal procurements.

Apprenticeship Program Preference (See: Appendix G). Pursuant to HRS 103-55, applicable to public works projects with estimated values of \$250,000 or greater. Section 103-55.6, HRS, as enacted by S.B. 19, Act 17, SLH 2009, and the State of Hawai‘i Comptroller’s Memorandum 2011-06 as amended, provides for a Hawai‘i Apprenticeship Preference for public works construction projects with estimated values of \$250,000 or greater. The preference shall be in the form of five percent (5%) bid adjustment applied to the Bidder’s Offer amount.

Safety and Health Program (See: Appendix I). Pursuant to HRS 396-18, applicable to construction projects where the offer amount is in excess of \$100,000.

1.3.13 Tax Adjustment for Out-Of-State Vendors and Tax Exempt Bidders: Pursuant to the provisions of Section 103-53.5, HRS, where the Bidder is an out-of-state vendor not doing business in the State of Hawai‘i, or is a person exempted from paying the applicable general excise tax, the package bid or purchase price, for the purpose of determining the lowest price bid, shall be increased by the applicable retail rate of general excise tax and the applicable use tax. The lowest responsible bidder who satisfies all of the requirements of these bid documents, taking into consideration the above increases, shall be awarded the contract, but the contract amount of any contract awarded shall be the amount of the bid offered and shall not include the amount of the increase.

1.3.14 Worker’s Compensation Act: The Contractor will be required to comply with the provisions of Chapter 97, Revised Laws of Hawai‘i 1955, known as the “Worker’s Compensation Laws,” and all laws amendatory thereof, relating to the compensation of employees for personal injuries sustained in the course of their employment. The Contractor’s surety or sureties shall be liable for any loss caused the Department by reason of the Contractor’s failure to comply with the provisions of said laws.

The Contractor shall furnish to the Department one copy of certificate of said insurance prior to commencement of work. Refer to the “RESPONSIBILITY OF SUCCESSFUL BIDDER” for additional requirements.

1.3.15 Subcontractor: Under the terms of this Contract, no subcontractor will be recognized. All subcontractors shall deal directly with the general Contractor; however, each and every subcontractor shall manage and take care of its own material and waste.

1.3.16 Listing Joint Contractors or Subcontractors:

Bidder shall complete the “[Joint Contractors or Subcontractors List](#).” It is the sole responsibility of the bidder to review the requirements of this Project and

determine the appropriate specialty contractor licenses that are required to complete the Project.

Bidder shall specify the name of each person or firm to be engaged by the Bidder as a joint contractor or subcontractor in the performance of the contract and the nature and scope of the work to be performed by each regardless of the percentage of the value of the work to be performed by the joint contractor or subcontractor. (HRS 103D-302(b))

Failure of the Bidder to provide the correct names and specialty contractor's nature of work to be performed may cause the bid to be rejected.

Bidder agrees the completed listing of joint contractors or subcontractors is required for the Project and that Bidder, together with the listed joint contractors and subcontractors, have all the specialty contractor licenses to complete the work.

Based on the Hawai'i Supreme Court's January 28, 2002 decision in Okada Trucking Co., Ltd. v. Board of Water Supply, et al., 97 Hawai'i 450 (2002), the bidder as a general Contractor ('A' or 'B' license) is prohibited from undertaking any work solely or as part of a larger project, which would require the bidder ('A' or 'B' general Contractor) to act as a specialty ('C' license) Contractor in any area in which the bidder ('A' or 'B' general Contractor) has no specialty Contractor's license. Although the 'A' and 'B' Contractor may still bid on and act as the "Prime Contractor" on an 'A' and '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. The bidder ('A' or 'B' general Contractor) must have the appropriate 'C' specialty Contractor's licenses either obtained on its own, or obtained automatically under HAR §16-77-32.

General Engineering 'A' Contractors automatically have these 'C' specialty contractor licenses: C-3, C-9, C-10, C-17, C-24, C31a, C32, C-35, C-37a, C-37b, C-38, C43, C49, C-56, C-57a, C-57b, and C61.

General Building 'B' Contractors automatically have these 'C' specialty contractor licenses: C-5, C-6, C-10, C-12, C-24, C-25, C31a, C32a, C42a, and C-42b.

1.3.16.1 Instructions to complete the Joint Contractors or Subcontractors List:

1.3.16.1.1 Describe the nature of work to be performed by the specialty contractor for this Project and provide the complete firm name of the joint contractor or subcontractor in the respective columns. If the bidder is a general contractor and providing the work of the required specialty contractor, fill in the Bidder's (general contractor's) name and nature of work to be performed for this Project.

1.3.16.1.2 List only one joint contractor or subcontractor per required specialty contractor classification.

1.3.16.1.3 For projects with alternate(s), fill out the respective "Joint Contractors or Subcontractors List for the Alternate(s)." Bidder shall describe the nature of work to be performed by the specialty contractor on this Project for the respective alternate. Bidders shall fill in the complete firm name and nature of work to be performed by the respective joint contractor or subcontractor. If the joint contractor or subcontractor was previously listed under base bid, listing under Alternate(s) is not required.

1.3.17 Wages and Labor Requirements: Pursuant to HRS Section 103-55, each bidder submitting an offer and list of subcontractors certifies that: **WAGES**: The service to be rendered shall be performed by employees paid not less than wages paid to public officers and employees for similar work; and **COMPLIANCE WITH LABOR LAWS**: All applicable laws of the Federal and State governments relating to workmen's compensation, unemployment compensation, payment of wages, and safety will be fully complied with. The successful Bidder shall complete the Wage Certification in Appendix E.

1.3.17.1 In accordance with HRS Section 104-2 et seq., the Hawai'i Director of Labor and Industrial Relations determines the prevailing wages applicable to the project. The wage rates are the minimum rates to be paid and may be revised. Contractors shall pay the applicable rates, as revised, at no cost to the Department. This is not a representation that labor can be obtained at these rates. It is the responsibility of bidders to inform themselves of local labor conditions and prospective changes or adjustments of wage rates. No increase in the contract price shall be allowed or authorized on account of the payment of wage rates in excess of those listed herein. Wage rate schedules are available at the office of the Department of Labor and Industrial Relations, State of Hawai'i.

Current Wage Rate Bulletin: **505**

1.3.18 Asbestos Cement Pipe: For all construction contract bids involving asbestos cement pipe, the Contractor shall remove, handle, and dispose of asbestos cement pipe in conformance

with all applicable OSHA, State, and Federal regulations. The asbestos cement pipes shall only be disposed of at an approved disposal site.

- 1.3.19 Chlorination Subcontractor: All construction contract bids involving any chlorination work shall have a name listed for the C-37d Water Chlorination Subcontractor. Any bid not listing this subcontractor shall be rejected and disqualified.
- 1.3.20 Substitute Materials: Bidders contemplating submission of bids based on substitute materials must obtain prior written permission from the Department. Lists of substitute materials together with qualifying data shall be submitted on the Department's Request for Substitution form by the date set in the Procurement Schedule in Section 1.1, as evidenced by the time stamp of the Department, to the Procurement Officer for approval (the Request for Substitution form may be obtained from this individual). It is not the intent of the Department to exclude or limit the products. Any substitute material determined by the Department upon evaluation to be an acceptable equal, will be listed in an addendum to this solicitation, issued prior to the bid opening date. The Department is the sole judge as to the comparable quality and suitability of any substitute material and its decision shall be final. If a Bidder offers a product without the Department's pre-approval, the substitute material shall not be considered for award.
- 1.3.21 Independent Price Determination: By submitting a bid, the bidder certifies that the price submitted was independently arrived at without collusion.
- 1.3.22 Protests: Any protest shall be submitted in writing within five (5) working days after the posting of the notice of award; provided that a protest based upon the contents of the solicitation shall be submitted in writing prior to the date set for the receipt of offers. Any and all protests pursuant to Hawai'i Procurement Code, Chapter 103D-701 HRS and Section 3-126-3 HAR shall be submitted in writing to the Procurement Officer for this solicitation.
- 1.3.23 Incorporation By Reference: Bidders hereby agree that all documents referred to in the Table of Contents are hereby incorporated by reference into this solicitation.
- 1.3.24 Severability: If any covenant, condition, or provision of this solicitation is held to be invalid by any court of competent jurisdiction, such holding shall not affect the validity of any other covenant, condition, or provision contained herein or incorporated by reference.
- 1.3.25 Remedies; Attorneys Fees, and Costs: All remedies provided in this solicitation shall be deemed cumulative and additional, and not in lieu of or exclusive of each other or of any other remedy available at law or in equity arising hereunder. Should any legal proceedings at law or in equity arise under or in connection with this solicitation, the Contractor shall be responsible for all attorneys' fees and costs (including reasonable fees and charges for the services of paralegals or other personnel who operate for and under the supervision of such attorneys and whose time is usually charged to clients) and any other expenses incurred in connection with such proceedings.

- 1.3.26 Department's Right to Audit: Books and Records: The Contractor shall, at all times during the term hereof, maintain complete and accurate books and records of its operations, including employee time records, in a form consistent with good accounting practice, including such books and records as would normally be examined by an independent certified public accountant in performing an audit or examination of the Contractor's receipts and expenses in accordance with generally accepted auditing standards. The Department has the right to designate an independent auditor to review books and records that specifically relate to this project. Subcontractors shall be bound by the same requirements. See: SECTION 6.9 - CONTROL OF THE CONTRACT of the GENERAL PROVISIONS in its entirety.
- 1.3.27 Confidential Material: All bids are subject to public inspection as set forth in 3-122-30, HAR. Bidders shall request in writing nondisclosure of designated trade secrets or other proprietary data to be confidential. Such data shall accompany the bid and shall be readily separable from the bid in order to facilitate eventual public inspection of the non-confidential portion of the bid. To facilitate the release of the information requested, the Department is prepared to sign a Non-Disclosure Agreement if necessary, however, the Department cannot guarantee that designated data will be kept confidential. The offers are subject to disclosure rules set forth in Chapter 92F, HRS and Non-Disclosure Agreements are enforceable only to the extent that they do not conflict with the provisions of Chapter 92F, HRS. The Bidder bears the burden of establishing that the designated data is exempted from the disclosure requirements set forth in Chapter 92F.
- 1.3.28 Cancellation of the Solicitation and Offer Rejection: The Department reserves the right to cancel this solicitation and to reject any and all offers in whole or in part, and waive any defects, when it is determined to be in the best interest of the Department, pursuant to HAR 3-122-96 and 3-122-97.

The Department shall not be liable for any costs, expense, loss of profit, or damages whatsoever, incurred by the Offeror in the event this solicitation is cancelled or an offer is rejected.

1.4 GENERAL PROVISIONS, SPECIFICATIONS, AND STANDARD DETAILS.

The Special Provisions, plans, General Provisions, Water Standards, County of Kaua'i Department of Public Works ("DPW") Standard Specifications and Details, as amended, contract documents, and all supplemental documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for the complete work. In case of conflict or discrepancy within any part of the contract, the stricter requirements, including Hawai'i State Statutory requirements, shall govern. Unless it is apparent that a different order of precedence is intended, the special provisions shall govern over plans, general provisions, and Water Standards; plans shall govern over general provisions; general provisions shall govern over Water Standards; Water Standards shall govern over DPW Standard Specifications; figured dimensions and drawings take precedence over measurements by scale, and detail drawings;

instructions to proposers shall be incorporated and made a part of the special provisions.

It is the responsibility of the prospective offerors, offerors, and Contractors to review the General Provisions, Water Standards, Specifications, and Standard Details and a submission of an offer to this solicitation shall be deemed an acknowledgement of the incorporation of these into this solicitation and the resulting contract, if any.

- 1.4.1 General Provisions for Construction Contracts: The General Provisions for Construction Contracts of the Department of Water, dated April 25, 2016 (“General Provisions”) are included in this solicitation. A copy may be found in Appendix “B.”
- 1.4.2 Water System Standards. The “Water System Standards”, 2002, as amended, as adopted by the Department of Water, County of Kaua‘i; Board of Water Supply, City and County of Honolulu; Department of Water Supply, County of Maui; Department of Water Supply, County of Hawai‘i (“Water Standards”) is by reference incorporated herein and made a part of these specifications. The Water Standards specifications are not bound in these contract documents, but shall by reference be incorporated herein and made a part hereof.
- 1.4.3 Department of Public Works, County of Kaua‘i Standard Specifications: Whenever reference is made to the DPW Standard Specifications, the specifications referred to is the “HAWAI‘I STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND PUBLIC WORKS CONSTRUCTION” of the State of Hawai‘i, 2005, as amended. These specifications are not bound in the Contract Documents, but shall by reference be incorporated herein and made a part hereof.
- 1.4.4 Department of Public Works, County of Kaua‘i, Standard Details: Whenever reference is made within these Special Provisions or the contract plans to the DPW Standard Details, the Details referred to is the “STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION”, September 1984 and all subsequent amendments. These specifications are not bound in the Contract Documents, but shall by reference be incorporated herein and made a part hereof.

1.5 PROCUREMENT OFFICER AND CONTRACT ADMINISTRATOR.

The Procurement Officer is responsible for administrating/facilitating all requirements of the solicitation process and is the **sole point of contact for Offerors** from the date of release of the solicitation until the selection of the successful Bidder.

The Contract Administrator shall be responsible for the contract administration once the contract is awarded and shall be the point of contact throughout the term of the contract.

If checked, the Procurement Officer and the Contract Administrator shall be the same individual.

The Procurement Officer and Contract Administrator are:

Procurement Officer:

Ryan Smith

Operations Division

Department of Water, County of Kauaʻi

4398 Pua Loke Street

Līhuʻe, HI 96766

Phone Number: 808-245-5436

Email: rsmith@kauaiwater.org

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2 SCOPE OF WORK

2.1 SCOPE OF WORK.

This Contract consists of the following Scope of Work and includes all other necessary work, all as indicated in the contract drawings and specifications. The general location of the work is as shown on the contract plans and as described herein.

The project's base bid consists of furnishing all materials, labor, tools, equipment, and appurtenances required to remove and install a permanent motor control center (MCC), and appurtenant items, as indicated in the contract drawings and specifications. The project site is located at the existing Paua Valley Well site off Kokee Road. All work shall be in place complete, as indicated in the contract drawings and specifications.

2.2 TIME OF COMPLETION.

2.2.1 It is understood and agreed that the work called for under this Project must and shall be completed within **NINE HUNDRED (900) CALENDAR DAYS** after written notice has been given to the Contractor to commence work. No extension of time will be granted for shipping and manufacturer's delays. The Contractor shall be subject to liquidated damages for delay or nonperformance as stated in this solicitation.

2.2.2 Work on the basic contract agreement is to be completed within the stipulated completion time from the date to the "Notice to Proceed." All work shall be done in co-operation with and coordinated with any other Contractors in a manner to allow completion of the entire construction within the scheduled time.

Per Approved Plans Water Construction Note: all materials, shop drawings, chlorination plan, hazardous material and health related submittals, etc. shall be approved by the Department before a preconstruction meeting can be scheduled. In order for the contractor to meet this requirement, as well as any other requirements related to permitting for the project, including but not limited to building, grading, road, noise, demolition, NPDES for staging areas, NPDES duly authorized person designation, etc., the Department has included 90 calendar days for the contractor to complete the process within the total time of completion calendar day amount. Notice to proceed will be given before the contractor begins the project submittal approval process and it is expected that the contractor will complete the submittal and permit process within the 90 calendar day timeframe. No additional days will be granted if the contractor does not complete the process to attain a preconstruction meeting within 90 calendar days.

2.3 PERMITS.

The Contractor shall obtain all necessary permits needed for this job, including, but not limited to, a Building Permit and Electrical Permit from the County of Kaua'i Department

of Public Works, prior to the commencement of the work. The Contractor shall pay for all required charges and fees associated with all applicable permits.

The Contractor shall also file an Application for Community Noise Variance with the State of Hawai'i, Department of Health, if necessary. The Contractor shall pay for all required charges and fees associated with this permit.

2.4 CONTRACTOR'S RESPONSIBILITY FOR EXISTING UTILITIES AND STRUCTURES.

The existence and location of underground utilities and structures as shown on the plans are from the best information available but are not guaranteed and other obstacles may be encountered in the course of the work. Prior to the start of excavation, the Contractor shall contact all utility companies and have them locate their respective lines affected. The Contractor shall be held responsible for any damage to and for the maintenance and protection of existing utilities and structures. See: SECTION 6 - PERFORMANCE OF CONTRACT of the GENERAL PROVISIONS in its entirety.

2.5 POWER AND WATER SUPPLIES.

The Contractor shall make all the necessary arrangements and installation work that may be required for power and water supplies for the work under this Contract. Cost for said power and water supplies shall be included in appropriate unit prices bid and no direct payment will be made therefore.

2.6 CONTRACTORS LICENSE REQUIRED.

The Department shall reject all bids received from contractors who are not licensed by the State Contractors License Board in accordance with Chapter 444, Hawai'i Revised Statutes. It is the sole responsibility of the Bidder to review the requirements of this Project and determine the appropriate licenses that are required to complete the Project.

2.7 HOURS.

No work shall be done on Saturdays, Sundays, legal State Holidays and/or in excess of eight (8) hours each day without the written consent of the Contract Administrator. Should permission be granted to work at such times, the Contractor shall pay for all inspectional and administrative costs thereof. No work shall be done at night unless authorized by the Contract Administrator. No work shall be done at night during seabird fallout season (September 15 – December 15, annually). See: SECTION 6.9 and 6.12 of the GENERAL PROVISIONS.

2.8 QUANTITIES.

All bids will be compared on the basis of quantities of work to be done, as shown in the

bid; the quantities shown in the Unit Price items are estimated, being given as a basis for comparison of bids. The Department reserves the right to increase or decrease the quantities or delete items entirely as may be required during the progress of the work. See: SECTION 7.2 and 7.3 of the GENERAL PROVISIONS.

2.9 MATERIALS FURNISHED FOR THE PROJECT.

All materials necessary for the completion of the project shall be furnished by the Contractor, unless specifically stated otherwise and full compensation thereof shall be included in the various items in the bid. All materials for this Project shall be ordered after the notice to proceed is issued and the shop drawings, if applicable, have been approved by the Department.

2.10 WORK TO BE DONE WITHOUT DIRECT PAYMENT.

Whenever it is specified in the contract that the Contractor is to do work or furnish materials of any kind for which no price is fixed in the contract, it shall be understood that such work or furnishing such materials was included in a unit price for the appropriate item, unless it is expressly specified that such work or material is to be paid for as extra work.

2.11 INTENT OF THE SPECIFICATIONS.

It is not the intent of the Department to limit Proposers to these specifications; however, the specifications designated as “requirements” contained herein are the minimum acceptable.

2.12 IMPLEMENTATION.

The Contractor will be required to:

- 2.12.1 Provide required permits for the construction of this Project, trained construction crew and project management necessary to ensure a complete constructed and fully functional water facilities as specified in this solicitation.
- 2.12.2 Provide all documentation, including all warranties and certification documents, on the construction materials being used.

2.13 GOVERNING LAW; APPLICATION OF LAW.

This solicitation and the Contract awarded based on such solicitation shall be governed by the laws of the State of Hawai‘i. The Contractor shall comply with all federal, State and local laws, regulations and ordinances, including occupational safety and health standards applicable to the performance of the services specified.

3 METHOD OF AWARD

3.1 METHOD OF AWARD.

- 3.1.1 Award, if made, shall be to the responsive, responsible Offeror submitting the lowest Total Sum Bid price.
- 3.1.2 Only those offers that meet all of the solicitation specifications, General Provisions, Special Provisions, and any other requirement contained herein will be considered for award. Any offer that proposes terms, conditions, or requirements that are contrary to those specified herein or does not meet the qualification requirements of this solicitation, as solely determined by the Department and as provided herein, may be considered nonresponsive and will be rejected as provided herein.

3.2 HAWAI'I REVISED STATUTES.

The Contractor's attention is called to the following chapters within the HRS which affect this Contract and the performance thereof:

Chapter 103, relating to expenditure of public money;
Chapter 104, relating to wages and hours of employees on public works;
Chapter 376, relating to industrial safety;
Chapter 386, relating to workmen's compensation;
Chapter 321, relating to the Health Department;
Section 507-17, relating to recovery on bond for material and labor used on public works; and
Chapter 378, relating to fair employment practices

3.3 RESPONSIBILITY OF SUCCESSFUL BIDDER.

- 3.3.1 The successful Bidder is advised that it shall, immediately prior to award of the contract, furnish proof of compliance with the requirements of HAR §3-122-112, to wit: Chapter 237, tax clearance; Chapter 383, unemployment insurance; Chapter 386, workers' compensation; Chapter 392, temporary disability insurance; Chapter 393, prepaid health care; and one of the following: a) Be registered and incorporated or organized under the laws of the State (hereinafter referred to as a "Hawai'i business"); or b) Be registered to do business in the State (hereinafter referred to as a "compliant non-Hawai'i business."
- 3.3.2 To comply with these requirements, the successful Bidder shall produce the following documents to the Department to demonstrate compliance with this section.

3.3.2.1 HRS Chapter 237 Tax Clearance Requirement for Award and Final Payment. Instructions are as follows:

Pursuant to HRS §103D-328, successful Bidder shall be required to submit

a tax clearance certificate issued by the Hawai‘i State Department of Taxation (“DOTAX”) and the U.S. Internal Revenue Service (“IRS”). The certificate is valid for six (6) months from the most recent approval stamp date on the certificate and must be valid on the date it is received by the Department of Water.

The tax clearance certificate shall be obtained on the State of Hawai‘i, DOT TAX CLEARANCE APPLICATION Form A-6 (Rev. 2003) which is available at the DOTAX and IRS offices in the State of Hawai‘i or the DOTAX website and by mail or fax:

DOTAX Website (forms & Information):

<http://www.state.hi.us/tax/alphalist.html#a>

DOTAX Forms by Fax/Mail: (808) 587-7572 / 1-800-222-7572

Completed tax clearance applications may be mailed, faxed or submitted in person to the Department of Taxation, Taxpayer Services Branch, to the address listed on the application.

DOTAX (fax): (808) 587-1488

IRS (fax): (808) 539-1573

The application for the clearance is the responsibility of the Bidder and must be submitted directly to the DOTAX or IRS and not to the Department of Water.

3.3.3 HRS Chapters 383 (Unemployment Insurance), 386 (Workers’ Compensation), 392 (Temporary Disability Insurance), and 393 (Prepaid Health Care) Requirements for Award. Instructions are as follows:

Pursuant to HRS §103D-310, the successful Bidder shall be required to submit an approved certificate of compliance issued by the Hawai‘i State Department of Labor and Industrial Relations (“DLIR”). The certificate is valid for six (6) months from the date of issue and must be valid on the date it is received by the Department.

The certificate of compliance shall be obtained on the State of Hawai‘i, DLIR APPLICATION FOR CERTIFICATE OF COMPLIANCE WITH SECTION 3-122-112, HAR, Form LIR#27 which is available at www.dlir.state.hi.us/LIR#27, or at the neighbor island DLIR District Offices. The DLIR will return the form to the Bidder who in turn shall submit it to the Department.

The application for the certificate is the responsibility of the Bidder and must be submitted directly to the DLIR and not to the Department of Water.

3.4 REQUIREMENT FOR AWARD.

To be eligible for award, the Bidder must comply as follows:

- 3.4.1 Hawai'i Business. A business entity referred to as a "Hawai'i business" is registered and incorporated or organized under the laws of the State of Hawai'i. As evidence of compliance, Bidder shall submit a CERTIFICATE OF GOOD STANDING issued by the State of Hawai'i Department of Commerce and Consumer Affairs Business Registration Division ("BREG"). A Hawai'i business that is a sole proprietorship, however, is not required to register with the BREG and therefore not required to submit the certificate. A Bidder's status as sole proprietor or other business entity and its business street address indicated on the OFFER form will be used to confirm that the Bidder is a Hawai'i business.
- 3.4.2 Compliant Non-Hawai'i Business. A business entity referred to as a "compliant non-Hawai'i business" is not incorporated or organized under the laws of the State of Hawai'i but is registered to do business in the State of Hawai'i. As evidence of compliance, Bidder shall submit a CERTIFICATE OF GOOD STANDING.

To obtain a CERTIFICATE OF GOOD STANDING go online to www.BusinessRegistrations.com and follow the prompt instructions. To register or to obtain a "Certificate of Good Standing" by phone, call (808) 586-2727 (M-F 7:45 to 4:30 HST). The "Certificate of Good Standing" is valid for six months from date of issue and must be valid on the date it is received by the Department.

- 3.4.3 Registration Costs. Bidders are advised that there are costs associated with registering and obtaining a "Certificate of Good Standing" from the DCCA.

3.5 TIMELY SUBMISSION OF ALL CERTIFICATES.

- 3.5.1 The certificates described in this section should be applied for and submitted to the Department as soon as possible after the Department notifies the successful Bidder that the Department intends to issue an award to the successful Bidder. If valid certificates are not submitted within **ten (10) calendar days** after the Department so notifies the successful bidder, the successful Bidder's offer may be disqualified and any prospective award (or actual award if mistakenly issued), even though the successful bidder's bid is otherwise responsive and responsible, may be canceled without any liability whatsoever to the Department. The Department, and not the successful bidder, shall determine whether all necessary certificates have been timely submitted.
- 3.5.2 If the Department cancels any prospective or actual award for failure to submit all required certificates, the Department reserves the right to make an award to the next lowest responsive and responsible Bidder who is able to submit all the required certificates.

3.6 FINAL PAYMENT REQUIREMENTS.

Contractor is also required to submit a tax clearance certificate for final payment on the contract. A tax clearance certificate, not over two months old, with an original green certified copy stamp, must accompany the invoice for final payment on the contract. In addition to a tax clearance certificate, an original “Certification of Compliance for Final Payment” (SPO Form-22), will be required for final payment. This form is attached hereto as Appendix F.

4 AWARD OF CONTRACT AND NOTICE TO PROCEED

4.1 AWARD.

The successful Bidder shall comply with SECTION 3 - AWARD AND EXECUTION OF CONTRACT of the GENERAL PROVISIONS in its entirety.

4.2 NOTICE OF AWARD.

The Procurement Officer will inform the successful Bidder of contract award selection within 48 hours of confirmation. Additionally, an official contract award notification letter will be executed by the Department and provided at the earliest date.

4.3 NOTICE TO PROCEED.

Upon contract execution, a "Notice to Proceed" letter will be provided to 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. The Department 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.

APPENDIX A: Sample Contract.

(Attached separately)

APPENDIX B: General Provisions for Construction Contracts for the Department of Water, dated April 25, 2016 (bound separately).

APPENDIX C: Offer.

Contractor _____

OFFER

For

DEPARTMENT OF WATER, COUNTY OF KAUA‘I,
LĪHU‘E, KAUA‘I, HAWAI‘I

_____ 20 _____

Chief Procurement Officer
Department of Water
County of Kaua‘i
4398 Pua Loke Street
Līhu‘e, Hawai‘i 96766

Dear Sir:

Pursuant to and in compliance with your Invitation For Bids and other Contract Documents relating thereto, the undersigned Offeror, having familiarized itself with the terms of the contract, the local conditions affecting the performance of the contract and the cost of the work at the place where the work is done, the plans and specifications, “General Provisions for Construction Contracts of the Department of Water”, “Water System Standards, 2002”, Invitation For Bids, and other Contract Documents, hereby proposes and agrees to perform, within the time stipulated in the said documents, including all its component parts and everything required to be performed, and to provide and furnish any and all of the labor, materials, tools, expendable equipment, and all utility and transportation services necessary to perform the contract, in a workmanlike manner, in place complete all of the work covered by the contract in connection with these specifications and accompanying construction plans titled:

**JOB NO. 23-09 PAUA VALLEY WELL MOTOR CONTROL CENTER REPLACEMENT,
KAUA‘I, HAWAI‘I**

on file in the office of the Department of Water for,

TOTAL SUM OFFER _____ DOLLARS
(words)

(\$ _____) said total sums being itemized on the following pages:

OFFER SCHEDULE

**JOB NO. 23-09 PAUA VALLEY WELL MOTOR CONTROL CENTER REPLACEMENT,
KAUA'I, HAWAI'I**

ITEM NO.	ESTIMATED QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
1	1 L.S.	Demolition of existing service feeders and motor control center for the Paua Valley Wells control building; furnish and install electrical equipment at the Paua Valley Wells site; electrical metering and service equipment for new grounded 480V 3Φ service; new service cabling in existing duct; utility coordination; portable generator cabinet and feeder; reconnection work for relocated and existing to remain power and lighting; power and electrical control wiring for well pumps; painting; reconnection and sparing of existing digital and analog system inputs and outputs from exterior SCADA cabinet; (re)testing of pump controls and instruments; and all appurtenant electrical work, in place complete, and in accordance with the plans and specifications, ready for operation or other trades.		\$
2	1 L.S.	Providing complete new motor control center system at the Paua Valley Wells Site and all appurtenant electrical work; in place complete, and in accordance with the plans and specifications, ready for operation.		\$
		TOTAL SUM OFFER (Items 1 to 2 inclusive)		\$

The prices bid herein for the above items shall include all labor, materials, equipment, tools, machinery and all incidentals necessary to install or to construct these items in place complete, all in accordance with the plans and specifications.

SCHEDULE C
MANDATORY LICENSING REQUIREMENT

“A” general engineering contractors and “B” general building contractors are reminded that due to the Hawai‘i Supreme Court’s January 28, 2002 decision in Okada Trucking Co., Ltd. V. Board of Water Supply, et al., 97 Haw. 450 (2002), they are prohibited from undertaking any work, solely or as part of a larger project, that 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 submit an offer on and act as the “prime” contractor on an “A” and “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 “C” specialty contractor’s license (*An “A” or “B” contractor obtains “C” specialty contractor’s licenses either on its own, or automatically under HAR § 16-77-32.*). The remaining work must be subcontracted out to appropriately licensed “C” specialty contractors. 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.

LISTING OF SUBCONTRACTORS

Sec. 103D-302, H.R.S., provides that each offer for Public Works Construction Contracts shall include the name of each person or firm to be engaged by the Offeror as a joint contractor or subcontractor in the performance of the Public Works Construction Contract. The Offer shall also indicate the nature and scope of the work to be performed by such joint contractors or subcontractors. All offers which do not comply with this requirement shall be rejected pursuant to Sec. 103D-302(b) H.R.S.

To comply with the above provisions, the offeror shall complete the schedule of the nature and scope of work by listing, where applicable, the names of the joint contractors and subcontractors to be used after the description of the nature and scope of the work.

ALL JOINT CONTRACTORS OR SUBCONTRACTORS TO BE ENGAGED ON THIS PROJECT

The Offeror certifies that the following is a complete listing of all joint contractors and/or subcontractors who will be engaged by the Offeror on this Project to perform the nature and scope of work indicated **regardless of the percentage of the value of the work to be performed by the joint contractor or subcontractor**, pursuant to Section 103D-302, Hawai‘i Revised Statutes, and understands that failure to comply with this requirement shall be just cause for rejection of the Offer.

The Offeror further understands that only those joint contractors or subcontractors listed shall be allowed to perform work on this Project. If no joint contractor or subcontractor for any subdivision of work is listed, it shall be construed that the work shall be performed by the Offeror with Offeror’s employees.

All Offerors must be sure that they possess, and that the joint contractors or subcontractors listed in the Offer possess, all the necessary specialty licenses needed to perform the work for this Project. The Offeror shall be solely responsible for assuring that all specialty licenses required to perform the work is covered in the Offer.

The Offeror shall include the license number of the joint contractors or subcontractors listed below. Failure to provide the correct names and license numbers as registered with the Contractors Licensing Board may cause rejection of the offer submitted.

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.

LISTING OF ALL JOINT CONTRACTORS OR SUBCONTRACTORS

	Contractor Classification	Name of Joint Contractor or Subcontractor	License Number
C-1	Acoustical and Insulation Contractor		
C-2	Mechanical Insulation Contractor		
C-3	Asphalt Paving and Surfacing Contractor		
C-3a	Asphalt Concrete Patching, Sealing, and Striping Contractor		
C-3b	Play Court Surfacing Contractor		
C-4	Boiler, Hot-Water Heating and Steam Fitting Contractor		
C-5	Cabinet, Millwork, and Carpentry Remodeling and Repairs Contractor		
C-5a	Garage Door and Window Shutters Contractor		
C-5b	Siding Application Contractor		
C-6	Carpentry Framing Contractor		
C-7	Carpet Laying Contractor		
C-9	Cesspool Contractor		
C-10	Scaffolding Contractor		
C-12	Drywall Contractor		
C-13	Electrical Contractor		
C-14	Sign Contractor		
C-15	Electronic Systems Contractor		
C-15a	Fire and Burglar Alarm Contractor		
C-15b	Telecommunications Contractor		
C-16	Elevator Contractor		
C-16a	Conveyor Systems Contractor		
C-17	Excavating, Grading, and Trenching Contractor		
C-19	Asbestos Contractor		
C-20	Fire Protection Contractor		
C-20a	Fire Repressant Systems Contractor		

	Contractor Classification	Name of Joint Contractor or Subcontractor	License Number
C-21	Flooring Contractor		
C-22	Glazing and Tinting Contractor		
C-22a	Glass Tinting Contractor		
C-23	Gunite Contractor		
C-24	Building Moving and Wrecking Contractor		
C-25	Institutional and Commercial Equipment Contractor		
C-27	Landscaping Contractor		
C-27a	Hydro Mulching Contractor		
C-27b	Tree Trimming and Removal Contractor		
C-31	Masonry Contractor		
C-31a	Cement Concrete Contractor		
C-31b	Stone Masonry Contractor		
C-31c	Refractory Contractor		
C-31d	Tuckpointing and Caulking Contractor		
C-31e	Concrete Cutting, Drilling, Sawing, Coring, and Pressure Grouting Contractor		
C-32	Ornamental, Guardrail, and Fencing Contractor		
C-32a	Wood and Vinyl Fencing Contractor		
C-33	Painting and Decorating Contractor		
C-33a	Wall Coverings Contractor		
C-33b	Taping Contractor		
C-33c	Surface Treatment Contractor		
C-34	Soil Stabilization Contractor		
C-35	Pile Driving, Pile and Caisson Drilling, and Foundation Contractor		
C-36	Plastering Contractor		
C-36a	Lathing Contractor		

	Contractor Classification	Name of Joint Contractor or Subcontractor	License Number
C-37	Plumbing Contractor		
C-37a	Sewer and Drain Line Contractor		
C-37b	Irrigation and Lawn Sprinkler Systems Contractor		
C-37c	Vacuum and Air Systems Contractor		
C-37d	Water Chlorination and Sanitation Contractor		
C-37e	Treatment and Pumping Facilities Contractor		
C-37f	Fuel Dispensing Contractor		
C-38	Post Tensioning Contractor		
C-40	Refrigeration Contractor		
C-40a	Prefabricated Refrigerator Panels Contractor		
C-41	Reinforcing Steel Contractor		
C-42	Roofing Contractor		
C-42a	Aluminum and Other Metal Shingles Contractor		
C-42b	Wood Shingles and Wood Shakes Contractor		
C-42c	Concrete and Clay Tile Contractor		
C-42e	Urethane Foam Contractor		
C-42g	Roof coatings Contractor		
C-43	Sewer, Sewage Disposal, Drain, and Pipe Laying Contractor		
C-43a	Reconditioning and Repairing Pipeline Contractor		
C-44	Sheet Metal Contractor		
C-44a	Gutters Contractor		
C-44b	Awnings and Patio Cover Contractor		
C-48	Structural Steel Contractor		
C-48a	Steel Door Contractor		
C-49b	Hot Tub and Pool Contractor		

	Contractor Classification	Name of Joint Contractor or Subcontractor	License Number
C-51	Tile Contractor		
C-51a	Cultured Marble Contractor		
C-51b	Terrazzo Contractor		
C-52	Ventilating and Air Conditioning Contractor		
C-55	Waterproofing Contractor		
C-56	Welding Contractor		
C-57	Well Contractor		
C-57a	Pumps Installation Contractor		
C-57b	Injection Well Contractor		
C-60	Solar Power Systems Contractor		
C-61	Solar Energy Systems Contractor		
C-61a	Solar Hot Water Systems Contractor		
C-61b	Solar Heating and Cooling Systems Contractor		
C-62	Pole and Line Contractor		
C-62a	Pole Contractor		
C-63	High Voltage Electrical Contractor		
C-68	Classified Specialist		
	Licensed Surveyor		
	Licensed Geotechnical Engineer		
	Licensed Structural Engineer		
	Archaeologist		
	Cultural Monitor		
	Licensed Civil Engineer		
	Supervising Control and Data Acquisition (SCADA) Contractor		
*			
*			
*			
*			

	Contractor Classification	Name of Joint Contractor or Subcontractor	License Number
*			
*			

* Contractor to add licenses as required to complete the scope of work. Attach additional sheet as needed. It is understood and agreed that the Department reserves the right to reject any and/or all offers and waive any defects when, in the Department’s opinion, such rejection or waiver shall be for the best interest of the Department.

For purpose of evaluating the criterion described in this solicitation, it is understood and agreed that offers will be compared on the basis of the Total Sum Offer which shall be considered to be the total sum of actual or corrected amounts proposed on each item. The offerors signed Offer shall constitute the Offeror’s official offer. The Department reserves the right to designate the contract amount based on selected Offeror’s Total Sum Offer depending on the funds available for this Project.

It is also understood and agreed that the work called for under this Project must and shall be completed within **NINE HUNDRED (900)** consecutive calendar days after written notice has been given to the successful Offeror to commence work. It is also understood and agreed that the quantities given herewith are approximate only and are subject to increase or decrease and that the undersigned will perform all quantities of work, as either increase or decrease, in accordance with the provisions of the specifications.

It is also understood and agreed that the estimated quantities shown for items for which a UNIT PRICE is listed in the Offer are only for the purpose of comparing on a uniform basis offers offered for the work under this contract, and the undersigned agrees that the undersigned is satisfied with and will not dispute said estimated quantities as a means of comparing the offers. It is understood and agreed that the Offeror will make no claims for anticipated profit or loss of profit because of a difference between quantities of the various classes of work done or the materials and equipment actually installed and the said estimated quantities. On UNIT PRICE offers, payment will be made only for the actual number of units incorporated into the finished project at the contract UNIT PRICE.

It is also understood and agreed that if the product of the UNIT PRICE offer and the number of units does not equal the total amount stated by the Offeror in the offer for any item, it will be assumed that the error was made in computing the total amount. For purpose of evaluating the criterion described in this solicitation, the stated UNIT PRICE alone will be considered as representing the Offeror’s intention and the total amount offered on such item shall be considered to be the amount arrived at by multiplying the UNIT PRICE by the number of units.

It is also understood and agreed that the liquidated damages in the amount of **FIVE HUNDRED AND 00/100 (\$500.00)** for each and every calendar day in excess thereof prior to completion of the contract beyond the specified and approved completion date, shall be withheld from payments due to the Contractor, pursuant to the Damages for Delay provision contained in this solicitation.

It is also understood and agreed that if this offer is accepted, the successful offeror will contract with the Board and said offeror shall furnish the required bonds to the Board within ten (10) days from the date of receiving from the Board the contract prepared and ready for execution.

It is further understood and agreed that the successful offeror will provide all necessary materials, labor, tools, equipment, and other incidental necessary to do all the work and furnish all the materials specified in the contract in the manner and time herein prescribed and according to the requirements of the Department as therein set forth.

The undersigned further understands and agrees that by submitting this Offer, 1) the Offeror is declaring that the Offer is not in violation of Chapter 84, Hawai'i Revised Statutes, and 2) Offeror is certifying that the price(s) submitted was (were) independently arrived at without collusion.

It is also understood and agreed that if this Offer is accepted and the undersigned shall fail to or neglect to contract as aforesaid, the Board may determine that the offeror has abandoned the contract and thereupon forfeiture of the security accompanying the Offer shall operate and the same shall become the property of the Board.

Enclosed herewith is a Bidder's Bond (Bid Security)	()	for the sum
Surety Bond	()	
Legal Tender	()	
Certificate of Deposit	()	
Share Certificate	()	
Cashier's Check	()	
Treasurer's Check	()	
Teller's Check	()	
Certified Check	()	

of _____ DOLLARS
(\$ _____) payable to the Department of Water, being not less than the sum required under Sub-Section 2.9 "Bid Security" of the "General Provisions for Construction Contracts of the Department of Water", dated April 25, 2016.

Evidence of the undersigned Offeror having the authority to submit this Offer and to enter a contract is herewith furnished.

Respectfully submitted,

Name of Offeror

Authorized Signature

Print/Type Name & Title of above

Address, Zip Code

Telephone

Contractor's License No.

State of Hawai'i General Excise Tax License No.

Federal Employer Identification No.

Type of Organization: (Please designate)

- Sole Proprietorship Partnership
 Corporation Joint Venture
 Other (*please specify*) _____

State of Incorporation: Hawai'i Other (*please specify*) _____

Name of Performance Bond Surety Co. _____

Address _____

Authorized to do Business in the State of Hawai'i? Yes or No

If corporation, state who will sign contract and signatory's title:

Name

Title

Name

Title

If the Offeror is a CORPORATION, the legal name of the corporation shall be set forth on the Offer, together with the signature(s) of the Officer(s) authorized to sign on behalf of the corporation and the corporate seal affixed thereto. Evidence of the authority of the Officer(s) to sign on behalf of the Corporation SHALL be attached to this page and included in the Offer. Acceptable evidence of authority to sign includes, but is not limited to, a copy of the articles of incorporation, corporate resolution, or corporate by-laws. (See HRS Ch. 415, Hawai'i Business Corporation Act).

If the Offeror is a LIMITED LIABILITY COMPANY, the legal name of the company shall be set forth on the Offer, together with the signature(s) of the member of the limited liability company or manager of the manger-managed limited liability company authorized to sign on behalf of the entity. Evidence of the authority of the Officer(s) authorized to sign on behalf of the company SHALL be attached to this page and included in the Offer.

If the Offeror is a PARTNERSHIP, the legal name of the firm shall be set forth on the Offer, together with the signature(s) of the General Partner(s) authorized to sign on behalf of the partnership. Evidence of the authority of the General Partner(s) authorized to sign on behalf of the partnership SHALL be attached to this page and included with the Offer. Acceptable evidence of authority to sign for the partnership includes, but is not limited to, a copy of the partnership registration statement or authorization signed by all of the partners. (See HRS Ch. 425, Partnerships).

If Offeror is a SOLE PROPRIETORSHIP, Offeror's signature shall be placed above.

NOTE: PLEASE DO NOT DETACH THIS SAMPLE OFFER FROM THE SPECIFICATIONS. FILL IN ALL BLANK SPACES WITH INFORMATION REQUIRED OR OFFER MAY BE REJECTED.

APPENDIX D: Insurance.

(Bound Separately)

APPENDIX E: Wage Certificate for Service Contracts

WAGE CERTIFICATE FOR CONSTRUCTION CONTRACTS

Projects subject to HRS 104

TO: Chief Procurement Officer

SUBJECT: Solicitation No.: _____

PROJECT: _____

Pursuant to **HRS 103-55.5 Wages and Hours of Employees on Public Works Construction Contracts**, I hereby certify that if awarded the contract in excess of \$2,000, the work to be performed will be performed under the following conditions:

1. Individuals engaged in the performance of the contract on the job site shall be paid:
 - a. Not less than the 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; and
 - b. Overtime compensation at one and one-half times the basic hourly rate plus fringe benefits for hours worked on Saturday, Sunday, or a legal holiday of the State or in excess of eight hours on any other day; and
2. 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.

Offeror: _____

By: _____

Title: _____

Date: _____

APPENDIX F: Certification of Compliance for Final Payment.

CERTIFICATION OF COMPLIANCE FOR FINAL PAYMENT
(Reference §3-122-112, HAR)

Reference: _____
(Contract Number) (IFB/RFP Number)

_____ affirms it is in
(Company Name)

compliance with all laws, as applicable, governing doing business in the State of Hawai‘i to include the following:

1. Chapter 383, HRS, Hawai‘i Employment Security Law – Unemployment Insurance;
2. Chapter 386, HRS, Worker’s Compensation Law;
3. Chapter 392, HRS, Temporary Disability Insurance;
4. Chapter 393, HRS, Prepaid Health Care Act; and

maintains a “Certificate of Good Standing” from the Department of Commerce and Consumer Affairs, Business Registration Division.

Moreover, _____
(Company Name)

acknowledges that making a false statement shall cause its suspension and may cause its debarment from future awards of contracts.

Signature: _____

Print Name: _____

Title: _____

Date: _____

APPENDIX G: Apprenticeship Program.

Bidders seeking preference for this shall:

1. Be a party to an apprenticeship program registered with the State Department of Labor and Industrial Relations (DLIR) at the time of its Offer for each apprenticeable trade the Proposer will employ to construct the public works project for which the Offer is made; and
2. For each apprenticeable trade the proposer will employ for this project, submit with its Offer fully executed and authorized CERTIFICATION OF BIDDER'S PARTICIPATION IN APPROVED APPRENTICESHIP PROGRAM UNDER ACT 17. Schedule F attached to this solicitation verifying participation in apprenticeship program(s) registered with the DLIR.
3. The Contractor shall certify each month that work is being conducted on the project and that it continues to be a participant in the relevant apprenticeship program for each trade it employs. Monthly certification shall be made on MONTHLY REPORT OF CONTRACTOR'S PARTICIPATION IN APPROVED APPRENTICESHIP PROGRAM UNDER ACT 17 (Schedule F-I).

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

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

* Name of Apprenticeable Trade and Apprenticeship Sponsor must be the same as recorded in the List of Construction Trades in Registered Apprenticeship Programs that is posted on the State Department of Labor and Industrial Relations website. (Rev. 08/25/2010)

SCHEDULE F-1 - MONTHLY REPORT OF CONTRACTOR'S PARTICIPATION IN APPROVED APPRENTICESHIP PROGRAM UNDER ACT 17

I. Contractor's Identifying Information		II. Reporting Period	
A. Legal Business Name:		A. Month: (choose)	B. Year: (choose)
B. Project Bid Title & Reference No.:			
C. Contact Person's Name:			
1. Phone No.:		2. E-Mail:	
III. Apprenticeship Program (Complete a separate form for <i>each</i> apprenticeship program in which workers are employed on the project)			
A. Contractor was a party to an apprenticeship program or programs with the following sponsor: (Give sponsor's name(s).*)		B. Was the contractor a party to the program during the <i>entire</i> report month?	
		1. YES <input type="checkbox"/>	
		2. NO <input type="checkbox"/> If NO, state applicable period and why (may be subject to sanctions.)	
III. Contractor's Certification			
I certify that the above information is accurate to the best of my knowledge. I understand that my willful misstatement of facts may cause forfeiture of the preference under Act 17 and may result in criminal action. I give permission for outside sources to be contacted and for them to disclose any information necessary to verify the bidder's preference.			
_____		_____	
A. Name (Type)		B. Title	
_____		_____	
C. Signature (original signature required)		D. Date	
IV. Apprenticeship Sponsor's Contact Information			
A. Training Coordinator's Name: _____			
B. Address: _____			
C. Phone No.: _____		D. E-Mail: _____	
E. Fax No: _____			
V. Apprenticeship Program Sponsor's Certification			
I certify that the above information is accurate to the best of my knowledge. I understand that my willful misstatement of facts may cause forfeiture of the bidder's preference and may result in criminal action. I give permission for outside sources to be contacted and for them to disclose any information necessary to verify the bidder's preference under Act 17.			
_____		_____	
A. Name of Authorized Official		B. Title	
_____		_____	
C. Signature (original signature required)		D. Date	

* Name of Name of Apprenticeship Sponsor must be the same as recorded in the list of Construction Trades in Registered Apprenticeship Programs that is posted on the State Department of Labor and Industrial Relations website. (Rev. 08/25/2010)

APPENDIX I: Employment of State Residents on Construction Procurement Contracts.

a. Definitions

“Contract” means contracts for construction under Chapter 103D HRS.

“Contractor” has the same meaning as in section 103D-104, HRS; provided that contractor includes a subcontractor where applicable

“Construction” has the same meaning as in section 103D-104 HRS

“Procurement Officer” has the same meaning as in section 103D-104 HRS

“Resident” means a person who is physically present in the state at the time the person claims to have established the person’s domiciled in the state and shows the person’s intent is to make Hawai‘i the person’s primary residence.

“Shortage trade” means a construction trade in which there is a shortage of Hawai‘i residents qualified to work in the trade.

b. Requirements of Contractor

The contractor awarded this contract shall ensure that Hawai‘i Residents compose not less than eighty percent (80%) of the workforce employed to perform this Contract, calculated as follows:

The eighty percent (80%) requirement shall be determined by dividing the total number of hours worked on a contract by Residents by the total number of hours worked by all employees of the Contractor in the performance of the Contract. Hours worked for any subcontractor of the contractor shall count towards the calculation for purposes of this subsection. The hours worked by employees within shortage trades, as determined by the Department of Labor and Industrial Relations, shall not be included in the calculations for purposes of this subsection.

This requirement shall be applicable during the entire duration of this Contract. A notarized Certification for Employment of State Residents on Construction Procurement Contracts (Schedule I) shall be submitted on a monthly basis with your request for progress payments. If no request for progress payments are made for any month, the Contractor is still responsible to submit the certification on a monthly basis.

c. Penalties

Failure to comply with this requirement shall be subject to any of the following sanctions:

- A. Temporary suspension of work on the project until the Contractor or subcontractor complies with Act 68;
- B. Withholding of payment on the Contract or subcontract as applicable, until the Contractor or subcontractor complies with Act 68;
- C. Permanent disqualification of the Contractor or subcontractor from any further work on the project;

D. Recovery by the Department of any moneys expended on the Contract or subcontract, as applicable; or

E. Proceedings for debarment or suspension of the contractor or subcontractor under section 103D-702.

d. Conflict with Federal Law

Act 68 shall not apply if the application of the Act is in conflict with any federal law, or if application of Act 68 will disqualify the Department from receiving federal funds or aid.

CERTIFICATION OF COMPLIANCE
FOR
EMPLOYMENT OF STATE RESIDENTS
ACT 68, SESSION LAWS OF HAWAI'I 2010

Project Title: _____

DOW Project No.: _____

Contract No.: _____

As required by Act 68, Session Laws of Hawai'i 2010 – Employment of State Residents on Construction Procurement Contracts, I hereby certify under oath, that I am an officer of _____ (*Name of Company*) and for the month of _____, 20____, _____ (*Name of Company*) is in compliance with Act 68, SLH 2010, by employing a workforce of whom not less than eighty percent are Hawai'i residents, as calculated according to the formula in the solicitation, to perform this Contract.

- I am an officer of the Contractor for this contract.
- I am an officer of the Subcontractor for this contract.

CORPORATE SEAL

(Name of Company)

(Signature)

(Print Name)

(Print Title)

NOTARY CERTIFICATION

APPENDIX J: Certification of Compliance with HRS 396-18, Safety and Health Programs for Contractor Bidding On Board Construction Jobs

PROJECT NAME: _____

SOLICITATION NO.: _____

This is to certify that the undersigned will comply with the requirements of HRS 396-18, as follows:

(A) Pursuant to HRS 396-18, all bids and proposals in excess of \$100,000 shall include a signed certification from the bidder that a written safety and health plan for the job will be available and implemented by the notice to proceed dates of the project. The written safety and health plan shall include:

- (1) A safety and health policy statement reflecting management commitment;
- (2) A description of the safety and health responsibilities of all levels of management and supervisors on the job, and a statement of accountability appropriate to each;
- (3) The details of:
 - (a) The mechanism for employee involvement in job hazard analysis;
 - (b) Hazard identification, including periodic inspections and hazard correction and control;
 - (c) Accident and “near-miss” investigations; and
 - (d) Evaluations of employee training programs.
- (4) A plan to encourage employees to report hazards to management as soon as possible and to require management to address these hazards promptly; and
- (5) A certification by a senior corporate or company manager that the plan is true and correct.

(B) Failure to submit the required certification may be grounds for disqualification of the bid.

(C) Failure to have available on site or failure to implement the written safety and health plan by the project’s Notice to Proceed Dates shall be considered willful noncompliance and be sufficient grounds to disqualify the award and terminate the contract.

Name of Contractor: _____

Signature and Title: _____

Date: _____

APPENDIX K: Special Provisions.

TABLE OF CONTENTS FOR SPECIAL PROVISIONS

SECTION SP-1 – GENERAL REQUIREMENTS

<u>SECTION</u>	<u>DESCRIPTION</u>
1.1	General Provisions, Specifications and Standard Details
1.2	Preconstruction Conference
1.3	Contractor’s Responses by Hardcopy or Facsimile
1.4	Failure to Complete On Time and Liquidated Damages
1.5	Measurements
1.6	Project Record Drawings
1.7	Substitutions
1.8	Storage, Work Zone, Construction Access
1.9	Preservation of Property
1.10	Extra Work
1.11	Building Laws
1.12	Delivery of Materials at Site
1.13	Defective Materials
1.14	Clean-up
1.15	Environmental Protection
1.16	Project Sign
1.17	Submittals
1.18	Construction Coordination

Division 300, Water System Standards

SPECIAL PROVISIONS

SECTION SP-1 – GENERAL REQUIREMENTS

- 1.1 GENERAL PROVISIONS, SPECIFICATIONS, AND STANDARD DETAILS: The special provisions, plans, general provisions, Water Standards, DPW Standard Specifications and Details, contract documents and all supplemental documents are essential parts of the contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for the complete work. In case of conflict or discrepancy within any part of the contract, the stricter requirements, including Hawai'i State Statutory requirements, shall govern. Unless it is apparent that a different order of precedence is intended, the special provisions shall govern over plans, general provisions and Water Standards; plans shall govern over general provisions; general provisions shall govern over Water Standards; Water Standards shall govern over DPW Standard Specifications; figured dimensions and drawings take precedence over measurements by scale, and detail drawings; instructions to proposers shall be incorporated and made a part of the special provisions.
- 1.1.01 GENERAL PROVISIONS FOR CONSTRUCTION CONTRACTS OF THE DEPARTMENT OF WATER, COUNTY OF KAUA'I: The “GENERAL PROVISIONS FOR CONSTRUCTION CONTRACTS OF THE DEPARTMENT OF WATER, COUNTY OF KAUA'I”, April 25, 2016 as amended, is by reference incorporated herein and made a part of these specifications.
- 1.1.02 WATER SYSTEM STANDARDS: The “WATER SYSTEM STANDARDS”, 2002, as amended, as adopted by the Department of Water, County of Kaua'i; Board of Water Supply, City and County of Honolulu; Department of Water Supply, County of Maui; Department of Water Supply, County of Hawai'i is by reference incorporated herein and made a part of these specifications. These specifications are not bound in these contract documents, but shall by reference be incorporated herein and made a part of these specifications.

SECTION 302 - WATER MAINS AND APPURTENANCES

The following shall supplement the applicable subsections of Division 300 - Construction of the “Water System Standards”, 2002.

Make the following amendments to said section:

SECTION 302.02 – TRENCH EXCAVATION

Add the following paragraph to the “A. General” subsection:

Because construction will occur within residential neighborhoods, the Contractor shall secure all areas under construction with due regard for the safety of all persons and property at all times.

Amend the first paragraph of the “B. Payment” subsection to read:

Payment for trench excavation (without classification), backfill, select borrow, pipe cushion, and cost to safely secure all areas under construction will not be paid for separately but shall

be included in the Unit Price for the furnishing and installation of the various items in the Proposal.

SECTION 302.03 – TRENCH BACKFILL

Add the following paragraph to the “A. General” subsection:

If backfilling ground is continuously wet, pipe cushion and backfill material shall consist of coarse aggregate, ASTM C 33, Size Number 67, and shall be completely encapsulated with non-woven geotextile filter fabric unless approval for other material is granted.

Amend the first paragraph of the “G. Payment” subsection to read:

Payment for aggregate and sand pipe cushion surrounding the pipe, pipe bedding, non-woven geotextile filter fabric pipe cushion encasement, trench backfill, select borrow, warning tape, and backfill at valve boxes, meter boxes, manholes, and handholes will not be paid for separately but shall be included in the Unit Price for the furnishing and installation of the various items in the Proposal.

SECTION 302.04 – SHEATHING

Add the following paragraph to the “A. General” subsection:

Contractor shall provide and maintain sheathing and bracing as necessary to support excavation and trenching and shall comply with Occupational Safety & Health Administration (OSHA) requirements. The contractor shall deem a competent person for trench excavation and that person shall be on-site during all trench excavation and backfill.

Amend the entire “B. Payment” subsection to read:

Payment for installation and removal of sheathing and bracing, and for additional excavation (without classification), additional aggregate and sand cushion to surround the pipe, additional non-woven geotextile filter fabric to surround the cushion, additional bedding, and additional backfill required because of sheathing or bracing work will not be paid for separately but shall be included in the Unit Price for the furnishing and installation of the various items in the Proposal.

SECTION 302.05 – DEWATERING

Amend the first paragraph of the “A. General” subsection to read:

In locations where water is present in the trench, the Contractor must dewater by pumping or other means to keep the trench free of water during the installation of pipe cushion, the pipe itself, the testing, connection, relocation, lowering of the water mains, and until backfilling is completed to a point 12 inches above the top of the pipe. The Contractor shall provide proper facilities for delivering all pump water to its intended outfall location and attain all necessary permits required for discharge.

If the Contractor elects to discharge dewatering effluent into State Waters or existing drainage systems, the Contractor shall obtain NPDES General Permit Coverage authorizing discharges

associated with construction activity dewatering from the Department of Health, Clean Water Branch (DOW-CWB). The Contractor shall prepare and submit permit application (CWB-NOI Form G) to DOH-CWB and shall not begin dewatering activities until DOH-CWB has issued Notice of General Permit Coverage (NGPC) and shall conduct dewatering operations in accordance with the conditions in NGPC. Contractor shall submit a copy of NPDES dewatering Application and Permit to the Manager.

Amend the entire “B. Payment” subsection to read:

Payment for dewatering activities, including but not limited to the preparation and implementation of NPDES General Permit Coverage authorizing discharges associated with construction activity dewatering, and the installation, maintenance, monitoring, and removal of Best Management Practices (BMPs), will not be paid for separately but shall be included in the Unit Price for the furnishing and installation of the various items in the Proposal.

For all fines received by the Department for non-compliance with the Notice of General Permit Coverage (NGPC), the Contractor shall reimburse the Department within 30 days for the full amount of the outstanding cost the Department has incurred, or the Department will deduct the cost from the Contractor’s progress payment.

SECTION 302.06 – “ADOBE” OR CLAY

Amend the entire “B. Payment” subsection to read:

Exclusive of the payments due for work defined in Section 302.07 – MUD REMOVAL AND CRUSHED ROCK TRENCH STABILIZATION, no separate payment for excavation (without classification) and removal of adobe, clay or other unsuitable material from the pipe trench or for necessary backfill material approved by the Manager to replace those materials will be made; the compensation for such work shall be deemed to be included in the Unit Price for the furnishing and installation of the various items in the Proposal.

SECTION 302.07 – MUD REMOVAL AND CRUSHED ROCK TRENCH STABILIZATION

Amend the first paragraph of the “B. Payment” subsection to read:

Payment for excavation (without classification) to remove and dispose of mud or undesirable materials from the pipe trench whether native or caused by contractor means and methods will not be paid for separately but shall be included in the Unit Price for the furnishing and installation of the various items in the Proposal.

SECTION 302.08 – BLASTING

Amend the entire “A. General” and “B. Payment” subsections to read:

No blasting shall be allowed on this project.

SECTION 302.09 – EXCAVATION FOR MANHOLES

Amend the second paragraph of the “B. Payment” subsection to read:

Payment for excavation (without classification) for manholes will not be paid for separately but shall be deemed to be included in the Unit Price for the furnishing and installation of Manholes.

SECTION 302.10 - EXCAVATION FOR THRUST BLOCKS, BEAMS, AND TEST BLOCKS

Amend the entire "B. Payment" subsection to read:

Payment for excavation (without classification) and backfill of concrete thrust blocks, thrust beams, reaction blocks, and test blocks will not be paid for separately but shall be included in the Unit Price for installation of Concrete Thrust Blocks, Thrust Beams, Reaction Blocks, and Test Blocks or Waterline installation line items.

SECTION 302.11 – SURPLUS EXCAVATION

Amend the entire "B. Payment" subsection to read:

Payment for the removal and disposal of surplus excavation material will not be paid for separately but shall be included in the Unit Price for the furnishing and installation of the various items in the Proposal.

SECTION 302.12 - DUCTILE IRON PIPE

Add the following paragraph to the "A. General" subsection:

Transition couplings shall be Romac Style "501", Style "RC501", or approved equal. D.I. to A.C. transition couplings shall be 14" in length.

Add the following paragraphs to the "E. Payment" subsection:

The Unit Price for furnishing and installation of the various sizes of Ductile Iron Pipe shall be inclusive of trench excavation (without classification), trench backfill, pipe cushion, warning tape, sheathing and dewatering of trench, removal and disposal of adobe, clay, mud, and other unsuitable material from the trench, and removal and disposal of surplus excavation material, and all associated cost for licensed Geotechnical Engineer monitoring, analysis, and testing.

Payment for furnishing and installation of transition couplings shall not be made directly, costs for furnishing and installation of transition couplings shall be included in the Lump Sum for the various Connections to Existing Water Mains in the Proposal.

SECTION 302.14 PLASTIC PIPE

Add the following paragraphs to the "A. General" subsection:

The contractor shall furnish and install Polyvinyl Chloride (PVC) pipe for this project if required. All types and sizes of PVC pipes shall be AWWA C900, Pressure Class 200, DR14 pipe for pipes larger than 2 1/2" or schedule 80 PVC pipe for sizes 2 1/2" and smaller.

Pipe cushion material as called for on the plans shall adhere to the requirements of “Water System Standards” Section 209.02, Pipe Cushion. When ground water is encountered or when required by the Engineer, the pipe cushion shall be wrapped in non-woven geotextile fabric in accordance with the “Water System Standards” Section 212.05, Geotextile Fabrics. The contractor shall retain the services of a licensed Geotechnical Engineer to monitor the quality of pipe cushion material, installation, and compaction of the pipe cushion, geotextile encasement, and trench backfill. The Department of Water will require periodic sieve testing of the pipe cushion material during the course of construction.

If PVC installation will be within State Highways Right-of-Way, installation, work, and materials used for this project shall comply with the requirements in Section 624 – Water System, Section 703.21 – Trench Backfill Material, Section 716 – Geotextiles, and Section 716.03 – Geotextiles for Underdrain Applications of the “Specifications for Road and Bridge Construction”, State of Hawai‘i, dated 2005, unless otherwise approved by the authoritative agency.

Transition couplings shall be Romac Style “501”, Style “RC501”, or approved equal. C-900 PVC to A.C. transition couplings shall be 14" in length.

Amend the first paragraph of the “B. Payment” subsection to read:

Payment for furnishing and installation of various sizes of PVC Pipe including all necessary joints accessories and fusion process and accompanying ground restraints, will be made at the respective Unit Price per linear foot based on the actual linear feet of PVC pipe installed (exclusive of valves, fittings, bends, and adapters), cleaned or pigged and successfully hydrotested in the field.

Add the following paragraphs to the “B. Payment” subsection:

The Unit Price for furnishing and installation of the various sizes of PVC Pipe shall be inclusive of trench excavation (without classification), trench backfill, pipe cushion, geotextile filter fabric encasement, conducting cable, warning tape, sheathing, removal and disposal of adobe, clay, mud, and other unsuitable material from the trench, removal and disposal of surplus excavation material, and all associated cost for licensed Geotechnical Engineer monitoring, analysis, and testing.

Payment for furnishing and installation of transition couplings shall not be made directly, costs for furnishing and installation of transition couplings shall be included in the Lump Sum for the various Connections to Existing Water Mains in the Proposal.

SECTION 302.15 - FITTINGS AND SPECIALS (DUCTILE IRON, CONCRETE CYLINDER, PLASTIC PVC PIPE)

Add the following paragraph to the “A. General” subsection:

The contractor shall furnish and install EBAA Iron Series 2000PV MEGALUG Mechanical Joint Restraint for plain end PVC pipe at all mechanical joint fittings and EBAA Iron Series 2100 MEGAFLANGE Restrained Flange Adapter for plain end PVC pipe at all flange joints. Both shall be installed in accordance with the manufacturer’s guidelines.

Amend the first paragraph of the “B. Payment” subsection to read:

Payment for furnishing and installing Cast Iron and Ductile Iron Fittings will be made at the Lump Sum Price, complete in place. The Contractor shall be responsible for the actual number of cast iron and ductile iron fittings furnished, installed and tested in the field. If a line item for Cast Iron and Ductile Iron fittings is not specifically provided, the contractor shall include the cost in the furnishing and installation of the waterline unit price.

Amend the fourth paragraph of the “B. Payment” subsection to read:

Payment for furnishing and installation PVC Fittings, including copper toning wire will not be paid for separately but shall be included in the Unit Price for furnishing and installation of the various sized PVC Pipes in the proposal.

Amend the fifth paragraph of the “B. Payment” subsection to read:

Payment for furnishing and installation Flanged by Bell Adapters, Flanged Dismantling Joints, MEGALUG Mechanical Joint Restraint, and MEGAFLANGE Restrained Flange Adapters will not be paid for separately but shall be included in the Lump Sum Price for Cast Iron and Ductile Iron Fittings, in place complete.

SECTION 302.16 - GATE VALVES AND BUTTERFLY VALVES

Amend the first paragraph of the “A. General” subsection to read:

The contractor shall furnish and install all permanent and temporary gate valves and butterfly valves at locations shown on the plans or as directed by the Engineer. Unless otherwise specified, the installation shall be in accordance with the Standard Details. Specifications for furnishing and installing Temporary Gate Valves will comply with this section of the specification.

Amend the fourth paragraph of the “A. General” subsection to read:

Concrete anchor block with non-corrosive straps will not be required for this project.

Add the following paragraph to the “B. Payment” subsection:

The Unit Price for furnishing and installing Gate Valves and Butterfly Valves and furnishing and installing Temporary Gate Valves shall be inclusive of trench excavation (without classification), cast iron valve box, trench backfill, pipe cushion, warning tape, sheathing and dewatering of trench, removal and disposal of adobe, clay, mud, and other unsuitable material from the trench, and removal and disposal of surplus excavation material.

SECTION 302.17 - AIR RELIEF VALVES

Add the following paragraph to the “A. General” subsection:

Air relief valves shall be One-Inch Val-Matic Valve & Manufacturing Corp. Combination Air Valve 201C.2 with screened hood, or approved equal.

Amend the second paragraph of the “B. Payment” subsection to read:

The Unit Price for furnishing and installation of Air Relief Valve shall be full compensation for all labor, materials, tools and equipment for excavation (without classification) and backfill, sheathing and dewatering of trench, installation of copper pipes, fittings, various types of valves, ARV, cinder or crush rock cushion, brick saddle, ARV pipe stand, concrete footing, roofing felt, stainless steel straps, screened hood, paint, testing, and all other incidentals to complete this work.

SECTION 302.18 - SERVICE LATERALS, CONNECTIONS AND PIPES

Add the following paragraphs under “A. General” subsection:

New service laterals shall be terminated with an angle valve in the existing meter boxes to facilitate the reconnection to the water meter.

Where existing meters are located within private properties, the new service lateral will be terminated within the public right-of-way and include a new Type “B” or Type “X” meter box with cast iron cover.

When a new lateral is being installed for an existing Department of Water consumer, the contractor shall furnish and install lateral piping including all fittings and appurtenances between the new meter and the existing consumer piping and perform reconnection work, and include a new meter box and cover.

When an existing lateral is being abandoned, the contractor shall cut and plug the existing lateral at the main. The existing meter box and cover shall be cleaned and transported to the Department’s Baseyard in Līhu‘e or Puhi, unless otherwise directed by the Engineer.

Amend the entire “D. Payment” subsection to read:

Payment covered under service laterals and connections and appurtenances shall be as follows: Payment for furnishing and installing various sizes of new service laterals and service connections, regardless of the lengths of the laterals or connections, will be made at the Unit Price per each unit based on the actual number installed and tested.

The Unit Price for furnishing and installing various sizes of new service laterals, service connections, and appurtenances shall be full compensation for all labor, materials, tools, and equipment for all handling, hauling, unloading, placing, testing, and all other incidental necessary to complete the work.

No separate payment for the furnishing and installation of taps into mains, reconnections to existing consumer piping, temporary connections, cut and plug and removal of existing laterals, transferal of meters, pipes, fittings, ball corps, ball stops, angle valves, globe valves, double hub fittings, tapping tees, service saddles, meter boxes and covers, meter splices, brass pipes, caps, PVC conduits, warning tape, polyethylene wrap, plastic lateral for isolation, nor any other appurtenances will be made. Additionally, no separate payment will be for trench excavation (without classification) and backfill, sheathing and dewatering of trench, pipe cushion, nor transporting existing meter boxes and covers to the Department’s Baseyard in

Lihu'e or Puhi. The compensation for this work and items shall be deemed to be included in the Unit Price for New Service Laterals.

SECTION 302.19 – METER BOXES

Amend the entire “B. Payment” subsection to read:

Payment for the furnishing and installation of meter boxes including frames and covers will not be paid for separately but shall be included in the Unit Price for Service Laterals or Air Relief Valve Assemblies.

Payment for the furnishing and installation of Meter Boxes shall be full compensation for all labor, materials, tools and equipment for all handling, hauling, unloading, placing, bricks, concrete, cast iron covers, painting, concrete slabs and all other incidentals necessary to complete the work.

No separate payment for excavation (without classification) and backfill of Meter Boxes will be made; the compensation for such work shall be deemed to be included in the Unit Price for Service Laterals or Air Relief Valve Assemblies.

SECTION 302.20 - FIRE HYDRANTS

Amend the third paragraph of the “B. Payment” subsection into the following paragraphs:

Payment for excavation (without classification), backfill, sheathing and dewatering of trench, and fire hydrant markers will not be paid for separately but shall be included in the Unit Price for the furnishing and installation of Fire Hydrants.

No separate payment for the furnishing and installation of hydrant elbow, hydrant extension, pipe cushion, flat brick support, and all other appurtenances will be made; the compensation for such work shall be deemed to be included in the Unit Price for Fire Hydrants.

SECTION 302.21 - FIRE HYDRANT MARKERS

Amend the first paragraph of the “B. Payment” subsection to read:

Payment for hydrant markers will not be paid for separately but shall be included in the Unit Price for the furnishing and installation of Fire Hydrants.

SECTION 302.22 - CONCRETE BLOCKS, JACKETS, BEAMS, CURB GUARDS FOR FIRE HYDRANTS AND METER BOXES, MANHOLE AND VALVE BOX COLLAR

Amend the entire “B. Payment” subsection to read:

Payment for concrete reaction blocks, thrust beams, thrust blocks and test blocks will be made at the Unit Price per each either by specific proposal line item or as a portion within the furnishing and installation of waterline line item. The Unit Price for concrete reaction blocks, thrust beams, thrust blocks and test blocks shall be full compensation for all labor, materials, tools and equipment for all excavation (without classification), backfill, sheathing, dewatering, concrete, forms, tie wire and chairs, bracings, straps, structural struts, surface finishing, curing,

mixing, hauling, furnishing and placing reinforcing steel, and all other incidental materials and work necessary to construct the concrete reaction block, thrust block or thrust beam, in place complete.

Payment for concrete jackets will be made at the Unit Price per linear feet of concrete jacket installed for the various sizes of pipe, regardless of pipe size either by specific proposal line item or as a portion within the furnishing and installation of waterline line item. The Unit Price for concrete jackets shall be full compensation for all labor, materials, tools and equipment for all excavation (without classification), backfill, sheathing, dewatering, concrete, forms, tie wire and chairs, bracings, straps, surface finishing, curing, mixing, hauling, furnishing and placing reinforcing steel, and all other incidental materials and work necessary to construct the concrete jackets in place complete.

Payment for concrete jackets for smaller utility conduits crossing the project's waterlines shall not be made separately. Costs for furnishing and installation of concrete jackets, including miscellaneous items such as warning tapes, shall be deemed to be included in the Unit Price for furnishing and installation of the various sizes and types of pipes in the Proposal.

SECTION 302.24 - VALVE BOXES

Amend the first paragraph of the "A. General" subsection to read:

Valve boxes for air relief valves, butterfly valves and cleanouts shall be installed in accordance with the Standard Details. Valve boxes for temporary and permanent gate valves shall be furnished and installed in conformance with Standard Detail V11 of the WATER SYSTEM STANDARDS or as defined on the construction drawing for this project. Valve boxes shall be installed 3 feet minimum clear from gutter, curbs, utilities and any structures. For this section, Valve Box specifications for Temporary and Permanent Gate Valves are identical.

Amend the entire "B. Payment" subsection to read:

Payment for the furnishing and installing of valve boxes including cast iron frames and covers and adjusting valve boxes to the required grade will not be paid for separately but shall be included in the Unit Price for Gate Valves or Temporary Gate Valves or Tapping Valves or Cleanout assemblies.

Payment shall be full compensation for all labor, materials, tools and equipment for all excavation (without classification) and backfill, cast iron frames and covers, concrete settlement slab, reinforced concrete collar and leveling slab, standpipe (concrete, cast iron, ductile iron, or welded steel pipe), brick leveling course, crushed rock fill, pipe cushion, painting, general area clean up, and all other incidentals necessary to complete the work.

No separate payment for backfilling around valve boxes with black sand, sand or coral chips and for temporary backfill and additional excavation (without classification) to expose the risers after chlorination will be made; the compensation for such work shall be deemed to be included in the Unit Price for Gate Valves, Temporary Gate Valves, Tapping Valves, or Cleanout assemblies.

SECTION 302.30 – CONNECTIONS, RELOCATIONS & LOWERING OF WATER MAINS AND LATERALS

Amend the first paragraph of the “A. General” subsection to read:

Whenever connections to, disconnections from, relocations to, or lowering of existing mains, service laterals, or hydrant laterals are required, the Contractor shall perform all work necessary for the installation of the new or temporary water facility or abandonment of the existing water facility, as shown on the plans, under the coordination of the Manager or his authorized representative.

Add the following paragraph under “A. General” subsection:

The contractor shall utilize temporary waterlines to provide continuous water service and fire protection to existing consumers, as needed.

For this project, Connections to Existing Water Main involve connecting to various types of pipe. The Contractor shall not saw or cut or damage existing asbestos cement pipe. Asbestos cement pipes, fittings, and appurtenances shall be removed at the nearest coupling. The Contractor shall remove and dispose of asbestos cement pipes, fittings, and appurtenances in accordance with Section 302.31.

Amend the entire “B. Payment” subsection to read:

Payment for Connection to Existing Water Main, Connection to Existing Service Lateral, or Connection to Existing Hydrant Lateral which may include the furnishing and installing of pipes, fittings, fire hydrants, gate valves, tapping sleeves and valves, service saddles, hub clamps and other appurtenant materials, will be included in the Lump Sum Price for Connection to Existing Water Main or in the Unit Price for Connection to Existing Service Lateral, Connection to Existing Hydrant Lateral, or temporary bypasses and disconnects.

The Lump Sum Price or Unit Price shall represent full compensation for furnishing all materials, labor, tools, equipment, and incidentals required for excavation (without classification), backfill, sheathing and dewatering of trench, relocating existing gate valves, connections, relocations, disconnections, removal, or lowering of the existing mains as called for on the plans and in accordance with these specifications and inclusive of all incidentals required to complete the work.

No separate payment for cutting, plugging, relocating existing main, lowering of existing mains, providing temporary water service (if necessary), providing temporary fire protection (if necessary), or abandoning of existing mains will be made; the compensation for such work shall be deemed to be included in the Lump Sum for Connections to Existing Water Main or in the Unit Price for Connection to Existing Service Lateral or Connection to Existing Hydrant Lateral.

No separate payment for installation of bypass lines including cutting, plugging and abandoning existing bypass lines will be made; the compensation for such work shall be deemed to be included in the Lump Sum for Connections to Existing Water Main or in the Unit Price for Service Lateral Connections or Connection to Existing Hydrant Lateral.

SECTION 302.31 – REMOVING OR DEMOLISHING, REINSTALLING OR RETURNING EXISTING PIPES AND APPURTENANCES

Add the following paragraphs under “A. General” subsection:

The contractor shall be responsible for removal and disposal of existing pipes and appurtenances abandoned within the State and County Right-of-Way. Removal and disposal of pipes shall follow all applicable OSHA, HIOSH, State of Hawai‘i and Federal Regulations. Abatement personnel shall oversee removal and disposal, when required. Unless otherwise directed by the Manager, pipes and appurtenances shall become the property of the Contractor and shall be expeditiously removed from the construction site.

Care shall be exercised when removing and disposing of asbestos cement pipe and appurtenances. If the contractor causes the asbestos cement pipe or appurtenance to become friable, he will not be reimbursed for extra costs incurred to handle, containerize, transport, and dispose of the waste. Disposal of asbestos cement pipe and appurtenances shall be at an approved asbestos disposal site and all disposal related costs shall be borne by the contractor. Disposal of all hazardous materials shall be completed within 24 hours of removal from the water system and shall not be stored within the project site beyond the 24 hour period.

Temporary pipes, fittings, valves, cleanouts, valve boxes with frames and covers, and appurtenances that were installed to provide temporary water service and fire protection shall be salvaged, cleaned, and transported to the Department’s Baseyard in Līhu‘e or Puhi.

Amend the first paragraph of the “B. Payment” subsection to read:

Payment for the removal, cleaning, and transporting of existing fire hydrants, standpipes, cleanouts, and air relief valves will be made at the Unit Price per each unit, based on the actual number removed and accepted by the Manager. If a specific proposal line item is not provided, the contractor shall incorporate the costs into the unit price of the furnishing and installation of the applicable waterline. The Unit Price includes full compensation for all labor, materials, tools, and equipment for removing, cleaning, plugging existing water mains, providing temporary water service, restoring disturbed area, and transporting salvaged fire hydrants, standpipes, air relief valves, and appurtenances to the Department’s Baseyard in Līhu‘e or Puhi.

Add the following paragraphs to the “B. Payment” subsection:

Payment for removal of existing gate and tapping valves will be made at the Unit Price per each unit, based on the actual number removed and accepted by the Manager. If a specific proposal line item is not provided, the contractor shall incorporate the costs into the unit price of the furnishing and installation of the applicable waterline. The Unit Price includes full compensation for all labor, materials, tools, and equipment for removing existing valve box components, removing concrete settlement slab, plugging of existing water mains, installing concrete and dirt backfilling, restoration of disturbed area, and cleaning and transporting the salvaged cast iron frames and covers to the Department’s Baseyard in Līhu‘e or Puhi.

Payment for removal of temporary gate valves and valve box components will be made at the Unit Price per each unit, based on the actual number removed and accepted by the Manager. If a specific proposal line item is not provided, the contractor shall incorporate the costs into the unit price of the furnishing and installation of the applicable waterline. The Unit Price includes full compensation for all labor, materials, tools, and equipment for removing the

temporary gate valves and valve box components, removing concrete settlement slab, installing concrete and dirt backfill, restoration of disturbed area, and cleaning and transporting salvaged gate valves and cast iron frames and covers to the Department's Baseyard in Lihu'e or Puhi.

Payment for the removal of temporary pipes and fittings will be made at the Lump Sum or Unit Price for Removal Temporary Water Main. The Lump Sum or Unit Price includes full compensation for all labor, materials, tools, and equipment for excavating (without classification), sheathing, dewatering, disconnecting and removing the temporary pipe and fittings, backfill and restoration of disturbed area, and cleaning and transporting salvaged pipes and fittings to the Department's Baseyard in Lihu'e or Puhi.

Payment for the removal and disposal of existing pipes, fittings, and appurtenances within the State and County Right-of-Way will be made at the Lump Sum or Unit Price for Removal of Water Main. The Lump Sum or Unit Price shall be full compensation for all labor, materials, tools and equipment for excavating (without classification), sheathing, dewatering, disconnecting, removing, processing, storing, hauling, and disposing of abandoned pipes and fittings, backfill and restoration of disturbed area, abatement personnel, disposal and inspection fees, cutting and plugging of existing water mains and laterals, and all other incidental materials and work necessary for the complete removal of abandoned pipes, fittings, and appurtenances.

Payment for the removal and disposal of existing pipes and appurtenances not specified above shall be considered incidental and shall not be paid for separately but shall be included in the Unit Price or Lump Sum for the various items in the proposal. Payment shall be full compensation for all labor, materials, tools and equipment for excavating (without classification), sheathing, dewatering, disconnecting, removing, hauling, storing, and disposing of abandoned pipes and fittings, backfilling and restoring disturbed area, disposal and inspection fees, cutting and plugging of existing water mains and laterals, and all other incidental materials and work necessary for the complete removal of abandoned pipes and appurtenances.

SECTION 302.35 - VALVE MARKERS

Amend the entire "B. Payment" subsection to read:

Payment for the furnishing and installation of Valve Markers will not be paid for separately, but shall be included in the Unit Price for the installation of various sized of gate or tapping valves. Payment shall be full compensation for all labor, materials, tools and equipment for all excavation (without classification), backfill, concrete, painting, and all other incidental materials and work necessary to complete the work.

SECTION 302.36 – SLOW CURING ASPHALT PAVEMENT (COLD MIX)

Amend "B. Payment", replace the first paragraph with the following:

Payment for furnishing, placement, maintenance and removal of SLOW CURING ASPHALT (Cold Mix) shall be deemed to be included in the Unit Price for furnishing and installation of the various sizes and types of pipes in the Proposal.

SECTION 302.37 - RESTORING PAVEMENTS, DRIVEWAYS, SIDEWALKS, CURBS, GUTTERS, FENCES, WALLS, AND MISCELLANEOUS

Add the following paragraphs under “A. General” subsection:

Asphalt concrete (A.C.) pavement resurfacing work shall include cold planing a 2-inch thick layer of existing A.C. pavement and resurfacing with a minimum 2-inch thick layer of new A.C. pavement (State Mix IV or V). Cold planing and resurfacing of A.C. pavement shall be in accordance with the Hawai‘i Standard Specifications for Road and Bridge Construction, 2005. The contractor shall construct the project per the approved construction drawings details and notes and verify potential AC thicknesses that could be encountered prior to submitting a proposal.

Existing pavement striping disturbed by this project shall be restored using thermoplastic extrusion. Painting is not acceptable. Installation of thermoplastic extrusion shall be in accordance with the Hawai‘i Standard Specifications for Road and Bridge Construction, 2005.

Existing reinforced concrete sidewalks, curbs, gutters, ramps, driveways, and swales disturbed by this project shall be restored to State Highways Standards in accordance with the Hawai‘i Standard Specifications for Road and Bridge Construction, 2005 and the Highway’s Division, Design Branch, Standard Plans, 2008.

Amend the entire “C. Payment” subsection to read:

Unless otherwise specified, payment for restoring fences, mail boxes, walls, landscaping, highway signs, highway markers and reflectors, and thermoplastic pavement striping shall not be measured nor paid for directly but shall be considered incidental to the construction work.

Payment for Restoring A.C. Pavement, inclusive of base and subbase courses, will be made at the Unit Price per square yard based on the minimum quantity required to be replaced on the approved plans, measured on the basis of the area of trenches specified for excavation plus an additional of twelve inches on each side of the trench for restoration within the State Right-of-Way or six inches on each side of the trench for restoration within the County Right-of-Way. The Unit Price shall be full compensation for all labor materials, tools, and equipment, for all handling, removing, placing, maintaining and all other incidental materials and work necessary to complete the Restoring A.C. Pavement work.

Payment for Cold Planing Existing A.C. Pavement and A.C. Pavement Resurfacing will each be made at the Unit Price per square yard based on the minimum quantities required as noted on the approved plans. Each Unit Price shall be full compensation for all labor materials, tools, and equipment, for all handling, removing, placing, maintaining and all other incidental materials and work necessary to complete the Cold Planing of Existing A.C. Pavement and A.C. Pavement Resurfacing work.

Payment for A.C. Pavement resurfacing, will be made at the Unit Price per square yard based on the minimum quantity required to be replaced on the approved plans, measured on the basis of the area of roadway required to be resurfaced within the State Right-of-Way or County Right-of-Way. The Unit Price shall be full compensation for all labor materials, tools, and equipment, for all handling, removing, placing, maintaining and all other incidental materials and work necessary to complete the A.C. Pavement resurfacing work.

Unless otherwise specified, payment for restoration of Reinforced Concrete Sidewalk, Curbs, and Ramps, Reinforced Concrete Driveway, AC Driveways and Reinforced Concrete Swale shall not be measured nor paid for directly but shall be considered incidental to the construction work. If specified as a Unit Price, the Unit Price shall be full compensation for all labor materials, tools, and equipment, for all handling, removing, placing, finishing, maintaining, installation of forms, steel or weld wire fabric reinforcement, base course, and all other incidental materials and work necessary to complete the restoration of Reinforced Concrete Sidewalk, Curbs, and Ramps, Reinforced Concrete Driveway, AC Driveway and Reinforced Concrete Swale work.

Add the Following Section:

SECTION 302.40 - BRACING OF UTILITY POLES

When excavating close to utility poles, when specified on the plans, or when directed by the Manager, the Contractor shall brace the utility pole if the utility pole is owned by Hawaiian Telcom or pay for bracing if the utility pole is owned by Kaua'i Island Utility Cooperative (KIUC). In addition to "Bracing of Utility Poles", the utility agency(s) may require the contractor to stabilize the ground adjacent to the pole(s). "Bracing of Utility Poles" and stabilizing the ground adjacent to the utility pole(s) includes all labor, materials, tools, and equipment necessary to install braces for existing utility poles, stabilize the ground adjacent to the utility poles, and for their removal when bracing and/or stabilizing are no longer necessary. Payment for bracing of utility poles or reimbursement for utility poles braced by KIUC or stabilizing the ground adjacent to the utility poles will not be made directly but shall be included in the Unit Price for the various items in the proposal.

Add the Following Section:

SECTION 302.41 – TRAFFIC CONTROL

Unless provided a specific line item in the proposal, Payment for traffic control work will not be made directly but shall be included in the Unit Price for the various items in the proposal.

SECTION 302.42 - REMOVING AND SALVAGING/DISPOSING OF MATERIALS

Payment for removal and salvage or disposal of materials (fire hydrants, standpipes, valve boxes, etc.) and for the restoration of the area shall not be made directly; costs for these items of work shall be included in the unit price offer for the various items in the proposal.

Add the Following Section:

SECTION 302.43 – EROSION CONTROL / BMP

Payment for all erosion control / BMP measures shown on the drawings will not be made directly but shall be included in the Unit Price for waterline installation.

- 1.1.03 DEPARTMENT OF PUBLIC WORKS, COUNTY OF KAUA'I STANDARD SPECIFICATIONS: Whenever reference is made within these Special Provisions or the contract plans to the DPW Standard Specifications, the specifications referred to is the

“HAWAI‘I STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND PUBLIC WORKS CONSTRUCTION” of the State of Hawai‘i, 2005, and all subsequent amendments. These specifications are not bound in these contract documents, but shall by reference be incorporated herein and made a part of these specifications.

1.1.04 DEPARTMENT OF PUBLIC WORKS, COUNTY OF KAUA‘I, STANDARD DETAILS: Whenever reference is made within these Special Provisions or the contract plans to the DPW Standard Details, the Details referred to is the “STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION”, September 1984 and all subsequent amendments. The DPW Standard Details are not bound in these contract documents, but shall be incorporated herein and made a part of these specifications by reference.

1.1.05 SPECIAL DEFINITIONS: The following definitions shall apply unless the context indicates otherwise. Wherever the terms “Engineer” or “Owner” are used in any document which forms a part of this contract, they shall mean the Department of Water, County of Kaua‘i and its authorized agents.

1.2 PRECONSTRUCTION CONFERENCE: The Contractor shall arrange a preconstruction conference with the Project Manager, along with other affected agencies, firms and individuals within seven (7) days after issuance of “Notice to Proceed”.

The Contractor shall submit a construction schedule to the Department of Water at the conference. This construction schedule shall be closely adhered to throughout the period of the contract.

At the preconstruction conference, the Contractor shall submit to the Department, the name of its authorized superintendent of the job.

The Contractor shall notify the Department at least three (3) working days prior to the start of construction.

1.3 CONTRACTOR’S RESPONSES BY HARDCOPY OR FACSIMILE: The Contractor may respond in writing by submitting a hardcopy or by facsimile only to the following Department’s requests:

- A. Notice of Intention to Propose.
- B. Request for Clarification.
- C. Pre-Proposal Due Date Modification or Withdrawal of Offers.

The hardcopy or facsimile shall be submitted as specified in the applicable subsection and shall include the following information:

To: Chief Procurement Officer
Department of Water, County of Kaua‘i

Fax Number: 1-808-245-5813

Attention: Procurement Officer

From:

Date:

Subject: (Subject of Facsimile)
Job No. 23-09 Paua Valley Motor Control Center Replacement

- 1.4 FAILURE TO COMPLETE ON TIME AND LIQUIDATED DAMAGES: The Contractor shall complete the work within the number of calendar days specified in the contract. The specified number of calendar days shall commence from the date designated in the Notice to Proceed.

Completion of the work within the required time is important since delay in the prosecution of the work will inconvenience the public, obstruct traffic and interfere with business.

If the Contractor fails to complete the work on or before the final completion date specified in the contract, damages will be sustained by the Department of Water, County of Kaua'i. Since the amount of damage, exclusive of the actual cost of engineering, inspection and superintendence, including necessary traveling expenses, is difficult, if not impossible to definitely ascertain and prove, the amount of such damages are fixed in advance at the sum of Five Hundred Dollars (\$500.00) for each and every calendar day which the Contractor has delayed in the completion of the contract; and the Contractor shall pay that amount as liquidated damages and not by way of penalty, and in case the same are not paid, the Department may deduct the amount thereof from any monies due or that may become due to the Contractor under the contract.

- 1.5 MEASUREMENTS: Figured dimensions and drawings take precedence over measurements by scale. The Contractor must verify all measurements at the site and be responsible for the accuracy of the same.

1.6 PROJECT RECORD DOCUMENTS:

1.6.01 SECTION INCLUDES: Overview of maintenance of documents, recording requirements, and submittal of Project Record Documents.

1.6.02 MAINTENANCE OF DOCUMENTS:

- A. Maintain a record copy of the following Project Record Documents on-site and record actual revisions to the work:
- (1) Contract Drawings.
 - (2) Specifications.
 - (3) Amendments.
 - (4) Change orders and other modifications to the Contract.
 - (5) Reviewed submittals.
 - (6) Permits. (Road, Building, Noise, NPDES, etc.)
 - (7) Specified installer/tradesman certificates.
 - (8) Update Revisions to BMP plans as required by NPDES permit(s).
 - (9) Other Project Record Documents as indicated in specific Specification sections.
- B. Store Project Record Documents apart from other documents. Provide separate files, racks, and secure storage for Project Record Documents.

- C. Record information concurrent with construction progress.
- D. Label and file Project Record Documents in accordance with these Specifications. Label each document "PROJECT RECORD" in neat, large, printed letters.
- E. Maintain Project Record Documents in a clean, dry and legible condition.
- F. Keep Project Record Documents available for inspection.

1.6.03 RECORDING REQUIREMENTS:

- A. Use an erasable red pencil (not ink or indelible pencil) to clearly record information or changes on the Drawings by graphic line and note as required. Use an erasable yellow pencil to clearly mark for verification all major components shown as constructed.
- B. Use different colors for overlapping changes if required for clarification.
- C. Record information concurrently with construction progress. Do not conceal any work until required information is recorded. Date all entries reflecting change.
- D. Legibly mark each item on the Drawings to record actual construction, including:
 - (1) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - (2) Field changes of dimension and detail.
 - (3) Changes made by Contract amendments and modifications.
 - (4) Details not on original Drawings.
 - (5) References to related shop drawings.
- E. Specifications: Legibly mark each item to record actual construction, including the following:
 - (1) Manufacturer's name and product model and number.
 - (2) Product substitutions or alternates utilized, as approved by DOW.
 - (3) Changes made by amendment and contract modifications.
- F. As-Built Drawings: The contractor shall provide and keep up-to-date a complete set of as-built prints for this project which shall be corrected regularly, showing every change from the original contract drawing set, including all addenda, change orders job decisions, etc. The as-built prints shall be used only as a record set and shall be kept on the job site available for the Department's review.

At the time of the final inspection, the contractor shall furnish the Department with one hard copy set of the as built drawings for review. After DOW provides review comments to the contract, the contractor shall provide one hard copy Mylar set with all original signatures and redline changes (**also CADD format and PDF format on CD**) showing all of the changes from the original contract set drawings including addenda, change orders, job decisions, etc. The “As-built Drawings” will be required to include the information stated in the General Provisions and prior to final acceptance as stated in the General Provisions. The “RECORD TRACINGS” block shall be utilized and signature blocks for the contractor, engineer and DOW Manager shall be provided on all sheets.

1.6.04 SUBMITTALS:

- A. At the completion of construction, deliver Project Record Documents.
- B. Transmit the Project Record Documents with a cover letter listing.
 - (1) Date.
 - (2) Project title and number.
 - (3) Contractor’s name, address, and telephone number.
 - (4) Number and title of each Project Record Document.
 - (5) Signature of Contractor or authorized representative.

1.7 SUBSTITUTIONS

- A. The materials or products specified herein by trade name shall be provided as specified. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such references shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Brand names where used on the plans or in the specifications shall be presumed to be followed by the words “or approved equal.” Such approval will be granted only under the following conditions: Substitution of a brand other than specifically name in the contract documents will be approved by the Department of Water if it meets the following conditions:

That it is equal or superior to the brand name in the specifications in construction, efficiency and utility.

That it is equal or less in cost to the Owner.

That during the construction period, the material or product specified cannot be delivered to the job in time to complete the work in proper sequence due to conditions beyond the control of the Contractor.

- B. To receive consideration, request for substitutions must be accompanied by documentary proof of the quality, difference in price and delivery, if any, in the form of certified quotations from suppliers of both specified and proposed materials or products. In case of a difference in price, the County shall receive all-benefit of the difference in cost involved by change order or credit the County with any savings so obtained.

- C. If substitution of any brand other than the one specifically named requires changes to work detailed or specified under other headings, then the Contractor assumes all responsibility for this work.
- D. Substitution request must be received by said date in Section 1.9 “Substitute Materials” (Section 1-Administration, Page 20).

1.8 STORAGE, WORK ZONE, CONSTRUCTION ACCESS: Department of Water shall not assume the responsibility to approve proposed storage areas, work zones, construction traffic pattern in and out of the project site. The Contractor shall be responsible for all additional NPDES permits, as well as, all updates to approved BMPs per NPDES permit approval requirements.

1.9 PRESERVATION OF PROPERTY: Due care shall be exercised to avoid injury to existing roadway improvements or facilities, utility facilities, adjacent property and roadside trees, shrubs and other plants that are not to be removed.

Roadside trees, shrubs and other plants that are not to be removed, and pole lines, fences, walls, signs, markers and monuments, buildings and structures, manholes and handholes, conduits, pipelines under or above ground, drain and sewer and water lines, all roadway facilities and any other improvements or facilities within or adjacent to the project shall be protected from injury or damage and if ordered by the Department of Water, the Contractor shall provide and install suitable safeguards, approved by the Department of Water, to protect such objects from injury or damage. If such objects are injured or damaged by reason of the Contractor’s operations, they shall be replaced or restored at the Contractor’s expense. The facilities shall be replaced or restored to a condition as good as when the Contractor entered upon the work, or as good as required by specifications accompanying the contract. The Department of Water may require the Contractor to make or cause to be made such temporary repairs borne by the Contractor and may be deducted from any moneys due or to become due to the Contractor under this contract. The fact that any underground facility is not shown upon the plans shall not relieve the Contractor of his or her responsibility. It shall be the Contractor’s responsibility to ascertain the existence of any underground improvements or facilities which may be subject to damage by reason of this operation.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in protecting or repairing property shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed.

1.10 EXTRA WORK: No work of any kind in connection with the work covered by these specifications and plans shall be considered as extra work, or entitles the Contractor to extra compensation, except when the work has been ordered in writing by the Department of Water, and specifically referred to as EXTRA WORK and the amount of compensation stated in the change order.

1.11 BUILDING LAWS: The Contractor shall comply with the local laws, ordinances, rules and regulations bearing on the work and he must obtain and pay for all permits, licenses, certificates and give all notices required thereby.

1.12 DELIVERY OF MATERIALS AT SITE: Have all materials delivered at the site in such quantities as will ensure the uninterrupted progress of the work and the least obstruction of the premises and the adjoining property.

1.13 DEFECTIVE MATERIALS: When requested, furnish, without charge, samples of all materials

entering into the work. All materials not conforming to the requirements of these specifications shall be considered as defective and all such materials, whether in place or not, shall be rejected.

- 1.14 CLEAN UP: On the completion of each day's work during this construction project, the Contractor shall remove from the site all debris, tools and excess material resulting from his or his subcontractor's the work and leave the work and any affected surroundings area broom clean.
- 1.15 ENVIRONMENTAL PROTECTION: The Contractor shall comply with the requirements for pollution control in performing all construction activities as set forth in the General Provisions.
- 1.16 PROJECT SIGN: The Contractor shall furnish, erect, maintain and remove one (1) project sign. The project signboard shall be 3/4 inch thick "AC" exterior grade fir plywood, 4 feet in height and 8 feet long. Sign shall be painted with one prime coat and two finish coats. The sign layout detail and sign and post details shall be submitted to the Department for approval. The project sign shall be erected at the site designated by the Department of Water within seven (7) calendar days after approval of the sign layout. The Contractor shall apply and pay for all permits and fees required for the placement of the sign. The sign layout shall include the Department of Water's logo (graphic to be provided by the Department of Water) and the following information:

**PAUA VALLEY WELL MOTOR CONTROL CENTER REPLACEMENT
JOB NO. 23-09
DEPARTMENT OF WATER**

1.17 SUBMITTALS:

1.17.01 SECTION INCLUDES: Overview of transmittal of submittals, submittals requirements, definition of submittal for review and definition of submittal for closeout.

1.17.02 RELATED SECTIONS: Section 1.6 Project Record Documents.

1.17.03 TRANSMITTAL OF SUBMITTALS:

- A. General: Transmit submittals, number of copies as indicated in subsequent articles, to the following address:

Kaua'i Department of Water
Attn: Contract Administrator
4398 Pua Loke Street
Lihu'e, Kaua'i, Hawai'i 96766

- B. Submittals for Review: Transmit one (1) copy to the Department of Water for review. The Department will retain electronic set and return one (1) reviewed set. Should the contractor require more returned, he shall provide the additional sets at his or her cost. Where more copies are called for in any section of these Special Provisions, the Contractor shall be required to submit said number of prints for approval.

Whenever possible, submittals/transmittals shall also be submitted electronically.

- C. Submittals for Closeout:

- (1) Operations and Maintenance Manuals:
 - a. Preliminary Submittal: Transmit one (1) copy of manual to the Department of Water two (2) weeks prior to final inspection. These copies will be returned after final inspection, with comments.
 - b. Final Submittal: Revise manuals and submit two (2) copies to the Department of Water two (2) weeks after receipt of comments to Preliminary Submittal.
- (2) Project Record Documents: Submit Project Record Documents at the time of final inspection.

1.17.04 SUBMITTAL REQUIREMENTS:

- A. Required submittals shall include:
 - (1) Shop drawings.
 - (2) Piping layout.
 - (3) Manufacturer’s Data.
 - (4) Certificates of Warranty.
 - (5) Any others as called for in the plans, specifications, or by the Engineer.
- B. The Contractor’s stamp and verification of drawings shall consist of the following information:

CONTRACTOR NAME

PROJECT: _____

JOB NO.: _____

THIS SUBMITTAL HAS BEEN CHECKED BY THIS GENERAL CONTRACTOR. IT IS CERTIFIED CORRECT, AND IN COMPLIANCE WITH CONTRACT DRAWINGS AND SPECIFICATIONS. ALL AFFECTED CONTRACTORS AND SUPPLIERS ARE AWARE OF, AND WILL INTEGRATE THIS SUBMITTAL INTO THEIR OWN WORK.

DATE RECEIVED: _____

SUBMITTAL NUMBER: _____

SPECIFICATION SECTION: _____

SPECIFICATION PARAGRAPH: _____

DRAWING NUMBER: _____

SUBCONTRACTOR NAME: _____

SUPPLIER NAME: _____

MANUFACTURER NAME: _____

CERTIFIED BY: _____

- C. This stamp, "filled in", should appear on the title sheet of each shop drawing, on a cover sheet of submittals in an 8½"x11" format, or on a one face of a cardstock tag (min. 3"x6") tied to each sample. The tag on samples should state what the sample is, so that, if the tag is accidentally separated from the sample, it can be matched up again.
- D. The person signing the Contractor's submittal stamp shall be the person with authority to act for the Contractor in connection with the contract during the performance of the contract. The signature shall be in original ink. Stamped signature will not be acceptable.
- E. Prepare submittals to show that the material, equipment, or work shown is in accordance with contract requirements and has been checked for dimensions and relationship with work of all other trades involved. All deviations from the plans and specifications shall be noted.
- F. Approval shall extend only to general conformance and shall not relieve the Contractor from his or her responsibility for coordinating his or her work with other trades and complying with the provisions of the contract documents for lengths, fits, quality of materials, quantities, applicable code requirements and other details. Approval does not authorize changes from the contract requirements unless stated in a separate letter or change order.
- G. Submittals shall be made in sufficient time to allow the Engineer not less than twenty regular working days for examining the drawings. The Contractor shall make submittals at the earliest possible date after the Notice to Proceed date to meet the construction schedule. The Engineer will not consider delays caused by the Contractor's failure to make submittals on time as justifiable reasons for contract time extensions.
- H. When the submittals have been reviewed by the Engineer, two sets of submittals will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the submittal may be rejected and one set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit six copies of the drawings, unless otherwise directed by the Engineer. No changes shall be made by the Contractor to the resubmitted shop drawings other than those changes indicated by the Engineer. The resubmittal shall be so indicated on the shop drawing.
- I. Prior to approval of such drawings, any work which the Contractor may do on fabrications covered by the same is at his or her own risk, as the County will not be responsible for any expense incurred by the Contractor for changes to make the same conform to the drawings as finally approved.
- J. Upon approval of the above drawings, lists, prints and other data, a copy of the same shall be kept with the job site plans, and the fabrications furnished shall be in conformance with the same. However, approval of above drawings, lists, prints, specifications and other data shall in no way release the Contractor from his or her responsibility for the proper fulfillment of the requirements of this contract nor for fulfilling the purpose of the installation nor from his or her liability to replace the same should it prove defective or fail to meet the specified requirements.

- K. Submittal Clarity:
- (1) Drawings:
 - a. Prepare finished drawings so that prints, reproducibles, and reductions to half size will be clear and legible.
 - b. Make free-hand lettering no less than 5/32 inch high and typewritten notes no less than 1/8 inch high to allow for reduction. Do not crowd lettering.
 - (2) Manufacturer's Literature:
 - a. Submit a minimum of one original of manufacturer's printed material. Remaining number of submittals may be reproductions. Ensure reproductions of original materials are clear and legible.
 - b. Clearly mark the item(s) and/or information applicable to this project with arrows, bubbles, etc. Do not use high-lighted markings.
 - c. Provide the name and phone number of manufacturer's sales and service representative for each device submitted.

1.17.05 DEFINITION OF "SUBMITTALS FOR REVIEW":

- A. Catalog Data: Manufacturer's standard printed information on materials, products and systems, which shows performance characteristics, dimensions, material of fabrication, and other characteristics necessary to assure conformity with the design requirements. Where other items or information not related to the work of this project are included in the literature submitted, the item(s) and/or information applicable to this project shall be clearly marked.
- B. Shop Drawings: Drawings necessary to show fabrication details to ensure compliance with contract documents.
- C. Block Diagrams: Block Diagrams necessary to show system connections and details to ensure compliance with contract documents.
- D. Wiring Diagrams: Drawings showing the point-to-point or schematic wiring of a piece of equipment or between pieces of equipment in a system.
- E. Calculations: The methods and results of calculations in documented form where specified.
- F. Material / Parts List: A list of system components or material components.
- G. Samples / Colors: Samples, including colors, of proposed materials.

- H. Certifications: A written statement, signed by a qualified party, attesting that items or services are in accordance with specified requirements. Typically, this written statement is accompanied by additional information to substantiate the statement.
- I. Installation Instructions / Test Procedures: Manufacturer's instructions, step-by-step if necessary, showing the field installation and testing of parts, components, equipment, and other similar items.
- J. Test Reports: Results of specified test requirements.
- K. Meetings: Schedule, agenda, attendees, and location for required meetings and meeting notes.
- L. Other: Other submittal information as described in individual specification sections.

1.17.06 DEFINITION OF "SUBMITTALS FOR CLOSEOUT":

A. Operations and Maintenance (O&M) Manuals:

(1) Format:

a. Hardcopy: Three (3) full sets

- 1) Size: 8½"x11". Fold 11"x17" drawings to 8½"x11" size. Reduce drawings larger than 11"x17" format to 11"x17" format.
- 2) Binders: Use commercial quality expandable post binders meeting the following requirements:
 - (a) Binder Covers: 1/8" thick construction (minimum).
 - (b) Hinges: Continuous, metal piano hinge.
 - (c) Binder Expandability: 3½" – 5½".
 - (d) Sheet Size: 8½"x11".
 - (e) Binder Cover Material: Heavy vinyl.
 - (f) Binder Printing: Provide custom printed spine and front imprinted with the following information:

County of Kaua'i
 Department of Water
 (Print O&M manual titles and project title)

- (g) Manufacturer's Reference: Specialty Loose Leaf, Inc.

- 3) Fill: Do not fill binders more than 75% full.

- 4) Indexed Tabs: Internally subdivide the binder contents with permanent page dividers, logically organized, with tab titling clearly printed under reinforced laminated plastic tabs.
 - b. Adobe PDF Electronic Copy: Provide a facsimile of the hardcopy O&M Manual in Adobe PDF Electronic Format on compact disk(s).
 - c. Electronic Data: Provide electronic files on compact disk(s) or jump drive of any material created electronically by Integrator, in file format in which document was created, that is, Microsoft Word, AutoCAD, etc., including but not limited to:
 - 1) Drawing Files.
 - 2) Installation Instructions.
 - 3) Software Documentation.
 - 4) Operating and Maintenance Instructions.
 - d. Odd Sized Material: Where O&M information does not lend itself to incorporation into 8½"x11" format, such as the material listed, below, provide it separate from the O&M Manuals. However, clearly label each item, and provide reference in the O&M Manual to the material that is provided separate from the O&M Manuals.
 - 1) Edge-glued books or manuals without 3-hole punched binding.
 - 2) Material of a size other than 8½"x11".
 - 3) Compact disks in jewel cases.
- (2) Contents:
- a. Table of Contents: Prepare a Table of Contents, for each volume, with each product or system description identified, and include with each volume of manual. Type on 24-pound white paper.
 - b. Directory: Provide names, addresses, and telephone number of Prime Contractor, Integrator, Installation Contractor, other subcontractors, and major equipment suppliers. Clearly identify contact for warranty support.
 - c. General: Provide operations and maintenance data for equipment described in the individual sections of the Specification. Prepare and include additional data when the need for such data becomes apparent during training.
 - d. Description of System and Component Parts:
 - 1) System block and interconnection diagrams.

- 2) Control diagrams by controls vendor and as-installed control drawing by Contractor.
 - 3) As-installed wiring diagrams, that is, ladder diagrams, point to point diagrams, loop diagrams, circuit directories of panel boards, and similar items.
 - 4) Manufacturer's printed installation, operating, and maintenance instructions for the exact item of equipment supplied.
 - 5) Catalog data containing information required for service, future additions or substitutions.
 - 6) Function, normal operating characteristics, and limiting conditions.
 - 7) Performance curves, engineering data and tests.
 - 8) Complete nomenclature and commercial number of replaceable parts.
- e. System Operating Procedures:
- 1) Description of sequence of operation by control manufacturer.
 - 2) Routine and normal operating instructions.
 - 3) Sequences required.
 - 4) Special operating instructions.
- f. System and Equipment Maintenance Procedures:
- 1) Routine operations.
 - 2) Guide to "trouble-shooting"
 - 3) Disassembly, repair and reassembly.
 - 4) Alignment, adjusting and checking.
- g. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
- h. Spare Parts List: List of manufacturer's spare parts provided with the job, manufacturer's current prices for spare parts, and recommended quantities to be maintained in storage.
- B. Project Record Documents: Provide Project Record Documents as required.
- C. Spare Parts / Maintenance Materials:

- (1) Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections prior to Final Acceptance.
 - (2) Deliver to Project site and place in location as directed by the Department of Water. Contractor shall obtain receipt.
- D. Test Reports: Results of specified test requirements. Provide Table of Contents of test results and incorporate into Operation and Maintenance Manuals described above.
- E. Warranty Certificates:
- (1) For each item required by specific sections of this specification, provide a notarized warranty certificate.
 - (2) Execute and assemble documents from subcontractors, suppliers, and manufacturer.
 - (3) For each item of copyrighted software provide under this contract, provide a software license certificate naming the Department of Water as the licensee and stating the number of licenses provided.
 - (4) Provide Table of Contents of software licenses and incorporate into Operation and Maintenance Manuals described above.

1.18 CONTRACTOR'S OPERATIONS: The Contractor must employ, insofar as possible, such methods and means of carrying out his work so as not to cause any interruption or interference to the Department of Water's or the landowner's operations. Where the Contractor's operations would result in interruptions which would hamper the operations, the Contractor shall coordinate his schedule of work with the Department of Water or the landowner, accordingly.

In the event that the Contractor obtains permission from the landowner for use of any area or resources outside of the designated lot(s), County Right-of-Way, State Highway's Right-of-Way, and/or designated easement(s), the Contractor shall meet the requirements of Division 300, Section 301.15 – USE AND/OR DAMAGE TO PRIVATE PROPERTY (PROPERTY OWNED OTHER THAN BY THE CONTRACTOR) of the Water System Standards, 2002.

END OF SECTION

WATER SYSTEM STANDARDS

DIVISION 300

SECTION 304.03 - ELECTRICAL WORK

The following shall modify and supplement Section 304.03 "Electrical Work", in the Water System Standards, 2002.

SECTION 304.03 Electrical Work

- A. SCOPE OF WORK. The following shall be ADDED to and be made a part of this subsection.
1. Provide all articles, materials, equipment, operations, and services herein or on Drawings, including all labor, materials, taxes, fees, insurance, and incidentals required to insure completion.
 2. TEST COMPLETE INSTALLATION. Installation shall be complete in every detail as specified and ready for use. Any item supplied by Contractor developing defects within one year of final acceptance by Department of Water Supply shall be replaced by such materials, apparatus, or parts to make such defective portion of complete system conform to true intent and meaning of these Drawings and Specifications, at no cost to Department of Water Supply. Exceptions are fluorescent ballast, fluorescent and incandescent lamps which will be guaranteed for 100 operating hours after date of final certificate of payment.
 3. WORK SHALL INCLUDE:
 - a. Underground service entrance raceways, including all required handholes and pullboxes required for electric utility services and electrical equipment at the Paua Valley Well site.
 - b. Updated utility metering equipment for new 480Y/277V electrical service at the Paua Valley Well site.
 - c. Service equipment and grounding system at the Paua Valley Well site.
 - d. Motor Control Center, complete with motor control components for pump and accessories at the Paua Valley Well site.
 - e. Various pump control systems at the Paua Valley Well site.
 - f. New power and control circuits for existing chlorination system at the Paua Valley Well site.
 - g. Coordination with utility company for electric service at the Paua Valley Well site.

- h. Provide new general use receptacles and equipment connection systems at the Paua Valley Well site.
 - i. Electrical conduit and wire system to connect the pump and various controls and instrumentation at the Paua Valley Well site.
 - j. Metering equipment according to KIUC requirements.
 - k. Final adjustment and testing of various pumps, controls, and instrumentation.
4. The Contractor shall make arrangements with KIUC for electrical services to the Paua Valley Well site, as indicated on the plans. The Contractor shall provide service equipment and suitable metering provisions.
 5. The Owner shall pay only non-recurring off-site power service charges incurred in providing this service but the Contractor shall pay for services and all other work pertaining to this contract and shall coordinate the request and installation so service is available when required for testing and completion of the contract.
 6. During bidding and construction, Contractor shall coordinate his work with utilities and other trades to avoid omissions and overlapping responsibilities. Electrical Contractor shall notify other trades and suppliers of project voltages and of existing equipment when new work must be compatible with existing conditions.

B. WORK BY OTHERS. The following shall be ADDED to and be made a part of this subsection.

1. Meters and final connection of service provided by KIUC.
2. Concrete, forming, excavation, backfilling and painting provided by respective sections of this contract.
3. Equipment utilizing electricity shall be provided by respective sections of this contract. Installation of equipment complete with power wiring and electric controls and interlock wiring shall be part of Electrical Work.
4. During bidding and construction, Contractor shall coordinate his work with utilities and other trades to avoid omissions and overlapping responsibilities. Electrical Contractor shall notify other trades and suppliers of project voltages and of existing equipment when new work must be compatible with existing conditions.

C. MATERIALS AND WORKMANSHIP. The following shall be ADDED to and be made a part of this subsection.

1. DRAWINGS:
 - a. These specifications are accompanied by architectural plans of buildings, site plans and diagrammatic electrical plans showing locations of outlets, switches, service runs,

feeder runs, devices, and other electrical equipment. Locations are approximate. Before installing, Contractor shall study adjacent construction details and make installation in most logical manner.

- b. Any device may be relocated within 10 feet before installation at direction of the Department of Water Supply without additional cost to Owner.
- c. Before installing, verify all dimensions and sizes of equipment at job site. Circuit and conduit routing is typical and may be altered in any logical manner; however, all changes shall be approved by the Department of Water Supply and shown on "as built" drawings.

2. DEPARTURES FROM DRAWINGS AND SPECIFICATIONS:

- a. Departures resulting from substitution of materials or system shall be accompanied by appropriate changes in all affected work of every trade. Such changes shall be at no increase in the contract amount and shall be the responsibility of the subcontractor or supplier responsible for the departures. Changes proposed by the Contractor shall be based on a system approach and shall be allowed if implemented without decrease in quality in performance or operations, increase in utility space to install the equipment. Such departures shall be submitted and noted in shop drawings for approval by the Department of Water Supply. Departures initiated by other trades, requiring changes in the electrical system as well as other systems, shall be accompanied by appropriate changes to all affected work of every trade, at no increase in contract amount, by the trade responsible for the departures.
- b. The General Contractor shall be responsible to coordinate, approve, and select systems that do not impose unaccounted for impact on the electrical work. It shall be understood that after the award of contract, all departures having electrical impact, shall make appropriate changes to the electrical system required to accommodate the departures and shall be at no additional cost to the Department of Water Supply.

3. CONSTRUCTION METHODS:

- a. Construction shall conform to construction practices as recommended by the American Electricians Handbook by Croft (latest edition), Edison Electrical Institute, National Electric Safety Code and Applicable Instructions of manufacturers of equipment and material supplied for this project.
- b. Grounding:
 - i. All services, motors, metallic enclosures, raceways, and electrical equipment shall be grounded according to requirements of National Electric Code. At buildings, 5/8" x 10' copperweld ground rods, Copperweld Steel Company, shall be driven with top 12" below finished grade and shall be connected together with bare copper wire buried 12" below finished grade to obtain a ground of 25 ohms or less as measured by three point potential method with an electric ground megger. At each building, connect ground to nearest cold water

pipe and to building entrance equipment, raceways, motors, ground type receptacles, and other metallic parts directly exposed to ungrounded electric conductors. Connection shall be made by continuous metal raceways or with conductors.

- ii. All grounding wire runs within buildings shall be copper conductors. Where applicable, all ground wires shall be run together with circuit conductors.
- c. Testing:
- i. All wiring shall be tested to ensure proper operation according to functions specified herein on drawings and other sections of these Specifications.
 - ii. Insulation resistance of wires shall be according to requirements of the National Electric Code. All feeder cables, #4 or larger, shall have insulation resistance of 1.5 megohms or higher. Insulation resistance shall be measured by a 500 volts megger, Biddle Company or equal. Resistance of feeder cables shall be recorded and turned over in 4 copies to Engineer during final inspection. Proper operation of all electrical devices shall be demonstrated at request of the Department of Water Supply during final inspection.
- d. Conduits:
- i. Below grade, within concrete floor slabs or within concrete walls use Schedule 40 PVC. Provide separate ground wire and rise out of ground or concrete slab with PVC and transition to rigid steel conduit within 6" of finished grade. For conduits rising out of walls, transition to EMT and galvanized rigid steel conduit as required below within 6" of emerging from the wall.
 - ii. Above finished ground floor where exposed below 7'- 0" above finished floor use rigid steel conduit; in non-air conditioned locations use rigid steel conduit; exposed on the exterior of the building or beneath the building use rigid steel conduit; where exposed on exterior of the building and exposed to sunlight use rigid steel conduit. Where exposed to corrosive atmospheres and near shorelines use rigid steel conduit. Where exposed to damage use rigid steel conduit.
 - iii. Conduits cut square and inner edges reamed. Butt together evenly in couplings.
 - iv. Bends and offsets made with hickey or conduit-bending machine. Do not use vice or pipe tee. Bends made so that interior cross-sectional area will not be reduced. Radius of curve of inner edge of field bend shall not be less than ten times the internal diameter of conduit.
 - v. Use of running threads not permitted. Where conduits cannot be jointed by standard threaded couplings, approved water-tight conduit unions shall be used.
 - vi. Cap conduits during construction with plastic or metal-capped bushings

to prevent entrance of dirt or moisture. All conduits shall be swabbed out and dried before wires or cables are pulled in.

- vii. Conduit shall be free from other piping, valves, or mechanical equipment.
 - viii. Fish wires, cords, strings, chains, or the like shall not be placed or inserted in the conduit system during installation.
 - ix. Insulating bushings and two locknuts installed on each end of every run of conduit at enclosures and boxes. Provide grounding bushings as required for grounding receptacles and to connect conduits to switchboard with #10 bare copper.
 - x. Securely fastened in place to all outlet boxes and to structure or support. Project adequate number of conduit threads through box for bushings. Anchorage for 1-1/2 inches and smaller conduit shall be made with one-hole galvanized conduit straps or clamps; 2 inches or larger conduit shall be anchored with galvanized wrought iron "U" clamps or equal fittings.
 - xi. Exposed conduit parallel with or at right angles to structural or architectural elements. Securely fastened in place with one-hole galvanized pipe strands with screws or bolts and spaced not more than 5 feet apart; or with approved beam clamps or approved single or gang pipe hangers spaced not more than 5 feet apart as the conditions require. Vertical runs supported at intervals not exceeding 5 feet by approved clamp hangers.
 - xii. Conduit runs with one 90° bend or equivalent, 150 feet maximum without pull box.
 - xiii. Conduit runs with two 90° bends or equivalent, 100 feet maximum without pull box.
- e. Boxes and Enclosures:
- i. Provide outlet boxes in hollow tiles or concealed in other spaces with extensions or raised rings of such depth that metal will be flush with surrounding surfaces of opening.
 - ii. Use gang boxes wherever 3 or more switches are installed at one location. Concealed boxes installed with edges flush with surrounding wall surface.
 - iii. Boxes plumb and exactly flush.
- f. Conductors:
- i. Mechanical means for pulling shall be torque-limiting type and not used for #2 AWG and smaller wires.

- ii. Pulling tensions shall not exceed wire manufacturer's recommendation.
 - iii. Where necessary, powdered soapstone used as lubricant for drawing wires through conduit. No other means of lubricating allowed. Conduit fittings shall not be used with conductors larger than #2 AWG.
- g. Splicing:
- i. Wires shall be formed neatly in enclosures and boxes.
 - ii. Splices made according to NEC. Conductors #10 and smaller twisted and secured with twist on wire connectors. Conductors #8 through #4/0 spliced with solderless clamp or compression (indent) connectors.
 - iii. Splices reinsulated according to wire manufacturer's instructions. Splice insulation shall be 150% in thickness of original wire insulation and of the same electrical and mechanical characteristics. Insulating type (600V use) shall be neoprene, Okoprene by Okonite Company or approved equal. Jacketing and insulating tape shall be high density cold setting polyethylene adhesive tape, Scotch No. 33 by Minnesota Mining and Manufacturing Company or approved equal.
- h. Finishing:
- i. Structural and architectural elements cut or drilled for installation of electrical system then patched, repaired, and restored. Drilling, cutting, patching, repairing, and restoring subject to approval of the Department of Water Supply.
 - ii. Attachment of electrical equipment to wood by wood screws. Attachment to concrete by embedded or expansion inserts and bolts. Powder charge driven with approval only. Close unused knockouts on boxes or expansion with metal cap.
 - iii. Wipe clean all exposed raceways and enclosures with rag and solvent. Unfinished raceways and enclosures prime painted and finished by Painting Section. Factory finished enclosures shall be painted. Panelboards identified by stenciling with paint on back of doors the voltage and designation. Voltage ratings stenciled on the front of disconnect switches and junction boxes where wires are terminated for connection to equipment that are not part of this contract.
4. EXTERIOR WORK: Materials, equipment, and construction methods specified in other paragraphs of the specifications for Electrical Work shall apply to the exterior work.
- a. Exterior underground cables and wires shall be NEC type THW or THWN insulated. Insulation and sheath conforming respectively to ASTM 0 1352-60 and ASTM 9 752-60. Splices shall be made with half lapped layers of insulation-jacketing neoprene tape, Minnesota Mining and Manufacturing Scotch No. 23 or equal and jacketed with

high density polyethylene plastic tape, Minnesota Mining and Manufacturing Company Scotch No. 33 or equal. Thickness of insulation and jacketing shall be equal to 200% of original cable. Splicing of conductors shall be made with sleeve compression type fittings. Entire splice, after reinsulating, shall be painted with black tape compound. Minnesota Mining and Manufacturing Company "Scotchcast" may be used.

b. Ductlines and Handholes:

- i. Ductlines shall consist of polyvinyl chloride (PVC) Schedule 40 duct in concrete jacket unless noted otherwise.
- ii. Ducts and fittings shall be round bore, for use with tapered fittings and manufactured from polyvinyl chloride (PVC). Kraloy/Chemtrol Co. PVC, Johns-Manville and Orangeburg Manufacturing Co., Schedule 40.
- iii. Concrete for ductlines shall be according to the "Concrete Section". Concrete for ductline jackets shall be 2500 psi compressive strength in 28 days with aggregates of #3 fine size.

c. Trenching and backfilling for ductlines and handholes shall be according to the "Trenching and Backfilling Section". Depths of trenches on slope shall be measured from finished grade of lower edge.

- i. Backfill Material, Type A: Backfill material shall consist of earth and gravel mix with gravel content consisting of 1 inch diameter maximum and not exceeding fifty percent (50%) by volume of the mix.
- ii. Backfill Material, Type B: Backfill material shall consist of earth and gravel mix with gravel content consisting of 1/2-inch diameter maximum and not exceeding twenty percent (20%) by volume of the mix.
- iii. Any existing underground piping or conduit that is encountered shall be properly shored and protected from damage. Any damage to existing utilities resulting from the Contractor's operations shall be repaired by him at his own expense.

d. Identification Tags: Each set of cables in handholes shall be identified by a noncorrosive metal tag. Letters shall be minimum 1/4 inch high identifying the cable as to use and/or voltage. Tags shall be wrapped around the cables and taped. Power tags shall be red.

e. Ductlines:

- i. Ducts and/or conduits shall be laid in the trenches on plastic treated against termite or concrete spacers. Spacing between ducts shall be as follows:
 - 1) Control/Instrumentation and control/instrumentation ducts - 1-1/2 inches of

concrete.

- 2) Electric power and electric power ducts - 1-1/2 inches of concrete.
 - 3) Electric power and control/instrumentation ducts - 3 inches of concrete.
- ii. After all ducts are installed, duct bank shall be securely bound with #12 steel tie wire and anchored to prevent movement during concrete pouring. Tapered ends of ducts or conduits shall be coated with sealing compound before coupling is applied to insure a water-tight joint. Reinforcing steel, shoring and forming, where required, shall be installed according to Concrete Section of this Specification. Concrete shall be poured on ducts without the use of mechanical vibrators. Concrete shall be tamped manually with wooden rods.
 - iii. Ducts shall be completely encased in concrete. The thickness of concrete encasement is minimum and may be increased to fit the actual shape of the trench. Changes in direction of runs exceeding 5 degrees shall be accomplished by using special couplings or bends manufactured for this purpose. Where conduit lines enter handholes, the conduits shall terminate in end bells. Conduit shall be thoroughly cleaned before laying. When it is necessary to cut a tapered end on a piece of conduit at the site, the cut shall be made with saw and tapered with a lathe designed to match the original taper.
 - iv. After the conduit line has been completed, a mandrel not less than 12 inches long having a diameter 1/4 inch less than the inside diameter of the conduit, shall be pulled through each conduit after which a brush with stiff bristles shall be pulled through to make certain that no particles of earth and/or gravel have been left in the line.
- f. Cables shall be thoroughly lubricated with soapstone before drawn into ducts.
5. DEVICES AND EQUIPMENT: All devices, materials, and equipment specified herein shall be manufactured and installed in accordance with the appropriate articles in the NEC except as noted.
- a. Wiring Materials:
 - i. Conduits: Hot dip galvanized, rigid steel, round bore electrical conduit and for use with threaded fittings. 3/4" minimum diameter unless otherwise specified on the drawings. Aluminum conduits shall not be used.
 - ii. Non-metallic Conduit: PVC schedule 40, 3/4" minimum diameter.
 - iii. Flexible Conduit: Liquid-tight flexible steel, zinc-coated, jacketed with high density polyethylene and with factory approved fittings. Liquid-tight with factory fittings for wet or moist areas.

- iv. Stainless Steel Materials: All stainless steel materials shall be Type 316 or 316L Stainless Steel.
- v. Enclosures and Cabinets: Enclosures and cabinets for panelboards, breakers, and switches shall be NEMA type, fabricated from galvanized steel, prime painted and enamel finished according to NEMA specifications.
- vi. Large Junction Boxes: For dry interior location, the box shall be fabricated from NEC gauge galvanized steel with matching screw-on type cover, field punched knockouts. For exterior and wet locations, the box shall be NEMA 4X stainless steel, with matching gasketed cover and threaded Myers type hubs for conduit connection. Screws shall be stainless steel.
- vii. Outlet and Small Junction Boxes: Concealed boxes shall be pressed from NEC code gauge steel, galvanized 4" square x 1-1/2" deep minimum or as specified on drawings.
 - 1) Exposed boxes and weather exposed recessed boxes shall be galvanized cast iron or NEMA 4X stainless steel, prime painted, enamel finished, threaded Myers type hubs for conduit connection.
 - 2) Extension or raised rings for pressed boxes pressed from NEC code gauge steel and galvanized. Use as required at device outlets and make box opening flush with finished surface.
- viii. Wires and Cables: Conductors shall be copper No. 12 AWG minimum. Conductors No. 10 and smaller, solid and round **except for control type conductors which shall be stranded**. Conductors No. 8 and larger, 7 or 19 strands, concentric. All conductors No. 6 and smaller shall be types THW for interior use or RHW for exterior use. All conductors No. 4 AWG and larger shall be type THWN-2 for interior use; or RHW-2 or USE-2 for exterior use. Conductors used for control wiring may be sized according to the system manufacturer based on their load and voltage drop calculations and code requirements. Conductors installed on roof tops and exposed to sunlight shall be derated per NEC Table 310.15(B)(2)(b) or shall be type XHHW-2. Conduit sizes shall be increased as necessary to accommodate derated and type XHHW-2 conductors. Reduce conductor sizes at equipment terminations as required to accommodate maximum allowable conductor size accepted at equipment terminals per manufacturer's recommendations. Provide UL listed in-line reducer splice kit or UL listed cable reducing adapter plugs as required to reduce conductor sizes.
 - 1) Provide color coding for all 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, the other neutral shall be white with a colored (not green) stripe. The color of the ungrounded conductors in different voltage systems shall be as follows:

a) 120/208 volt, 3-phase:

(1) Phase A – black

(2) Phase B – red

(3) Phase C – blue

b) 277/480 volt, 3-phase:

(1) Phase A – brown

(2) Phase B – orange

(3) Phase C – yellow

2) Color coding shall be maintained throughout entire system. Use other colors when more wires than above are contained in one raceway. Engineer shall determine whether deviation from color coding will be permitted.

3) Wire Markers: All wires shall be tagged with circuit identifying markers at both ends of termination. Markers shall be cloth with plastic letters covered with mylar film. Markers shall have high strength adhesive bond, be able to withstand abrasion, shall be oil and water resistant, and shall be taped around cable near termination.

b. Devices:

i. Tumbler Switches:

1) Single and 3-way as required, non-mercury quiet, 20 amperes, 120-277 volts, UL labeled AC type, silvered contacts, tumbler switch with endurance of 10,000 make-breaks. Enclose in outlet box and device plate.

2) When two or more switches are installed at single location, mount in gang box under single device plate. Interchangeable line of switches may be used only when use of gang box conflicts with other work.

ii. Duplex Receptacle: Duplex 20 ampere, 125 volts, 3 wires, side and back wired, grounding type in plastic body with parallel and ground U-shaped slots.

iii. Device and Cover Plates:

1) Plates for interior flush construction shall be satin finished 302 high nickel stainless steel, 18% chrome, 8% nickel with suitable holes for device.

2) Plates for exposed and weather exposed boxes (indicate WP on drawings) shall be cast metal with neoprene gasket for sealing against entry of water

or moisture into box. Switch plates provide with neoprene cover over handle or raintight level mechanism. Receptacle plates shall be provided with weatherproof lid as indicated on drawings.

- iv. Hardware, Supports, Backings, etc.: All hardware, supports, backings, and other equipment shall be provided. Wood materials shall be "wolmanize" treated against termite; iron or steel materials shall be galvanized for corrosion protection and nonferrous materials shall be brass or bronze.
- c. Protective Equipment:
- i. Panelboard: Copper busses with bolted molded plastic case circuit breaker complement. Assembly shall be mounted in a NEMA 1 surface mount enclosure, as indicated. Provide circuit directory in metal frame. Manufacture and install according to NEC Articles 240 and 384.
 - ii. Individual circuit breaker shall consist of molded plastic case circuit breaker with toggle operated mechanism and thermal-magnetic overload trips. Interchangeable trip shall be provided when available. Toggle positions "ON" and "OFF", engraved or embossed on body. Breakers shall have 10,000 ampere minimum interrupting capacity unless indicated otherwise.
 - iii. Equipment disconnect switch: Heavy-duty horsepower rated, lever-operated contacts, spring-loaded.
- d. Miscellaneous Equipment: Utility Company Meter Socket shall be in accordance with NEMA, EUSERC, and KIUC standards, enclosed in stainless steel enclosure, raintight construction with gray enamel finish.
- e. Main Electrical Service and Well Pump Feeders Surge Protective Device (SPD):
- Furnish new service surge protective device as shown on the plans for each new well pump motor control circuit.
- i. General Features
 - 1) Peak Surge Current Capacity: 300kA per phase, 150kA per mode.
 - 2) Suitable for use in ANSI/IEEE Category A, B & C locations.
 - 3) UL Listings:
 - a) UL 1449 3rd Edition
 - b) cUL
 - c) UL 1283

- 4) Manufacturer Qualifications: ISO 9110 and ISO 12000 certified manufacturer.
 - 5) Ground per NEC and manufacturer's instructions.
- ii. Mechanical and Electrical Features
- 1) 200kAIC short circuit rating with 60A RK5 fuse (fuse to be provided)
 - 2) Input Power Frequency: 47Hz to 420Hz
 - 3) Operating Temperature: -40 degree F (-40 degree C) to +185 degree F (85 degree C)
 - 4) Response Time: ≤ 1 ns.
 - 5) Mode protected: L-L, L-G.
 - 6) Each MOV protected from over-current, thermal overload and monitored individually
 - 7) Diagnostics: 1 green indicator per phase, normally on. Form C Volt Free (dry) relay contacts, rated 60W or 125VA / 125VAC and 0.5A / 30VDC and 1.0A, internal weatherproof mounting
 - 8) Capacitance: up to 15nF per mode
 - 9) Surge Life per UL Life Cycle Testing (20kV, 10kA impulse): >20,000 impulses
 - 10) S.M.A.R.T. diagnostics: audible alarm, surge counter, phase loss monitoring with reset ability for surge counter
 - 11) Integral fused disconnect
 - 12) ARM-3 remote alarm module
 - 13) ANSI/IEEE C62.41-1991 Measured Limiting Voltage
- iii. Manufacturer: Cutler-Hammer SPD Series, Total Protection Solutions or approved equal.
- f. Branch Feeder Circuit Surge Protective Devices (SPD):
- i. General Specifications:
 - 1) Provide solid-state surge protection unit.

- 2) The unit shall be latest UL 1449 listed.
 - 3) Units shall have integral, replaceable fusing per phase, with status indicators (except for pin base mounted 120V surge suppressor, which shall have internal fusing).
 - 4) Unit enclosure shall be resistant to oil, moisture, and dust, and other industrial airborne contaminants.
 - 5) Each unit shall include installation instructions, and be warranted for a minimum of five (5) years.
 - 6) Lead lengths must be supplied by manufacturer, and be no longer than 30 inches.
- ii. General Construction:
- 1) Enclosure shall be nonconductive, corrosion resistant, and shall withstand temperatures of -40° to 200° F.
 - 2) Electrical components are manufactured specifically for surge suppression.
 - 3) Units are fast acting externally or internally fused per phase, thereby eliminating code requirement for adding circuit breaker or fused switches at panel.
 - 4) Units shall have blown fuse indicator lights, one for each phase (except for pin base mounted 120V surge suppressor).
 - 5) Units shall use #14 AWG 64 Strand Nickel Cadmium wire, 105°C.
- iii. General Electrical Characteristics:
- 1) Response time/component response time shall be sub-nanosecond.
 - 2) Enclosure shall be rated for NEMA 1, 2, 3, 3R, 4, 4X, 12 and 13, as required, (except for pin base mounted 120V surge suppressor, which shall be rated for NEMA 1 only).
 - 3) Frequency range: 50-400Hz
 - 4) EMI-RFI noise attenuation: to 40dB
 - 5) Operating Temperature: -40° to 85°C.
 - 6) Operating Humidity: 1% to 95%
 - 7) Maximum peak transient power line voltage @ 120V - 2.4 megawatts.

- 8) Capacitance: 1 to 1.5 - microfarad per line.
 - 9) Rated power dissipation: 1 watt per line.
 - 10) Latest U.L. 1449 Listed.
- iv. Specific Technical Specifications:
- 1) System: 480V, 3 phase, 3 wire (delta).
 - a) Max. continuous line voltage (RMS): 485
 - b) Nominal clamping voltage (peak): 558
 - c) Max. peak current (8 x 20) sum: 90,000
 - d) Transient energy (joules): 3150
 - e) Fuses: 5 Amp, 600V (Buss KTK-5)
 - 2) System: 120/208V, 3 phase, 4 wire (wye).
 - a) Max. continuous line voltage (RMS): 130
 - b) Nominal clamping voltage (peak): 198
 - c) Max. peak current (8 x 20) sum: 90,000
 - d) Transient energy (joules): 1345
 - e) Fuses: 10 Amp, 250V (AGC or equal)
 - 3) System: 120V, 1 phase, 2 wire.
 - a) Max. continuous line voltage (RMS): 130
 - b) Nominal clamping voltage (peak): 170
 - c) Max. peak current (8 x 20) sum: 6,500
 - d) Transient energy (joules): 155
 - e) Fuses: internal.
 - f) Failure indicators
 - g) Alarm (120V) allows user to be notified, or various other features such

as shutdown can be performed.

h) Pin base mounted with eight pin base socket and spring retainer.

6. GENERATOR TAP BOX

The generator tap box shall be manufactured by ESL Power Systems, Eaton, or approved equal. The approved manufacturer must have produced and sold generator tap boxes for a minimum of two (2) years, and shall provide a complete factory assembled and tested outlet box; the final installation shall comply with the applicable NEC standards.

The tap box shall be constructed in accordance with the latest UL 891 standard with the minimum withstand rating as indicated on the Drawings. Warranty shall be minimum 1 year after shipping from manufacturer.

- a. Enclosure: minimum NEMA Type 3RX, 316 stainless steel. The main access shall be through a hinged door that extends the full height of the enclosure. Access for portable generator cables with female cam-style plugs shall be via cable entry openings in the bottom of the enclosure. A hinged flap door shall be provided to cover the cable openings when cables are not connected; the hinged flap door shall allow cable entry only after the main access door has been opened. Enclosure shall be powder coated after fabrication; color shall be wrinkle light gray.
- b. Overcurrent protection device: UL 489, 3 pole molded case breaker integral to equipment, 80% rated (standard), with an ampere interrupting capacity no less than indicated on the Drawings for the applicable voltage system.
- c. Cam-style female connectors (outlets) shall be single-pole separable type, rated for 600VAC with an ampacity no less than the overcurrent protection device indicated on the plans. Connectors shall be constructed in accordance with the latest UL 1691 standard. Cam-style female connectors shall be color coded, and shall be provided for each phase and for ground, and shall also be provided for neutral if required. The ground cam-style female connectors shall be bonded to the enclosure, and a ground lug shall be provided for connection of the facility ground conductor. None of the cam-style female connectors shall be accessible unless the main access door is open.

7. MOTOR CONTROL CENTER (MCC)

The Motor Control Center (hereinafter noted as MCC) shall be manufactured and assembled by Square D, General Electric, Eaton, Siemens, Allen Bradley or approved equal.

THE MOTOR CONTROL CENTER SHALL BE FACTORY ASSEMBLED, WIRED, AND TESTED.

The MCC shall be constructed in accordance with the latest UL 845 standards, with necessary steel plates, angle iron supports and bolts, and shall be of the cubicle type as shown on the drawings. MCC shall be rated NEMA Class II, Type C. The MCC shall

meet the requirements for Seismic Zone D as defined by the latest version of the International Building Code. All wires shall be identified by wire number wherever terminated with an approved type slip-thru wire marker. Submit sample for review by the Department of Water Supply. The wire number, terminal block number and terminal block arrangement within the MCC shall be indicated on the shop drawings.

Switches mounted on front panel of the MCC shall be mounted no higher than 70 inches AFF. Emergency stop pushbuttons shall be mounted no higher than 60 inches AFF. Account for 3-1/2-inch concrete housekeeping pad.

Terminal blocks shall be control type, one piece, 600 volt, 30 amperes, phenolic marking strip, screw with wire saddle-type clamps on both sides, total number of points as required.

Wire markers shall be slip-thru type, white bands with black numbers, compression type of heat shrink, identification numbers to match shop drawings.

Nameplates shall be installed as shown on the drawings.

All necessary sides, top, and back sheets and doors for totally enclosing the switching apparatus, and for forming the steel cabinets shall be included as part of the telemetering section.

No changes may be made in the overall dimensions of the electrical control section without the written approval of the Department of Water Supply.

The MCC shall be arranged in one continuous assembly, as indicated on plans, and shall include, but not be limited to, the following:

a. Motor Control Center Panels: Number of panels as shown on plans.

For housing motor starter, molded case circuit breaker, control circuit relays, wiring, and appurtenances. These compartments shall be fully enclosed and shall have a door in the front on which shall be mounted the following:

- i. Selector Switches
- ii. Trouble Reset Push Button
- iii. Emergency Stop Button, Pull to Reset
- iv. Manual Timeclock and Timer Switches
- v. Indicating Lights
- vi. Test/Normal Switch

For flush mounting the digital multi-function power monitor.

For mounting circuit breakers and selector switches, as shown on drawings.

This compartment shall be fully enclosed with a door in the front of the compartment.

b. The following is a list of the major component parts of the electrical control center.

i. Incoming Main Power Breaker:

1) The incoming power breaker shall have continuous ampere trip rating as indicated with symmetrical ampere interrupting capacity rating, and voltage trip rating as called for in the short circuit analysis and coordination study.

ii. Well Pump Feeder Circuit Breaker:

1) Feeder circuit breakers shall be stored energy type mechanism to provide quick-make and quick-break operation, UL listed 80 percent continuous current capacity. The feeder circuit breakers shall have a solid state tripping device and shall be molded case equipped with toggle type handle over center switching mechanism that is trip-free so that breaker cannot be held closed against short circuits and abnormal currents. The tripped position shall be clearly indicated by breaker handle maintaining a position between "ON" and "OFF." All poles shall open, close, and trip simultaneously. Short circuit capacity shall be determined by the results of the required short circuit and arc flash analysis.

a) Circuit breakers shall provide manual switching operation by means of a low-torque handle or pushbutton on the front of the unit. Automatic operation during overload and short circuit conditions shall be provided by solid state tripping devices located in the circuit breaker frame.

b) Circuit breakers shall be front accessible, stationary, individually mounted, and shall have short circuit capabilities equal to or greater than the system in which they are installed.

iii. Instrument Transformers:

1) General: Instrument transformers shall be molded dry-type in accordance with ANSI C57.13. Transformer volt-ampere rating shall be suitable for carrying the specified load without overheating or exceeding the permissible accuracy for the transformer.

2) Potential Transformers: Potential transformers shall have an ANSI accuracy class of 0.6. They shall be equipped with current limiting fuses.

3) Current Transformers: Current transformers shall be furnished with the specified ratios. The accuracies shall conform to ANSI C57.13.

iv. Feeder Circuit Breaker:

- 1) Disconnecting means for feeders shall be circuit breakers with thermal-magnetic trip units for 250 A and smaller frames; provide an electronic trip unit for 400 A and larger frames.
- 2) Interrupting capacity rating shall meet or exceed the available fault current as called for in the short circuit analysis and coordination study.
- 3) Minimum frame size shall be 125 A.
- 4) Provide one normally open and one normally closed circuit breaker auxiliary contact which follows the position of the circuit breaker main contacts for indication of 'On' or 'Off/Tripped'.

c. Motor Starters:

i. Scope of Work:

- 1) These specification requirements are for solid-state reduced voltage motor controllers herein referred to as soft starts.
- 2) They are for use with NEMA design B, AC motors to reduce the current in-rush as well as mechanical shocks that can result from starting or stopping a motor across the line.

ii. Quality Assurance:

- 1) The soft start shall be listed by an independent testing laboratory in accordance with Electric Industrial Control Equipment Specification UL 508.
- 2) The soft start shall carry the CE mark for indication of compliance to medium voltage and EMC directives.
- 3) The manufacturer shall be a certified ISO 9002 facility.

iii. Warranty: An eighteen-month warranty shall be provided on materials and workmanship from date of final acceptance. Provide a 3-year manufacturer's warranty, based on a supervised start-up by a manufacturer's trained technician.

iv. General Description:

- 1) The soft start shall be provided by the manufacturer in a configuration suitable for panel mounting. The component must be suitable for mounting in a pollution degree 3 environment. All power devices and components must be inaccessible during routine maintenance or set-up.
- 2) The soft start shall utilize a thyristor (SCR) bridge consisting of at least two

SCRs per phase to control the starting and stopping of industry standard motors.

- 3) The soft start shall provide torque control for linear acceleration without external feedback independent of motor load or type of application. The gating of the thyristors will be controlled in such a manner to ensure smooth and stable acceleration ramp.
 - 4) The soft start shall be controlled by a microprocessor that continuously monitors the current and controls the phasing of the SCRs. Analog control algorithms shall not be allowed.
 - 5) All soft start power ratings will utilize the same control module.
 - 6) Integral protective capabilities and selectable deceleration control shall be available even if a shorting contactor is used with soft starts rated 47 A or above. Power terminals shall be provided to simplify integration shorting contactor integration without additional components.
 - 7) The soft start shall have the ability to be programmed for power outage ride thru and catch the motor while spinning and re-ramp in the case of a power outage.
 - 8) The soft start shall contain a real time clock capable of recording 9 faults and 99 events.
 - 9) Acceptance of a tachometer input for speed controlled ramp.
 - 10) Zero sequence ground fault input.
 - 11) Motor PTC feedback.
 - 12) Minimum of 3 Form A and 3 Form C programmable relays.
 - 13) The main controls circuit board shall be housed in a NEMA 4X fiberglass enclosure with a clear Lexan cover.
- v. Motor Data: The soft start shall be designed to operate a NEMA design B motor with a nameplate rating of one standard size larger than nameplate rating of motor being provided, for cooler operation of the SCRs.
- vi. Ratings:
- 1) The soft start shall be designed to operate in an ambient temperature 0°C to 40°C. For ambient temperatures between 40°C and 60°C, derate the current by 1.2% per °C above 40°C.
 - 2) Storage temperature range shall be -25°C to 70°C.

- 3) Maximum relative humidity shall be 93% at 40°C, non-condensing.
- 4) The soft start shall be designed to operate in altitudes up to 3300ft. For higher altitudes, derate by 0.5% for each additional 330 ft.
- 5) The soft start shall be capable of operation between -15% and +10% of normal voltage rating.
- 6) The soft start shall automatically adapt for operation at 50 or 60 Hz. Frequency tolerance shall be $\pm 5\%$ when starting between +5% and -15% during steady state operation.
- 7) The soft start shall be capable of supplying 350% of rated full load current for 30 seconds or 115% continuous at maximum ambient temperature.
- 8) The SCRs shall have minimum P.I.V. rating of 2.5 times the line voltage or minimum of 8000 P.I.V.
- 9) Rated short circuit of 50 KARMS.
- 10) Insulation test rating of 33 KVAC, 146.7 KVDC.
- 11) Basic impulse load level rating of 75 KV BIL standard.
- 12) Lower rated SCRs with protection by MOVs are not acceptable.

vii. Main Isolation Switch:

- 1) Operating Features:
 - a) Externally operable, ganged 3 pole load break, fault make unit.
 - b) Switch shall interrupt no-load current of control transformer supplied in controller.
 - c) In off position, the switch shall ground the load side components, discharging hazardous stored energy, to provide safer operation and maintenance.
 - d) Removes power to coil of inline and bypass contactor before removing line power during manual operation of the disconnect to open incoming power.
 - e) Mechanically and/or electrical interlocked to prevent opening of medium voltage door when isolating switch is in the closed position and prevent closing of the isolating switch when medium voltage door of starter is open.

2) Design Features:

- a) One Normally Open and one Normally Closed auxiliary contacts as standard.
- b) Disconnect Switch shall remain connected to external operating handle at all times, fully interlocked with inline contactor.
- c) Capable of being padlocked in open position with up to three locks.

3) Required Ratings:

- a) Rated interrupting current, RMS: 600A load break
- b) Rated interrupting current, RMS: 600A
- c) Continuous current, RMS: 600A
- d) Impulse withstand BIL: 95 KV standard
- e) Momentary current, RMS: 40 kA (asymmetrical)
- f) Short-time current, RMS: 25 kA (3 seconds)
- g) Fault closing current with CL fuses: 40 kA (asymmetrical)

viii. Power Fuses & Holders:

- 1) Current limiting type rated 50KAIC symmetrical.
- 2) Fuse size shall be manufacturer's standard.
- 3) Fuses shall be vertically mounted in the enclosure for ease of inspection and removal without special tools.
- 4) Provide blown fuse indication.
- 5) Power fuse holders to be manufacturer's standard style, part of starter assembly.
- 6) Fuse holders shall be designed to accept current limiting fuses for Class E2 operation.

ix. SCR Stacks:

- 1) Arranged for proper heat management.

- 2) Heat sinks sized for specified Starts per Hour without requiring auxiliary cabinet cooling fans when possible. Fans may be required for severe duty cycles.
- x. SCR Gating: Provide Fiber Optic Continuous Hard Gate Drive Signals and Fiber Optic Cable to SCR stacks for safe isolation of control and power circuits and precision control of SCRs.
 - xi. Contactors: An inline (main) contactor and a bypass contactor shall be provided as follows:
 - 1) Vacuum break type: Fixed mounted style.
 - 2) Current rating: Manufacturer standard for horsepower rating.
 - 3) Voltage rating: Up to 13,800 VAC.
 - 4) The main and/or bypass contactor shall be sequenced by the starter manufacturer for proper operation of the solid state starter.
 - 5) The bypass contactor shall bypass the SCRs after starting and while the starter is in the run (full voltage) mode.
 - xii. Line Reactors: Line reactors shall be supplied with all starters to protect the AC switches from unfavorable circuit conditions. Line reactors shall be connected within the starter circuit.
 - xiii. Terminations For External Connections:
 - 1) Phase sequencing shall have proper identification.
 - 2) Cable entry or exit shall be bottom and/or top as required.
 - 3) A minimum of 18 inches space shall be allowed for contractor installation of Stress Cones during wiring of the starter.
 - xiv. Adjustments and Configurations:
 - 1) All dialogue functions, display units, remote functions, terminal blocks, configuration switches and adjustment potentiometers shall be accessible on the front of the control module. Exposure to control circuit boards or electrical power devices during routine adjustments is prohibited.
 - 2) Digital indication shall provide, as a minimum, the following conditions:
 - a) Soft start status - ready, starting/stopping, run.
 - b) Motor status - current, torque, thermal state, power factor.

- c) Fault status - Motor thermal overload, starter thermal fault, phase fault, frequency fault, supply fault, locked rotor fault, motor underload, max start time exceeded, external fault, serial link fault, phase inversion, internal failure, overcurrent, ground fault.
 - d) Time between starts.
 - e) Starts per hour.
 - f) 16 RTD input feedback.
- 3) The starter must be preset to the following for adjustment-free operation in most applications:
- a) Torque acceleration ramp of 10 seconds.
 - b) Current limitation to 300% of the motor full load current rating.
 - c) Class 10 overload protection.
 - d) Motor current preset per NEC and UL tables for standard hp motors.
- 4) A digital keypad shall be utilized to configure the following operating parameters as required:
- a) Motor full load amps adjustable from 50 to 130% of the controller's rating.
 - b) Current limitation on starting adjustable from 1.5 to 7 times rated motor current.
 - c) Torque ramp adjustable from 1 to 60 seconds.
 - d) Initial torque adjustable from 10 to 100% of nominal motor torque.
 - e) Torque limit adjustable from 10 to 200% of nominal motor torque.
 - f) Maximum start time adjustable from 10 to 999 seconds.
 - g) Voltage boost adjustable from 50 to 100% of the nominal supply voltage.
 - h) Selection of freewheel, soft stop or braking.
 - i) Adjustable soft stop torque ramp time from 1 to 60 seconds.
 - j) Threshold to change to freewheel following a soft stop from 0 to 100%

of the nominal motor torque.

- k) Braking torque level adjustable from 0 to 100% effectiveness.
 - l) Selection of Class 2, 10, 10A, 15, 20, 25, or 30 motor thermal overload protection.
- 5) A digital keypad shall be utilized to configure the following controller parameters as required:
- a) Selectable automatic reset operation.
 - b) Cancellation of the torque control loop for multi-motor installations.
 - c) Adjustment of the stator loss estimation for specialty installations.
 - d) Assignment of controller inputs and outputs.
 - e) Activation of phase reversal protection.
 - f) Reset of motor thermal state.
 - g) Return of factory settings.
 - h) Activation of test mode for use with low power motors.
 - i) Indication of elapsed time in hours of starting, running and stopping.
 - j) Adjustment of internal backspin timer parameter.
 - k) Enable and adjustment of slow speed parameter (Cyclo-Converter 0.1% to 40% motor speed).
 - l) Configuration and enable of Squared and S ramp profiles.
 - m) RTD O/L biasing by RS-485.
- 6) Output relay shall provide the following status indications:
- a) One form A and one form B minimum for indication of fault or control of an isolation contactor.
 - b) One form A for indication that torque ramp is complete and current is below 130% motor FLA (End of start).
- 7) Additional inputs and outputs shall be available to provide the following status indications:

- a) One logic input for force to freewheel, indication of external fault, force to local control, control of cascading motors, or external motor overload reset.
 - b) One logic output for indication of motor thermal overload pre-alarm or presence of motor current and one logic output to indicate overcurrent alarm.
 - c) One analog output shall be available for 4 to 20 milliamp indication of motor current, torque, thermal state, or power factor.
- 8) Relay and I/O functions listed above must be isolated with respect to common.
- 9) Low Voltage Compartment
- a) Locate the low voltage section behind separate door and physically isolated from the medium voltage section.
 - b) Door to permit access to control logic without exposure to medium voltages.
 - c) Interlocking and control as well as metering, relays, and pilot devices shall be located in this section.
 - d) Optically isolate main control PC card located in low voltage section from medium voltage Gate Driver cards on power poles.
 - e) Controller shall include 120VAC test capability to power and adjust microprocessor control when isolating switch is in open position, with the following features:
 - (1) Test circuit shall consist of receptacle mounted in low voltage compartment and accessible only when low voltage door is open.
 - (2) In test position, plug may be inserted into the provided receptacle and connected to external 120V source of power.
 - (3) This shall isolate control transformer and prevent energizing control transformer secondary from test voltage source.
 - f) The interior of the Low Voltage compartment shall be painted white.

xv. Protection:

- 1) A microprocessor controlled thermal protection system shall be included which continuously calculates the temperature-rise of the motor and soft start and provides:

- a) An overload pre-alarm that indicates by relay contact that the motor has exceeded its rated temperature rise by 110%. This function shall be annunciation only.
 - b) A thermal fault condition that stops the motor if the temperature-rise exceeds 120% of the motor thermal capacity.
 - c) An analog electronic circuit with a time-constant adjustable to the motor's thermal cooling time-constant ensuring the memorization of the thermal state even after power supply disconnection or shorting out of the power semiconductors.
- 2) The soft start shall provide phase loss, phase reversal, underload, stall, and jam protection.
 - 3) The integral protective features shall be active even if an external shorting contactor is used to bypass the SCRs during steady state operation.

xvi. Control Options:

- 1) The soft start's control circuit shall be completely independent of its power circuit and adaptable to other voltages, 50 or 60 Hz. The peripheral soft start control circuitry shall be operated at 120 VAC, 60 Hz from a control power transformer included within the MCC soft start's section.
- 2) The soft start shall accept control logic either by operator devices (pushbuttons, selector switches, etc.) wired directly to the unit or from external relay logic, including but not limited to the following:
 - a) Three position H-O-A switch that provides for manual (HAND) start or remote signal (AUTO) start from remote relay contacts.
 - b) Red RUN pilot light illuminated whenever the soft start is provided with a run command and no fault condition is present.
 - c) Green STOP pilot light illuminated whenever the soft start is supplied with control power and no run command is present.
 - d) All operator devices shall be panel door mounted using supplied 120 Vac control logic. Clearly labeled terminals shall be provided.
- 3) Starter shall have either a RS234 or RS485 digital communication port and be MODBUS compatible.

xvii. Shorting Contactor:

- 1) Shorting contactor shall be NEMA rated.

- 2) A microprocessor shall control the operation of the shorting contactor via an output relay.
- 3) The shorting contactor shall close, shorting the thyristors after the motor current is below 130% of motor FLA and voltage is below nominal voltage (indicating ramp complete) and open on a stop command to allow a deceleration ramp.
- 4) Overload protection integral to the soft start shall continue to protect the motor when shorting is utilized.

xviii. Manufacturer: Benschaw with MX3 controller, or approved equal.

- d. Terminal Blocks: Control type, one piece, 600 volt, 30 amperes, phenolic marking strip, screw with wire saddle-type clamps on both sides, total number of points as required, end-to-end mounting as required. General Electric CR151B series or equal.
- e. Control Relays: Cutler-Hammer D26 Series Type M or equal. Relays shall be equipped with a neon indicating light mounted on the relay to indicate the state of the magnet coil. Number of contacts and types indicated on the drawings. Furnish with mounting channels. Furnish mounting channels in place for future relays where indicated.
- f. Selector Switches: Cutler-Hammer Type 10250T or equal, oiltight, with knob operator and maintained contacts unless otherwise indicated. Operation, contact arrangements, and legend plates as indicated on the drawings.
- g. Pushbuttons: Cutler-Hammer Type 10250T or equal, oiltight, with flush button operator, black color unless otherwise indicated. Operation, contact arrangement, and legend plates as indicated on the drawings.
- h. Emergency Stop Pushbutton: Cutler-Hammer Type 10250T or equal, maintained contact with separate reset pushbutton, large mushroom red pushbutton with wording "EMERGENCY STOP".
- i. Indicating Lights: Cutler-Hammer Type 10250T or equal, oiltight, LED with press-to-test circuit, color and legend plates as indicated on the drawings.
- j. Time Delay Relays: Cutler-Hammer Type PN, for pneumatic type, 0-3 minutes adjustable. Agastat Series 7000 for timing ranges longer than 3 minutes. Operation, contacts, and timing ranges as indicate on the drawings.
- k. Nameplates: Nameplates shall be 1/8 inch black-white-black laminated plastic plates with identifying nomenclature engraved into plate to expose white Commercial Gothic letters. Nameplates screwed to MCC or motor starter enclosure.
- l. Control Circuit Sequence Timer:

- 1) Shall be as manufactured by the Siemens Energy & Automation, Inc. LOGO! 230RL Series, or approved equal.
 - 2) The timer control shall be equipped with required circuits to perform the functions as indicated on the plans.
 - 3) The timer shall operate on 120 volt, 60 cycle power. Time range of the timer shall be adjustable from 0-30 minutes.
- m. Manual Timeclock: 120 volt astronomic electromechanical timeclock suitable for running motor control signals for a set time period without use of SCADA inputs. Minimum 1 programmable channel with SPST relay, 24/7/365 on/off control, holiday scheduling, and up to 128 time-based programmable events minimum 1 minute apart.
- n. Cabinets: Cabinets fabricated from galvanized NEC code gage steel with hinged door and latch, finished to match panelboards and with one inch termite treated plywood backing inside.
- o. Wireways: Wireways shall be fabricated from NEC code gage steel, square cross-section, galvanized, prime painted and enamel finished. Manufacture and install in accordance with NEC Articles 362 and 374.
- p. Three Phase Digital Multi-Function Power Monitor:
- 1) The meter shall be UL listed and CE marked.
 - 2) Power meter shall be designed for Multifunction Electrical Measurement on 3 phase power systems.
 - a) Meter shall support 3-Element Wye, 2.5 Element Wye, 2 Element Delta, 4 wire Delta systems.
 - b) Surge withstand shall conform to IEEE C37.90.1
 - c) The meter shall be user programmable for voltage range to any PT ratio.
 - d) Meter shall accept a burden of up to .072VA per phase, Max at 600V, 0.003VA at 120 Volts.
 - e) The meter shall accept a voltage input range of 5 to 347VAC Line to Neutral, and a range of 10 to 600VAC Line to Line.

The meter shall accept a current reading of up to 20 Amps continuous. Start-up current for a 5 Amp input shall be no greater than 0.005 Amps
 - f) The meter shall have a frequency range of (45 to 69.9) Hz.

q. Three Phase Digital Multi-Function Power Monitor – Main Service:

The three phase digital multifunction power monitor shall measure simultaneously display metered electrical power functions, including: Volts, Amperes, Frequency, KW, KVAR, PF, Total KWH, Total KVARH, and Total Harmonic Distortion. It shall also include digital communications and up to 10 channels of analog outputs.

- i. The meter shall be UL listed and CE marked.
- ii. Power meter shall be designed for Multifunction Electrical Measurement on 3 phase power systems. The meter shall perform to spec in harsh electrical applications in high and low voltage power systems.
 - 1) Meter shall support 3-Element Wye, 2.5 Element Wye, 2 Element Delta, 4 wire Delta systems.
 - 2) Surge withstand shall conform to IEEE C37.90.1 and ANSI C62.41 (6kV).
 - 3) The meter shall be user programmable for voltage range to any CT or PT ratio.
 - 4) Meter shall have a voltage burden of not more than 0.072VA per phase, Max at 600V, 0.003VA per phase, Max at 120 Volts.
 - 5) The meter shall have a current inputs burden of not more than 0.008VA per phase Max at 20 Amps.
 - 6) The meter shall accept a voltage input range of (5 to 347) VAC Line to Neutral, and a range of (10 to 600)VAC Line to Line
 - 7) The meter shall accept a current reading of up to 20 Amps continuous. Start-up current for a 5 Amp input shall be no greater than 0.005 Amps
 - 8) The meter shall have a frequency range of (45 to 69.9) Hz.
- iii. Power Meter shall use a dual input method for current inputs. Method one shall allow the CT to pass directly through the meter without any physical termination on the meter, ensuring the meter cannot be a point of failure on the CT circuit. The second method shall provide additional termination pass-through bars, allowing the CT leads to be terminated on the meter. The CT used with the power meter shall be metering class Current Transformers following the applicable standards of C57.13 with an accuracy rating of 0.3% or better.
 - 1) Fault Current Withstand shall be 100 Amps for 10 seconds, 300 Amps for 3 seconds, and 500 Amps for 1 second at 23°C.
 - 2) Pass through wire gauge dimension of 0.177" / 4.5 mm shall be available.

- 3) All inputs and outputs shall be isolated to 2500 Volts AC.
- iv. The power meter shall measure and report the following quantities at a minimum:
 - 1) Watts (total and per phase), VARs (total and per phase), VA (total and per phase), Power Factor (total and per phase), voltage max/min in the Interval, and Frequency. 100 millisecond and one second readings shall be available simultaneously. Readings shall be available for both metering and control. All specified readings shall be made available through the meter's standard and optional communication ports.
 - 2) Accumulated Watt-hr, VA-hr, and VAR-hr; Watt-hr received; Watt-hr delivered; VAR-hr and VA-hr reading shall be accumulated and stored for each of the 4 quadrants of power.
 - 3) Power demand shall be simultaneously calculated using five different averaging methods: Fixed Window (Block) Average, Sliding Window (Rolling Block) Average, Thermal Average, Predicted Average, and Cumulative Demand. Values for all averaging intervals must be available simultaneously.
 - 4) Fixed Window (Block) Average interval shall be user-settable from one second to 18 hours. Sliding Window (Rolling Block) Average sub-interval shall be user-settable from one-second to 18 hours. The number of intervals in the Sliding Window (Rolling Block) Average shall be user-settable from one to 255 sub-intervals.
 - v. The power meter shall compensate for errors in current transformers and potential transformers.
 - 1) Error shall include voltage, multipoint current, multiphase angle, and better than .01% resolution.
 - 2) The unit shall utilize five different current compensation points per phase wherein the points shall be concentrated at the lower end of the dynamic range.
 - vi. The power meter shall provide the following accuracies. Accuracies shall be measured as percent of reading at standard meter test points.
 - 1) Power meter shall meet ANSI C12.20 for Class 2 and IEC 62053-22 accuracy requirements.
 - 2) Voltage accuracy shall be within less than 0.05% for the one second reading and less than 0.1% for 100 millisecond reading.

- 3) Current accuracy shall be within less than 0.025% for the one second reading and less than 0.1% for the 100 millisecond reading.
 - 4) Frequency shall have a display resolution accuracy of less than 0.01 Hz for the one second reading and less than 0.03 Hz for the 100 millisecond reading.
- vii. The power meter shall have Auto-calibration components that include:
- 1) Precision internal references with real-time auto calibration for voltage and current channels.
 - 2) An internal temperature sensor that enables recalibration of the meter upon change of temperature in real time, while under operation.
- viii. The power meter shall include upgrade packs that shall enable in-field upgrade without removing the installed meter. The three upgrades packs shall be:
- 1) V1 - Standard power meter as described in this document with 128 MegaBytes memory and 512 samples per cycle.
 - 2) V2 - V1 plus 1 Gigabyte memory and 1024 samples per cycle.
 - 3) V3 - V2 plus 10MHz Transient recording.
 - 4) V-2 and V-3 shall enable an IEC 61850 Protocol Network Server for the standard Ethernet port.
- ix. The power meter shall include an integrated 5.7-inch touch screen TFT LCD color display with multiple display modes. Display shall support 4 groups of screens: Real Time, Trending, Alarms, and Power Quality modes.
- 1) Groups of screens shall include:
 - a) Real Time viewing of voltage, current, power, demand
 - b) Accumulated Energy and Time of Use readings
 - c) Flicker readings in Instantaneous, Short Term (PST), and Long Term (PLT)
 - d) Alarm conditions
 - e) Phasor analysis
 - f) Harmonic spectrum analysis and waveform scopes for both voltage and current

- g) Real time trending
 - h) Log status
 - i) Configuration settings
- 2) The Display shall be constructed of bright TFT glass with a high temperature and long-life LED backlight. CCFL backlight shall not be acceptable.
 - 3) The meter shall have two infrared accuracy test pulses on the meter front.
 - 4) The display shall support screen rotation to enable vertical meter mounting.
 - 5) The display shall be selectable for English text.
 - 6) The display shall have a Demand Reset lock located on the bottom left section of the display. The Demand lock shall allow for a physical locking device to seal a Demand Reset switch.
- x. The power meter shall provide multiple digital communication ports and support multiple open protocols:
- 1) The meter shall include an ANSI Optical port for communication to external devices that supports speeds of up to 57,600 bps.
 - 2) The meter shall have one standard 10/100BaseT Ethernet port. With V-2 and V-3 upgrade packs, this Ethernet port shall provide IEC61850 protocol in addition to Modbus/TCP. The IEC 61850 Protocol Ethernet Network server shall provide the following features:
 - a) Integrates into any IEC 61850 network.
 - b) Provides support for Modbus and IEC 61850 protocols simultaneously.
 - c) Configurable for multiple logical nodes.
 - d) Provides buffered and unbuffered reporting.
 - e) Provides configurable .ICD and .CID files.
 - 3) The meter shall have a second Ethernet port. Optional Ethernet port shall be available as either 10/100BaseT or 10/100Base-FX Fiber Optic configuration.
 - a) The meter shall include two RS485 ports through the Dual Pulse Output/RS485 card. The card shall have 4 user-programmable KYZ pulse outputs. Each RS485 port shall be user configurable with regard

to speed, protocol, address, and other communications parameters. All Ports shall support a minimum communication speed of up to 115k baud simultaneously and be assignable for Modbus or DNP 3.0 communication.

- b) The meter shall have a high-speed USB port mounted on the front panel.
 - c) The meter shall communicate simultaneously using Modbus RTU, Modbus ASCII, DNP 3.0, Modbus TCP/IP, DNP over Ethernet, and, with V-2 and V-3 upgrade packs, IEC 61850 protocols as standard configurations. All instantaneous data, logged data, event data, power quality analysis and waveform information shall be available using both Modbus TCP and FTP file transfer format. The meter shall also provide means for custom Modbus mapping.
 - d) The meter shall include DNP 3.0 protocol utilizing a level 2 implementation for communication to SCADA systems. All instantaneous data and average data shall be available using DNP 3.0 protocol. User shall be able to custom map data into DNP protocol using Windows based Communicator EXT™ software.
- 4) The meter shall have Input/Output expandability through four Option card slots on the meter's back and through optional External Output modules.
- a) The Option cards shall be capable of being installed in the field, without removing the meter from installation.
 - b) The meter shall auto-detect the presence of any Option cards.
 - c) The available Option cards shall be:
 - d) Ethernet card with RJ45 or Fiber Optic port with 100BaseT support
 - e) Up to two Relay Output cards with 6 output relays on each card
 - f) Up to two Digital Input Status cards with 16 inputs on each card
- 5) The meter shall have optional External Output Modules in the following configurations:
- a) The meter shall support up to 4 Analog Output Modules in 0-1mA or 4-20mA, in either 4 or 8 analog output models.
 - b) The meter shall support up to one Digital Dry Contact Relay Output Module, with 4 relay outputs.
 - c) The meter shall support up to 4 Digital Solid State Pulse Outputs modules for KYZ pulsing.

- d) The meter shall support up to 4 Analog Input Modules for external sensing of temperature or process conditions
 - e) External Output modules shall be powered by external power source and attached to the meter with mounting brackets.
- 6) The power meter's Ethernet port(s) shall act as a Web server.
- a) Web server shall host webpages with meter information. Multiple meters may be displayed on the webpages. Webpages shall be viewable using any standard Internet browser. Webpages shall provide access to live meter readings, power quality information, and general meter information, and also shall enable remote upgrades to the Ethernet card's firmware.
 - b) Web server shall operate without ActiveX controls or Java Applets and shall be readable via smart phone and/or tablet computing devices.
 - c) Web server shall operate through firewalls.
 - d) Web server shall support emailing of alarm conditions to configured email addresses.
 - e) Web server shall be fully customizable.
 - f) Web server shall support DNP over Ethernet and at least 8 simultaneous sockets Modbus TCP/IP.
- xi. The power meter shall internally record and store Time of Use data.
- 1) The following Time of Use parameters must be included:
 - a) Bi-directional consumption and demand
 - b) Eight (8) TOU Schedules
 - c) Twenty (20) Year Calendar
 - d) Four (4) seasons per year
 - 2) The meter must provide the following TOU information for all rates in real-time:
 - a) Hourly accumulations
 - b) Daily accumulations

- c) Weekly accumulations
 - d) Current month accumulations
 - e) Previous month accumulations
 - f) Current season accumulations
 - g) Previous season accumulations
 - h) Total accumulations to date
 - i) Programmable Freeze Registers
 - j) Cumulative Demand
- 3) Full four quadrant accumulations for Watt-hr, VAR-hr, VA-hr and coincident VARs during peak watt demand including max demand, shall be available for each rate schedule, each season and for total accumulations.
- xiii. The power meter shall have eight built-in digital high-speed status inputs:
- 1) Inputs shall automatically sense when the circuit is externally wetted.
 - 2) If externally wetted, inputs shall accept up to 300VDC; if internally wetted the meter shall supply the necessary voltage for the control application.
 - 3) Status inputs shall be configurable for pulse accumulation, pulse synchronization, or event monitoring. When used for pulse accumulation, each input shall have an accumulating register to count incoming pulses.
 - 4) All changes in status shall be time stamped to the nearest millisecond and placed in an event log with time and event label information.
 - 5) Event log shall enable users to recreate sequence of events involving external status points.
- xiv. High-speed status inputs shall be able to trigger waveform recording to the waveform log.
- xv. The power meter shall enable users to perform Flicker analysis and reporting and shall comply fully with the requirements of EN61000-4-15 and EN61000-4-30 Class A.
- 1) The meter shall provide logging and monitoring for Instantaneous, Short term readings (PST-10min) and Long term readings (PLT-4 hour).
 - 2) Flicker shall support both 220Volt/50Hz systems and 120Volt/60Hz

systems.

- 3) The meter shall offer full reporting of power quality conditions using the EN61000-4-30 Class A methodology. The meter shall support automatic generation of EN50160/IEC61000-4-30 reports at user-settable intervals. Reports shall be viewable with a Log Viewer program and downloadable to other applications. In support of EN61000-4-30 Class A methodology, the meter shall calculate group and sub-group values for harmonics and inter-harmonics, up to the 51st order. Thresholds for the values shall be programmable. The sub-group readings and over-threshold status shall be available through the Flicker log and Modbus registers.

xvi. The power meter shall have 16-bit Waveform and Fault Recorder.

- 1) The meter shall record up to 1024 samples per cycle continuously on all 8 channels simultaneously, and transient captures sensitive to at least 166,000 samples per cycle. Storage for recorded waveform samples shall be up to 1000 MegaBytes.
- 2) The meter shall perform voltage and current recording with pre- and post-event analysis when a waveform limit is exceeded. Pre and post event shall be configurable to up to 30 cycles pre- and up to 300 cycles post-event.
- 3) Fault recording shall offer 8 times full scale capture capability.
- 4) The meter shall allow viewing of Harmonic magnitudes to the 512th order. Real time Harmonic magnitudes shall be resolved to the 128th order.
- 5) Percent THD and K-factor shall be calculated by the meter.
- 6) The accuracy of the IRIG-B time stamping of the waveform capture shall be 100 microseconds.

xvii. The power meter with upgrade pack V-3 shall have a sub- cycle Transient recorder.

- 1) The transient recorder shall process 10MHz high- speed voltage transients.
- 2) Transient will be analyzed utilizing a field programmable gate array (FPGA) to designate the high peak transient magnitude and its duration in nanoseconds.

xviii. The power meter shall be equipped with extensive non- volatile memory for recording logs and Programming data.

- 1) The meter shall have at least 1000 MegaBytes of non-volatile storage. Equipped with 1000 MegaBytes of memory, the meter shall be able to store 800 files or a total of 800 MegaBytes in logs.

- 2) In the event of loss of control power, the data stored in memory shall be retained for no less than ten years.
 - 3) The meter shall have no less than eight historical logs. Each historical log shall be user configurable, and the user can allot the amount of memory for each log. The user must be able to select up to 128 parameters per log.
- xiv. The meter shall have a log for Limits/Alarms. The Limits log shall provide magnitude and duration of an event, time- stamp, and log value.
- 1) The meter shall have a log for System Events. The System Events log shall record the following occurrences with a time-stamp: Demand Resets, Password Requests, System Startup, Energy Resets, Log Resets, Log Reads, and Programmable Settings Changes.
 - 2) The meter shall have a log for High-speed Input status changes.
 - 3) The meter with Upgrade packs 3 shall have a log which is capable of recording a waveform both when a user-programmed value goes out of limit and when the value returns to within limit.
 - 4) The meter shall store a separate ITIC/CBEMA log that records magnitude and duration of voltage and current surges and sags for every power quality event. The CBEMA log shall be downloadable through the digital communication ports.
- xv. The power meter shall provide a separate IRIG-B input for time synchronizing to GPS time signal.
- 1) IRIG-B input shall accept un-modulated time signal input from a standard GPS satellite clock.
 - 2) Time input shall enable synchronizing of meter time to within one millisecond of Universal Standard Time as transmitted by the GPS clock system. Synchronizing shall not be subject to network or other delays.
- xvi. The power meter shall be programmable by software supplied by the meter manufacturer.
- 1) Software shall have a user-friendly, Windows® OS compatible interface.
 - 2) Software shall include capacity to program meter, download meter, and analyze downloaded data files.
 - 3) Software shall store all data in an ODBC compliant database. Data based storage shall include all log and waveform data.

- xvii. The power meter shall provide Limits alarms and Control capability as follows:
- 1) Limits can be set for any measured parameter.
 - 2) Up to 34 limits can be set.
 - 3) Limits shall be based on % of Full Scale settings.
 - 4) Manual Relay Control shall be available through software.
 - 5) Relay set delays and reset delays shall be available.
- xviii. The power meter shall be able to act as a Master RTU device.
- 1) The meter shall have the ability to poll Remote Modbus slave devices, read data from the slave devices and log the data for RTU concentrator functions.
 - 2) The meter's Master RTU port shall support Modbus RTU.
- xix. The power meter shall have password and sealing switch protection.
- 1) The meter shall support a bi-level and extended password configuration.
 - a) Level 1 shall provide access to TOU accumulations.
 - b) Level 2 shall provide access to all password protected functions.
 - c) Level 2 shall allow the creation of up to 8 additional password profiles with specific restrictions and capabilities.
 - 2) The meter shall support a sealing switch consisting of a physical switch located on the front panel and a software setting to enable/disable the sealing switch. When it is enabled, the sealing switch shall further restrict access to password protected features.
- xx. The power meter shall be appropriately constructed to provide long life in abusive physical and electrical environments.
- 1) Meter firmware shall be held in flash RAM and shall be upgradeable through one of the communications port without removing the unit from service.
 - 2) Meter shall operate successfully at temperature extremes from -20°C to $+70^{\circ}\text{C}$.
 - 3) Depending on ordered option, meter shall operate with control power from either (100-240) VAC or (90-265) VAC@50/60Hz; (100-370) VDC; or (18-60) VDC.

- 4) Meter shall have a standard 4-year warranty.
- xxi. Provide current transformers (CTs) for power monitor connected and configured per power monitor manufacturer's standard wiring diagram. CTs shall be accuracy class 0.3% per C57.13 standards. Coordinate selection of CTs with power monitor manufacturer.
- xxii. Provide potential transformers (PTs) for power monitor connected and configured in accordance with power monitor manufacturer's standard wiring diagram for WYE configuration, for 120V connection at the power monitor. PTs shall be accuracy class 0.6% per C57.13 standards. Coordinate selection of PTs with power monitor manufacturer.
- xxiii. Manufacturer: The power meter shall be manufactured by Electro Industries/ GaugeTech, model number: NEXUS1500+ -D2-60-20-V1-485P-X-X-X, or approved equal.
- r) Three Phase Electric Motor Protector shall be a SymCom, Inc. Model No. 777 or approved equal. Do not provide this item if Benshaw motor starters are provided.
 - i. Input Voltage:
 - 1) 200 - 480 VAC, 3 phase (Standard).
 - 2) (500-600 VAC, 3 phase (Available).
 - ii. Frequency: 50 or 60 Hz
 - iii. Motor Full Load amp Range:
 - 1) 2 - 90 Amps, 3 \emptyset (Direct)
 - 2) 91 - 800 Amps, 3 \emptyset (External CT's)
 - iv. Programmable Operating Points:
 - 1) LV - Low Voltage Threshold: 170V - HV Setting
 - 2) HV - High Voltage Threshold: LV Setting - 528V
 - 3) VUB - Voltage Unbalance Threshold: 2 - 15% or 999
 - 4) MULT - # of Loops or CT Ratio (XXX:5): 1 - 10 Loops or 100-800
 - 5) OC - Over Current Threshold: (20 - 100A) / MULT
 - 6) UC - Under Current Threshold: (0, 10 - 98A) / MULT

- 7) CUB - Current Unbalance Threshold: 2 - 25% or 999 (OFF)
 - 8) TC - Over Current Trip Class: 5, J5, 10, J10, 15, J15, 20, J20, 30, J30
 - 9) RD1 - Rapid Cycle Timer: 2 - 500 Seconds
 - 10) RD2 - Restart Delay After All Faults Except Under Current (Motor Cool Down Timer): 2 - 500 Minutes
 - 11) RD3 - Restart Delay After Under Current (Dry Well Recovery Timer): 2 - 500 Minutes
 - 12) #RU - Number of Restarts After: 0, 1, 2, 3, 4, A (Automatic)
 - 13) ADDR - RS485 Address: A01 - A99
 - 14) #RF - Number of Restarts After All Faults Except Under Current: 0, 1, oc1, 2, oc2, 3, oc3, 4, oc4, A, ocA
 - 15) UCTD - Under Current Trip Delay: 2 - 60 Seconds
 - 16) GF - Ground Fault Current Threshold: (3 - 20A) / MULT or OFF
- v. Physical Specifications:
- 1) Low Voltage: 4 seconds
 - 2) Output Contact Rating (Pilot Duty) SPDT: 480 VA @ 240 VAC
 - 3) Transient Protection (Internal): 2500 V for 10 mSeconds
- vi. Accuracy:
- 1) Voltage: +/- 1%
 - 2) Current: +/- 3% (<100 amps direct)
 - 3) Timing: 5% +/- 1 Second
- vii. Repeatability:
- 1) Voltage: +/- 0.5%
 - 2) Current: +/- 1% (<100 amps direct)
- viii. Temperature Range: 0 - 70 degrees Celsius

- ix. Dimensions: 3.0" H x 5.1" D x 3.6" W
 - x. Power Consumption: 10 Watts (Max.)
 - xi. Weight: 1.2 lbs.
 - xii. Motor saver shall be provided with the MODBUS Output monitoring port.
- s. Three Phase Electric Motor Protector Remote Manager shall be a SymCom, Inc. Model RM-2000 with an RS485MS-2W serial interface for connection to the SymCom, Inc. Model 777-KW Motor Protector, or approved equal. Do not provide this item if Benshaw motor starters are provided.
- i. Control Voltage - 115VAC +/- 10%; 50-60 Hz
 - ii. Transient Protection (Internal) - 2500 V for 10ms
 - iii. Power Consumption - 3 Watts (Maximum)
 - iv. Communication Ports:
 - 1) 1 Port for MS777
 - a) Setup: Even Parity, 1 Stop Bit
 - b) Baud Rate: 9600
 - c) Protocol: Modbus RTU
 - d) Available Addresses: 01
 - e) Serial Interface: RS485
 - 2) 1 Port for PC, PLC, etc.
 - a) Setup: None, Odd, or Even
 - b) Baud Rate Parity Protocol: 1 or 2 Stop Bits
 - c) Available Addresses: 300 – 28800
 - d) Serial Interface: Modbus RTU; A01 - A99; RS485
 - v. Real-time Clock:
 - 1) Battery Back-up Life: 10 years @ 25 degrees Celsius without external power.

- 2) Last fault memory: Stores up to 4 faults with time and date stamp, includes voltages and currents at the time of trip.
- vi. Output Relays:
- 1) (option 1): Consult Factory for Function of Relays
 - 2) Configuration: Two Independent Electro- Mechanical Form C(SP DT)
 - 3) Contact Material: Silver/Tin Oxide
 - 4) Pilot Duty Rating: 240 VA @ 120 VAC
 - 5) General Purpose Rating: 5 A @ 120 VAC
- vii. Analog Output (option 2):
- 1) Types: 0-20 mA, 4-20 mA, 0-5 VDC, 0-10 VDC (specify with order, for others consult factory)
 - 2) Output Signal: KW, PF, Amps, or Volts
 - 3) Maximum Load: (Software Selectable)
 - a) 0-20 mA: 500 Ohms max.
 - b) 4-20 mA: 500 Ohms max.
 - c) 0-10 VDC: 2 kilo Ohms min.
 - d) 0-5 VDC: 2 kilo Ohms min.
 - 4) Accuracy: +/- 1% @ 25 degrees Celsius
 - 5) Isolation: 1 kVrms
- viii. Analog/Digital:
- 1) Inputs (option 3): Consult Factory
- ix. Physical Specifications: Remote Manager.
- 1) Certifications:
 - a) UL: UL 508
 - b) cUL: cUL 508

- c) CE: Pending
- x. Environment:
 - 1) Class of Protection: NEMA 4x
 - 2) Ambient Operating Temp.: -20 to 70 degrees Celsius
 - 3) Ambient Storage Temperature: -30 to 70 degrees Celsius
 - 4) Humidity: Up TO 85%, non-condensing
- xi. Enclosure:
 - 1) Dimensions: 6.1" L x 6.5" W X 1.1" D
 - 2) Weight: 1.2 lbs.
 - 3) Material: Black Polycarbonate
- xii. Display: Liquid Crystal with extended temp range.
 - 1) Size: 2 rows x 20 characters
 - 2) Lighting: LED Back-Light
- xiii. Keypad: Eight 0.5" stainless steel dome buttons for tactile feedback.
 - 1) Mechanical Life: 50,000 actuations
 - 2) Overlay Material: Polyester
 - 3) UV Exposure without degradation: 2000 Hrs.
- xiv. Terminal: Depluggable terminal block.
- t. Capacitors and Capacitor Breakers:
 - i. The KVAR rating of the capacitor shall be per the motor manufacturer's recommendation and such that the power factor of the individual motor and related control be as near unity as standard size capacitors permit at line voltage and no load conditions. Capacitors shall be designed and manufactured according to NEMA standards, and rated in continuous KVAR, voltage and frequency for operating within the ambient temperature range of -40° to +46°C. They shall be subject to all NEMA standard dielectric tests.
 - ii. They shall be filled with nonflammable high dielectric liquid and be individually fused with current-limiting fuses. Askarel and insulating liquids

containing polychlorinated biphenyls (PCB's) shall not be provided. Capacitors shall have high ohmic value discharge resistors connected internally across the terminals of the capacitor units to reduce the residual voltage after the unit has been disconnected from the circuit.

- iii. Capacitor circuit breakers shall be thermal-magnetic type and be suitable for capacitor furnished. Breaker rating shall be approximately 150 percent of capacitor rated current.
- iv. Capacitor, and capacitor circuit breaker, shall be mounted in the motor control center.
- u. Capacitor Isolation Contactor: The capacitor isolation contactor shall be provided to isolate the capacitors from the pump motor feeder circuit during starting of the pump motor. Rating of the isolation contactor shall match or exceed the capacitor circuit breaker rating.
- v. Infrared Window: Infrared windows shall be provided to allow for thermal scanning of the MCC.
 - 1) Window shall be 4" in diameter.
 - 2) Fully impact-resistant.
 - 3) UL 94 5VA nylon window housing and cover.
 - 4) UL 946 compliant, visual, UV and IR transmissive polymer optic.
 - 5) Aluminum coated with UL 94 5VA nylon reinforcing grill.
 - 6) UL 94 5VA TPE gaskets.
 - 7) 316 stainless steel hardware.
- w. Thermal Imager: Thermal imager shall be provided for the infrared scanning of the MCC,
 - 1) 9 Hz minimum refresh rate.
 - 2) 2% temperature measurement accuracy at 25° nominal.
 - 3) 4 feet minimum infrared focus distance.
 - 4) 3.5" minimum LCD display.
 - 5) -20°C to 250°C temperature measurement range.
 - 6) Mini USB for direct download to a PC.

7) 7.5 to 14 micrometer spectral band.

x. Phase Reversal/Loss Relay:

- i. The phase reversal/loss relay shall be Timemark Model No. C2652, 3-phase, 480 volts, with adjustable range of 380- 500 VAC and drop out time of 0.05 seconds or approved equal. Relay drops out under the following conditions; loss of any phase, low voltage on any or all phases and phase reversed from A-B-C sequence.
- ii. The relay shall continuously monitor 3-phase power lines for abnormal conditions. Solid state sensing circuit and reset timer can be used with either Wye or Delta systems without requiring a neutral. Red "Trip Light" and green "Normal Light" to show condition of sensing circuit and the output contacts shall be provided.

y. Current Limiting Fuses:

- i. Time delay, Class J fuses. Fiberglass body, 300kA Interrupt rating, 2:1 selectivity, open fuse indicator.
- ii. Spare Fuse cabinet, NEMA 1, wall mounted. Inventory card pocket on door, four shelves, and lockable door. Provide with 15 spare fuses.

z. Motor Control Center Approval: Prior to installation, the Contractor shall submit to the Department of Water Supply for their approval, five copies of the dimensional drawings and connection diagram of the motor control center. The Contractor shall also provide five sets of neatly bound instruction books which fully cover installation, operation and maintenance of the motor control center, including a spare parts list for each component of the control center.

aa. Ordering of Motor Control Center: The motor control center shall be ordered and written confirmation submitted to the Department within twenty (20) calendar days after all shop drawings and catalog data relating to the motor control center have been approved by the Engineer.

bb. Motor Control Center Tests: The motor control center shall be shop tested and checked for proper connections and operating of all component parts before shipment to the job site. A warranty stating that shop test has been satisfactorily conducted shall be furnished to the Department of Water Supply prior to delivery of the motor control center at the job site. The Contractor shall be held responsible for all delays caused by faulty operation of the control center due to improper connections or defective parts.

D. EQUIPMENT SHOP DRAWINGS. The following shall be ADDED to and made a part of this subsection.

Junction Boxes, pullboxes Receptacles

Light Switches Panelboards

Step-down Transformers Disconnect Switches

Cabinets; generator terminal cabinets

Conduits and Fittings

Conductors and Cables

Metering Equipment and Main Circuit Breaker

Motor Control Center(s)

Surge Protective Devices

Power Monitors and associated CTs and PTs

Reduced Voltage Solid State Starters (Soft Starters)

Power Factor Correction Capacitors, Circuit Breakers, and Contactors

Short Circuit, Coordination, and Arc Flash Hazard Analysis Study

1. Shop Drawings: Prior to fabrication, the Contractor shall submit for written approval of the Department of Water Supply six (6) copies of complete installation drawings and manufacturer's wiring diagrams for the voltage surge arrester, main electrical switchgear system, control and connection diagrams, connection diagrams, installation details, and any built-to-order equipment.
2. Electrical Installation Drawings: At least 30 days prior to the installation of conduits, the Contractor shall submit for written approval of Department of Water Supply complete electrical voltage surge arrester installation drawings, main electrical switchgear system installation drawings with all manufacturer's wiring diagrams for the main electrical switchgear system.

Upon approval, the Contractor shall provide, for the use of the Department of Water Supply, five (5) copies of such approved electrical installation drawings, including five copies of the manufacturer's wiring diagrams.
3. As-Built Drawings: Upon completion of the final inspection and testing, the Contractor shall provide, for the use of the Department of Water Supply six (6) copies of as-built installation drawings and manufacturer's wiring diagrams for the main electrical switchgear system and any built-to-order equipment.
4. Training for all electrical and electronic equipment SHALL BE CONDUCTED BY ITS RESPECTIVE FACTORY PERSONNEL; A FACTORY CERTIFIED REPRESENTATIVE IS NOT ACCEPTABLE AND WILL NOT BE APPROVED. A minimum of two (2) days of training for the Motor Control Center system.

The following subsection shall be ADDED to and be made a part of subsection 304.03.

E. SHORT CIRCUIT, COORDINATION, AND ARC FLASH HAZARD ANALYSIS

1. Materials, equipment, and construction methods specified in other sections of the specifications for Electrical Work shall apply to this section.
2. This section specifies that the Contractor shall subcontract an independent full member NETA Engineering and Study Firm and Testing Firm to prepare and furnish but not necessarily be limited to, the following:
 - a) Short-circuit study (SCS) and a protective device coordination study (PDCS) for all facility electrical distribution power system equipment.
 - b) Arc Flash Hazard Analysis Study (AFA) per the requirements set forth in the current version of NFPA 70E -Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE Standard 1584 - 2018, the IEEE Guide for Performing Arc-Flash Calculations.
 - c) The scope of the studies shall include all new distribution and power equipment supplied under this contract, temporary distribution and power equipment, and existing equipment, including, but not limited to, the following:
 - i. Existing utility transformer.
 - ii. Existing equipment fed by the new equipment.
 - iii. Existing equipment feeding new equipment.
 - iv. Uninterruptible Power Supplies (UPS).
 - d) Qualifications: The short-circuit, protective device coordination, and arc flash hazard analysis studies shall be performed by the manufacturer of the distribution and power equipment or by an electrical study or testing service that is regularly engaged in power system studies. The Hawaii registered professional Electrical Engineer responsible for the studies shall affix the professional licensed electrical stamp (Hawaii) and sign the studies.
3. Applicable Publications: The publications listed below and/or listed herein shall form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Consider the advisory provisions to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70, unless more stringent requirements are specified or indicated.

1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

- i. IEEE 141 - Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems.
 - ii. IEEE 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
 - iii. IEEE 399 - Recommended Practice for Industrial and Commercial Power System Analysis.
 - iv. IEEE 241 - Recommended Practice for Electric Power Systems in Commercial Buildings.
 - v. IEEE 1015 - Recommended Practice for Applying Low- Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
 - vi. IEEE 1584 - Guide for Performing Arc-Flash Hazard Calculations.
2. American National Standards Institute (ANSI):
- i. ANSI C57.12.00 - Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.
 - ii. ANSI C37.13 - Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures.
 - iii. ANSI C37.010 - Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis.
 - iv. ANSI C 37.41 - Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.
3. The National Fire Protection Association (NFPA)
- i. NFPA 70 - National Electrical Code, latest edition.
 - ii. NFPA 70E - Standard for Electrical Safety in the Workplace.
4. National Electrical Testing Association (NETA)
- i. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
4. Submittals: Submit a complete arc flash hazard analysis and short circuit/coordination study report, as specified herein, in accordance with the submittal procedures:
- 1. The studies shall be submitted prior to receiving final approval of the new distribution and power equipment shop drawings and/or prior to release of equipment drawings for

manufacturing. If formal completion of the study may cause delays in equipment shipments, approval from the DWS may be obtained for a preliminary submittal of data to ensure that the selection of device ratings and characteristics will be satisfactory to properly select the distribution and power equipment. The formal study will be provided to verify preliminary findings.

2. The results of the short-circuit, protective device coordination, and arc flash hazard analysis studies shall be summarized in a final report. Electronic PDF copies of the report shall be provided upon request.
3. The product shall be a certified report summarizing the short circuit and coordination study and conclusions or recommendations which may affect the integrity of the electric power distribution system. As a minimum, the report shall include the following sections that pertain specifically to the project and the components involved included in the analysis:
 - i. Executive Summary including Introduction, Scope of Work and Results/Recommendations.
 - ii. Short-Circuit Methodology Analysis Results and Recommendations.
 - iii. Short-Circuit Device Evaluation Table.
 - iv. Protective Device Coordination Methodology Analysis Results and Recommendations
 - v. Protective Device Settings Table.
 - vi. Time-Current Coordination Graphs and Recommendations.
 - vii. Arc Flash Hazard Methodology Analysis Results and Recommendations including the details of the incident energy and flash protection boundary calculations, along with Arc Flash boundary distances, working distances, Incident Energy levels and Personal Protection Equipment levels in accordance with the methods outlined in IEEE Standard 1584 and stated hereinafter.
 - viii. Arc Flash Labeling section showing types of labels to be provided. Section will contain descriptive information as well as typical label images.
 - ix. Work shall include the fabrication of signs with the arc flash hazard study results and the installation of the signs on the equipment in accordance with NFPA 70E Table 3-3.9.3 that includes the personnel protective equipment (PPE) risk category, the energy available, and the clothing recommendation.
 - x. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location, device numbers used in the time-current coordination analysis, and other information pertinent to the computer analysis.

- xi. The equipment manufacturer's information used to prepare the study.
- xii. Power Utility Company system information applicable to the project.
- xiii. Short circuit calculations listing short circuit levels at each bus. Provide a sketch of the bus and use both the project term and the bus-code-name to identify the bus, branches, sources, loads. Base the system on the Project One-Line diagram.
- xiv. Coordination study time-current curves including the instrument transformer ratios, model numbers of the protective relays, and the relay settings associated with each breaker.
 - 1) Comparison of short circuit duties of each bus to the interrupting capacity of the equipment protecting that bus.
 - 2) Data used as input to the report that includes cable impedances, source impedances, equipment ratings for the equipment being purchased for the project, etc.
 - 3) Assumptions made during the study.

5. Studies: The Contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D, as prepared by the subcontracted Study Firm. This study shall also include a short circuit and coordination study on the electrical power distribution system as specified and as described in Section 6.1 of NETA ATS. The studies shall be performed in accordance with IEEE Standards 141 and 242 and shall utilize the ANSI method of short circuit analysis in accordance with ANSI C37.010.

The studies shall be performed using actual equipment data for both existing and new equipment. For new equipment, the Contractor shall provide copies of final reviewed equipment submittals to the Study Firm upon request.

Any power distribution equipment outages shall be scheduled in advance and coordinated with the DWS to limit process outages as required per plant process capacities.

6. Data:
- 1. Contractor shall furnish all data as required for the power system studies. The Study Firm performing the short-circuit, protective device coordination, and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution and power equipment shop drawings and/or prior to the release of the equipment for manufacturing.
 - 2. Source combination may include present and future motors.

3. Load data utilized may include existing and proposed loads obtained from Contract Documents.
 4. If applicable, include fault contribution of existing equipment data, if necessary, to satisfy the study requirements.
7. Short-Circuit Analysis:
1. Transformer design impedances shall be used when test impedances are not available.
 2. Provide the following:
 - i. Calculation methods and assumptions.
 - ii. Selected base per unit quantities.
 - iii. One-line diagram of the system being evaluated that clearly identifies individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis.
 - iv. The study shall include input circuit data including electric utility system characteristics, source impedance data, conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.
 - v. Tabulations of calculated quantities including short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings and notes regarding adequacy or inadequacy of the equipment rating.
 - vi. Results, conclusions, and recommendations. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.
 3. For solidly-grounded systems, provide a bolted line-to-ground fault current study for applicable buses as determined by the Engineer performing the study.
 4. Protective Device Evaluation:
 - i. Evaluate equipment and protective devices and compare to short circuit ratings.
 - ii. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short-circuit stresses.
 - iii. Provide written notification of any circuit protective devices improperly rated for the calculated available fault current.

8. Protective Device Time-Current Coordination Analysis:
 1. Protective device coordination time-current curves (TCC) shall be displayed on 5-cycle log-log scale graph paper.
 2. Include on each TCC graph, a complete title with descriptive device names.
 3. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
 4. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
 5. Plot the following characteristics on the TCC graphs, where applicable:
 - i. Electric utility's overcurrent protective device.
 - ii. Medium voltage equipment overcurrent relays.
 - iii. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
 - iv. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands.
 - v. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
 - vi. Low and medium voltage conductor damage curves.
 - vii. Ground fault protective devices, as applicable.
 - viii. Pertinent motor starting characteristics and motor damage points, where applicable.
 - ix. The largest feeder circuit breaker in each motor control center and applicable panelboard.
 - x. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.
 - xi. Provide the following:
 - 1) A One-line diagram shall be provided which clearly identifies individual equipment buses, bus numbers, device identification numbers and the maximum available short circuit current at each bus when know.
 - 2) A sufficient number of log-log plots shall be provided to indicate the degree of system protection and coordination by displaying the time-current

characteristics of series connected overcurrent devices and other pertinent system parameters.

- 3) Computer printouts shall accompany the log-log plots and will contain descriptions for each of the devices shown, settings of the adjustable devices, and device identification numbers to aid in locating the devices on the log-log plots and the system one- line diagram.
- 4) The study shall include a separate, tabular printout containing the recommended settings of all adjustable overcurrent protective devices, the equipment designation where the device is located, and the device number corresponding to the device on the system one-line diagram.
- 5) A discussion section which evaluates the degree of system protection and service continuity with overcurrent devices, along with recommendations as required for addressing system protection or device coordination deficiencies.
- 6) Provide written notification of any significant deficiencies in protection and/or coordination. Provide recommendations for improvements.

9. Arc Flash Hazard Analysis:

1. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA 70E, Annex D. The arc flash hazard analysis shall be performed in conjunction with the short-circuit analysis and the protective device time-current coordination analysis.
2. The flash protection boundary and the incident energy shall be calculated at significant locations in the electrical distribution system (switchboards, switchgear, motor control centers, panelboards, busway and splitters) where work could be performed on energized parts.
3. Working distances shall be based on IEEE 1584. The calculated arc flash protection boundary shall be determined using those working distances.
4. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations.
5. The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location in a single table. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum. Conversely, the maximum calculation will assume a maximum contribution from the utility. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable as well as any stand-by generator applications.

The Arc Flash Hazard Analysis shall be performed utilizing mutually agreed upon facility operational conditions, and the final report shall describe, when applicable, how these conditions differ from worst case bolted fault conditions.

6. The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors should be decremented as follows:

Fault contribution from induction motors should not be considered beyond 5 cycles.

7. For each piece of ANSI rated equipment with an enclosed main device, two calculations shall be made. A calculation shall be made for the main cubicle, sides, or rear; and shall be based on a device located upstream of the equipment to clear the arcing fault. A second calculation shall be made for the front cubicles and shall be based on the equipment's main device to clear the arcing fault. For all other non-ANSI rated equipment, only one calculation shall be required and it shall be based on a device located upstream of the equipment to clear the arcing fault.
8. When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.
9. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.
10. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. A maximum clearing time of 2 seconds will be used. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.
11. Provide the following:
 - i. Results of the Arc-Flash Hazard Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, working distances, personal- protective equipment classes and AFIE (Arc Flash Incident Energy) levels.
 - ii. The Arc-Flash Hazard Analysis shall report incident energy values based on recommended device settings for equipment within the scope of the study.
 - iii. The Arc-Flash Hazard Analysis may include recommendations to reduce AFIE levels and enhance worker safety.

12. Execution:

- i. Field Adjustment:
 - 1) Contractor shall adjust relay and protective device settings according to the recommended settings table provided by the coordination study.
 - 2) Contractor shall make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.
 - 3) Provide written notification of any required major equipment modifications.
- ii. Arc Flash Labels:
 - 1) Provide a 4-inch x 4-inch, Brady thermal transfer type label of high adhesion polyester for each work location analyzed.
 - 2) The labels shall be designed according to the following standards:
 - a) UL969 – Standard for Marking and Labeling Systems.
 - b) ANSI z535.4 – Product Safety Signs and Labels.
 - c) NFPA 70 (National Electric Code – Article 110.16.(5) Limited, restricted, and prohibited
 - 3) The label shall include the following information:
 - a) System Voltage.
 - b) Flash protection boundary.
 - c) Personal Protective Equipment Category.
 - d) Arc Flash Incident energy value (cal/cm²)
 - e) Limited, restricted, and prohibited Approach Boundaries.
 - f) Study report number and issue date.
 - 4) Labels shall be printed by a thermal transfer type printer, with no field markings.
 - 5) Arc flash labels shall be provided for equipment as identified in the study and the respective equipment access areas per the following:
 - a) Floor Standing Equipment – Labels shall be provided on the front of each individual section. Equipment requiring rear and/or side access shall have labels provided on each individual section access area. Equipment line-ups

containing sections with multiple incident energy and flash protection boundaries shall be labeled as identified in the Arc Flash Analysis table.

- b) Wall Mounted Equipment - Labels shall be provided on the front cover or a nearby adjacent surface, depending upon equipment configuration.
- c) General Use Safety labels shall be installed on equipment in coordination with the Arc Flash labels. The General Use Safety labels shall warn of general electrical hazards associated with shock, arc flash, and explosions, and instruct workers to turn off power prior to work.

iii. Implementing PDCS Settings and Arc Flash Sign Installation:

- 1) The Testing Firm shall implement the protective device coordination study settings on the equipment, based on the Study Firm's Protective Device Coordination Report specified herein and accepted by the Department of Water, and submit a final amended report of the Record As-Built electrical equipment protective device settings subsequent to start-up and testing.
- 2) The Testing Firm shall work with the Contractor and the Study Firm for implementing the Arc Flash Hazard sign installation requirements for electrical equipment as specified in NEC Article 110.16 Flash Protection and NFPA 70E.

END OF SECTION

The following subsection shall be ADDED to and be made a part of subsection 304.03.

F. PAYMENT FOR SECTION 304.03.

1. General: No separate payments will be made for the work covered by the separate sections of the 304.03 series of these specifications. With the exception of the nonrecurring utility installation costs, all costs in connection with furnishing and installing of the various items in accordance with standard practice, the details shown on the drawings and in accordance with these specifications, shall be included in the lump sum price of which the item is a part.
2. Compensation: Payment of the furnishing and installing of equipment (exclusive of nonrecurring utility installation costs) will be made at the lump sum price bid of which the item is a part and shall be full compensation for all work in accordance therewith, complete and finished in accordance with the drawings and specifications.
3. Utility Installation Costs: Payment for the nonrecurring utility installation costs will be made by the Department of Water Supply. The Contractor shall submit a copy of the final utility installation billing to the Owner for payment.