

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF BOATING AND OCEAN RECREATION
Honolulu, Hawaii

BOARD OF LAND AND NATURAL RESOURCES

Ryan K.P. Kanaka'ole
Acting Chairperson

CONTRACT SPECIFICATIONS AND PLANS

Job No. B46CM71B
Lahaina Small Boat Harbor Front Row Piers and Dinghy Dock Repairs
Lahaina, Island of Maui, Hawai'i


May 2026

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Approved: 
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May 2026

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NOTICE TO BIDDERS

(Chapter 103D, HRS)

COMPETITIVE SEALED BIDS for Job No. B46CM71B, Lahaina Small Boat Harbor Front Row Piers and Dinghy Dock Repairs, Lahaina, Maui, Hawaii may be submitted to the Department of Land and Natural Resources, Division of Boating and Ocean Recreation, Engineering Branch on the specified date and time through the State of Hawaii e-Procurement System (HIePRO).

The Department of Land and Natural Resources Interim General Conditions dated October 1994, as amended is available on request; and the General Conditions – AG008, latest revision shall be made a part of the specifications. Electronic copies of the General Conditions is available on the HIePRO site.

The project is located at Lahaina Small Boat Harbor, Lahaina, Maui, Hawaii.

The purpose of this Invitation for Bids (IFB) is to award to a Contractor work that shall generally consist of repair and restoration of the front row piers and dinghy dock at Lahaina Small Boat Harbor including water and electrical utilities.

Due to the nature of work contemplated, bidders must possess a valid State Contractor's license, Classification "A".

The estimated cost of construction is \$6,000,000.

As a condition for award of the contract and final payment, the vendor shall provide proof of compliance with the requirements of 103D-310(c) HRS. Proof of compliance/documentation is obtained through Hawaii Compliance Express (HCE). Vendors shall register in Hawaii Compliance Express (HCE), a program separate from HIePRO. The annual subscription fee to utilize the HCE service is currently \$12.00. Allow 2 weeks to obtain complete compliance status after initial registration. It is highly recommended that vendors subscribe to HCE prior to responding to a solicitation. The vendor is responsible for maintaining compliance. If the vendor does not maintain timely compliance in HCE, an offer otherwise deemed responsive and responsible may not be awarded.

The award of the contract, if it be awarded, will be subject to the availability of funds.

The Engineering Branch Head is responsible for administering and overseeing the Contract, including monitoring and assessing contractor performance.

The job is subject to preference for Hawaii Products established by Section 103D, Hawaii Revised Statutes. The Hawaii Product List may be examined at the State Procurement Office.

Should there be any questions, please use the question and answer section of the HIePRO solicitation.

INFORMATION AND INSTRUCTIONS TO BIDDERS

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INFORMATION AND INSTRUCTIONS TO BIDDERS

- A. PROJECT LOCATION AND SCOPE OF WORK: The project location and scope of work shall be as generally described in the Notice to Bidders.
- B. SEALED PROPOSALS: **Not applicable. See D. PROPOSAL FORM.**
- C. GENERAL CONDITIONS: The Department of Land and Natural Resources Interim General Conditions dated October 1994, as amended, shall be made a part of these contract specifications and are referred to hereafter as the General Conditions.
- D. PROPOSAL FORM: **The Bidders shall fill out and upload the electronic copy of the proposal form to the HiePRO website when submitting the bid. Bid Proposals shall not be mailed, faxed or delivered to the State, unless requested to do so after the designated closing date. The successful Bidder shall fill out and print a hard copy of the proposal form, sign and submit the form with the contract award package.**
- E. OMISSIONS OR ERASURES: Any proposal which contains any omission or erasure or alteration not properly initialed, or conditional bid, or other irregularity may be rejected by the Board of Land and Natural Resources (Board).
- F. NOTICE OF INTENT TO BID AND QUESTIONNAIRE:
A Notice of Intent to Bid is not required for this project. In compliance with HRS Section 103D-310, the lowest responsive and responsible bidder may be required to complete a standard questionnaire. When required, the completed questionnaire shall be submitted to the Chief Engineer for evaluation. Failure to furnish the requested information within the time allowed may be grounds for a determination of non-responsibility, in accordance with HRS Section 103D-310 and HAR Section 3-122-108.
- G. BID SECURITY: A bid security will be furnished by each bidder as provided in sub-section 2.7 of the General Conditions. The successful bidder's bid security will be retained until Contract execution and furnished a performance and payment bond in an amount equal to one hundred percent (100%) of the total Contract price, including an amount estimated to be required for extra work, is furnished. **No bid security is required for bids less than \$50,000.**
- The Board reserves the right to hold the bid securities of the four lowest bidders until the successful bidder has entered into a contract and has furnished the required performance bond. All bid securities will be returned in accordance with sub-section 3.5 of the General Conditions.
- Should the successful bidder fail to enter into a contract and furnish a satisfactory performance bond within the time stated in the proposal, the bid security shall be forfeited as required by law.
- H. CONTRACTOR'S LICENSE REQUIRED: The Board will reject all bids received from contractors who have not been licensed by the State Contractors License Board in accordance

with Chapter 444, HRS; Title 16, Chapter 77, Hawaii Administrative Rules; and statutes amendatory thereto. This project will require a Class "A" contractor's license.

- I. IRREGULAR BIDS: No irregular bids or propositions for doing the work will be considered by the Board.
- J. WITHDRAWAL OF BIDS: No bidder may withdraw his bid between the time of the opening thereof and the award of contract.
- K. SUCCESSFUL BIDDER TO FILE PERFORMANCE AND PAYMENT BONDS: The successful bidder will be required to file performance and payment bonds each; in the amount equal to the total contract price, including amounts estimated to be required for extra work, as provided in sub-section 3.6 of the General Conditions. **Performance and payment bonds are not required for bids less than \$50,000.**
- L. NUMBER OF EXECUTED ORIGINAL COUNTERPARTS OF CONTRACT DOCUMENTS: If requested by the Board, six copies of the Contract, performance and payment bonds shall be executed. **For contracts less than \$50,000, the State reserves the right to contract the work under a purchase order.**
- M. CHANGE ORDERS: No work of any kind in connection with the work covered by the plans and specifications shall be considered as change order work, or entitle the Contractor to extra compensation, except when the work has been ordered in writing by the Chief Engineer (Engineer) and in accordance with sub-section 4.2 of the General Conditions.

The Contractor shall clearly identify and inform the Engineer in writing of any deviations from the contract documents at the time of submission and shall obtain the Engineer's written approval to the specified deviation prior to proceeding with any work.

- N. WAGES AND HOURS: In accordance with sub-sections 7.3 to 7.9 of the General Conditions relative to hours of labor, minimum wages and overtime pay, the current minimum wage rates promulgated by the Department of Labor and Industrial Relations (DLIR) shall be paid to the various classes of laborers and mechanics engaged in the performance of this contract on the job site. The minimum wages shall be increased during the performance of the contract in an amount equal to the increase in the prevailing wages for those kinds of work as periodically determined by the DLIR.

The Department of Land and Natural Resources will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the said minimum wage rates. The possibility of wage increase is one of the elements to be considered by the Contractor in determining his bid, and will not, under any circumstances, be considered as the basis of a claim against the Department under this Contract.

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 Engineer. Should permission be granted to work at such times, the Contractor shall pay for all inspection administrative costs thereof. No work shall be done at night unless authorized by the Engineer.

- O. PERMITS: The Contractor shall procure all required project permits and pay the required

fees, including hiring consultants and payment thereto for services related to obtaining required permits if required. In all cases, the Contractor shall give all notices necessary and incident to the due and lawful prosecution of the work.

- P. PROPERTY DAMAGE: It shall be the responsibility of the contractor to respect State property and to prevent damage to existing improvements. The Contractor will be responsible for damages resulting from construction operations. Immediately upon discovery, the Contractor shall repair such damage to the satisfaction of the Engineer.

All trees and shrubbery outside the excavation, embankment or construction limits shall be fully protected from injury.

- Q. TIME: The time of completion is specified in the Proposal. It is the Board's intention to insist the Contractor diligently prosecute the work to completion within the specified time.

Prospective bidders are reminded that the State has the option to proceed with or abandon a project depending on whether the project can be completed for occupancy in the specified time.

It is the bidder's responsibility to check the availability of all materials before bidding. The bidder shall select sub-contractors and suppliers who can warrant availability and delivery of all specified or qualified materials to assure project completion within the specified time.

The successful bidder must assume all risks for completing the project by the specified date. There shall be no extension of time for any reason except for delays caused by acts of God, labor disputes involving unions, or actions of the State. If for any reason the project falls behind schedule, the Contractor shall at its own cost, take necessary remedial measures to get the project back on schedule, i.e., working overtime, air freighting all materials, etc. In addition, if the Contractor fails to fully complete the project by the completion date, Contractor will be required to make the facility usable at its own cost.

- R. BIDDER'S RESPONSIBILITY TO PROVIDE PROPER SUPERINTENDENCE: The successful low bidder shall designate in writing to the Engineer the name of its authorized superintendent (Superintendent), who will be present at the job site whenever any work is in progress. The Superintendent shall be responsible for all work, receiving and implementing instructions from the Engineer in a timely manner. The cost for superintendence shall be considered incidental to the project.

If the Superintendent is not present at the site of work, the Engineer shall have the right to suspend the work as described under sub-section 5.5 c. and 7.20 - Suspension of Work of the General Conditions.

- S. LIQUIDATED DAMAGES: Liquidated damages in the amount specified in the Proposal will be assessed for each and every calendar day from and after the expiration of the time period stated in the Contract for the completion of the project.

- T. HIRING OF LOCAL LABOR: The Contractor shall hire local labor whenever practicable.

- U. WATER AND ELECTRICITY: The Contractor shall make all necessary arrangements and

pay all expenses for water and electricity used in the construction of this project.

- V. PUBLIC CONVENIENCE AND SAFETY: The Contractor shall conduct construction operations with due regard to the convenience and safety of the public at all times. No materials or equipment shall be stored where it will interfere with the safe passage of public traffic. The Contractor shall provide, install, and maintain in satisfactory condition, all necessary signs, flares and other protective facilities and shall take all necessary precautions for the protection of the work and the convenience and safety of the public. The Engineer shall have the right to suspend the performance of the work in accordance with sub-section 7.20 - Suspension of Work of the General Conditions.

- W. WORK TO BE DONE WITHOUT DIRECT PAYMENT: Whenever the contract that the Contractor is to perform work or furnish materials of any kind for which no price is fixed in the contract, it shall be understood that the Contractor shall perform such work or furnish said materials without extra charge or allowance or direct payment of any sort. The cost of performing such work or furnishing said material is to be included by the Contractor 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.

- X. AS-BUILT DRAWINGS: As-built drawings, the intent of which is to record the actual in-place construction so that any future renovations or tie-ins can be anticipated accurately, shall be required. All authorizations given by the Engineer to deviate from the plans shall be drawn on the job site plans. All deviations from alignments, elevations and dimensions which are stipulated on the plans shall be recorded on the as-built drawings. Final as-built drawings shall be submitted to the Engineer by the Contractor at the end of the project in both hard copy and electronic copy in Adobe PDF format on CD ROM.

- Y. ASBESTOS CONTAINING MATERIALS: The use of asbestos containing materials or equipment is prohibited. The Contractor shall insure that all materials and equipment incorporated in the project are asbestos-free

- Z. WORKER SAFETY: The Contractor shall provide, install and maintain in satisfactory condition all necessary protective facilities and shall take all necessary precautions for the protection and safety of its workers in accordance with the Occupational Safety and Health Standards for the State of Hawaii. The Engineer shall have the right to suspend the performance of the work in accordance with sub-section 7.20 - Suspension of Work of the General Conditions.

- AA. TOILET FACILITIES: All toilet facilities constructed at the project site shall be in accordance with the Public Health Regulations of the State Department of Health (DOH). All necessary precautions shall be observed at the project site. The use of sanitary facilities shall be strictly enforced and workers violating these provisions shall be promptly discharged.

- BB. SIGNS: Whenever the project involves closing or obstructing any public thoroughfare, the Contractor shall provide traffic signs conforming to the applicable provisions of the current edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways", published by the Federal Highway Administration as directed by the Engineer for the purpose of diverting or warning traffic prior to the construction area. All traffic signs shall bear

proper wording stating thereon the necessary information as to diverting or warning traffic.

- CC. FIELD OFFICE AREA FOR DEPARTMENT: **Not required for this project.**
- DD. QUANTITIES: All bids will be compared on the basis of quantities of work to be done as shown in the Proposal; the quantities shown in the Unit Price items are estimated, being given as a basis for comparison of bids. The Board reserves the right to increase or decrease the quantities given under the items or delete items entirely as may be required during the progress of the work.
- EE. OTHER HEALTH MEASURES: Forms of work site exposure or conditions which may be detrimental to the health or welfare of workers or of the general public shall be eliminated or reduced to safe levels as required by the DOH codes, standards, and regulations. Suitable first aid kits and a person qualified to render first aid, as specified in the DOH regulations, shall be provided at all times when work is scheduled.
- FF. HAWAII BUSINESS OR COMPLIANT NON-HAWAII BUSINESS REQUIREMENT: Bidders (Contractors) shall be incorporated or organized under the laws of the State or be registered to do business in the State as a separate branch or division that is capable of fully performing under the contract, as stipulated in §3-122-112 HAR.
- GG. COMPLIANCE WITH §3-122-112 HAR:
As a condition for award of the contract the contactor shall be in compliance with the following requirements:
- A. **TAX CLEARANCE REQUIREMENTS (HRS Chapter 237)**: Bidder shall obtain a tax clearance certificate from the Hawaii State Department of Taxation (DOTAX) and the Internal Revenue Service (IRS). The certificate is valid for six months from the most recently approved stamp date on the certificate; the certificate must be valid on the date received by the Department.
 - B. Department of Labor (DLIR) “**Certificate of Compliance**”. (HRS Chapter 383 - Unemployment Insurance, Chapter 386 - Workers’ Compensation, Chapter 392 - Temporary Disability Insurance, and 393 – Prepaid Health Care): Bidder shall obtain a certificate of compliance from the Hawaii State Department of Labor and Industrial relations (DLIR). The certificate is valid for six months from the date of issue; certificates must be valid on the date received by the Department.
 - C. Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG) “**Certificate of Good Standing**”. Bidder shall obtain a certificate of good standing issued by the Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG). The certificate of good standing is valid for six months from the date of issue; certificates must be valid on the date received by the Department.

COMPLIANCE, DOCUMENTATION AND HAWAII COMPLIANCE EXPRESS

As a condition for award of the contract and as proof of compliance with the following requirements of 103D-310(c) HRS:

Vendors are required to be compliant with all appropriate state and federal statutes. Proof of compliance (compliance documentation) is required. See the HIePRO Buyer FAQ on the State Procurement website for more information.

Proof of compliance/documentation is obtained through Hawaii Compliance Express (HCE). Vendors shall register in Hawaii Compliance Express (HCE), a program separate from HIePRO. The annual subscription fee to utilize the HCE service is currently \$12.00.

Allow 2 weeks to obtain complete compliance status after initial registration. It is highly recommended that vendors subscribe to HCE prior to responding to a solicitation.

The vendor is responsible for maintaining compliance. If the vendor does not maintain timely compliance in HCE, an offer otherwise deemed responsive and responsible may not be awarded.

SPECIAL PROVISIONS

Amend INTERIM GENERAL CONDITIONS, dated October 1994, as follows:

Section 2 – Proposal Requirements and Conditions

1. **AMEND** Section 2.1 Qualification of Bidder with the following:

Written Notice of Intent to Bid or Offer: A written Notice of Intent to Bid is not required for the Solicitation.

Standard Qualification Questionnaire: Bidders may be required to complete a standard qualifications questionnaire. When requested, the information shall be furnished within two working days or longer at the discretion of the Engineer. Failure to furnish the requested information within the time allowed may be grounds for a determination of non-responsibility, in accordance with HRS Section 103D-310 and HAR Section 3-122-108.

Hawaii Business or Compliant Non-Hawaii Business Requirement: Bidders shall be incorporated or organized under the laws of the State or be registered to do business in the State as a separate branch or division that is capable of fully performing under the contract, as stipulated in §3-122-112 HAR. A certified letter is not required prior to bid opening.

Compliance with §3-122-112 HAR: As a condition for award of the contract and as proof of compliance with the requirements of 103D-310(c) HRS, the apparent low bidder shall furnish the required documents to the Department. If the valid required certificates are not submitted on a timely basis for award of a contract, a bidder otherwise responsive and responsible may not receive the award. Bidder is responsible to apply for and submit the following documents to the Department.

- A. Tax Clearance (HRS Chapter 237): Bidder shall obtain a tax clearance certificate from the Hawaii State Department of Taxation (DOTAX) and the Internal Revenue Service (IRS). The certificate is valid for six months from the most recently approved stamp date on the certificate; the certificate must be valid on the date received by the Department.
- B. Department of Labor (DLIR) “Certificate of Compliance”. (HRS Chapter 383 - Unemployment Insurance, Chapter 386 - Workers’ Compensation, Chapter 392 - Temporary Disability Insurance, and 393 – Prepaid Health Care): Bidder shall obtain a certificate of compliance from the Hawaii State Department of Labor and Industrial relations (DLIR). The certificate is valid for six months from the date of issue; certificates must be valid on the date received by the Department.
- C. Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG) “Certificate of Good Standing”. Bidder shall obtain a certificate of good standing issued by the Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG). The certificate of good standing is valid for six months from the date of issue; certificates must be valid on the date received by the Department.

Hawaii Compliance Express. Alternately, instead of separately applying for these certificates at the various state agencies, bidder may choose to use the Hawaii Compliance Express (HCE), which allows businesses to register online through a simple wizard interface at <http://vendors.hawaii.gov> to acquire a “Certificate of Vendor compliance” indicating that bidder’s status is compliant with requirements of §103D-310(c), HRS, shall be accepted for contracting and final payment purposes.

Bidders that elect to use the new HCE services will be required to pay an annual fee of \$15.00 to the Hawaii Information Consortium, LLC (HIC). Bidders choosing not to participate in the HCE program will be required to provide the paper certificates as instructed in the previous paragraphs.

2. **ADD** Section 2.4a, Pre-Bid Conferences

Required Pre-bid Conferences: For construction and design-build projects with an estimated value of \$500,000 or more and solicited under the competitive sealed bid method (103D-302 HRS); and for construction and design-build projects with an estimated value of \$100,000 or more and solicited under the competitive sealed proposal method (103D-303 HRS); a pre-bid conference is required.

Other Pre-Bid Conferences: The Department may require a pre-bid conference for construction or design-build projects that are below the dollar threshold listed in above or when projects have special or unusual requirements.

Other Conditions: The Department may require the prospective Bidders to make a physical inspection of the project site and make attendance at the pre-bid conference a condition for submitting an offer.

Nothing stated at the pre-bid conference shall change the solicitation unless a change is made by written addendum.

3. **DELETE** Section 2.5, Addenda and Interpretations, in its entirety and replace with the following:

“Discrepancies, omissions, or doubts as to the meaning of drawings and specifications should be communicated using the question and answer section on the HiePRO solicitation for interpretation and must be received in the time frame set in the HiePRO solicitation. Any interpretation, if made and any supplemental instructions will be in the form of written addenda to the plans and specifications and made available prior to the offer due date. It shall be the prospective bidder’s sole responsibility to verify and obtain any said addenda. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.”

Section 3 – Award and Execution of Contract

1. **AMEND** Section 3.3, Award of Contract, by deleting “sixty (60)” and replacing with “ninety (90)” in the first paragraph.

2. **AMEND** Section 3.3, Award of Contract, by adding the following after the first paragraph:

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

3. **AMEND** Section 3.9, Notice to Proceed, by replacing the last paragraph with the following:

In the event the Notice to Proceed is not issued within three hundred and sixty-five (365) days after the date of bid opening, the Contractor may submit a claim for increased labor and materials costs (but not overhead costs) that will be incurred after 365 days after the date of bid opening plus the contract time allowed for performance of the work. Such claims shall be accompanied with the necessary documentation to justify the claim. No payments will be made for escalation costs that are not fully justified as determined by the State.

4. **ADD** Section 3.10, Protests:

“3.10 PROTESTS—Pursuant to Section 103D-701, Hawaii Revised Statutes, an actual or prospective offeror who is aggrieved in connection with the solicitation or award may submit a protest. Any protest shall be submitting in writing to the Chairperson, Department of Land and Natural Resources, 1151 Punchbowl Street, Honolulu, Hawaii 96813, or designee as specified in the solicitation.

A protest shall be submitted in writing within five (5) working days after the aggrieved person knows or should have known the facts giving rise thereto; provided that a protest based upon the content of the solicitation shall be submitted in writing prior to the date set for receipt of offers. Further provided that a protest of an award or proposed award shall be submitted within five (5) working days after the posting of the award of the contract.

The notice of award, if any, resulting from this solicitation shall be posted on the HIePRO website.

Section 5 – Control of Work

AMEND Section 5.8 Value Engineering Incentive by deleting “\$100,000” and replacing with “\$250,000” in the first paragraph.

Section 6 – Substitution of Materials and Equipment

ADD the following to Section 6.3 Sub-paragraph b:

4. If the substitution meets all the requirements of the specifications and plans.

Section 7 – Prosecution and Progress

1. **DELETE** Section 7.2d in its entirety and replace with the following:

“d. INSURANCE REQUIREMENTS

1. **Obligation of Contractor** - Contractor shall not commence any work until it obtains, at its own expense, all required herein insurance. Such insurance must have the approval of the Department as to limit, form and amount and must be maintained with a company authorized by laws of the State to issue such insurance in the State of Hawaii. Coverage by a “Non-Admitted” carrier is permissible provided the carrier has a AM Best’s Rating of “A-VII” or better.
2. All insurance described herein will be maintained by the Contractor for the full period of the contract and in no event will be terminated or otherwise allowed to lapse prior to written certification of final acceptance of the work by the Department.
3. Certificate(s) of Insurance acceptable to the Department shall be filed with the Engineer prior to commencement of the work. Certificates shall identify if the insurance company is a “captive” insurance company or a “Non-Admitted” carrier to the State of Hawaii. The Best’s Rating must be stated for the “Non-Admitted” carrier. Certificates shall contain a provision that coverages afforded under the policies will not be canceled or changed until at least thirty (30) days written notice has been given to the Engineer by registered mail. The insurance policies shall name the State of Hawaii, its officers and employees as an additional insured and such coverage shall be noted on the certificate. Should any policy be canceled before final acceptance of the work by the Department, and the Contractor fails to immediately

procure replacement insurance as specified, the Department, in addition to all other remedies it may have for such breach, reserves the right to procure such insurance and deduct the cost thereof from any money due to the Contractor.

4. Nothing contained in these insurance requirements is to be construed as limiting the extent of Contractor's responsibility for payment of damages resulting from its operations under this contract, including the Contractor's obligation to pay liquidated damages, nor shall it affect the Contractor's separate and independent duty to defend, indemnify and hold the Department harmless pursuant to other provisions of this contract. In no instance will the Department's exercise of an option to occupy and use completed portions of the work relieve the Contractor of its obligation to maintain the required insurance until the date of final acceptance of the work.
5. All insurance described herein shall cover the insured for all work to be performed under the contract, all work performed incidental thereto or directly or indirectly connected therewith, including traffic detour work or other work performed outside the work area, and all change order work.
6. The Contractor shall, from time to time, furnish the Engineer, when requested, satisfactory proof of coverage of each type of insurance required or a copy of the actual policies covering the work. Failure to comply with the Engineer's request may result in suspension of the work and shall be sufficient grounds to withhold future payments due the Contractor and to terminate the contract for Contractor's default.
7. If the Contractor is self-insured, it shall furnish, upon the request and the satisfaction of the Engineer, any documentation to demonstrate the ability to self-insure itself. The Engineer, from time to time, can conduct an audit to determine the ability of the Contractor to be self-insured. Failure to comply with the Engineer's request will be considered a material breach of the contract, and at the discretion of the Engineer, may be sufficient grounds to terminate the contract, suspend any work or withhold future payments.
8. It is the responsibility of the Contractor to notify the Department of any changes to its insurance policies or if the Contractor receives a notice of cancellation of any of its insurance policies. The Contractor will immediately provide written notice to the Department should the insurance policies evidenced on its Certificate of Insurance form be cancelled, limited in scope, or not renewed upon expiration.
9. In addition, the Contractor's insurance policies shall contain the following clauses:
 - (a) The State of Hawaii is added as an additional insured with respect to operations performed for the State of Hawaii.
 - (b) It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contribute with, insurance provided by this policy.
- 10. Types of Insurance** - The Contractor shall purchase and maintain insurance described below which shall provide coverage against claims arising out of the Contractor's operations under the contract, whether such operations be by the Contractor itself or by the subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.
 - (a) **Worker's Compensation.** The Contractor and all subcontractors shall obtain worker's compensation insurance for all persons whom they employ or may employ in carrying out the work under this contract. This insurance shall be in strict conformity with the

requirements of the most current and applicable State of Hawaii Worker's Compensation Insurance laws in effect on the date of the execution of this contract and as modified during the duration of the contract.

- (b) Commercial General Liability. The Contractor shall obtain General Liability insurance with a limit of not less than \$1,000,000 per occurrence and \$2,000,000 aggregate. The commercial general liability insurance shall include the State as an additional insured. The required limit of insurance may be provided by a single policy or with a combination of primary and excess policies.
- (c) Comprehensive Automobile Liability. The Contractor shall obtain Auto Liability insurance covering all owned, non-owned and hired autos with a combined single Limit of not less than \$1,000,000 per accident for bodily injury and property damage. The State shall be named as additional insured. The required limit of insurance may be provided by a single policy or with a combination of primary and excess policies.

Furthermore, the Contractor's commercial general liability insurance and automobile liability insurance shall include coverage for bodily injury, sickness, disease or death of any person, arising directly or indirectly out of, or in connection with, the performance of work under this contract.

The Contractor's property damage liability insurance shall provide for all damages arising out of injury to or destruction of property of others including the Department's, arising directly or indirectly out of or in connection with the performance of the work under this contract including explosion or collapse.

The Contractor shall either:

- i. Require each of its subcontractors to procure and to maintain during the life of its subcontract, subcontractors' comprehensive general liability, automobile liability and property damage liability insurance of the type and in the same amounts specified herein; or
- ii. Insure the activities of its subcontractors in its own policy.

The Contractor will be permitted, in cooperation with insurers, to maintain a self-insured retention for up to 25% of the per occurrence combined single limits of the commercial general liability and the automobile liability policies. The existence of the self-insured retention must be noted on the certificate of insurance coverage submitted to the Department or else it will be understood that the insurer is providing first dollar coverage for all claims. For all claims within the self-insured retention amount, the rights, duties and obligations between the Contractor and the Department shall be identical to that between a liability insurer and the Department, as an additional insured, as if there was no self-insured retention.

- (d) Builder's Risk Insurance. Unless included in the Specifications of this project, the Contractor shall not be required to provide builder's risk insurance. If required as noted in the Specifications, builder's risk insurance shall be provided during the progress of work and until final acceptance by the Department upon completion of the contract. It shall be "All Risk" (including but not limited to earthquake, windstorm and flood damage) completed value insurance coverage on all completed work and work in progress to the full replacement value thereof. Such insurance shall include the

Department as additional name insured. The Contractor shall submit to the Engineer for its approval all items deemed to be uninsurable. The policy may provide for a deductible in an amount of up to 25% of the amount insured by the policy. With respect to all losses up to any deductible amount, the relationship between the Contractor and the Department shall be that of insurer and additional insured as if no deductible existed”.

2. **DELETE** Section 7.16 in its entirety and replace with the following:

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

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

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

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

Section 8 – Measurement and Payment

1. **DELETE** Section 8.7a in its entirety and replace with the following:

- a. Tax Clearances from the State of Hawaii Department of Taxation and Internal Revenue Service, subject to section 103D-328, HRS, current within two months of issuance date indicating that all delinquent taxes levied or accrued under State Statutes against the contractor have been paid.

2. **ADD** Section 8.7d, Certificate of Compliance:

- d. A Certification from the Contractor affirming that the Contractor has, as applicable, remained in compliance with all laws as required by Section 103D-310, HRS, and Section 3-122-112, HAR. A

contractor making a false affirmation shall be suspended and may be debarred pursuant to section 103D-702, HRS.

1. Certification of Compliance for Final Payment, State Procurement Office Form-22. Must be Signed Original.

3. **ADD** Section 8.7e, Hawaii Compliance Express:

- e. In lieu of submitting the tax clearances from Taxation and IRS, and SPO Form -22, the Contractor may choose to use the Hawaii Compliance Express as described on page SP-1 of this Special Provisions.

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SECTION 01019 - GENERAL SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

Work shall consist of furnishing all labor, tools, materials and equipment necessary and required to construct in place complete all work as indicated on the drawings and as specified herein.

1.02 GENERAL

- A. Construction Lines, Levels and Grades: The Contractor shall verify all lines, levels and elevations indicated on the drawings before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of the Engineer, and any change shall be made in accordance with the Engineer's instruction. The Contractor shall not be entitled to extra payment for failing to report the discrepancies before proceeding with any work whether within the area affected or not.
- B. Examination of Premises: The Contractor shall contact the Engineer and obtain permission before visiting the site.
- C. Notices: The Contractor shall notify the Engineer and give at least three (3) working days notice before starting any work.
- D. Disruption of Utility Services: All work related to the temporary disconnection of electrical system shall be pre-arranged with the Engineer so that any disruption of such services will be kept to a minimum. In the event temporary power hook-up is required, the Contractor shall provide the necessary services.
- E. Contractor's Operations
 - 1. The Contractor must employ, insofar as possible, such methods and means of carrying out the work so as not to cause any interruption or interference to the facility's operations. Where the Contractor's operations would result in interruptions which would hamper the operations of the facilities, the Contractor shall rearrange the schedule of work accordingly.
 - 2. The Contractor shall maintain safe passageway to and from the facility's occupied rooms and other occupied spaces for the user agency personnel and the public at all times.
- F. Contractor Use of Premises
 - 1. The Contractor shall review the applicable asbestos survey reports and insure that he fully understands their contents as to whether and where there may be asbestos containing materials (ACM) in the building(s) in which he will be

working.

2. The Contractor shall inform its employees, subcontractors and all other persons engaged in the project of the presence (as applicable) of asbestos in the existing buildings at the job site in accordance with the requirements of Chapter 110, Article 12-110-2 (f) (1) (B) of the Occupational Safety and Health Standards, State of Hawaii.
 3. In the event the Contractor, its subcontractor(s) and/or other persons engaged in the project must work in any building(s) on the site other than that one(s) designated in the project, the Contractor shall request copies of the asbestos survey report(s) for the building(s) from the Engineer and notify all persons as indicated in Item 2 above.
 4. When the project includes paint to be disturbed that was applied prior to 1980, it shall be assumed to contain lead. The Contractor shall inform its employees, subcontractors, and all other persons engaged in the project that lead containing paints are present in the existing buildings at the job site and to follow the requirements of the Department of Labor and Industrial Relations, Division of Occupational Safety and Health, Title 12, Subtitle 8, Chapter 148, Lead Exposure in Construction, Hawaii Administrative Rules (Chapter 12-148, HAR).
- G. Parking Policy for Contractor
1. The Contractor and its employees will not be allowed to park in zones assigned to facility personnel.
 2. Areas to be used by the Contractor shall be as designated by the Engineer. Any lawn damaged by the Contractor shall be restored as instructed by the Engineer at no cost to the State.
- H. Toilet Accommodations: The Contractor may use the existing toilet facilities if so designated by the Engineer; however, it is the Contractor's responsibility to keep same clean and in a sanitary condition at all times.
- I. Protection of Property: The Contractor shall continually maintain adequate protection of all its work from damage and shall protect all property, including but not limited to buildings, equipment, furniture, grounds, vegetation, material, utility systems located at and adjoining the job site. The Contractor shall repair, replace or pay the expense of repair of damages resulting from its operations.
- J. Use of Power Driven Equipment: The Contractor is cautioned to take all necessary safety precautions to protect the facility personnel, and the public whenever power driven equipment is used.
- K. Safety: The Contractor shall carefully read and strictly comply with the requirements of the Hawaii Occupational Safety and Health Law, Chapter 396, Hawaii Revised Statutes, as amended, is applicable and made a part of the Contract.

- L. Clean Up Premises: The Contractor shall clean up and remove from premises all debris accumulated from operations as necessary or as directed. See also Section 7.25 of the General Conditions.
- M. Responsibility
1. The State will hold the Contractor liable for all the acts of Subcontractors and shall deal only with the prime Contractor in matters pertaining to other trades employed on the job. The Contractor shall be responsible for coordinating the work of all trades on the job.
 2. Should the Contractor discover any discrepancy in the plans or specifications, the Contractor shall immediately notify the Engineer before proceeding any further with the work, otherwise, the Contractor will be held responsible for any cost involved in correction of work placed due to such discrepancy.
- N. Cooperation With Other Contractors: The State reserves the right at any time to contract for or otherwise perform other or additional work within the contract zone limits of this Contract. The Contractor of this project shall, to the extent ordered by the State, conduct its work so as not to interfere with or hinder the progress or completion of the work performed by other contractors.
- O. Division of the Work: The Divisions and Sections into which these Specifications are divided shall not be considered an accurate or complete segregation of work by trades. This also applies to all work specified within each Section.
- P. Drawings and Specifications
1. The Contractor shall not make alterations in the drawings and specifications. In the event the contractor discovers any errors or discrepancies, the Contractor shall immediately notify the Engineer in accordance with the General Conditions.
 2. Where devices, or items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items or parts as are required to properly complete the work.
 3. Specifications and drawings are prepared in abbreviated form and include incomplete sentences. Omission of words or phrases such as "the Contractor shall", "as shown on the drawings", "a", "an", and "the" are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.
- Q. Required Submittals
1. Required submittals as specified in the Technical Sections of these specifications include one or more of the following: Shop drawings; color

samples; material samples; technical data; schedules of materials; schedules of operations; guarantees; operating and maintenance manuals; and as-built drawings.

2. The Contractor shall make a comprehensive list of the required submittals, by Specification Section, and submit this list to the Engineer within 15 days after notice to proceed.
3. As-Built Drawings: When as-built drawings are required for submittal, the following shall apply:
 - a. As-built drawings, the intent of which is to record the actual in-place construction so that any future renovations or tie-ins can be anticipated accurately, shall be required.
 - b. All deviations from alignments, elevations and dimensions which are stipulated on the plans shall be recorded in red on the as-built drawings.
 - c. The following procedure shall be followed:
 - 1) Immediately after these changes are constructed in place, the Contractor shall record them on the field office plans.
 - 2) Within two weeks after final inspection of the project, the Contractor shall transfer the changes marked on the field office plans onto a clean copy of plans using a red pencil. Any deletions shall be so noted and redrawn as necessary. The Contractor shall stamp or mark the tracings "AS-BUILT", and also sign and date each drawing so marked.
 - 3) The Contractor shall submit the as-built drawings together with the marked-up field office plans to the Engineer.
 - 4) Any as-built drawing which the Engineer determines does not accurately record the deviation shall be corrected by the State, and the Contractor shall be charged for the services.

PART 2 - MATERIALS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION

SECTION 01090 - STANDARD REFERENCES

PART 1 - GENERAL

Wherever used in the project, the following abbreviations will have the meanings listed:

<u>Abbreviation</u>	<u>Company</u>
AA	Aluminum Association Incorporated 818 Connecticut Avenue, N.W. Washington, D.C. 20006
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W., Suite 225 Washington, D.C. 20001
ACI	American Concrete Institute P.O. Box 19150 Detroit, MI
AEIC	Association of Edison Illuminating Companies 51 East 42nd Street New York, NY 10017
AFBMA	Anti-Friction Bearing Manufacturer's Association 60 East 42nd Street New York, NY 10017
AGA	American Gas Association 8501 East Pleasant Valley Road Cleveland, OH 44131
AGMA	American Gear Manufacturer's Association 1330 Massachusetts Avenue, N.W. Washington, D.C.
AISC	American Institute of Steel Construction 101 Park Avenue New York, NY 10017
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, D.C. 20036
AITC	American Institute of Timber Construction 333 West Hampden Avenue Englewood, CO 80110

<u>Abbreviation</u>	<u>Company</u>
AMCA	Air Moving and Conditioning Association, Inc. 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute, Inc. 1430 Broadway New York, NY 10018
APA	American Plywood Association 1119 A Street Tacoma, WA 98401
API	American Petroleum Institute 1801 K Street N.W. Washington, DC 20006
ARI	Air-Conditioning and Refrigeration Institute 1814 North Fort Myer Drive Arlington, VA 22209
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017
ASCII	American Standard Code for Information Interchange United States of America Standards Institute 1430 Broadway New York, NY 10018
ASE Code	American Standard Safety Code for Elevators, Dumbwaiter and Escalators American National Standards Institute 1430 Broadway New York, NY 10018
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers United Engineering Center 345 East 47th Street New York, NY 10017
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017

<u>Abbreviation</u>	<u>Company</u>
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWPA	American Wood Preservers Association 1625 Eye Street Washington, DC 20006
AWS	American Welding Society 2501 N.W. 7th Street Miami, FL 33125
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
CBM	Certified Ballast Manufacturers 2120 Keith Building Cleveland, OH 44115
CMAA	Crane Manufacturers Association of America, Inc. (Formerly called: Overhead Electrical Crane Institute - OECI) 1326 Freeport Road Pittsburgh, PA 15238
CRSI	Concrete Reinforcing Steel Institute 180 North La Salle Street Chicago, IL 60601
CSA	Canadian Standards Association 178 Rexdale Boulevard Rexdale, Ontario, M9W 1R3, Canada
DEMA	Diesel Engine Manufacturer's Association 122 East 42nd Street New York, NY 10017

<u>Abbreviation</u>	<u>Company</u>
DIS	Division of Industrial Safety California Department of Industrial Relations 2422 Arden Way Sacramento, CA 95825
EI	Edison Electric Institute 90 Park Avenue New York, NY 10016
EIA	Electronic Industries Association 2001 Eye Street N.W. Washington, DC 20006
EJMA	Expansion Joint Manufacturer's Association 331 Madison Avenue New York, NY 10017
ESO	Electrical Safety Orders, California Administrative Code, Title 8, Chap. 4, Subarticle 5 Office of Procurement, Publications Section P.O. Box 20191 8141 Elder Creek Road Sacramento, CA 95820
FEDSPEC	Federal Specifications General Services Administration Specification and Consumer Information Distribution Branch Washington Navy Yard, Bldg. 197 Washington, DC 20407
FEDSTDS	Federal Standards (see FEDSPECS)
FM	Factory Mutual Research 1151 Boston-Providence Turnpike Norwood, MA 02062
HEI	Heat Exchange Institute 122 East 42nd Street New York, NY 10017
HI	Hydraulic Institute 1230 Keith Building Cleveland, OH 44115

<u>Abbreviation</u>	<u>Company</u>
IAPMO	International Association of Plumbing and Mechanical Officials 5032 Alhambra Avenue Los Angeles, CA 90032
ICBO	International Conference of Building Officials 5360 South Workman Mill Road Whittier, CA 90601
ICEA	Insulated Cable Engineers Association P.O. Box P South Yarmouth, MA 02664
IEEE	Institute of Electrical and Electronics Engineers, Inc. 345 East 47th Street New York, NY 10017
IES	Illuminating Engineering Society C/O United Engineering Center 345 East 47th Street New York, NY 10017
ISA	Instrument Society of America 400 Stanwix Street Pittsburgh, PA 15222
JIC	Joint Industrial Council 7901 Westpark Drive McLean, VA 22101
MILSPEC	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Street, N.E. Vienna, VA 22180

<u>Abbreviation</u>	<u>Company</u>
NAAMM	National Association of Architectural Metal Manufacturers 100 South Marion Street Oak Park, IL 60302
NACE	National Association of Corrosion Engineers P.O. Box 986 Katy, TX 77450
NEC	National Electric Code National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
NEMA	National Electrical Manufacturer's Association 155 East 44th Street New York, NY 10017
NESC	National Electric Safety Code American National Standards Institute 1430 Broadway New York, NY 10018
NFPA	National Forest Products Association (Formerly called: National Lumber Manufacturer's Association) 1619 Massachusetts Avenue, N.W. Washington, DC 20036
OSHA	Occupational Safety and Health Act U.S. Department of Labor San Francisco Regional Office 450 Golden Gate Avenue, Box 36017 San Francisco, CA 94102
PPIC	The Plumbing & Piping Industry Council, Inc. Suite 402 510 Shatto Place Los Angeles, CA 90020
SAE	Society of Automotive Engineers 2 Pennsylvania Street New York, NY 10001

<u>Abbreviation</u>	<u>Company</u>
SAMA	Scientific Apparatus Makers Association One Thomas Circle Washington, DC 20005
SBCC	Southern Building Code Congress 1116 Brown-Marx Building Birmingham, AL 35203
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc. 8224 Old Courthouse Road Tysons Corner Vienna, VA 22180
SSPWC	Standard Specifications for Public Works Construction Building News, Inc. 3055 Overland Avenue Los Angeles, CA 90034
TEMA	Tubular Exchanger Manufacturer's Association 331 Madison Avenue New York, NY 10017
UBC	Uniform Building Code Published by ICBO
UL	Underwriters Laboratories Inc. 207 East Ohio Street Chicago, IL 60611
UMC	Uniform Mechanical Code Published by ICBO
UPC	Uniform Plumbing Code Published by IAPMO
USBR	Bureau of Reclamation U.S. Department of Interior Engineering and Research Center Denver Federal Center, Building 67 Denver, CO 80225
WWPA	Western Wood Products Association (Formerly called: West Coast Lumberman's Association - WCLA) Yeon Building Portland, CA 97204

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01100 – ARCHAEOLOGICAL PROTECTION

PART 1 - GENERAL

- 1.01** This section covers the requirements for the protection and preservation of historical resources.
- 1.02** The project site is located within the Lahaina National Historic Landmark District.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

- 3.01** In the event that any previously unknown archaeological properties (such as artifacts; subsurface deposits of bone, shell or charcoal; rock or coral alignments, paving or walls) or human remains are encountered, the Contractor shall suspend all work in the immediate area of the discovery and notify the Engineer and the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) at 808-243-5169 as soon as possible. The potential significance of the discovery will be agreed upon and mitigation needs, as appropriate for non-burial sites, will be discussed and resolved with the SHPD archaeological staff. Notes, scaled maps, and photographic documentation will be recorded of cultural features that are encountered during excavations.
- 3.02** If human remains are discovered, the County of Maui Police Department shall be notified in addition to the Engineer and SHPD. No work in the immediate area of the find shall proceed until SHPD has been able to assess the discovery as required under Chapter 6E-43.6, Hawaii Revised Statutes and Chapters 13-265 and 13-300, Hawaii Administrative Rules. Utmost care will be taken to ensure that any associated items or stratigraphic context are not further disturbed. No remains will be removed or further disturbed without SHPD determination. SHPD will assume the lead in consulting with the recognized descendants and the Maui Island Burial Council.
- 3.03** Subsequently, if the State requires it, the Contractor shall engage the services of a professional archaeologist to assist the State in meeting historic preservation requirements and coordination with SHPD.
- 3.04** A Kupuna, a person knowledgeable of the cultural area, and approved by the Engineer, should be invited to give a cultural perspective during the preconstruction orientation. Cost to consult with the Kapuna will be paid for by the Contractor.
- 3.05** The Contractor shall hire an archaeologist to prepare an Archaeological Monitoring Plan to be submitted to SHPD; and to monitor ground disturbing activities if required by SHPD.

3.06 A draft Archaeological Monitoring Report shall be submitted within 90 days of completion of monitoring fieldwork to the SHPD for review and approval. A final report will be submitted within 30 days of any review comments being received.

END OF SECTION

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Shop drawings shall be required for:
 - 1. Electrical Work.
 - 2. Fixed Pier
 - 3. FRP Grating
 - 4. Gangway
 - 5. Project Sign
 - 5. Any others as called for in the plans, specifications or by the Engineer.

- B. Other required submittals shall include:
 - 1. Piping materials.
 - 2. Shoring and Sheeting Plan
 - 3. Fiber Reinforced Plastic Grating
 - 4. Site Specific Best Management Practices
 - 5. Electrical System
 - 6. Manufacturer's Data
 - 7. Certificates of Warranty
 - 8. Any others as called for in the plans, specifications, or by the Engineer.

1.02 BIDDER'S SPECIAL RESPONSIBILITY FOR COORDINATING CONTRACTUAL WORK AND SUBMITTALS:

- A. The Contractor is responsible for the coordination of all contractual work and submittals.

B. The Contractor shall have a rubber stamp made up in the following format:

CONTRACTOR NAME

PROJECT: _____

JOB NO: _____

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

DATE RECEIVED _____
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 8-1/2" x 11" format, or on one face of a cardstock tag (min. 3" x 6") tied to each sample. The tag on the samples should state what the sample is so that, if the tag is accidentally separated from the sample, it can be matched up again. The back of this tag will be used by the Engineer for his receipt, review, and log stamp and for any comments that relate to the sample.
- D. All submittals for material, equipment, and shop drawings listed in the contract documents, including dimensioned plumbing shop drawings, shall be required and shall be reviewed by the Engineer, prior to any ordering of materials and equipment.
- E. Unless otherwise noted, the Contractor shall submit to the Engineer for his review eight copies of all shop drawings, piping layout, and/or catalog cuts for fabricated items and manufactured items (including mechanical and electrical equipment) required for the construction. Drawings shall be submitted in sufficient time to allow the Engineer not less than twenty regular working days for examining the drawings.
- F. The drawing shall be accurate, distinct, and complete and shall contain all required information, including satisfactory identification of items, units and assemblies in relation to the contract drawings and specifications.

- G. Unless otherwise approved by the Engineer, shop drawings shall be submitted only by the Contractor, who shall indicate by a signed stamp on the drawings or other approved means that the Contractor has checked the shop drawings and that the work or equipment 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 listed. The practice of submitting incomplete or unchecked shop drawings for the Engineer to correct or finish will not be acceptable, and shop drawings which, in the opinion of the Engineer, clearly indicate that they have not been checked by the Contractor will be considered as not complying with the intent of the contract documents and will be returned to the Contractor for resubmission in the proper form.
- H. When the shop drawings 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 drawing 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 eight 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. The review of such drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of the dimensions, fabrication details, and space requirements or for deviations from the contract drawings and specifications, unless the Contractor has called attention to such deviations, in writing, by a letter accompanying the drawings and the Engineer approved the change or deviations, in writing, at the time of submission; nor shall review by the Engineer relieve the Contractor from the responsibility for errors in the shop drawings. When the Contractor does call such deviations to the attention of the Engineer, he shall state in his letter whether or not such deviations involve any deduction or extra cost adjustment.
- J. The approval of the above drawings, lists, prints, specifications, or other data shall in no way release the Contractor from his responsibility for the proper fulfillment of the requirements of this contract nor for fulfilling the purpose of the installation nor from his liability to replace the same should it prove defective or fail to meet the specified requirements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01505 - MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Description: This section covers the requirements for mobilization and demobilization.

1.02 MOBILIZATION

Mobilization shall consist of the transporting, assembling, constructing, installing, and making ready for use at the job site, all the equipment, machinery, structures, utilities, materials, labor, and incidentals necessary to do the work covered by this contract.

1.03 DEMOBILIZATION

Demobilization shall consist of the dismantling and removal of the above-mentioned equipment, machinery, structures, utilities, materials, and incidentals, and the cleaning up of the site.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GUIDELINES

If the Contractor utilizes private lands other than the sites provided by the Department for mobilization purposes, the provisions of this section shall apply, and the mobilization and demobilization work on said private lands shall be in accordance with the agreement between the Contractor and the land owner.

Any and all additional mobilization or demobilization costs in excess of the maximum amounts specified in the Proposal shall be included in the appropriate unit prices bid in the Proposal. The Contractor shall not receive any compensation for mobilization and demobilization in addition to those specified in the Proposal.

All equipment, machinery, buildings, utilities and incidentals mobilized and demobilized under this section shall remain the property of the Contractor.

END OF SECTION

SECTION 01530 - BARRICADES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Description. This work shall consist of furnishing, installing and maintaining barricades in accordance with the requirements of the contract.

Barricade application shall be provided for in the latest edition of the FHWA publication, Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), and as amended.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lumber: Lumber for rails, frames and braces shall be dry, sound, undamaged, well seasoned, and free from any defect which may impair their strength and durability.
- B. Hardware: Nails shall be galvanized wire nails. As many and as large a size as is practicable shall be used.
- C. Paints: Paints shall be exterior enamel paint of the best grade or first line as made by approved manufacturers.
- D. Sheet Reflecting Material: Sheet reflecting material shall conform to the applicable requirements of Subsection 712.20(C) of the "Standard Specifications for Road and Bridge Construction".
- E. Alternate Designs: Alternate barricade designs such as plastic molded barricades may be used subject to the Engineer's approval. The Contractor shall submit shop drawings or catalog cuts for approval.

PART 3 - EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. General: Barricades shall be constructed in a first class, workmanlike manner in accordance with details shown on the plans and as specified herein.

Barricades shall be in good condition and approved by the Engineer for use within the project limits. Barricade application and installation shall be as shown on the plans and as directed by the Engineer in accordance with the guidelines provided in the latest edition of

the FHWA publication, Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), and any amendments or revisions thereof as may be made from time to time.

Sand bags or other approved weights shall be provided where required or as directed by the Engineer. Sand bags or other approved weights shall not be placed on any striped barricade rail.

Steady burn and/or flashing lamps shall be required on selected barricades used during hours of darkness. Locations shall be as shown on the plans and as directed by the Engineer. Lamps shall be attached on the barricade ends closest to the traveled way and shall be visible to the motorist.

Barricades furnished and paid for as provided for as provided herein may be used for temporary detours, construction phasing, or other temporary traffic control work.

Barricades furnished and paid for use in temporary detours or construction phasing may be used for permanent location called for on the plans.

Upon completion of the construction work, barricades shall be left in place, relocated, or removed and disposed of as shown on the plans or as directed by the Engineer. Barricades left in place, or relocated to new permanent locations shall become the property of the State. Barricades directed to be removed and disposed of shall become the property of the Contractor.

- B. Painting: Wooden rails, frames and braces shall be given a prime coat and 2 finish coats of new white exterior enamel paint. Rail faces to be reflectorized may be left unpainted unless otherwise specified or directed.
- C. Reflectorization: Reflectorization of barricade rails shall be done in a first class, workmanlike manner and the attachment of reflective sheeting shall be as shown on the plans, specified herein, or as directed and approved by the Engineer.

Both vertical faces of each barricade rail shall be reflectorized as shown on the plans.

Wooden rails shall be reflectorized with one of the following:

1. Reflective sheeting specified in Subsection 712.20(C)(4) of the "Standard Specifications for Road and Bridge Construction" and backed with a 26 gage galvanized steel sheet, or
2. a hardened aluminum backed reflective sheeting as specified in Subsection 712.20(C)(5) of the "Standard Specifications for Road and Bridge Construction."

- D. Color: Rails, frames and braces shall be white.

The front and back faces of barricade rails shall have 6-inch wide alternative colored and white striped sloping downward toward the traveled way at an angle of 45 degrees with the vertical. The colored stripes shall be either orange or red in accordance with the following requirements:

1. Orange and white stripes shall be used in the following conditions:
 - a. Construction work.
 - b. Detours.
 - c. Maintenance work.
2. Red and white stripes shall be used in the following conditions:
 - a. On roadways with no outlet (ie. dead-ends, cul-de-sacs).
 - b. Ramps or lanes closed for operational purposes.
 - c. Permanent or semipermanent closure or termination of a roadway.

- E. Maintenance: Barricades shall be kept in good condition throughout their usage during construction until the end of the contract.

- F. The Contractor shall repair, repaint, clean or replace the barricades as required and as directed by the Engineer to maintain their effectiveness and appearance.

The Constructor shall immediately replace all lost, stolen or damaged barricades, lamps, sand bags and other approved weights.

Barricades used during construction phasing, temporary detours or other temporary traffic control work shall be cleaned and repaired as necessary, prior to being relocated to a permanent location shown on the plans or as directed.

No extra payment will be made for any repair work, repainting, or cleaning of barricades. The Engineer shall determine the suitable condition of each barricade and shall determine when each barricade shall be repaired, repainted or cleaned.

END OF SECTION

SECTION 01568 - ENVIRONMENTAL PERMITS AND POLLUTION CONTROL

PART 1 – GENERAL

1.01 GENERAL

- A. With the exception of those measures set forth elsewhere in these specifications, environmental protection shall consist of the prevention of environmental pollution as the result of construction operations under this contract. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare, unfavorably alter ecological balances of importance to human life, affect other species of importance to man, or degrade the utilization of the environment for aesthetic and recreational purposes.
- B. The work under this section shall include the following:
 - 1. Ensure that all permits required are obtained and valid for the construction period.
 - 2. Provide all air and water quality testing and monitoring work required by the permits during construction.
 - 3. Provide all facilities, equipment and structural controls for minimizing adverse impacts upon the environment during the construction period.

1.02 GENERAL REQUIREMENTS

A. Applicable Regulations

In order to provide for abatement and control of environmental pollution arising from the construction activities of the Contractor and his subcontractors in the performance of this contract, the work performed shall comply with the intent of the applicable Federal, State, and County of Maui and regulations concerning environmental pollution control and abatement, including, but not limited to the following regulations:

- 1. State of Hawaii, Department of Health, Administrative Rules, Chapter 55, WATER POLLUTION CONTROL: Chapter 54, WATER QUALITY STANDARDS.
- 2. State of Hawaii, Department of Health, Administrative Rules, Chapter 59, AMBIENT AIR QUALITY: Chapter 60, AIR POLLUTION CONTROL LAW.
- 3. State of Hawaii, Department of Health, Administrative Rules, Chapter 44A, VEHICULAR NOISE CONTROL.
- 4. State of Hawaii, Occupational Safety and Health Standards, Title 12, Department of Labor and Industrial Relations, Subtitle 8, Division of Occupational Safety and Health, Subparagraph 12-202-13, ASBESTOS DUST: Environmental Protection Agency, Code of Federal Regulation Title 40, Part 61, Subpart B, NATIONAL EMISSION STANDARDS FOR ASBESTOS; and U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Asbestos Regulations, Code of Federal Regulations Title 29, Part 1910.

B. Permits and Water Quality Certification

1. The Contractor shall comply with the requirements and conditions of all regulatory agency permits, including the following:
 - a. Department of Army Permit
 - b. National Pollutant Discharge Elimination System (NPDES) Individual Permit
 - c. Section 401 Water Quality Certification
 - d. Any other required permits
2. All permit applications and/or forms shall be submitted to the State for concurrence prior to submission to the accepting agencies.
3. The project shall be in accordance with the terms of the Lahaina Historic District.

C. Rubbish Disposal

1. No burning of debris and/or waste materials shall be permitted on the project site.
2. No burying of debris and/or waste material except for materials which are specifically indicated elsewhere in these specifications as suitable for backfill shall be permitted on the project site.
3. All unusable debris and waste material shall be hauled away to an appropriate off-site dump area. During loading operations, debris and waste materials shall be watered down to reduce dust.
4. No dry sweeping shall be permitted in cleaning rubbish and fines which can become airborne from ground or other paved areas. Vacuuming, wet mopping, or wet or damp sweeping is permissible.
5. Cleanup shall include the collection of all waste paper and wrapping materials, cans, bottles, construction waste materials and other objectionable materials, and removal as required. Frequency of cleanup shall coincide with rubbish producing events.

D. Dust

1. The Contractor shall prevent dust from becoming airborne at all times including non-working hours, weekends and holidays in conformance with the State of Hawaii, Department of Health, Administrative Rules, Chapter 60, AIR POLLUTION CONTROL LAW.
2. The method of dust control and costs shall be the responsibility of the Contractor. Methods of dust control include using water to prevent airborne dust.
3. The Contractor shall be responsible for all damage claims in accordance with Section 7.16 – “Responsibility for Damage Claims” of the GENERAL CONDITIONS.

E. Noise

1. Noise shall be kept within acceptable levels at all times in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 43 – Community Noise Control for the County of Maui. The Contractor shall obtain and pay for the Community Noise Permit from the State Department of Health when his construction equipment or other devices emit noise at levels exceeding the allowable limits.
2. All internal combustion engine-powered equipment shall have mufflers to minimize noise and shall be properly maintained to reduce noise to acceptable levels.
3. Construction equipment meeting allowable noise limits shall not be started prior to 6:45 a.m. without prior approval of the Engineer. Equipment exceeding allowable noise levels shall not be started-up prior to 7:00 a.m.

F. Historical, Archaeological and Cultural Resources

There are no known historical, archaeological or cultural resources within the project site. In the unlikely event that historical sites, including human burials are uncovered during the course of any construction activities, all work in the vicinity must stop and the State Historic Preservation Division must be contacted at 692-8015.

G. Protection of Water Resources

1. Contractor's Site-specific BMP Plan. The Contractor shall submit a Site-specific BMP Plan to the State of Hawaii Department of Health (DOH) for their review, comment, and acceptance, prior to the start of construction. The BMP plan shall include the Contractor's plans to take care of any turbidity which may occur during the demolition of shoreline debris, cleats, metal and wooden structures, ramps, stairs, and appurtenances. BMPs shall include, but are not limited to the following:

Perform regular cleanup of areas exposed to storm water.

Store material under shelter or covering to avoid contact with storm water.

All storage of construction-related materials shall be above the influence of the tides and shall be stored in such a manner to preclude any contaminants, or runoff containing such contaminants from entering State waters.

The Contractor shall not deposit at the site or in the storm drainage system any solid waste or discharge liquid waste, such as fuels, lubricants, bituminous waste, untreated sewage, and other pollutants, which may contaminate the existing surface or ground waters and harbor waters. No excavated material shall be stockpiled in harbor waters.

Care shall be taken to ensure that no petroleum products, bituminous materials, or other deleterious substances, including debris, allowed to fall, flow, leach, or otherwise enter existing surface or ground waters and harbor waters.

The Contractor shall properly control fugitive dust from entering the harbor waters or the neighborhood surrounding the project site.

The Contractor shall not allow any debris or construction waste material to be blown or dropped into the harbor or ocean. Any debris or waste blown or dropped into the harbor or ocean shall be immediately retrieved by the Contractor's personnel.

H. Others

1. Whenever trucks and/or other construction equipment leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being carried onto the pavement. Trucks hauling sand, debris or other material shall be covered as required by Public Utilities Commission (PUC) regulations.
2. Wastewater shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basins unless treated to comply with the State Department of Health water pollution regulations.
3. Except in an emergency, such as a mechanical breakdown, all vehicle fueling and maintenance shall be done in a designated area isolated from State waters. A temporary berm shall be constructed around the area when runoff can cause a problem.
4. If any oil or petroleum spills occur, or if a visual sheen is noted on the water, work shall be suspended and the spill shall be cleaned up. Sorbent materials shall be kept on site to be used in the event of such spills. Spills shall be reported to the Engineer, to the Hawaii Department of Health – Clean Water Branch (telephone 808-586-4309) and the U.S. Coast Guard shall be notified (telephone 808-424-8802).
5. In the event there is a petroleum spill on the sand, the operator shall promptly remove the contaminated sand from the beach.

I. Suspension of Work

1. Violations of any of the above requirements or any other pollution control requirements which may be specified in the Detailed Specifications herein shall be cause for suspension of the work creating such violation. No additional compensation shall be due to the Contractor for remedial measures to correct the offense. Also, no time extension will be granted for delays caused by such suspensions.
2. If no corrective action is taken by the Contractor within 72 hours after a suspension is ordered by the Engineer, the State reserves the right to take whatever action is necessary to correct the situation and to deduct all costs incurred by the State in taking such action from monies due to the Contractor.
3. The Engineer may also suspend any operations which he feels are creating pollution problems although they may not be in violation of the above-mentioned requirements. In this instance, the work shall be done and paid for in accordance by force account as described in Subsection 4.2b – “Additional Work” of the GENERAL CONDITIONS and paid for in accordance with Subsection 8.4b – “Force – Account Work” therein. The count of elapsed working days to be charged against the contract in this situation shall be computed in accordance with Subsection 7.18 – “Contract Time” of the GENERAL CONDITIONS.

1.03 ENVIRONMENTAL PROTECTION REQUIREMENTS

A. Work in and around Water

1. All work in and around water, including sandbag barriers, water monitoring, and other waterfront activities shall conform to the Contractors Site-specific Best Management Practices Plan.
2. During performance of the work, the Contractor shall institute and enforce procedures to prevent spills and floating debris from fouling the waters. If such procedures fail, the Contractor shall promptly clean up all spills and floating debris at no cost to the State. The Contractor shall evaluate failed procedures and take corrective measures to fix any deficiencies immediately. For all spills in State waters occurring after normal duty hours, notify the Engineer. The Contractor shall notify the National Response Center (800-424-8802), as required by 40 CFR 302.6, if the quantity of the released substance exceeds the reportable quantities. The Contractor shall also be responsible for notifying the State Emergency Response Commission (586-4249) if the release has the potential to migrate off-site and affect adjacent communities as required by the Emergency Planning and Community Right-to-Know Act (EPCRA) Section 304.
3. Monitoring

Monitoring shall be in accordance with requirements of the site-specific BMP plan that has been accepted by the State DOH prior to construction.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 BEST MANAGEMENT PRACTICES (BMP) PLAN

Best Management Practices (BMPs) shall be implemented to ensure that water quality and marine resources are protected and preserved. Mitigation measures involve the use of good quality sand for backfill. Silt and dust containment shall be practiced for the duration of construction activities.

The contractor's Site-specific BMP Plan shall include a temporary erosion control and sediment control plan approved by the Engineer prior to commencement of grading.

Measures to control erosion and other pollutants shall be in place before any earth moving work is initiated. These measures shall be properly constructed and maintained throughout the construction period.

All sand backfill material shall be free of contaminants of any kind including: excessive silt, sludge, anoxic or decaying organic material, temperature, turbidity, abnormal water chemistry, clay, dirt, organic material, oil, floating debris, grease or foam or any other pollutant that would cause an undesirable condition on the beach or water.

Where any interference, nuisance, or harm may be caused by construction activities, the Contractor shall take measures to minimize or eliminate the interference, nuisance, or harm.

Contractor shall inspect sandbag barriers daily and repair as necessary.

No motorized construction equipment is to be operated in the water at any time.

3.02 AIR POLLUTION CONTROL

A. Emission

The Contractor shall not be allowed to operate equipment and vehicles that show excessive emissions of exhaust gases until corrective repairs or adjustments are made to the satisfaction of the Engineer.

B. Dust

1. For the duration of the contract, the Contractor shall maintain all embankments, haul roads, access roads, vegetation sites, waste disposal areas, borrow areas, and all other work areas within the project limits. He shall control the dust from these areas to minimize hazardous work conditions and negative impacts on persons or property. Industry accepted methods of stabilization suitable for the area involved, such as sprinkling or similar methods will be permitted. Chemical or oil treating shall not be permitted.

C. Burning shall not be permitted.

3.03 WATER POLLUTION CONTROL

A. Wastes

The Contractor shall not deposit at the site or in the storm drainage system any solid waste or discharge liquid waste, such as fuels, lubricants, bituminous waste, untreated sewage, and other pollutants, which may contaminate the existing surface or ground waters. Excavated material shall not be stockpiled in the marine environment.

B. Spillage

Care shall be taken to ensure that no petroleum products, bituminous materials, or other deleterious substances, including debris, are allowed to fall, flow, leach, or otherwise enter existing surface or ground waters.

C. The work areas and haul roads, including roadways leading to the project site, shall be continuously watered to prevent the generation of dust and shall be cleaned daily to remove all mud and droppings from construction vehicles. Mud shall be removed from the tires of all vehicles before entering the construction site.

3.04 NOISE CONTROL

A. Construction equipment shall be equipped with suitable mufflers to maintain noise within levels complying with applicable regulations.

3.05 SOLID WASTES

- A. Construction waste, such as crates, boxes, building materials, and other rubbish shall be reduced to a size approved by the Engineer. Large size objects shall be reduced to a size acceptable by the County of Maui specifications for disposal in their landfills. Other areas or methods proposed by the Contractor will be approved only if the Engineer determines that their effect on the environment is equal to or less than those described herein.
- B. Removal of waste shall be a continuous ongoing operation. Wastes and debris shall not be allowed to accumulate in large open piles.
- C. Wind-blown waste and debris and wastes left by workers shall be collected by the Contractor and disposed of as described above.
- D. Conduct the fueling and lubricating of equipment and motor vehicles to protect against spills and evaporation. Dispose of lubricants to be discarded and all excess oil in accordance with Federal, State, and local regulations.
- E. Dispose of electrolyte solution from lead-acid batteries in accordance with hazardous regulations. Do not dump electrolyte onto the ground or into storm drains or sanitary sewers. Transport the electrolyte to a State-approved hazardous waste disposal site. The method of transportation and equipment shall comply with applicable Federal and State regulations.

3.06 CONSTRUCTION REQUIREMENTS

- A. Do not begin work until the site-specific BMP plan has been completed and accepted in writing by the State DOH and the Environmental Protection Plan has been completed and accepted in writing by the Engineer.
- B. Install, maintain, monitor, repair, and replace site-specific BMPs.
- C. Address all comments received from the Engineer.
- D. Modify and resubmit plans and construction schedules to correct conditions that develop during construction which were unforeseen during the design and pre-construction stages.
- E. Coordinate temporary control provisions with permanent control features throughout the construction and maintenance period.
- F. Install and maintain either or both stabilized construction entrances and wheel washes to minimize tracking of dirt and mud onto roadways. Restrict traffic to stabilized construction areas only. Clean dirt, mud, or other material tracked onto the road immediately. Modify stabilized construction entrances to prevent mud from being tracked onto roadways. Stabilize entire access roads if necessary.
- G. Provide for controlled discharge of waters impounded, directed, or controlled by project activities.
- H. Cover exposed surface of materials completely with tarpaulin or similar device when transporting aggregate, soil, excavated material, or material that may be a source of fugitive dust.

- I. Clean up and remove any pollutant that can be attributed to the Contractor's activities.
- J. Install or modify BMPs due to a change in the Contractor's means and methods, omitted condition that should have been allowed in the accepted site-specific BMP plan, or a BMP that replaces an accepted site-specific BMP that is not satisfactorily performing.
- K. Remove, destroy, replace, or relocate any BMP that must be removed, destroyed, replaced, or relocated due to potential or actual flooding or potential danger or damage to the Project or public.
- L. Maintain records of inspections and maintenance of BMPs. Keep records for duration of the project. Submit weekly copy of records to the Engineer.
- M. The Contractor's designated representative shall address any BMP concerns brought up by the Engineer within 24 hours of notification, including weekends and holidays. If the Contractor fails to satisfactorily address these concerns, the Engineer reserves the right to employ outside assistance or use the Engineer's own labor forces to provide necessary corrective measures. The Engineer will charge the Contractor such incurred costs plus any associated project engineering costs. The Engineer will make appropriate deductions from the Contractor's monthly progress estimate. Failure to apply BMPs shall result in either or both the establishment and increase in the amount of retainage due to unsatisfactory progress or withholding of monthly progress payment. Continued failure to apply BMPs may result in one or more of the following: assessment of liquidated damages, suspension, or cancellation of contract with the Contractor being fully responsible for all additional costs incurred by State.

END OF SECTION

SECTION 01581 - PROJECT SIGN

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

Furnish all labor, materials and equipment necessary to construct and install all project sign as specified hereinafter.

1.02 SUBMITTAL

The contractor shall provide the Engineer with six (6) shop drawings of the project sign for review and approval by the Engineer prior to ordering the sign.

1.03 LETTER STYLE

Copy is centered and set in Adobe Type Futura Heavy. If this specific type is not available, Futura Demi Bold may be substituted. Copy should be set and spaced by a professional typesetter and enlarged photographically for photo stencil screen process.

1.04 ART WORK

Constant elements of the sign layout - frame, outline, stripe, and official state information - may be duplicated following drawing measurements, or be reproduced and enlarged photographically using a layout template if provided. The "STATE OF HAWAII" masthead should be reproduced and enlarged as specified, using the artwork provided.

1.05 TITLES

The specific major work of the project under construction is emphasized by using 3-3/4" type, all capitals. Secondary information such as location or buildings uses 2-1/4" type, all capitals. Other related information of lesser importance uses letter heights as indicated on 01581-3, upper / lower case letters.

Design should follow the example on page 01581-3.

PART 2 - PRODUCTS

2.01 MATERIALS

A. LUMBER

1. Panel is 3/4" exterior grade high density overlaid plywood, with resin-bonded surfaces on both sides.
2. 4"x4" sign posts shall be Douglas Fir No. 1 or better.

B. PAINTS & INKS

Screen print inks are matte finish. Paints are satin finish, exterior grade. References to Ameritone Color Key Paint are for color match only.

COLOR:	1.	1BL10A	Bohemian Blue
	2.	2H16P	Softly (White)
	3.	2VR2A	Hot Tango (Red)
	4.	1M52E	Tokay (Gray)

C. CONCRETE

Concrete shall be class B with a 2,500 psi 28-day compressive strength.

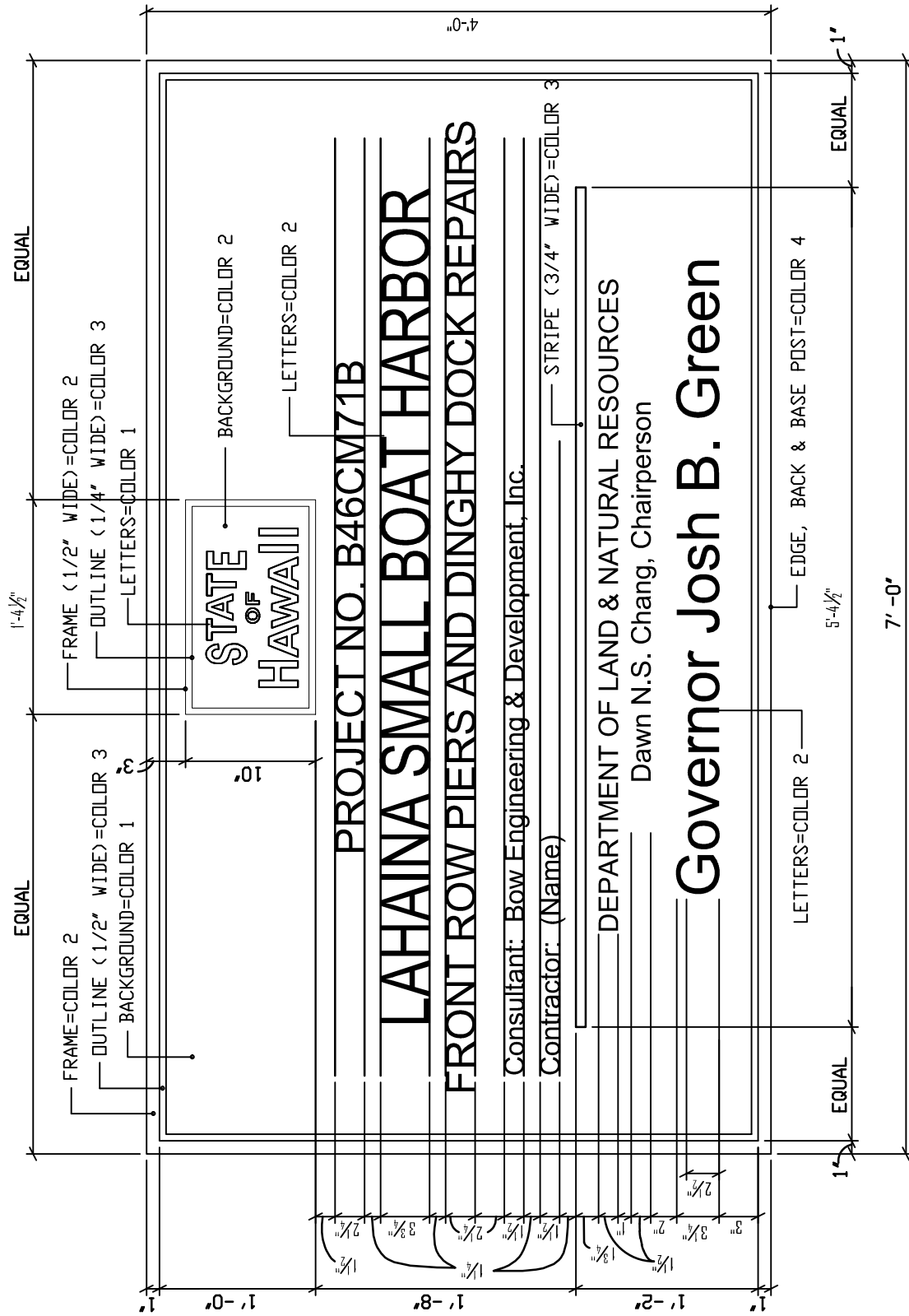
PART 3 - EXECUTION

3.01 GENERAL

- A. The Project Sign shall be constructed with new materials as specified above.
- B. The Project sign shall be installed at the location indicated on the drawings or as designated by the Engineer. The project sign shall be erected upon commencement of work.

3.02 MEASUREMENTS AND PAYMENT

The construction of the project sign, including all equipment, labor and material necessary to furnish and install the project sign will be paid for under the "Project Sign" proposal item.



END OF SECTION

NOTE: Number of signs required 1

SECTION 02050 - DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. The work covered by this Section includes the furnishing of all material and equipment and the performing of all labor to complete the demolition, removal and disposal of structures off the property as shown on the Contract Drawings and as herein specified or directed by the State's Representative. Unless otherwise noted within the Contract Documents, the Contractor shall be responsible for disposing of all demolition and removal items off-site. During the demolition work, adjacent tenant equipment and storage areas shall be protected from damage. Any damage resulting from demolition work shall be repaired or replaced by the Contractor to the satisfaction of the State's Representative at no additional cost to the State. Cleanup of all debris shall be done by the Contractor.

1.02 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise indicated the most recent edition of the publication, including any revisions, shall be used.
- B. AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
 - ASSE/SAFE A10.6 Safety Requirements for Demolition Operations
- C. U.S. ARMY CORPS OF ENGINEERS (USACE)
 - EM 385-1-1 Safety -- Safety and Health Requirements
- D. U.S. FEDERAL AVIATION ADMINISTRATION (FAA)
 - FAA AC 70/7460-1 (Rev K) Obstruction Marking and Lighting
- E. U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
 - 40 CFR 61 National Emission Standards for Hazardous Air Pollutants
 - 40 CFR 82 Protection of Stratospheric Ozone
 - 49 CFR 173.301 Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

1.03 DEMOLITION REQUIREMENTS

- A. Do not begin demolition or deconstruction until authorization is received from the State. The work of this section is to be performed in a manner that maximizes salvage and recycling of materials. Remove rubbish and debris from the project site daily, unless otherwise directed; do not allow accumulations inside or outside the site(s). The work includes demolition, deconstruction, salvage of identified items and materials, and removal of resulting rubbish and debris. Store materials that cannot be removed daily in areas specified by the State's Representative. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.04 SUBMITTALS

The Contractor shall submit the following in accordance with Contract Documents. Note that approval of the submittals by the State's Representative shall not be construed as relieving the Contractor from responsibility for compliance with the specifications nor from responsibility of errors of any sort in the submittals.

- A. Preconstruction Submittals
 - 1. Existing Conditions
 - 2. Demolition Plan: Submit a demolition plan including sequence of work and methods for demolishing existing pier structures. Include plan for capture, control, and transport of demolished materials.
 - 3. Work Procedures: Proposed salvage, demolition, deconstruction, and removal procedures for approval before work is started.

1.05 REGULATORY AND SAFETY REQUIREMENTS

- A. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6.
- B. Notifications
 - 1. General Requirements: Furnish timely notification of demolition, deconstruction, and renovation projects to State and local authorities. Notify the State's Representative in writing 10 working days prior to the commencement of work.

1.06 DUST AND DEBRIS CONTROL

- A. Prevent the spread of dust and debris to adjacent building and structures, and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, flooding, sedimentation of harbor waters or storm sewers, or other pollution.

1.07 PROTECTION

A. Traffic Control Signs

1. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the State's Representative prior to beginning such work.
2. Contractor must provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the State's Representative. Maintain the temporary services during the period of construction and remove only after permanent services have been installed and tested and are in operation.

B. Existing Conditions Documentation: Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the State's Representative showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document.

C. Items to Remain in Place: Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the State. Repair or replace damaged items as approved by the State's Representative. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the State's Representative prior to performing such work. Any damage to the adjacent structures or pavements during demolition shall be made good to the satisfaction of the State's Representative at the Contractor's expense. Stop work immediately if adjacent structures appear to be in danger.

D. Existing Construction Limits and Protection: Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

- E. Weather Protection: Protect materials and equipment from the weather at all times. Have materials and workmen ready to provide adequate and temporary covering of exposed areas and materials where necessary.
- F. Utility Service: Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Locate and mark utilities to remain with highly visible tags or flags, with identification of utility type. Coordinate work with utility companies and notify before starting work. Comply with their requirements and obtain required permits. Do not disrupt public utilities without permit from the authority having jurisdiction. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to the State. Do not close, shut off, or disrupt existing utility branches or take-off that are in use without at least 3 days prior written notification to the State. The cost of either relocation or removal and plugging of utilities shall be incidental to the demolition and removal work. Provisions shall be made to install temporary services to supply the adjacent structures where necessary.
- G. Facilities: Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Piles, caps, sheet piles and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the State's Representative. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.
- H. Protection of Personnel: Before, during and after the demolition and deconstruction work the Contractor shall continuously evaluate the condition of the structures being demolished and deconstructed and take immediate action to protect all personnel working in and around the project site. No area, section, or component of piles, caps, decking, sheeting, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.08 BURNING

- A. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.09 RELOCATIONS

- A. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Items to be relocated which are damaged by the Contractor shall be repaired or replaced with new undamaged items as approved by the State's Representative at no additional cost to the State.

1.10 REQUIRED DATA

- A. Prepare a Demolition Plan. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Identify components and materials to be salvaged for reuse or recycling with reference to paragraph Existing Facilities to be Removed. Append tracking forms for all removed materials indicating type, quantities, condition, destination, and end use. Coordinate with Waste Management Plan. State provisions that will be used for securing the safety of the workers throughout the performance of the work. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan shall be approved by the State's Representative prior to the start of work.

1.11 ENVIRONMENTAL PROTECTION

- A. Comply with the requirements in Section 01568-Environmental Permits and Pollution Control.

1.12 USE OF EXPLOSIVES

- A. Use of explosives will not be permitted.

PART 2 - PRODUCTS

2.01 FILL MATERIAL

- A. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill voids, depressions or excavations resulting from demolition or deconstruction of structures.

2.02 REMOVED MATERIALS

- A. All material and debris, either existing or resulting from demolition and removal work, which are not designated to be salvaged or relocated, shall become the property of the Contractor and shall be removed from the property and disposed of off-site at an approved facility. The Contractor shall exercise care in performing demolition and removal work in order not to damage adjacent structures or materials to be reused or stored for future use as directed by the State's Representative.

PART 3 - EXECUTION

3.01 EXISTING FACILITIES TO BE REMOVED

- A. Inspect and evaluate existing structures on site for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Unless stated otherwise, salvage materials or other reuse of materials shall be for temporary structures and utility services for temporary installations only, and in no case shall salvage materials be used in new construction for permanent facilities. Salvage materials are intended to be removed and disposed of by the Contractor and provided to recycling facilities to the greatest extent practical.

- B. Structures
 - 1. Remove existing structures indicated to be removed as shown in the Contract Drawings.
 - 2. Demolish structures in a systematic manner from the top of the structure to the bottom elevations. Complete demolition work above before the supporting members on the lower level are disturbed. Demolish concrete and masonry walls in small sections. Remove structural framing members and transport to grade by means of derricks, platforms hoists, or other suitable methods as approved by the Engineer.
 - 3. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting piles, cap beams, framing or other structural elements.

- C. Utilities and Related Equipment
 - 1. General Requirements: Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the State's Representative. Do not interrupt existing utilities serving facilities occupied and used by the State except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.
 - 2. Disconnecting Existing Utilities: Remove existing utilities, as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the State's Representative. When utility lines are encountered that are not indicated on the drawings, the State's Representative shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the State's Representative.

- D. Paving and Slabs: Sawcut concrete and asphaltic concrete paving and slabs as indicated to full depth below grade. Provide neat sawcuts at limits of pavement removal as indicated. Pavement and slabs designated to be recycled and utilized in this project shall be moved, ground and stored as directed by the Engineer. Pavement and slabs not to be used in this project shall be removed from the Site at Contractor's expense.
- E. Concrete: Saw cut concrete structures along straight lines to full depth. Make each cut in structure perpendicular to the face and in alignment with the demolition limits shown on the contract drawings. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.
- F. Miscellaneous Metal: Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Waste Management Plan.
- G. Patching: Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:
 - 1. Concrete and Masonry: Completely fill holes and depressions, caused by previous physical damage or left as a result of removals in existing masonry walls to remain, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.
- H. Mechanical Equipment and Fixtures: Disconnect mechanical hardware at the nearest connection to existing services to remain, unless otherwise noted. Mechanical equipment and fixtures must be disconnected at fittings. Remove service valves attached to the unit. Salvage each item of equipment and fixtures as a whole unit; listed, indexed, tagged, and stored. Salvage each unit with its normal operating auxiliary equipment. Transport salvaged equipment and fixtures, including motors and machines, to a designated storage area as directed by the State's Representative. Do not remove equipment until approved. Do not offer equipment for reuse; provide to recycling service for disassembly and recycling of parts.
 - 1. Preparation for Storage: Water, dirt, dust, and foreign matter from units; tanks, piping and fixtures shall be drained; interiors, if previously used to store flammable, explosive, or other dangerous liquids, must be steam cleaned. Seal openings with caps, plates, or plugs. Secure motors attached by flexible connections to the unit. Change lubricating systems with the proper oil or grease.

2. Piping: Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve shall be attached to the open end of the pipe to ensure positive leak control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Classify piping not designated for salvage, or not reusable, as scrap metal.
- I. Electrical Equipment and Fixtures: Salvage motors, motor controllers, and operating and control equipment that are attached to the driven equipment. Salvage wiring systems and components. Box loose items and tag for identification. Disconnect primary, secondary, control, communication, and signal circuits at the point of attachment to their distribution system.
 1. Fixtures: Remove and salvage electrical fixtures. Salvage unprotected glassware from the fixture and salvage separately. Salvage incandescent, mercury-vapor, and fluorescent lamps and fluorescent ballasts manufactured prior to 1978, boxed and tagged for identification, and protected from breakage.
 2. Electrical Devices: Remove and salvage switches, switchgear, transformers, conductors including wire and nonmetallic sheathed and flexible armored cable, regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items. Box and tag these items for identification according to type and size.
 3. Wiring Ducts or Troughs: Remove and salvage wiring ducts or troughs. Dismantle plug-in ducts and wiring troughs into unit lengths. Remove plug-in or disconnecting devices from the busway and store separately.
 4. Conduit and Miscellaneous Items: Salvage conduit except where embedded in concrete or masonry. Consider corroded, bent, or damaged conduit as scrap metal. Sort straight and undamaged lengths of conduit according to size and type. Classify supports, knobs, tubes, cleats, and straps as debris to be removed and disposed.
 - J. Items With Unique/Regulated Disposal Requirements: Remove and dispose of items with unique or regulated disposal requirements in the manner dictated by law or in the most environmentally responsible manner.

3.02 DISPOSITION OF MATERIAL

- A. Title to Materials: Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from the State's property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the State's Representative of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the State's Representative to begin demolition and deconstruction. The State will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.
- B. Reuse of Materials and Equipment: Remove and store materials and equipment listed in the Demolition Plan to be reused or relocated to prevent damage and reinstall as the work progresses.
- C. Salvaged Materials and Equipment: Remove materials and equipment that are listed in the Demolition Plan to remain the property of the Contractor or specified to remain the property of the State and deliver to a storage site as directed.
 - 1. Store all materials salvaged for the Contractor as approved by the State's Representative and remove from the State's property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site.
 - 2. Remove salvaged items to remain the property of the State in a manner to prevent damage and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers.
- D. Fire Suppression Containers: Deactivate fire suppression system cylinders and canisters with electrical charges or initiators prior to shipment. Also, safety caps must be used to cover exposed actuation mechanisms and discharge ports on these special cylinders.

3.03 CLEANUP

- A. Remove debris and rubbish from excavations. Remove and transport in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.04 DISPOSAL OF REMOVED MATERIALS

- A. Regulation of Removed Materials: Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations. Storage of removed materials on the project site is prohibited.
- B. Removal from State Property: Transport waste materials removed from demolished and deconstructed structures, except waste soil, from State property for legal disposal. Dispose of waste soil as directed.

3.05 REUSE OF SALVAGED ITEMS

Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

3.06 MEASUREMENT AND REPAYMENT

Demolition and removal will not be measured for payment but will be paid for separately under the Contract Lump Sum Bid Item No.4 "Remove and dispose of existing mooring buoys. Payment will be full compensation for the work prescribed in this section and the contract documents.

END OF SECTION

SECTION 02100 - SITE PREPARATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

The work to be performed under this section shall include clearing the premises of all obstacles and obstructions, the removal of which will be necessary for the construction, execution and completion of the other work included in this contract.

1.02 COORDINATION WITH OTHER SECTIONS

- A. SECTION 01100 – ARCHAEOLOGICAL PROTECTION
- B. SECTION 01530 – BARRICADES
- C. SECTION 01568 – ENVIRONMENTAL PERMITS AND POLLUTION CONTROLS
- D. SECTION 02050 – DEMOLITION
- E. SECTION 02200 – EARTHWORK

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. Maintenance of Traffic: The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, passageways, etc.

When necessary, the Contractor shall provide and erect barriers, etc., with special attention to protection of personnel.

- B. Protection: Throughout the progress of the work protection shall be provided for all property and equipment, and temporary barricades shall be provided as necessary. Work shall be done in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, and the State of Hawaii's Occupational Safety and Health Standards, Rules and Regulations.
- C. Fires: No burning of fires of any kind will be allowed.
- D. Reference Points: Benchmarks, etc., shall be carefully maintained, but if disturbed or destroyed, shall be replaced as directed, at the Contractor's expense.
- E. Disposal: All materials resultant from operations under this Section shall become the property of the Contractor and shall be removed from the site. Loads of materials shall be trimmed to prevent droppings.

3.02 EXISTING UTILITY LINES

- A. The existence of active underground utility lines within the construction area is not definitely known other than those indicated in their approximate locations on the Drawings. Should any unknown line be encountered during excavation, the Contractor shall immediately notify the Engineer of such discovery. The Engineer shall then investigate and issue instructions for the preservation or disposition of the unknown line. Authorization for extra work shall be issued by the Engineer only as he deems necessary.

3.03 CLEARING AND GRUBBING

- A. The Contractor shall clear the premises of all obstacles and obstructions, the removal of which will be necessary for the proper reception, construction, execution and completion of other work included in this contract.
- B. After clearing has been completed, the entire site shall be stripped of the organically contaminated near-surface soils to a minimum depth of 6 inches. Remove trees and roots to a minimum of 3 feet below existing ground level. Remove all large roots in excess of 2 inches in diameter, and backfill and compact the resulting depression. All debris accumulated from this operation shall be completely removed from the premises by the Contractor.
- C. The Contractor shall protect from injury and damage all surrounding trees, plants, etc., and shall leave all in as good as condition as at present. Any damage to existing improvement shall be repaired or replaced by the Contractor to the satisfaction of the Engineer.

3.04 PRELIMINARY DRIVEN PILE FOUNDATION

- A. For preliminary geotechnical recommendations in support of the design of the driven pile foundations, see attached Technical Memorandum – prepared by Geotechnical Engineer, Kokua Geotech LLC.

3.05 CLEAN UP OF PREMISES

- A. Clean up and remove all debris accumulated from clearing operations from time-to-time as directed by the Engineer. Upon completion of the construction work and before final acceptance of the contract work, remove all surplus materials, equipment, scaffoldings, etc., and leave entire job site raked clean and neat to the satisfaction of the Engineer.

END OF SECTION

TECHNICAL MEMORANDUM

PROJECT: Lahaina Small Boat Harbor
Replacement of Front Row Piers
Lahaina, Maui, Hawaii

PROJECT NO.: 022624-00
DATE: April 21, 2025
FROM: Tim Lin, P.E.

SUBJECT: Preliminary Driven Pile Foundation
Recommendations

TO: KAI Hawaii, Inc.
ATTN.: Mr. Brandon Ching
EMAIL: bching@kaihawaii.com

As requested, this technical memorandum contains our preliminary geotechnical recommendations in support of the design of the driven pile foundations planned at the *Lahaina Small Boat Harbor Replacement of Front Row Piers* project. The preliminary geotechnical recommendations presented herein are based on our recently completed Phase 1 land based field exploration and laboratory testing program, pending the results from our Phase 2 in-water field exploration and laboratory testing program. A detailed summary of our findings and recommendations will be contained in our geotechnical engineering report for the project. The final report should be consulted when it becomes available.

PROJECT CONSIDERATIONS

The project generally involves the installation of five new fixed finger piers, three fixed piers with Tahiti mooring slips, two pile-guided floating docks, and one pile-guided floating dinghy dock supported by concrete piles at the Lahaina Small Boat Harbor in Lahaina on the Island of Maui, Hawaii. Based on the information provided, we understand the new finger piers, fixed piers, floating docks, and mooring piles will generally replace existing facilities that were destroyed in the August 2023 wildfires. The location of the project and general vicinity are shown on the Project Location Map, Plate 1, and a layout of the project site is shown on the Site Plan, Plate 2.

We understand the new finger piers will be approximately 3 feet wide by 50 feet long, while the fixed piers will be approximately 3 feet wide by 20 feet long. Similarly, we understand the two new pile-guided floating docks will be approximately 5 feet wide by 50 and 65 feet long, while the pile-guided floating dinghy dock will be approximately 5 feet wide by 50 feet long. The project structural engineer provided the following preliminary structural loading information for the foundation design analyses:

PRELIMINARY STRUCTURAL LOADING INFORMATION				
Pier/Slip Configuration	Maximum Ship Mooring Load on Pier			
	F _x (kips)	F _y (kips)	T _{xy} (ft-kips)	P (kips)
Finger (Slips 4+5)	-1.44	24.64	27.44	21.00

PRELIMINARY STRUCTURAL LOADING INFORMATION				
Pier/Slip Configuration	Maximum Ship Mooring Load on Pier			
	F _x (kips)	F _y (kips)	T _{xy} (ft-kips)	P (kips)
Finger (Current)	-1.08	23.74	25.67	21.00
Tahiti	-0.72	11.60	4.43	0.00

SUBSURFACE CONDITIONS

Our land based borings generally encountered surface fill materials overlying alluvial soils, lagoonal deposits, older alluvial soils, and basalt rock formation extending down to the maximum depth explored of about 100.5 feet below the existing ground surface. In addition, Boring No. 1 was located on a paved area and encountered about 6 inches of asphaltic concrete overlying the surface fill materials.

The surface fill materials were encountered in Boring No. 1 only to a depth of about 6 feet below the existing ground surface and generally consisted of loose silty sand with some gravel. Alluvial soils were encountered underlying the surface fill materials in Boring No. 1 only to a depth of about 12 feet below the existing ground surface and generally consisted of medium dense silty sand with boulders.

Lagoonal deposits were encountered underlying the alluvial soils in Boring No. 1 and at the mudline in Boring No. 2 to a depth of about 78 feet below the existing water surface and generally consisted of very loose to medium dense clayey sand/gravel and soft to medium stiff sandy clay/silt.

Older alluvial soils were encountered underlying the lagoonal deposits to depths ranging from about 92 to 95 feet below the existing water surface and generally consisted of medium stiff sandy silt/clay and very loose to silty sand. Hard basalt rock formation was encountered underlying the older alluvial soils and extended down to the maximum depth explored of about 100.5 feet below the existing water surface.

We encountered groundwater in Boring No. 1 at a depth of about 1.7 feet below the existing ground surface at the time of our field exploration. However, it should be noted that groundwater levels are subject to change due to tidal fluctuation, rainfall, time of year, seasonal precipitation, surface water runoff, and other factors. Graphic representations of the materials encountered are presented on the Logs of Borings, Plates A-1 and A-2.

DRIVEN PILE FOUNDATIONS

Based on the structural loads provided and the subsurface conditions encountered in our borings, we recommend using driven concrete pile foundations to support the new finger piers, fixed piers, floating docks, and mooring piles. Based on our field exploration and engineering

analyses, we recommend using 20-inch octagonal precast prestressed concrete pile foundations to support the new structures. Detailed discussions and recommendations for the foundation design are presented in the following sections.

Axial Capacity

In general, we recommend using 20-inch octagonal precast prestressed concrete piles with an allowable compressive load capacity of 35 kips per pile to support the proposed finger piers, fixed piers, floating docks, and mooring piles. The allowable compressive load capacity is for supporting dead-plus-live loads and may be increased by one-third (1/3) when considering transient loads, such as those caused by wind or seismic forces.

We anticipate that the driven piles will derive vertical support capacity primarily from skin friction in the underlying lagoonal and alluvial soil deposits consisting of very loose to medium dense clayey/silty sand and gravel and soft to medium stiff sandy clay/silt. To develop the recommended pile capacity of 35 kips, a pile embedment of approximately 75 below the existing water surface will be required. The recommended embedment depth correlates to an estimated pile tip elevation of about -75 feet Mean Sea Level (MSL). The following table summarizes the pile foundation recommendations for the project.

SUMMARY OF DRIVEN PILE FOUNDATIONS			
<u>Pile Size</u>	<u>Estimated Pile Length</u> (feet)	<u>Estimated Tip Elevation</u> (feet, MSL)	<u>Allowable Compressive Load Capacity</u> (kips)
20-inch Octagonal	75 (below water level)	-75.0	35 kips

Uplift loads may be resisted by a combination of the dead weight of the driven pile and shear along the pile surface and the adjacent soils. In general, an uplift load capacity of up to 20 kips per pile may be achieved for the piles. It should be noted that this recommended uplift load capacity includes the weight of the pile.

The uplift load capacity of the piles provided is intended for transient load applications. Therefore, the uplift load capacities should not be further increased for transient load applications. For sustained uplift loads, we recommend reducing the uplift load capacities provided above by a factor of safety of 2.0 to resist sustained uplift loads. The capacity of the pile member in tension should be checked by the project structural engineer.

Lateral Load Resistance

The lateral load resistance of the driven pile foundations is a function of the stiffness of the surrounding soil, the stiffness of the driven pile, allowable deflection at the top of the pile, and the induced moment in the pile. The lateral load analyses were performed using the program LPILE, which is a microcomputer adaptation of a finite difference, laterally loaded deep foundation program originally developed at the University of Texas at Austin.

The program solves for deflection and bending moment along a deep foundation under lateral loads as a function of depth. The analysis was carried out with the use of non-linear “p-y” curves to represent soil moduli. The lateral deflection was then computed using the appropriate soil moduli at various depths.

Based on the preliminary structural loads provided and the anticipated subsurface soil conditions, we performed the lateral load analyses for the above driven pile foundations. However, the lateral load analyses resulted in significant lateral deflections based on the lateral and torque loading provided. Therefore, the lateral and torque loading provided were reduced by approximately one-half in our lateral load analyses. The results of our analyses are summarized in the following table.

SUMMARY OF LATERAL LOAD ANALYSES		
<u>Pile Size</u> (inches)	<u>Estimated Pile Length</u> (feet)	<u>Lateral Deflection</u> (inches)
20-inch Octagonal	75	6.5
Note: The lateral load analyses results presented above are based on a reduced lateral load of 12 kips and torque of 13 ft-kips located at the top of driven pile foundations		

Pile Foundation Settlement

Pile foundation settlements will result primarily from elastic compression of the pile member and the subgrade response. We estimate that the total settlement of the pile-supported foundation to range from about 0.5 to 1 inch. Differential settlements between adjacent piles should not exceed about one-half of the total foundation settlement. We believe that these settlements are essentially elastic and should occur as the loads are applied.

Pile Driving Considerations

Determination of driving equipment to be used for this project should take into consideration the “matching” of the pile hammer with the weight of the piles to be driven. This will result in the pile hammer efficiently delivering the required energy to the top of the pile and also reducing potential pile damage. In addition, we recommend using a pile driving hammer equipped

with an energy control level such that driving within the soft and/or loose soils may be controlled at a lower energy to reduce the potential for tensile stress development within the piles, which could damage the piles.

Kokua Geotech LLC should review the pile driving equipment proposed, to evaluate if the equipment is capable of installing the piles to the recommended capacities. A wave equation analysis should be performed after selection of the pile driving equipment to assess the driveability of the piles and to establish the pile driving criteria.

In general, we recommend a test pile program should be implemented for the driven piles consisting of conducting dynamic load testing using a Pile Driving Analyzer (PDA) to monitor hammer and drive system performance, assess pile installation stresses and integrity, as well as to evaluate pile capacity. After the initial driving to the tip elevation, re-striking of the test piles should be conducted as part of the test pile program. Re-striking of the test piles should be conducted no earlier than 72 hours after the initial driving.

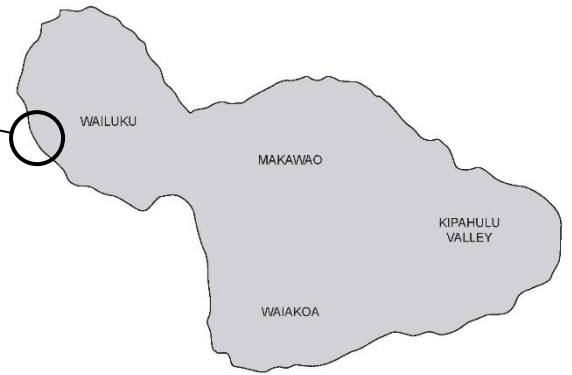
The test piles may be incorporated into the actual foundation system upon the evaluation of the dynamic load test results. When the final foundation plans are available, Kokua Geotech LLC should be consulted for selection of the test pile locations. PDA should be performed during test pile installation in general accordance with ASTM D4945 and the projects specifications. PDA monitored restrikes should be performed a minimum of 72 hours after initial drive on all test piles. In addition, Case Pile Wave Analysis Program (CAPWAP) analyses should be performed on specific hammer blows on all PDA monitored test piles at end of initial drive and the beginning of restrike.

CLOSURE

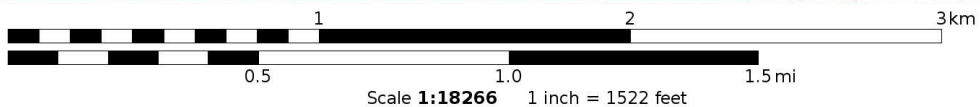
If you have questions regarding the content of this memorandum, please contact our office.

Attachments: Project Location Map, Plate 1
Site Plan, Plate 2
Logs of Borings, Plates A-1 and A-2

GENERAL PROJECT LOCATION



Mercator Projection
WGS84
UTM Zone 4Q
CALTPOPO



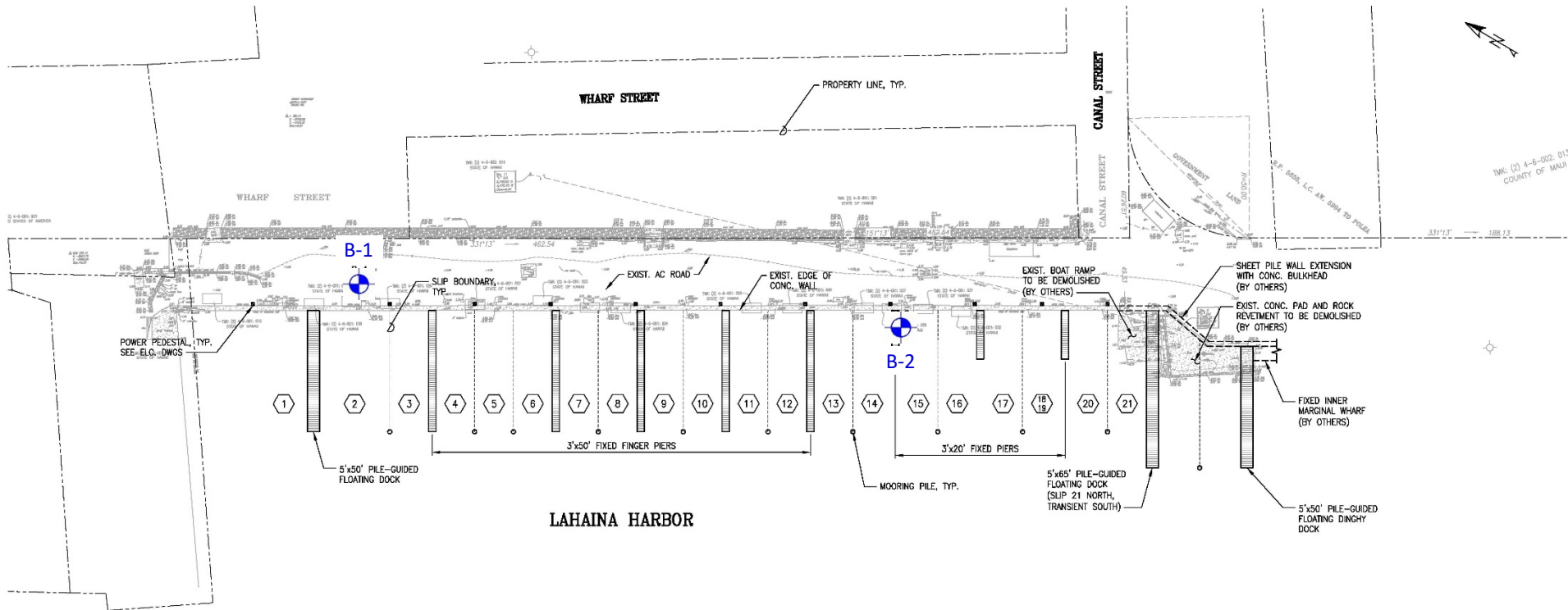
PROJECT LOCATION MAP
 LAHAINA SMALL BOAT HARBOR
 FRONT ROW PIERS AND DINGHY DOCK REPAIRS
 LAHAINA, MAUI, HAWAII

PROJECT NO.: 022624-00

PLATE

DATE: APRIL 2025

1



TWK: (2) 4-6-022: 013
COUNTY OF MAUI

REFERENCE: GENERAL SITE PLAN TRANSMITTED BY BOW ENGINEERING & DEVELOPMENT, INC. ON APRIL 21, 2025

 APPROXIMATE BORING LOCATION

<p>SITE PLAN</p> <p>LAHAINA SMALL BOAT HARBOR FRONT ROW PIERS AND DINGHY DOCK REPAIRS LAHAINA, MAUI, HAWAII</p>	
<p>PROJECT NO.: 022624-00</p>	<p>PLATE</p> <p>2</p>
<p>DATE: APRIL 2025</p>	

Project: **Lahaina Small Boat Harbor**
 Replacement of Front Row Piers
 Project Location: **Lahaina, Maui, Hawaii**
 Project Number: **022624-00**

Kokua Geotech LLC
 1017 N King St
 Honolulu, HI 96817
 (808) 214-9339

Key to Logs of Borings
 Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Core Recovery, %	RQD, %	U.S.C.S	Graphic Log	MATERIAL DESCRIPTION	Pocket Pen./Torvane, tsf	Water Content, %	Dry Unit Weight, pcf	Remarks and Other Tests
1	2	3	4	5	6	7	8	9	10	11	12	13	14










COLUMN DESCRIPTIONS

- 1** Elevation (feet): Elevation (MSL, feet).
- 2** Depth (feet): Depth in feet below the ground surface.
- 3** Sample Type: Type of soil sample collected at the depth interval shown.
- 4** Sample Number: Sample identification number.
- 5** Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
- 6** Core Recovery, %: , expressed as the amount of recovered material divided by the total length of the core run (presented as a percentage).
- 7** RQD, %: , expressed as a modified core recovery in which the lengths of all sound rock core piece over 4 inches in length are summed and divided by the length of the core run.
- 8** U.S.C.S: Type of material encountered.
- 9** Graphic Log: Graphic depiction of the subsurface material encountered.
- 10** MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
- 11** Pocket Pen./Torvane, tsf: the reading from Pooeket Penetrometer or Torvane.
- 12** Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
- 13** Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
- 14** Remarks and Other Tests: Other Tests













FIELD AND LABORATORY TEST ABBREVIATIONS

CORR: Corrosivity tests to assess soil corrosivity
 WOR: Weight of Rods
 WOH: Weight of Hammer
 CONS: One-dimensional consolidation test
 LL: Liquid Limit, percent
 PI: Plasticity Index, percent
 SPT: Standard Penetration Test
 UC: Unconfined Compression
 MCS: Modified California Sampler






MATERIAL GRAPHIC SYMBOLS

 Asphaltic Concrete (AC)	 Silty GRAVEL (GM)
 Basalt Rock Formation	 SILT, SILT w/SAND, SANDY SILT (ML)
 Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)	 Clayey SAND (SC)
 Clayey GRAVEL (GC)	 Silty SAND (SM)
	 Water

TYPICAL SAMPLER GRAPHIC SYMBOLS

 Auger sampler	 Grab Sample	 PQ Coring
 Bulk Sample	 HQ Coring	 Probing w/Pointed Tip
 3-inch-OD California w/ brass rings	 3-inch OD Modified California w/ brass liners	 2-inch-OD unlined split spoon (SPT)
 CME Sampler	 Pitcher Sample	 Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

 Water level (at time of drilling, ATD)
 Water level (after waiting)
 Minor change in material properties within a stratum
 Inferred/gradational contact between strata
 Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
 2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Project: Lahaina Small Boat Harbor Replacement of Front Row Piers	Kokua Geotech LLC 1017 N King St Honolulu, HI 96817 (808) 214-9339	Log of Boring No. 1 Sheet 1 of 3
Project Location: Lahaina, Maui, Hawaii		
Project Number: 022624-00		

Date(s) Drilled: 7/30/24 - 8/1/24	Logged By: JL	Checked By: AJF
Drilling Method: CF Auger & PQ Coring	Drill Bit Size/Type: 5-inch Solid Stem Auger & PQ-Size Coring	Total Depth of Borehole: 100.0 feet
Drill Rig Type: Blue Acker	Drilling Contractor: Kokua Geotech LLC	Approximate Surface Elevation: +5.0 feet MSL*
Groundwater Level: 1.7 feet @ 11:44 AM and Date Measured: 7/30/24	Sampling Method(s): SPT & PQ Coring	Hammer Data: 140 lbs. with 30-inch drop
Borehole Backfill: Gravel & AC Patch	Location: See Site Plan (Plate 2)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Core Recovery, %	RQD, %	U.S.C.S	Graphic Log	MATERIAL DESCRIPTION	Pocket Pen./Torvane, tsf	Water Content, %	Dry Unit Weight, pcf	Remarks and Other Tests
5	0								6-inch ASPHALTIC CONCRETE				
							SM		Brownish tan SILTY SAND with some gravel (coralline) loose, moist (fill) grades to wet		27		Sieve #200= 25.0%
0	5		1	8									
			2	15			SM		Dark gray SILTY SAND, medium dense, wet (alluvium) grades with boulders		28		
-5	10		3	16									
			4	12	0		GC		Gray CLAYEY GRAVEL (coralline) with some sand, medium dense, wet (lagoonal deposit) grades to loose		30		
-10	15		5	25									
			6	6	57								
-15	20		7	7									
			6	6									LL=42, PI=22
-20	25												
			7	7									
-25	30												
-30	35												

Project: Lahaina Small Boat Harbor Replacement of Front Row Piers	Kokua Geotech LLC 1017 N King St Honolulu, HI 96817 (808) 214-9339	Log of Boring No. 1 Sheet 2 of 3
Project Location: Lahaina, Maui, Hawaii		
Project Number: 022624-00		

Date(s) Drilled: 7/30/24 - 8/1/24	Logged By: JL	Checked By: AJF
Drilling Method: CF Auger & PQ Coring	Drill Bit Size/Type: 5-inch Solid Stem Auger & PQ-Size Coring	Total Depth of Borehole: 100.0 feet
Drill Rig Type: Blue Acker	Drilling Contractor: Kokua Geotech LLC	Approximate Surface Elevation: +5.0 feet MSL*
Groundwater Level and Date Measured: 1.7 feet @ 11:44 AM 7/30/24	Sampling Method(s): SPT & PQ Coring	Hammer Data: 140 lbs. with 30-inch drop
Borehole Backfill: Gravel & AC Patch	Location: See Site Plan (Plate 2)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Core Recovery, %	RQD, %	U.S.C.S	Graphic Log	MATERIAL DESCRIPTION	Pocket Pen./Torvane, tsf	Water Content, %	Dry Unit Weight, pcf	Remarks and Other Tests
-30	35		8	3					grades to very loose		32		
-35	40		9	4	0				grades very loose to loose		27		
-40	45		10	2	0				grades to very loose		38		
-45	50		11	2	0						40		
-50	55		12	3	0						31		
-55	60		13	3	0						39		Sieve #200= 28.0%
-60	65		14	3	0		CL		Dark gray SANDY CLAY with some gravel (coralline), soft (lagoonal deposit)		53		LL=42, PI=20
-65	70				0		SC		Dark gray CLAYEY SAND with traces of gravel (coralline) and some shells, loose (lagoonal deposit)				

Project: Lahaina Small Boat Harbor Replacement of Front Row Piers	Kokua Geotech LLC 1017 N King St Honolulu, HI 96817 (808) 214-9339	Log of Boring No. 1 Sheet 3 of 3
Project Location: Lahaina, Maui, Hawaii		
Project Number: 022624-00		

Date(s) Drilled: 7/30/24 - 8/1/24	Logged By: JL	Checked By: AJF
Drilling Method: CF Auger & PQ Coring	Drill Bit Size/Type: 5-inch Solid Stem Auger & PQ-Size Coring	Total Depth of Borehole: 100.0 feet
Drill Rig Type: Blue Acker	Drilling Contractor: Kokua Geotech LLC	Approximate Surface Elevation: +5.0 feet MSL*
Groundwater Level: 1.7 feet @ 11:44 AM and Date Measured: 7/30/24	Sampling Method(s): SPT & PQ Coring	Hammer Data: 140 lbs. with 30-inch drop
Borehole Backfill: Gravel & AC Patch	Location: See Site Plan (Plate 2)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Core Recovery, %	RQD, %	U.S.C.S	Graphic Log	MATERIAL DESCRIPTION	Pocket Pen./Torvane, tsf	Water Content, %	Dry Unit Weight, pcf	Remarks and Other Tests
-65	70		15	5			SC		Dark gray CLAYEY SAND with traces of gravel (coralline) and some shells, loose (lagoonal deposit)		87		
					0		ML		Very dark gray SANDY SILT with traces of gravel (coralline), soft (lagoonal deposit)				
-70	75		16	3			ML		Dark brown SANDY SILT, medium stiff (alluvium)		64		
					0		ML		Dark brown SANDY SILT, medium stiff (alluvium)				
-75	80		17	7			SM		Dark brown SILTY SAND with traces of gravel (basaltic), loose (alluvium)		45		
					0		SM		Dark brown SILTY SAND with traces of gravel (basaltic), loose (alluvium)				
-80	85		18	8			SM		Dark brown SILTY SAND with traces of gravel (basaltic), loose (alluvium)		31		
					0		SM		Dark brown SILTY SAND with traces of gravel (basaltic), loose (alluvium)				
-85	90		19	2			SM		Dark brown SILTY SAND with traces of gravel (basaltic), loose (alluvium)		44		
					0		SM		Dark brown SILTY SAND with traces of gravel (basaltic), loose (alluvium)				
-90	95				76	0	SM		Gray BASALT, severely to closely fractured, moderately weathered, hard (basalt rock formation)				
					67	22	SM		Gray BASALT, severely to closely fractured, moderately weathered, hard (basalt rock formation)				
-95	100								Boring terminated at approximately 100.0 feet below the existing ground surface				
									Elevations of borings estimated from Lahaina Small Boat Harbor Ferry Pier Improvements Plans transmitted by Bow Engineering & Development, Inc. on March 25, 2024				
-100	105												

Project: Lahaina Small Boat Harbor Replacement of Front Row Piers	Kokua Geotech LLC 1017 N King St Honolulu, HI 96817 (808) 214-9339	Log of Boring No. 2 Sheet 1 of 3
Project Location: Lahaina, Maui, Hawaii		
Project Number: 022624-00		

Date(s) Drilled: 8/5/24 -8/7/24	Logged By: JL	Checked By: AJF
Drilling Method: PQ Coring	Drill Bit Size/Type: PQ-Size Coring	Total Depth of Borehole: 100.5 feet
Drill Rig Type: Blue Acker	Drilling Contractor: Kokua Geotech LLC	Approximate Surface Elevation: Mudline -10.0 feet MSL*
Groundwater Level and Date Measured: N/A	Sampling Method(s): SPT & PQ Coring	Hammer Data: 140 lbs. with 30-inch drop
Borehole Backfill: Gravel	Location: See Site Plan (Plate 2)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Core Recovery, %	RQD, %	U.S.C.S	Graphic Log	MATERIAL DESCRIPTION	Pocket Pen./Torvane, tsf	Water Content, %	Dry Unit Weight, pcf	Remarks and Other Tests
0									WATER				
5													
10									Mudline at approximately 10.0 feet				
							GC		Gray CLAYEY GRAVEL with some sand, very loose (lagoonal deposit)				Sieve #200= 12.2%
15			1	2	0						38		
			2	2	0						41		
			3	8	0				grades to loose		37		
20							SC		Gray CLAYEY SAND with some gravel (coralline), very loose to loose (lagoonal deposit)				Sieve #200= 20.1%
			4	4	0						43		
25									grades to loose				LL=51, PI=27
			5	5	0						40		
30									grades to very loose				
			6	2	0						36		
35							GM		Grayish light tan SILTY GRAVEL (coralline) with some sand, loose (lagoonal deposit)				

Project: Lahaina Small Boat Harbor Replacement of Front Row Piers	Kokua Geotech LLC 1017 N King St Honolulu, HI 96817 (808) 214-9339	Log of Boring No. 2 Sheet 2 of 3
Project Location: Lahaina, Maui, Hawaii		
Project Number: 022624-00		

Date(s) Drilled: 8/5/24 -8/7/24	Logged By: JL	Checked By: AJF
Drilling Method: PQ Coring	Drill Bit Size/Type: PQ-Size Coring	Total Depth of Borehole: 100.5 feet
Drill Rig Type: Blue Acker	Drilling Contractor: Kokua Geotech LLC	Approximate Surface Elevation: Mudline -10.0 feet MSL*
Groundwater Level and Date Measured: N/A	Sampling Method(s): SPT & PQ Coring	Hammer Data: 140 lbs. with 30-inch drop
Borehole Backfill: Gravel	Location: See Site Plan (Plate 2)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Core Recovery, %	RQD, %	U.S.C.S	Graphic Log	MATERIAL DESCRIPTION	Pocket Pen./Torvane, tsf	Water Content, %	Dry Unit Weight, pcf	Remarks and Other Tests
35			7	5	0		GM		Grayish light tan SILTY GRAVEL (coralline) with some sand, loose (lagoonal deposit)		37		
40			8	16	0				grades to medium dense		39		
45			9	2	0		GC		Gray CLAYEY GRAVEL with some sand, very loose (lagoonal deposit)		42		Sieve -#200= 13.9%
50			10	14	0				grades to medium dense		38		
55			11	5	36				grades to loose		33		
60			12	2	0				grades to very loose		35		
65			13	2	0		SC		Gray CLAYEY SAND with some gravel and shells, very loose (lagoonal deposit)		35		Sieve -#200= 48.5%
70					0								

Project: Lahaina Small Boat Harbor Replacement of Front Row Piers	Kokua Geotech LLC 1017 N King St Honolulu, HI 96817 (808) 214-9339	Log of Boring No. 2 Sheet 3 of 3
Project Location: Lahaina, Maui, Hawaii		
Project Number: 022624-00		

Date(s) Drilled: 8/5/24 -8/7/24	Logged By: JL	Checked By: AJF
Drilling Method: PQ Coring	Drill Bit Size/Type: PQ-Size Coring	Total Depth of Borehole: 100.5 feet
Drill Rig Type: Blue Acker	Drilling Contractor: Kokua Geotech LLC	Approximate Surface Elevation: Mudline -10.0 feet MSL*
Groundwater Level and Date Measured: N/A	Sampling Method(s): SPT & PQ Coring	Hammer Data: 140 lbs. with 30-inch drop
Borehole Backfill: Gravel	Location: See Site Plan (Plate 2)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Core Recovery, %	RQD, %	U.S.C.S	Graphic Log	MATERIAL DESCRIPTION	Pocket Pen./Torvane, tsf	Water Content, %	Dry Unit Weight, pcf	Remarks and Other Tests
70			14	1	0		SC		Gray CLAYEY SAND with some gravel and shells, very loose (lagoonal deposit)		44		
	75		15	2	0				grades with no gravel and shells		50		
	80		16	3	0		SM		Brown SILTY SAND with traces of clay, very loose (alluvium)		49		
	85		17	8	0				grades to loose		32		
	90		18	7	0		CL		Brown SANDY CLAY, medium stiff (alluvium)		62		
	95		19	10/0" REF.					Gray BASALT, severely to closely fractured, moderately weathered, hard (basalt rock formation)		--		
	100		20		70	0			Boring terminated at approximately 100.5 feet below the existing water surface				
105													

SECTION 02200 - EARTHWORK

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

This section covers the requirements for earthwork.

- A. It shall be the responsibility of the Contractor to examine the project site and determine for themselves the existing conditions.
- B. Obvious conditions of the site existing on the date of the bid opening shall be accepted as part of the work, even though they may not be clearly indicated on the drawings and/or described herein or may vary therefrom.
- C. All debris of any kind accumulated from clearing shall be disposed of from the site, and the whole area left clean. The Contractor shall be required to make all necessary arrangements relative to the proposed place of disposal.

1.02 REMOVAL AND REPAIR WORK

- A. General

The Contractor shall exercise every precaution to preserve and protect all structures, walkways or utility improvements which are to remain or be relocated. Portions of walkway and pavement which are to remain shall be saw cut neat and true to line. Restore all pavement and curbs upon completion of the work.

1.03 SEQUENCE OF WORK

All sequence of work shall be subject to the approval of the Engineer.

1.04 PROTECTION

- A. Barricade: Erect temporary barricade to prevent people from entering into project area, to the extent as approved by the Engineer. The extent of barricades may be adjusted as necessary with the approval of the Engineer. This work shall be accomplished at no extra cost to the State of Hawaii.
- B. Take all precautions and safety measures as required to protect the State of Hawaii free and harmless from liability of any kind. Conduct operations with minimum interference to streets, driveways, sidewalks passages, etc.
- C. Adequate precautions shall be taken before commencing and during the course of the work to ensure the protection of life, limb, and property.
- D. The Contractor shall protect from damage all surrounding structures, trees, plants, grass, walks, pavements, etc. Any damage will be repaired or replaced by the Contractor, at his

expense, to the satisfaction of the Engineer.

1.05 PERMITS

The Contractor shall obtain and pay for necessary permits prior to the commencement of work.

1.06 MAINTAINING TRAFFIC

- A. The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, traffic activities, etc.
- B. When necessary, the Contractor shall provide, erect and maintain lights, barriers, etc., as required by traffic and safety regulations with special attention to protection of life.

1.07 CONSTRUCTION LINES, LEVELS AND GRADES

- A. The Contractor shall verify all lines, levels and elevations indicated on the drawings before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of the Engineer and any changes shall be made in accordance with his instructions. The Contractor shall not be entitled to extra payment if he fails to report the discrepancies before proceeding with any work whether within the area affected or not.
- B. The laying out of base lines, establishment of grades and staking out the entire work shall be done by a licensed Surveyor or a licensed Civil Engineer, registered in the State of Hawaii. He shall be solely responsible for their accuracy. Erect and maintain substantial batter boards showing construction lines and levels.

1.08 CLEANUP

Clean up and remove all debris accumulated from construction operations from time to time, and when directed by the Engineer. Upon completion of the construction work and before final acceptance of work, remove all surplus materials, equipment, etc. and leave entire jobsite clean and neat.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Yard Fill: Fill materials shall be soil with expansion value not greater than 3%, free from debris, perishable or combustible materials, sod and stones larger than 6 inches in maximum dimension. Rock or broken masonry shall be well distributed in earth or other fine material with voids filled and shall be placed within three feet of finished grades.
- B. Structural Fill: New structural fill below interior and exterior concrete slabs or paving, with allowance for depth of cushion fill, shall be select borrow material. This material shall be granular with an expansion value not greater than 3% non-adobe and with a plasticity index less than ten. Decayed rubbish, debris, or rocks greater than 3" in diameter shall

not be allowed as structural fill material. Certificate of compliance shall be submitted to the Engineer for approval prior to filling.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Protective Measures

1. All excavation shall be protected and guarded against danger to life, limb and property.
2. Shoring, cribbing and logging, as required to safely preserve the excavations and earth banks, free from damages resulting from the work shall be provided and installed by the Contractor.
3. All excavations shall be kept free from standing water. The Contractor shall do all pumping and draining that may be necessary to remove water to the extent required in carrying on the work. Grading shall be controlled so that the ground surface is properly sloped to prevent water run-off into structural foundations and open trenching excavations.
4. The underground utilities lines traversing the construction area known to exist by the designer are indicated on the plans. Should any be encountered during excavation, the Contractor shall not disconnect same without authorization from the Engineer but shall inform the latter immediately of each discovery. The Engineer shall investigate and issue proper authorization for procedure.

B. General

1. Excavation shall be done to the lines and grades indicated. Concrete slabs, concrete curbs, asphaltic concrete pavement, etc., not indicated to remain shall be removed and disposed of at a landfill.
2. Excavation for footings, foundation, etc., shall have level beds on unfilled, undisturbed, firm bearing, with stepped level where necessary. Small soft spots shall be compacted to unyielding firmness.

If soil conditions are suitable and approved, footing cuts may be made to exact size of footing.

3. Structural excavations carried below specified level shall be filled with concrete to the proper level at the expense of the Contractor.
4. Excavated materials declared unusable by Engineer shall be removed from the site at the Contractor's expense.

3.02 BACKFILL

A. Yard Area

1. Yard fill where no concrete slab occurs shall be in 6" layers (compacted thickness) compacted to 90% of maximum density as determined by ASTM Test, Method D-1557.
2. The areas not covered by asphalt paving or concrete slab shall be graded to conform to finish contours. Rough grading shall prevent the drainage of water into construction areas.

B. Structural Fill

1. In advance of preparing the subgrade or depositing a specified layer of material, existing material within the area where such materials is to be placed, which in the opinion of the Engineer is unsuitable as a subgrade foundation, shall be removed and the resulting space refilled with approved material and compacted.
2. Backfilling shall progress so that excessive unbalanced load is not introduced against any structure.
3. New structural fill material shall be placed in layers not to exceed 6" per compacted layer and compacted to a compaction of 95% as determined by ASTM Test, Method D-1557.
4. Materials and compaction of all yard and structural fill shall be tested by an independent testing agency approved by the Engineer and all after-compaction test results submitted to the Engineer for approval. All cost of testing shall be borne by the Contractor. Testing shall be made throughout the area for each 6" compacted layer as directed by the Engineer. All test results must be approved before proceeding with placing of topsoil, cushion fill or base course.
5. In the event insufficient amount of structural fill or yard fill is derived from earthwork operations, import the necessary materials without any additional cost to the State. Such imported material shall meet the requirements as specified for each category of materials.
6. The ground shall be scarified 6" below existing grade and recompacted to 90% compaction. Fill shall conform to structural fill.
7. Under interior and exterior slabs, the cushion fill as specified shall be compacted to a level surface to 95% compaction as determined by modified ASTM Test Method, D1557.

C. Grading

1. Rough Grading: The areas not covered by asphalt paving or concrete slab up to the contract zone limit shall be graded to the finish contours. Contractor shall

take the necessary precautions to prevent the drainage of water into construction area.

2. Finish Grading: Outdoor areas not covered by pavement shall be graded to finish grade and contours. Grading shall conform with the ordinances of the applicable County issuing the Grading Permit and as amended.

END OF SECTION

SECTION 02225 - TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

This section covers the requirements for trenching, backfilling, and compacting.

- A. Work included: Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.
- B. Related Work:
 - 1. SECTION 01100 – ARCHAEOLOGICAL PROTECTION
 - 2. SECTION 01530 – BARRICADES
 - 3. SECTION 01568 – ENVIRONMENTAL PERMITS AND POLLUTION CONTROLS
 - 4. SECTION 02050 – DEMOLITION
 - 5. SECTION 02700 – MARINA PIPING AND EQUIPMENT

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the Engineer.
- D. Compaction requirements are defined by American Society for Testing and Materials (ASTM) publication D-1557 "Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10-lb Rammer and 18-inch Drop."

1.03 SUBMITTALS

- A. Shoring and sheeting plan: Describe materials of shoring system to be used. Indicate whether or not components will remain after filling or backfilling. Provide plans, sketches, or details along with calculations by a professional engineer registered in Hawaii. Indicate sequence and method of installation and removal.
- B. Dewatering plan: Describe methods for removing collected water from open trenches and diverting surface water or piped flow away from work area. Describe equipment and procedures for installing and operating the dewatering system indicate.

1.04 PERMITS

- A. Obtain necessary permits required from applicable agencies. All permit fees will be considered incidental to the work and a separate payment shall not be made.

PART 2 - PRODUCTS

2.01 BACKFILL MATERIALS

- A. Select Material: Backfill from the bottom of the trench to one foot above the top of the pipe shall be select material. Sand, graded crushed rock (commonly known as "rock sand") or excavated granular or sandy material shall be used for select material provided that all rocks or lumps of material over one inch in its longest dimension have been removed. Select material shall be free from salt, ashes, refuse, organic material or other material which, in the opinion of the Engineer, is unsuitable.

All material to be used as select material backfill shall be approved by the Engineer. If in the opinion of the Engineer the excavated material does not meet the grading requirements of select material, the Contractor shall be required to screen the material prior to its use as select material backfill.

- B. Ordinary Material: Material used in the upper portion of the backfill from one foot above the top of the pipe to the surface of the ground or subgrade of the road shall not contain stone, rock or other material larger than six inches in its longest dimensions. No wood, vegetable matter or other material which, in the opinion of the Engineer, is unsuitable, shall be included in the backfill. No "adobe" or other materials determined to be deleterious by the Engineer shall be included in the backfill.
- C. The Contractor shall obtain the approval of the Engineer of all backfill material.

2.02 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 FINISH ELEVATIONS AND LINES

- A. All material excavated from trenches shall be considered unclassified, whether consisting of earth, lava, soft rock, decomposed rock, solid rock, boulders, or coral. The trench shall be so dug that the pipe can be properly installed to the alignment and grade specified. Excavation shall commence at the point directed by the Engineer and shall be carried on in an orderly manner. No trench shall be opened more than 500 feet in advance of the installed pipe without the approval of the Engineer. No jumps or spaces will be permitted unless approved by the Engineer. Before proceeding with any excavation under asphaltic concrete and concrete pavements, the Contractor shall cut the edges of the excavation with a power saw to insure a neat cut along the pavement.

B. Trench Widths:

1. The widths of trenches for all pipes and appurtenances shall be as shown on the Drawings.
2. Increases in widths over those shown due to sheeting, bracing, or other necessities of construction, may be made by the Contractor with the approval of the Engineer but no additional compensation will be allowed for such extra width.
3. Bell holes shall be provided at each joint to permit the jointing of pipes to be made properly.

C. Trench Depths:

1. In general, trench depths for all pipes and appurtenances shall be as shown on the Drawings.
2. Where necessary, the Engineer reserves the right to raise or lower the grades or to change alignments from those shown on the Drawings.

D. Excavation Below Grades:

1. Any part of the trench excavated below grade by the Contractor shall be corrected with select material, thoroughly compacted in place at no cost to the State.

3.03 PROCEDURES

A. Utilities:

1. All excavated areas shall be toned prior to excavation.
2. Unless shown to be removed, protect lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the State.
3. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
4. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the State.
5. Expose existing utilities to confirm clearances as initial trenching work. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
6. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

- B. Protection of persons and property:
 - 1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
 - 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
 - 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.
- C. Blasting:
 - 1. Blasting for excavation is prohibited.
- D. Dewatering:
 - 1. Remove water by pumping or other methods to prevent the softening of surfaces exposed by excavation, prevent hydrostatic uplift, and provide a stable trench condition for installation of the utility. Use screens and gravel packs or other filtering systems on the dewatering devices to prevent the removal of fines from soil.
 - 2. Dispose water at an approved location by pumps, drains, and other approved methods.
- E. During the period of construction, the Contractor shall protect the public against mud, dust and similar nuisances and shall take steps to abate such nuisances.
- F. Convenient access to buildings along the line of work shall be maintained and temporary approaches shall be provided and kept in order. Temporary bridges for pedestrian traffic shall have handrails securely fastened to them. Handrails shall be free from any projecting nails, splinters, and rough edges.
- G. Storing of excavated material alongside the trench shall be done in such a manner as not to obstruct traffic. Whenever, in the opinion of the Engineer, proper storage of excavated material cannot be made alongside the pipe trench, the material shall be hauled away from the work site. If the excavated material meets the requirements for backfill material and proper storage cannot be made alongside the pipe trench, the material shall be stockpiled at convenient locations for later use in backfill.
- H. Surplus Material:
 - 1. Unless otherwise specified in the Plans or Specifications, or ordered by the Engineer, surplus excavated material shall become the Contractor's property and shall be removed from the work site and disposed of at no cost to the State.

3.04 TRENCHING

- A. Comply with pertinent provisions of applicable "Soils Report" as provided for the project and the provisions of this Section.

- B. Provide sheeting and shoring necessary for protection of the Work, undermining of existing facilities and for the safety of personnel.
1. Prior to backfilling, remove all sheeting.
 2. Do not permit sheeting to remain in the trenches except when, in the opinion of the Engineer, field conditions or the type of sheeting or methods of construction such as use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, the Engineer may permit portions of sheeting to be cut off and remain in the trench.
- C. Excavation:
1. Short sections of a trench may be tunneled if, in the opinion of the Engineer, the conduit can be installed safely and backfill can be compacted properly into such tunnel.
 2. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects at no additional cost to the State, as directed by the Engineer.
 3. When the void is below the subgrade for the utility bedding, use select materials and compact to the relative density directed by the Engineer, but in no case to a relative density less than 90%.
 4. When the void is in the side of the utility trench or open cut, use suitable earth or sand compacted or consolidated as approved by the Engineer, but in no case to a relative density less than 80%.
 5. Excavating for appurtenances:
 - a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
 - b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the Engineer, and at no additional cost to the State.
- D. Depressions:
1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
 2. Except where rock is encountered, do not excavate below the depth indicated or specified.
 3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified.

- E. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.
- F. Cover:
 - 1. Provide a minimum cover over the top of the pipe as indicated on the drawings.
 - 2. Where the minimum cover is not provided, jacket the pipes in concrete as indicated. Provide concrete with a minimum 28 day compressive strength of 2500 psi.

3.05 BEDDING

- A. Provide bedding as indicated on the Drawings.

3.06 BACKFILLING

- A. General

- 1. All backfill material shall be placed in the trench by hand or by approved mechanical methods. The compaction of backfill material shall be done by tamping with hand tools or approved pneumatic tampers, by using vibratory compactors, by puddling if the backfill material can be suitably drained, or by any combination of the three. The method of compaction shall be approved by the Engineer and all compaction shall be done to the satisfaction of the Engineer.
- 2. When removal of unsuitable excavated material creates a shortage of backfill material, the Contractor shall, at no cost to the State, furnish material as specified in this section in the amount required to complete the backfill.
- 3. When backfill material is delivered by trucks, the material shall not be dumped directly into the trench but the fall of the material shall be broken at the edge of the trench. The backfill material shall then be deposited by hand or by approved mechanical methods.
- 4. Ensure that no damage is done to structures or their protective coatings.

- B. Backfilling Around Pipe:

- 1. Select material shall be used to backfill the trench from its bottom to one foot above the pipe. Prior to the laying of the pipe, the select material cushion shall be deposited in the trench and shall be leveled off, compacted, and shaped to obtain a smooth compacted bed providing firm uniform bearing along the laying length of the pipe.
- 2. After the pipe is installed, but prior to testing the line, select material shall be deposited in the trench evenly on both sides and along the full length of the pipe in 6-inch maximum loose lifts. If necessary, additional select material can be deposited over the center of each length of pipe to prevent undue movement during testing of the line. Ensure that initially placed material is tamped firmly under pipe haunches. The bell holes at the pipe joints shall not be backfilled at this time.

3. The pipeline shall then be tested. After the pipeline has passed the test, the Contractor shall backfill the bell holes with select material. The select material, which had been previously deposited over the pipe in the trench, shall be leveled and compacted.

C. Backfilling to Grade:

1. From an elevation one foot above the top of the pipe to grade, the backfill material shall be placed in layers not to exceed 12 inches in loose lifts each lift shall be compacted to a relative density not less than 90%.
2. If the trench section is flooded, no further backfill shall be placed for two (2) days. After this period, the backfill shall again be thoroughly compacted to a relative density of not less than 90% by a method and with equipment approved by the Engineer.
3. The Contractor shall reconstruct the base course and pavement of roadway damaged by the construction of the pipeline as covered elsewhere in these Detailed Specifications.
4. Other improvements such as driveways, sidewalks, curbs, gutters, stonewalls, fences and other structures damaged during construction shall be replaced or repaired to their original condition or better as approved by the Engineer.

3.07 FIELD QUALITY CONTROL

- A. The Engineer will inspect and approve open cuts and trenches before installation of pipeline or structures, and will make the following tests:
1. Assure that trenches are not backfilled until all tests have been completed;
 2. Check bedding for proper layer thickness and compaction;
 3. Verify that test results conform to the specified requirements, and that sufficient tests are performed;
 4. Assure that defective work is removed and properly replaced.

END OF SECTION

SECTION 02230 - AGGREGATE BASE COURSE

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Description. This work shall consist of furnishing and placing one or more courses of aggregate base on a prepared surface in accordance with the requirements of the contract.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials shall meet the requirements specified in the following Subsections of Division 700 Materials of the "Hawaii Standard Specifications of Road and Bridge Construction, State of Hawaii, Department of Transportation Highways Division, Honolulu, Hawaii, 2005," and all subsequent amendments.

Aggregate	703.06
Water	712.01

PART 3 - EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A Placing
1. The base material shall be placed on the prepared surface without segregation. Segregated materials shall be remixed until a uniform distribution is obtained. The material shall not be dumped in piles on the prepared surface.
 2. Depositing and spreading shall commence at that part of the work farthest from the point of loading the material and shall progress continuously without breaks, unless otherwise directed by the Engineer.
 3. If the required compacted depth of the base course exceeds 6 inches, the base shall be constructed on 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.
 4. If the contractor uses a vibratory roller weighing 9 tons or more, the lift thickness may be increased to 7 inches.
 5. Spreading of binder material over the surface of the compacted base will not be permitted. Additional material if required shall be incorporated uniformly throughout the thickness of the compacted material by scarifying and blading. The combined material shall meet all quality requirements as specified.

B. Shaping and compacting

1. The Contractor shall perform such shaping work as necessary and such that the finished base shall conform to the required grade and cross-section. The finished base where not controlled by adjacent structures or features shall not vary more than 0.04 foot above or below the theoretical grade.
2. Compaction of each layer shall continue until a density of not less than 95 percent of the maximum density, determined in accordance with the requirements of Subsection 106.09 - Special Test Methods, of the "Standard Specifications for Road and Bridge Construction, has been achieved. Field density determination will be made in accordance with Hawaii Test Method HWY-TC 1. The surface of each layer shall be maintained during the compaction operations in such a manner that a uniform texture is produced and the aggregates firmly keyed. Water shall be uniformly applied over the base materials during compaction in the quantity necessary for proper consolidation.
3. Should high or low spots develop during rolling operations, such spots shall be smoothed out by blading with a self-propelled and pneumatic-tired motor grader having a wheel base not less than 15 feet long and a blade not less than 10 feet long.
4. Each layer shall be compacted initially by rolling with three-wheel rollers followed by intermediate rolling with pneumatic-tired rollers. Final rolling shall be done with three-wheel rollers.

- C. Equipment. Three-wheel rollers and pneumatic-tired rollers shall conform to the requirements specified in Subsection 401.03(B)(4) - Rollers.

END OF SECTION

SECTION 02512 - ASPHALT PAVING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Asphaltic concrete shall consist of a mixture of mineral aggregate and bituminous material, mixed at a central plant in the proportions hereinafter specified and spread and compacted on a prepared base or existing road surface.

The pavement may consist of a surface course mixture and leveling or base course mixture, as hereinafter specified.

PART 2 - PRODUCTS

2.01 MATERIALS

All materials shall meet the requirements specified in the "Hawaii Standard Specifications of Road and Bridge Construction, State of Hawaii, Department of Transportation Highways Division, Honolulu, Hawaii, 2005," and all subsequent amendments with the following subsections of Division 700 - Materials.

Bituminous Material (Asphalt Cement, Grades AR 40 or 80)	702.01
Asphalt Paint (Emulsified Asphalt)	702.04
Aggregate	703.09
Filler	703.15
Blending Sand	703.22
Hydrated Lime	712.03

Leveling or base course mixture shall be Mix No. 2, surface wearing course mixture shall be as shown on the plans or called for in the special provision or proposal.

- A. Grading and Composition Requirements: Materials composing the asphalt concrete shall be combined to meet the requirements set forth in Table 1. The grading composition limits specified are based on materials of uniform specific gravity. Correction of grading limits shall be made to compensate for any variations in specific gravity of the individual sizes.

Compacted Thickness Individual Layers	Base and Leveling Course	Roadway Mixes		Resurfacing Mix
		(Std.)	(Dense Grade)	
Minimum	1-1/2"	1-1/4"	1-1/4"	3/4"
Maximum	2-1/2"	2-1/2"	2-1/2"	1-1/2"

TABLE 1-GRADING AND COMPOSITION REQUIREMENTS

MIX NO.	2	3	4	5
SIEVE SIZE	COMBINED AGGREGATE			
	Total Percent Passing by Weight			
1-1/4"	100	-	-	-
1"	85-100	100	-	-
3/4"	-	90-100	100	-
1/2"	60-85	70-90	85-100	100
3/8"	-	-	72-88	80-100
No. 4	36-55	40-57	48-66	55-75
No. 8	26-41	30-47	32-48	35-52
No. 16	17-32	20-36	21-37	22-38
No. 30	12-25	16-28	15-27	14-26
No. 50	8-18	10-22	9-21	8-20
No. 100	5-14	8-17	6-16	6-15
No. 200	1-8	4-10	4-10	4-10
Percentage by weight of Asphaltic Cement to be Added	4.5-6.5	5.0-7.0	6.0-8.0	5.0-7.0

The grading within the above tolerances shall be to the percentage of aggregate passing the sieves during any day's run will conform to the following limitations:

Passing No. 4 and larger sieves	7% above or below
Passing No. 8 and No. 100 sieves	4% above or below
Passing No. 200 sieves	2% above or below
Bituminous Binder	0.4% above or below
Temperature of Mixture on Delivery	20°F above or below

PART 3 - EXECUTION

3.01 DETAILS

- A. Mixing: The asphaltic cement shall be heated in a kettle of approved type, and maintained at a temperature between 275NF and 300NF. The heat must be so applied that there can be no burning of any portion of the asphaltic cement. No live steam shall be injected into the cement. The mineral aggregate shall be heated in an approved

appliance to a temperature of not less than 275NF nor more than 320NF. After heating to the required temperature, the required amount of asphalt cement shall be added to the heated aggregate. This mass shall be introduced into the mixer within 25NF of each other's temperature.

- B. Prime Coat: All surfaces on or against which asphalt concrete is to be placed shall first be given an asphaltic cement prime or tack coat as specified in Section 02513, "Prime Coat," of these specifications.

Before applying the prime and tack coat, the Contractor shall prepare the existing surfaces by power brooming to remove all loose particles, dust, sand, and other foreign materials.

- C. Asphaltic Concrete Interlayer Fabric Membrane: Immediately after installation of the prime coat and prior to installation of the asphaltic concrete wearing surface the interlayer fabric membrane is to be installed in accordance with Section 02517 (Not applicable for this project).

- D. Laying Wearing Surface: In advance of placing asphalt concrete over an existing base, surfacing, or pavement, and after the base, surfacing, or pavement has been prepared as herein specified, and if ordered by the Engineer or shown on the plans, a leveling course mixture shall be spread to level irregularities, dips, depressions, sags, and excessive crown, and to provide a smooth base of uniform grade and cross-section in order that the surface course will be of uniform thickness. The above specified material shall not be placed more than one day in advance of placing the surface course. No additional compensation will be allowed for placing leveling course mixture as specified above and full compensation for all work incidental to such operations shall be considered as included in the contract prices or price paid for the asphalt concrete mixture used.

The mixture as prepared above shall be brought to the work in suitable vehicles at a temperature of not less than 250 degrees F. Tarpaulins shall be provided and used upon all loads.

The wearing surface shall be spread with self-propelled mechanical spreading and finishing equipment, provided with a screed or strike-off assembly capable of distributing not less than the full width of a traffic lane. The screed shall be adjustable to the required crown and elevation. Screeding includes any cutting, crowding or other action which is effective on the mixture without tearing, shoving, or gouging, and which produces a finished surface of an even texture. The equipment shall be provided with rolling, tamping, or other suitable compacting devices, and shall be operated with a forward speed of not more than 20 feet per minute.

If the spreading and finishing equipment leaves ridges, indentations, or other marks in the surface that cannot be eliminated by rolling or prevented by adjustment in operation, its use shall be discontinued and other acceptable equipment shall be furnished by the Contractor.

If more than one course is to be laid in any area, not more than 24 hours shall elapse between the spreading and finishing of any two successive courses in that area.

The self-propelled mechanical spreading and finishing machine shall be capable of propelling the vehicle being unloaded in uniform manner and, if necessary, the load of the haul vehicle shall be so limited that satisfactory spreading will be obtained. While being unloaded, the vehicle shall be firmly attached to the machine and the brakes on the vehicle shall not be depended upon to obtain contact between the vehicle and the machine.

Before placing asphalt concrete wearing surface adjacent to cold transverse construction joints, such joints shall be trimmed to a vertical face in a neat line. The location of the proposed joint shall be tested with a 10-foot straight-edge and cut back such that when the straight-edge is laid on the finished surface parallel with the center line of the street, the surface shall in no place vary from the lower edge of the straight-edge more than 1/8 inch.

Before placing asphalt concrete adjacent to any existing asphalt concrete, the face of the existing asphalt concrete shall be trimmed to a vertical face in a neat line.

Where asphalt concrete wearing surface is placed adjacent to a Portland cement concrete gutter, the asphalt concrete wearing surface shall be so laid that its surface, after compaction, will approximately be 1/4-inch above the surface of the adjacent concrete. The edge of the asphalt concrete wearing surface shall then be smoothed and sealed over a width of approximately 3 inches with hot hand-irons having a self-contained heating unit.

At locations where the width of asphalt concrete mixture to be spread is too narrow to permit the use of self-propelled mechanical spreading and finishing equipment, or where the surfacing is to extend to a featheredge and the use of such a machine is not practicable, the mixture may be spread by hand-raking. Where hand-raking is permitted, the mixture shall be finally shaped and smoothed by means of a wooden float 8 feet long, one-inch thick and 4 inches wide. The float shall be rigidly ribbed, and to insure a true and flat surface on the underside, adjusting screws shall be placed between the rib and float at not more than 24-inch centers. The float shall be operated by means of a long handle, from the side of the area being paved or surfaced, and parallel with the center line of the pavement or surfacing. High spots and irregularities that are transverse to the path of traffic shall be cut down and the material redistributed over the area. The maximum depth of wearing surface which may be spread and rolled in one course shall not exceed a compacted thickness of 2 inches. Where such thickness exceeds 2 inches, it shall be spread and rolled in courses each not to exceed a compacted thickness of 1-1/2 inches unless otherwise specified in these specifications.

Wearing surface mixture shall not be spread from hauling vehicles.

No wearing surface shall be spread when the atmospheric temperature is below 50°F or during other unsuitable weather, or when the base is wet.

- E. Rolling: Immediately after the wearing surface has been laid as specified above, it shall be compressed with power rollers, smooth running, and in first-class mechanical

condition. Initial rolling or tamping shall be performed when the temperature of the mixture is between 220NF and 245NF.

After the first pass of the roller, any low or grainy spots shall be broken up with a hot rake and more material worked in to insure a surface of uniform texture and maximum density.

Rolling equipment shall be self-propelled. Initial rolling of asphalt concrete mixtures shall be performed by means of a three-wheeled roller weighing not less than 12 tons and with a compression on the rear wheels of not less than 325 pounds per linear inch of tire width, or in lieu thereof, by means of a three-axle tandem roller weighing not less than 12 tons. For production not exceeding 150 tons per hour, not less than one of the above specified rollers shall be used for initial rolling. For productions in excess of 150 tons per hour, one additional roller of a type designated by the Engineer will be required for each additional 100 tons or fraction thereof of asphalt concrete mixture placed.

Three-axle-tandem type rollers shall be so constructed that the rolls, when locked in position for all treads to be in one plane, are held with a rigidity which will permit the following test under full load. With the weight of the roller supported on the central roll, the tread of the central roll shall not be more than 1/8-inch above the plane tangent to the treads of the end rolls. With the weight of the roller supported on the end rolls, the tread of the central roll shall not be more than 1/4-inch below the plane tangent to the treads of the end rolls.

In general, three-axle tandem roller shall not be used in rolling over a crown or on warped surfaces when the axle is in a locked position.

Finishing rolling of asphalt concrete mixtures shall be performed by means of a tandem roller weighing not less than 10 tons.

Rolling shall continue until the compressed pavement or surfacing has a relative specific gravity of not less than 95 percent of the specific gravity of the combined mixture without voids.

- F. Smoothness: The finished surface of the pavement shall be true to grade and cross-section, free from depressions, or grainy spots, and shall show a uniform distribution of aggregate.

When a straight-edge, 10 feet long, is laid on the finished surface parallel to the center line of the pavement, the surface shall in no place vary from the lower edge of the straight-edge more than 3/16 of an inch.

No traffic shall be permitted on any course of asphalt concrete until it has cooled and set, except such traffic as may be necessary for construction purposes.

END OF SECTION

SECTION 02513 - PRIME COAT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and installing of prime coat.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Bituminous Material: Bituminous material for prime coat shall be a medium curing liquid asphalt, Grade MC-30, conforming to the applicable requirements of Section 702 - Bituminous Materials, "Hawaii Standard Specifications of Road and Bridge Construction, State of Hawaii, Department of Transportation Highways Division, Honolulu, Hawaii, 2005," and all subsequent amendments. The Contractor shall submit a Certificate of Compliance accompanied by test data, conforming to the requirements of ASTM M82-75 Cut-Back Asphalt (Medium Curing Type), for each lot or batch of MC-30. Medium curing liquid asphalt, grade MC-30 will not be accepted without adequate documentation. The Engineer reserves the right to waive any of the requirements for the MC-30 provided that its performance is not affected.

PART 3 - EXECUTION

3.01 DETAILS

- A. Immediately before applying the prime coat, the surface to be treated shall be swept clean of all loose material, dirt, excess dust or other objectionable material. Prime coat shall not be applied when the surface to be treated is appreciably damp or when weather conditions are unsuitable.
- B. The material shall be uniformly applied by a vehicle, mounted, pressure operated, sprayer type distributor at an approximate rate of 0.35 of a gallon per square yard. The exact rate of application shall be determined by the Engineer. After the prime coat has penetrated the surface, deficient areas shall receive additional applications and areas of excess bituminous material shall be blotted with clean sand. Traffic shall be kept off the prime coat until the material has been completely absorbed.
- C. Curbs, sidewalks and gutters shall be protected from prime coat. Any material sprayed on adjoining improvements shall be immediately cleaned off. The edges of existing asphalt paving, manholes and catch basin frames, concrete gutters, etc., against which asphaltic concrete pavement is to be placed shall be given a prime coat.

END OF SECTION

Prime Coat
02513-1

Job No. B46CM71B

SECTION 02514 - TACK COAT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and installing bituminous tack coat.

PART 2 - PRODUCTS

2.01 All sections or subsections called for in the specifications shall be referred to the "Hawaii Standard Specifications of Road and Bridge Construction, State of Hawaii, Department of Transportation Highways Division, Honolulu, Hawaii, 2005," and all subsequent amendments.

2.02 MATERIALS

Bituminous material for tack coat shall be slow-setting emulsified asphalt, Type SS-1 or Type SS-1H, conforming to the applicable requirements of Section 407 - Bituminous Tack Coat.

Water shall conform to the requirements of Subsection 712.01 - Water.

PART 3 - EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Weather Limitations: Tack coat shall not be applied on a wet surface or when weather conditions otherwise shall prevent proper construction.
- B. Equipment: The Contractor shall provide equipment for heating and applying the bituminous material. This equipment shall meet the requirements of Subsection 405.03(B) - Equipment.
- C. Preparation of Surface: Immediately before applying the tack coat, the surface to be treated shall be swept clean of all loose material, dirt, excess dust or other objectionable matter. A power broom or power blower, supplemented by hand methods if necessary, shall be used.
- D. Application of Bituminous Material: The emulsified asphalt shall be diluted with water at a rate of one part emulsion to one part of water by volume. The quantity, rate of application, temperature, and areas to be treated will be approved prior to application.

Tack coat shall be placed only so far in advance of the surface course placement as is necessary for it to cure to the proper condition for placement of such surface course.

Unless otherwise specified, tack coat shall be applied at the rate of 0.05 - 0.15 gallon per square yard on surface of base course.

Tack coat will not be measured for payment. Tack coat will be considered as incidental to the various contract items.

END OF SECTION

Tack Coat
02514-2

Job No. B46CM71B

SECTION 02577 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Furnish materials, labor and equipment required to accomplish pavement markings as indicated on the drawings.

1.02 SUBMITTALS

- A. Submit manufacturer's product data and application instructions.

1.03 DELIVERY AND STORAGE

- A. Deliver paints and paint materials in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. No asbestos containing materials shall be under this section. The Contractor shall insure that all materials incorporated in the project are asbestos-free.
- B. Paint: Non-reflective conforming to Fed. Spec. TT-P-102, color as indicated on the drawings or as selected by DLNR.
- C. Retroreflective Thermoplastic Compound Pavement Markings
 1. Retroreflective thermoplastic compound pavement markings shall conform to AASHTO M 247 and AASHTO M 249.
 2. Pigment, beads, and filler shall be uniformly dispersed in the resin. Material shall be free from skins, dirt, foreign objects, and ingredients that cause bleeding, staining, or discoloration, or combination thereof, and shall conform to Table 1 Composition Requirements.

Component	White	Yellow
Binder (percent minimum)	18	18
Titanium Dioxide (TiO ₂) Pigment (percent minimum)	10	N/A
Glass Beads (percent by weight)	30-40	30-40
Yellow Pigment	N/A	See Note*
Calcium Carbonate Filler (percent maximum)	42	48

* Note: Amount of yellow pigment, calcium carbonate, and inert fillers shall be at manufacturer's option, provided that all other requirements of these specifications are met. Yellow pigment used shall not contain materials listed under the Resource Recovery and Conservation Act (RRCA), including lead, cadmium, mercury, and hexavalent chromium. Total content of these materials in striping compound shall not exceed 100 parts per million.

3. Glass beads shall conform to the following requirements:
 - a. Have minimum refractive index of 1.50 when tested by liquid immersion method at 77 ± 9 degrees F, an minimum 70 percent true spheres, and be free from air inclusions.
 - b. Have standardized Type I gradation as specified in Table 2 - Glass Bead Gradation.

TABLE 2 - GLASS BEAD GRADATION	
U.S. Sieve Number	Percent Passing
20	100
30	75-95
50	15-35
100	0-5

- c. At least 70 percent of spheres shall conform to the following requirements:
 - i. Surfaces of spheres shall be smooth, lustrous, and free from film scratches and pits.
 - ii. Spheres shall be clear, transparent, and not ovate in shape or fused.
 - iii. Spheres shall show high auto collimating efficiency, with less than 1 percent of spheres black, amber, or milky.
4. Thermoplastic material shall conform to the following requirements:
 - a. Material shall be a maleic-modified glycerol ester resin (Alkyd-based) compound designed for traffic markings.
 - b. Material shall not be slippery, once installed.
 - c. Material shall not deteriorate by contact with sodium chloride, calcium chloride, oil content of pavement materials, or oil droppings from traffic, before warranty period has expired.
 - d. Material shall not be volatile, shall not give off fumes in application state, and shall not be toxic, noxious, or injurious to persons or property.
 - e. Material shall not break down or deteriorate if held at application temperature for 4 hours, or if reheated to application temperature three times.

- f. Material shall not discolor as result of up to three reheatings, or vary in color from batch to batch.
 - g. Material shall not change color and brightness characteristics after prolonged exposure to sunlight.
5. Application properties of thermoplastic compound shall conform with the following:
- a. Compound shall be machine-applied to pavement and concrete surface in molten state at temperature range of 412.5 ± 12.5 degrees F. Material shall not scorch or discolor if kept at molten state temperatures for up to 4 hours.
 - b. After cooling to ambient temperature and without polymerization or other chemical change, compound shall form traffic marking stripe of quality and appearance as specified herein.
 - c. Material shall show no appreciable deformation or discoloration under local traffic conditions and in ambient or pavement temperatures ranging from 0 degrees F to 120 degrees F.
 - d. Drying time is defined as minimum elapsed time from marking application to time after which normal local traffic leaves no impression or imprint on applied marking, and after which stripe attains and retains required characteristics, including thickness.

When applied at temperature range of 412.5 ± 12.5 degrees F and thickness of 1/8 inch to 3/16 inch, material drying time shall not exceed two minutes when the air temperature is 50 ± 3 degrees F. When air temperature is 90 ± 3 degrees F, drying time shall not exceed 10 minutes
 - e. Material shall allow stripes to maintain original dimensions and placement. Exposed surface shall be free from tack. Applied marking shall not chip or debond under normal movement of pavement surface.
 - f. Pigment shall be dispersed evenly throughout material. Material shall be of uniform density and character, throughout its thickness.
 - g. Material shall not smear or spread at pavement temperatures of 140 degrees F or less.
6. Specifications and Testing
- a. Material color after heating for 240 ± 5 minutes at 425 ± 3 degrees F and cooled to 77 ± 3 degrees F shall meet the following requirements:
 - i. White: Daylight reflectance at 45 degrees to 0 degrees shall be minimum of 75 percent. Chemical analysis of white titanium pigment shall be performed in accordance with ASTM D 1394. Material shall have maximum yellowness index of 15.

- ii. Yellow: Daylight reflectance at 45 degrees to 0 degrees shall be minimum of 45 percent. Yellow color shall match Federal Standard Number 595B, Color 13538.
- b. Material shall have less than 0.5 percent by weight of retained water when tested in accordance with ASTM D 570, Procedure (a).
- c. After heating for 240 ± 5 minutes at 425 ± 3 degrees F, material shall have softening point of 215 ± 15 degrees F when tested in accordance with ASTM D 36.
- d. Material shall have specific gravity of 1.9 to 2.5 when determined in accordance with ASTM D 153, Method A. Kerosene shall be used as immersion liquid. Test sample shall be ground to pass No. 30 sieve.
- e. Material shall have impact resistance of not less than 10 inch-pounds at 77 degrees F when tested as follows:
 - i. Heat material for 240 ± 5 minutes at 425 ± 3 degrees F.
 - ii. Cast material into bars of 1 square inch cross-sectional area, 3 inches long.
 - iii. Place material with 1 inch extending above vise in cantilever beam (Izod Type) tester, using 25 inch-pound scale 974 in accordance with ASTM D 256.
- f. Material shall have bond strength of not less than 150 pounds per square inch. Two concrete blocks, 2 inches by 3 inches by 7 inches, shall be cemented together on 3-inch by 7-inch 979 faces with 1/16- to 1/8-inch layer of thermoplastic traffic line material and tested in accordance with ASTM D 4796.
- g. After heating material for 240 ± 5 minutes at 425 ± 3 degrees F, testing in accordance with ASTM D 2240, and taking Shore Durometer readings after 15 seconds, material shall exhibit minimum hardness values, at designated testing temperature, as specified in Table 3 - Indentation Resistance.

TABLE 3 - INDENTATION RESISTANCE	
TEMPERATURE	READING
115 degrees F	65
77 degrees F	95
40 degrees F	95

- h. Each unit container shall be marked clearly to show color of material, process batch number or similar manufacturer's identification, manufacturer's name, plant address, and manufacture date. Each batch manufactured shall have its own, unique number. Label shall warn user that material shall be heated to 412.5 ± 12.5 degrees F during application.

Material shall be delivered to designated area in unit containers, such as sacks or bags, as processed by manufacturer; and shall weigh more than 24 pounds but less than 52 pounds, or as ordered by the Engineer.

2.02 EQUIPMENT

- A. Painting Equipment: The mechanical marker shall be an atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall be designed so as to apply markings of uniform cross-sections and clear-cut edges without running or spattering and within the limits for straightness set forth herein.

Use wheeled, motor-propelled applicator machine to apply traffic paint at nominal thickness of 0.015 inch or at rate of 300 linear feet of single 4-inch stripe for 1 gallon 150 paint. Use applicator having appropriate shields around nozzles to permit sharp stripe definition, and separate nozzle to direct air stream immediately ahead of paint application for clearing debris, dust, and other foreign matter. Immediately remove misted, dripped, and spattered paint from pavements.

- B. Thermoplastic Extrusion Pavement Marking Equipment: Apply material to pavement by extrusion method. One side of shaping die shall be pavement surface and other three sides shall be contained by, or shall be part of equipment for heating and controlling flow of material.

1. Equipment shall provide continuous mixing and agitation of material. Conveying parts of equipment shall be constructed to prevent accumulation and clogging.
2. Mixing and conveying parts, including shaping die, shall maintain material at plastic temperature.
3. Applicator shall cleanly and squarely cut off stripe ends. Pans, aprons, or similar appliances that the die overruns will not be allowed.
4. Apply beads to entire surface of completed stripe by automatic bead dispenser attached to liner.
5. Equip bead dispenser with automatic cutoff control synchronized with cutoff of thermoplastic material.
6. Use equipment that provides for varying die widths to produce varying widths of traffic markings.
7. Provide kettle for melting and heating composition. Equip kettle with automatic thermoplastic control device so that heating can be done by controlled heat transfer liquid rather than direct flame.
8. Equip and arrange applicator and kettle in accordance with National Fire Underwriters requirements.
9. Use mobile and maneuverable applicator that is capable of following straight lines and making curves in true arcs.

10. Use applicator capable of containing minimum of 125 pounds of molten material.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which pavement markings are to be installed. Should any condition be found unsuitable, no work shall be done until the unsatisfactory conditions have been corrected and are acceptable to the Contractor. Proceeding with the work will imply acceptance of the conditions by the Contractor.

3.02 SURFACE PREPARATION

- A. Allow new pavement surfaces to cure for a period of not less than 30 days before application of marking materials. Thoroughly clean surfaces to be marked before application of the paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Remove rubber deposits, existing paint markings, and other coatings adhering to the pavement by water-blasting. Scrub affected areas, where oil or grease is present on old pavements to be marked, with several applications of tri-sodium phosphate solution or other approved detergent or degreaser and rinse thoroughly after each application. After cleaning oil-soaked areas, seal with shellac or primer recommended by the manufacturer to prevent bleeding through the new paint.

3.03 PAINTING INSTALLATION

- A. Do not apply paint until the layouts, indicated alignment, and the condition of the existing surface has been approved by the Engineer.
- B. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Striping widths for lines shall be 4 inches, unless otherwise indicated.
- C. The finished product shall have an opaque, well-painted appearance, with no black or other discoloration showing through.

3.04 THERMOPLASTIC INSTALLATION

- A. Clean off dirt, blaze, paint, tape, and grease. Apply thermoplastic extrusion pavement marking only when pavement surface is dry.
- B. Use equipment that can apply material in variable widths from 2 inches to 12 inches. Apply material for full width of stripe in one application or pass.
- C. On concrete pavements, on HMA pavements more than seven days old, and on HMA pavements paved within seven days containing less than 6 percent bituminous asphalt, pre-stripe application area with binder material, primer, or prime seal coat recommended by pavement marker manufacturer.

SECTION 02713 - WATER SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

General Requirements: Furnish all labor, materials, equipment, and tools to install exterior water system as indicated on the Contract Drawings and specified herein.

1.02 SUBMITTALS

- A. Certificates: The Contractor shall furnish to the Engineer affidavits from the manufacturers of pipe, pipe coating, fittings, valves, etc., furnished and installed under this section certifying that such materials delivered to the project conform to the requirements of this section. Certificate of disinfection shall also be submitted to the Engineer.
- B. Test Results: Submit test reports for all tests conducted.

1.03 REFERENCES

- A. The "Water System Standards," Volume 1, 1985, and the "Approved Material List and Standard Details for Water System Construction," Volume 2, 1985, as applicable to the Board of Water Supply, City and County of Honolulu, hereinafter referred to as the "BWS Standard Specifications." (Paragraphs concerning Measurement and Payment are not applicable to this project.)
- B. The "Plumbing Code of the City and County of Honolulu", 1996 edition, hereinafter referred to as the "Plumbing Code".

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Water lines 3" and smaller shall be copper (ASTM B42 or ASTM B 88, Type K) with wrought copper solder type fittings conforming to ANSI B16.22 or ANSI B16.18. Solder shall be 95-5 tin-antimony or acceptable substitute for 2" and smaller; brazed with silver alloy filler metal for pipes 2-1/2" or larger.
- B. Solder and solder flux shall not contain lead. Flux shall be non-corrosive type. Self-cleaning flux shall not be used.
- C. Valves:

All valves shall be suitable for the minimum working pressure indicated, and in accordance with the latest edition of ASTM and ANSI specifications as indicated.

<u>Item</u>	<u>Size</u>	<u>Description</u>
Ball Valves	3" and smaller	Bronze body, 150-lb WOG, teflon seal, screwed ends, full port with stainless steel handle & nut. Ball valves shall be as manufactured by Nibco, Apollo, R.G. Sloane, Spears, Ford, Stockham, or acceptable substitute.

E. Valve boxes and cast-iron covers shall be as specified on the plans and in accordance with the BWS Standard Specifications and Details. Valve covers shall be painted color blue, as approved by the Engineer.

F. Dielectric Flanges and Compression

Provide at connections between copper and ferrous metal piping materials.

1. Dielectric unions or flanges shall be suitable for the required operating temperature and pressure. The metal parts of the dielectric unions or flanges shall be separated to prevent current flow between the dissimilar metals. Bolts/nuts/washers shall be stainless steel.
2. Compression couplings shall be cylindrical steel, middle ring with two (2) resilient gaskets and follower rings, joined with trackhead bolts or threaded rings. The coupling shall be as manufactured by "Dresser" or acceptable substitute.

PART 3 - EXECUTION

3.01 EXCAVATION AND BACKFILLING

- A. Trench excavation and backfilling for the laying and installation of water pipes, to the required line and grade and structure excavation for the construction of the appurtenant structures, shall be in accordance with Section 02200.
- B. The Contractor, in performing any work within the limits of work shown on the Contract Drawings, shall exercise due care to keep to an absolute minimum any damages to existing improvements. The Contractor shall be responsible for repairing, replacing and/or restoring all damages to existing improvements to the satisfaction of the Engineer.
- C. All trenching and backfilling operations shall be completed in the shortest time possible and such work for utility lines within or in the vicinity of buildings areas shall be completed prior to the pouring of footings.

3.02 INSTALLATION

- A. The Contractor shall be responsible for precisely laying out the various exterior utility lines shown on the Contract Drawings as provided elsewhere in these specifications. The locations shown on the Contract Drawings of the various existing utility lines which the new lines are to cross over or under or connect to were determined on the basis of the best information available; however, no assurance can be provided that the actual locations will be precisely as shown on the Contract Drawings.
- B. In performing all work, the Contractor shall exercise due care and caution necessary to avoid any damage to and impairment in the use of any existing utility lines. Any damage inflicted on existing lines resulting from the Contractor's operations shall be immediately repaired and restored as directed by the Engineer at the Contractor's expense.
- C. The installation, testing, disinfection, and acceptance of water lines shall be governed by the "Plumbing Code." The new lines shall be installed, but not

connected until pressure testing and disinfecting is completed. Connecting shall be done at the discretion of the Engineer. Pressure testing, flushing of valves and mains, and disinfection of the system shall be carried out in accordance with the "Plumbing Code" by the Contractor in the presence of the Engineer.

- D. Where stiff subsoils are encountered near the invert level, a 6-inch granular pipe cushion layer shall be used.
- E. At the time of final inspection of the work performed under the contract, the utilities covered by this section shall be complete in every respect and operating as designed. All surplus materials in every character resulting from the work of this section shall have been removed. All defects discovered in the utilities subsequent to this inspection shall be corrected prior to final acceptance.

3.03 CONNECTING, TESTING, FLUSHING AND DISINFECTING

- A. The new lines shall be installed, but not connected until pressure testing and disinfecting is completed. Connecting shall be done at the discretion of the Engineer. Pressure testing, flushing of valves and mains, disinfection of the system shall be carried out in accordance with the Water System Standards by the Contractor and he shall submit the results of such test to the Engineer for approval at the Contractor's expense.

END OF SECTION

- D. Line thickness, as viewed from lateral cross section, shall measure not less than 3/32 inch at edges, and not less than 1/8 inch in center.
- E. Provide finished lines with well-defined edges, free of waviness.

3.05 TRAFFIC CONTROL AND PROTECTION

- A. Place warning signs near the beginning of the work site and well ahead of the work site for alerting traffic. Place small markers along newly painted lines to control traffic and prevent damage to newly painted surfaces.

END OF SECTION

SECTION 10100 – GANGWAY SYSTEM ALUMINUM FABRICATIONS

PART 1 - GENERAL

1.01 SCOPE

GANGWAY SYSTEM ALUMINUM FABRICATIONS consists of furnishing transportation, labor, materials, and equipment to design, fabricate and install the aluminum gangway, concrete landing platform, skid plate/ramp, and associated appurtenances. All components shall be considered to be part of the “gangway system”.

1.02 RELATED WORK

- A. Floating Dock – Section 10110

1.03 REFERENCES

- A. References shall be the latest edition available as of the date of the invitation to bid unless otherwise specified. The following standards are hereby incorporated in this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

- B. Design Standards

Marina	United Facilities Criteria (UFC) 4-157-07 “Design Small Craft Berthing Facilities”
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Safety	Division of Occupational Safety and Health (OSHA) – Various Publications
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Steel	American Institute of Steel Construction (AISC) "Steel Construction Manual – 13 th Edition"
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Aluminum	The Aluminum Association, Inc. (AA) "Aluminum Design Manual ADM-1".
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	The Aluminum Association, Inc. (AA) "Specifications for Aluminum Structures".
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Accessibility	U.S. Department of Justice (DOJ) “ADA Standards for Accessible Design”
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- C. American Society for Testing and Materials (ASTM)

ASTM A 36	Specification for Structural Steel
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ASTM A 123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
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ASTM A 153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 276	Specification for Stainless Steel Bars and Shapes
ASTM A 325	Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 666	Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM B 221	Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B 308	Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
ASTM D 4976	Specification for Polyethylene Plastics Molding and Extrusion Materials
ASTM F 436	Specification for Hardened Steel Washers
ASTM F 593	Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F 594	Specification for Stainless Steel Nuts
D.	American Welding Society
AWS D1.1	Welding for Steel Structures
AWS D1.2	Welding for Aluminum Structures
E.	The Society for Protective Coatings (SSPC)
SSPC SP 6	Commercial Blast Cleaning

1.04 CONTRACTOR'S QUALIFICATIONS

The gangway system shall be furnished by a firm having a minimum of five (5) years' experience in the design and fabrication of aluminum marina gangway systems.

1.05 WARRANTY

The gangway system shall carry a manufacturer's written warranty against defects in materials and workmanship with a minimum term of 1 year from date of project acceptance. The warranty shall clearly state its conditions and any exclusions from coverage.

1.06 DESIGN REQUIREMENTS

- A. Information presented in this Specification is based upon the best estimate of those environmental and physical factors which reasonably can be expected to affect the design, performance, and durability of the proposed gangway and system. These criteria shall be considered as minimum requirements. Final calculations for the gangway system, including all structural components of the system, shall be designed for a minimum forty-year life expectancy.
- B. Final calculations shall demonstrate that the gangways are designed to withstand the required loading without damage throughout the specified design life using the criteria specified in this section as a minimum standard. The load combinations and allowable stresses are described herein.
- C. The Drawings show general layout and configuration of the gangway system as well as required dimensions. Complete dimensions, which conform to these requirements, specific site conditions, and OSHA and ADA Regulations will be required from the fabricator.
- D. The vertical design load shall be the combination of the dead weight of the structure, including any attached utilities, and either live load Case A or Case B, whichever governs.
 - 1. Case A shall be a uniform live load of 100 lbs. per square foot of deck surface area;
 - 2. Case B shall be a concentrated live load of 400 lbs. applied anywhere on the deck surface.
- E. The maximum allowable deflection under the vertical design load shall equal the span divided by 300.
- F. The deck and structural components shall be designed with a minimum safety factor on working stress as specified in AA "Specifications for Aluminum Structures" for bridge type structures. For non-aluminum structural components, similar safety factors shall apply.
- G. The horizontal design load shall be a uniform wind load of 20 lbs. per square foot of profile area. The horizontal design load shall be applied in combination with the dead weight.
- H. Design shall also consider stresses resulting from handling and installation, and provide notations on how to lift to unload and set in place.
- I. The gangway system design shall be coordinated with the float system design. Provide sufficient flotation to support the superimposed load of the gangway plus the appurtenances located on the pier to maintain required freeboard

- J. The completed gangway system shall have a manufacturer's label plate attached in a conspicuous location. This label plate shall be aluminum, brass or stainless steel. The following information shall be stamped or etched into this plate in letters not less than 1/4-inch high filled with black enamel:
1. Manufacturer's name
 2. Date of Manufacture
 3. Overall length (not including transition plate)
 4. Capacity (maximum live load)
- K. The walking surface shall be provided with a non-skid surface with a minimum coefficient of friction of 0.6 under wet conditions.
- L. The gangway system shall have a guardrail on each side of the walking surface fitted with a handrail extending a minimum of 1 foot beyond the ends of the structure, designed in accordance with OSHA and ADA requirements. The rails shall be fabricated of aluminum pipe or tubing. Openings in the guardrail shall not permit passage of a 4-inch diameter sphere, including the transitions at each end of the gangway.
- M. The gangway system shall be designed to withstand float motions including a vertical change in pier elevation due to water level fluctuation as indicated on the Drawings and horizontal drift due to lateral loads without structure interference or overstress, including fatigue of gangway members and supports. Gangway wheels shall remain in contact with the tracks on the float at all times.
- N. The transition plate shall make a smooth, gap-free transition between the gangway walking surface and the float. The transition plate shall be a minimum 1/4-inch material with a non-skid surface and shall be attached to the gangway by means of a continuous pipe hinge. The plate shall be the full width of the gangway and have a maximum slope not in excess of 1V:12H. The sliding edge shall be fitted with a continuous UHMW polyethylene wear block, conforming with ASTM D 4976, a minimum of 1/2-inch thick, which shall be beveled conforming to code requirements for accessibility and safety. The sliding edge shall rest on an aluminum plate a minimum of 1/8-inch thick affixed to the pier to protect the polyethylene wear block from excessive wear.
- O. Gangway wheel assembly shall consist of aluminum wheels that are a minimum of 8 inches in diameter by 2 1/2 inches wide with molded-on polyurethane throat and sealed bearings that do not require lubrication. Axle shall be Type 316 stainless steel conforming to the provisions in ASTM A 276.
- P. The wheels shall be kept on the track by wheel guides, one for each wheel. The wheel guides shall be of such length so as to underlie the gangway wheels at all times without contacting the gangway structure at any time, and without presenting a tripping hazard.

- Q. The gangway hinge shall be supported by the landing platform (at the shore end). The hinge shall be designed to permit rotation of the gangway in both the vertical direction and the horizontal direction due to lateral loads on the float and shall accommodate float motions for all environmental conditions.
- R. The gangway hinge shall make a smooth, gap-free transition between the gangway walking surface and the landing platform. The hinge cover plate shall be a minimum ¼-inch material with a non-skid surface and shall be attached to the gangway by means of a continuous pipe hinge. The plate shall be the full width of the gangway.
- S. The gangway system shall conform in all respects to design requirements of OSHA, ADA rules for marinas and local codes.

1.07 SUBMITTALS

Submit the following:

- A. Prior to ordering materials or starting fabrication of the gangway system, submit final design calculations signed and sealed by a SER (Structural Engineer of Record). The calculations shall demonstrate that the gangway system, using the criteria specified herein as minimum requirements, is designed to withstand the specified loads without damage throughout the design life of the gangway system. All documents submitted shall bear the professional seal and signature of the SER with the Statement: "This work was prepared by me or under my supervision and construction of this project will be under my observation." The SER shall be the Contractor's State of Hawaii Licensed Structural Engineer who will be the Structural Engineer of Records (SER) for the Gangway System.
- B. Prior to ordering materials, or starting fabrication of the gangway system, submit shop drawings signed and sealed by a SER (Structural Engineer of Record) holding a valid Certificate of Registration in the District of Columbia. The shop drawings shall indicate the proposed gangway system construction and connection details, and methods for attaching to the pier or ground substrate. Submit shop drawings for all fabricated items and catalog sheets for all standard manufactured items that are to be incorporated into the gangway system. All documents submitted shall bear the professional seal and signature of the SER with the Statement: "This work was prepared by me or under my supervision and construction of this project will be under my observation." The SER shall be the Contractor's State of Hawaii Licensed Structural Engineer who will be the Structural Engineer of Records (SER) for the Gangway System.
- C. Submit experience data verifying the gangway supplier's required years of experience in the manufacture of aluminum marina gangway systems.
- D. Submit quality control plan to be used during:
 - 1. The fabrication of the gangway system.
 - 2. Installation of the gangway: The Gangway SER shall provide details and notes on how the Contractor is to lift the gangway to set in-place (location and number of picking points).

- E. Prior to fabrication of the gangway, submit certified test reports for the following:
 - 1. Aluminum
 - 2. Steel hardware items
 - 3. Non-skid surface coefficient of friction

PART 2 - PRODUCTS

2.01 MISCELLANEOUS METAL

- A. Miscellaneous steel components shall conform to ASTM A 36 and shall be hot-dip galvanized after fabrication in accordance with ASTM A 123. Welding of steel shall comply with AWS D 1.1.
- B. Stainless steel hardware shall be Type 316. Bolts shall be ASTM F593, Group 2. Nuts shall be ASTM F 594, Group 2. Flat washers shall be cut from Type 316 stainless steel plate that conforms to the provisions in ASTM A 666.
- C. Materials for drill and bond fasteners for the gangway landings shall be:
 - 1. Adhesive bonding material shall be Hilti HVA or approved equivalent.
 - 2. The anchor rod assembly shall be Hilti HAS or approved equivalent.

2.02 GANGWAY SYSTEM

- A. Aluminum shall be alloy 6061-T6 conforming to ASTM B 308, or 6063-T6 conforming to the provisions in ASTM B 221. Welding of aluminum shall comply with AWS D1.2.
- B. Gangway wheel assembly shall consist of aluminum wheels that are a minimum of 8 inches in diameter by 2½ inches wide with molded-on polyurethane tread and sealed bearings that do not require lubrication. Axle shall be Type 316 stainless steel conforming to the provisions in ASTM A 276.

2.03 DISSIMILAR MATERIALS

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint to prevent galvanic action or isolated with UHMW PE bushings and washers.

PART 3 - EXECUTION

3.01 WORKMANSHIP

All work shall conform to the approved Shop Drawings, project drawings and this specification. Construction details, finishing details and colors shall be consistent throughout. Work shall be accurately set to establish lines and elevations, and securely fastened in place. Cutting, drilling and punching shall produce clean true lines and surfaces. Exposed surfaces of work shall have a smooth finish.

3.02 FINISHING

All exposed surfaces of the gangway system except handrails, shall be sandblasted in accordance with Commercial Sand Blast SSPC-SP-6, which produces a coarse matte finish. The handrails shall have a rubbed or light brush finish and provide a smooth gripping surface.

3.03 GANGWAY SYSTEM INSTALLATION

- A. Install in accordance with the manufacturer's instructions. Posts and vertical rails shall be plumb, and line rails level.
- B. Do not begin installation until site has been properly prepared. Substrate preparation is the responsibility of the Contractor; notify Owner of unsatisfactory conditions before proceeding.
- C. Contractor shall furnish all materials and equipment required for gangway system installation. The gangway shall not be dragged or skidded into place.
- D. Contractor shall provide, install and remove when no longer required, all temporary supports used to secure the gangway in place during installation.
- E. With the gangway secured in correct position, mark the location of the wheel guides and transition plate wear block protector plates, and fasten in place.
- F. Protect installed products until completion of project.

3.04 PAYMENT

Payment for Aluminum Gangways will be full compensation for the work prescribed in this section and the contract documents.

END OF SECTION

SECTION 10110 - FIXED PIERS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. This section covers the requirements for furnishing and installing of aluminum fixed pier and approach ramps and appurtenances, including all materials, labor, equipment and services necessary to complete this work.
- B. New concrete piles and pile caps will be installed by the Contractor.
- C. New fixed piers will be supported by 16-1/2" Octagonal concrete pile and connected to the existing concrete bulkhead. The deck of the new fixed piers shall match the top of the existing concrete bulkhead.
- D. In case of conflict between the drawings and the bid document, the most restrictive specifications shall prevail.
- E. A certified welder according to American Welding Society, AWS DI.2-Structural Welding Code, Aluminum or approved equal, shall make all aluminum and stainless steel welding. Welders shall be currently certified to weld the various materials to be incorporated in the work, mainly aluminum.

1.02 ALUMINUM FRAME SYSTEM

- A. Experience

The aluminum frame system shall be fabricated by a firm with a minimum of ten (10) years of experience.

1.03 SITE SURVEY

The Contractor shall retain a professional surveyor.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Aluminum Members

Aluminum extrusions for dock and approach ramp shall be aluminum alloy 6061 or 6005. Alloy 6061 shall be extruded in accordance with the requirements of applicable sections of Federal Specification QQ-A-200.

B. Top Decking Material

Decking material shall be fiber reinforced grating. Color to be selected by the Engineer.

C. Pier Fender

Fender material shall be Fiber Force plastic lumber dock fender, structural grade, produced by America Plastic Lumber, Inc. or approved equal.

D. Dock Boxes

Dock boxes shall be fiberglass Model 323 (39 1/2"W x 19 3/4"D x 21 1/2"1-1), standard dock box with one (1) lid lift. Dock box shall be Earth-Tone Brown color, produced by Dock Boxes Unlimited in Irving Texas or approved equal.

E. Mooring Cleats

Cleats shall be composed of ALMAG 35 cast aluminum alloy meeting the requirements of the Federal Specification QQ-A-371F and QQ-A-601E. The mooring cleat shall support 5,000 pound of force in any direction. Remove burrs and rough spots. Grind smooth to prevent chafing of boat lines.

F. Bolts

Galvanized steel bolts shall not be used for any purpose for the fixed dock system.

1. Stainless Steel Bolts

Stainless steel bolts, rods, nuts, washers and screws shall be Type 316.

G. Railing

Railing aluminum members shall be of 606146 or 6005-T5 and to be painted. Submit aluminum railing paint color to Engineer for review by SHPD and allow time for review to 8 weeks.

H. Stainless Steel

All stainless steel members shall be Type 316.

PART 3 – EXECUTION

3.01 FABRICATION REQUIREMENTS

A. Accessories

1. Cleats on aluminum decked docks shall be bolted with stainless steel bolts, nuts and washers.
2. Any potentially corrosive installation of dissimilar materials shall be properly insulated to minimize or eliminate corrosion in a marine environment.
3. Lock washers shall be used on all the bolt connection.
4. UHMW shall be placed between aluminum and concrete member as shown on the plan.

B. Structures

1. Approach ramp shall be fabricated based on shop drawing prepared by the Contractor.
2. Aluminum structural member shall be straight without and deformations before installation.

3.02 CONSTRUCTION REQUIREMENTS

A. Accessories

1. New cleats along the concrete bulkhead shall be located at exactly same location of existing cleats. At the site, these cleats serve as boundary lines of boat berthing area similar to land property line.
2. New cleats along the finger piers shall be installed as shown on the drawings.

B. Structures

1. Pier deck and approach ramp shall be built as shown on the plan.

Good concrete bonding at cold joint is very critical to prevent future concrete cracks.
2. New concrete pile cap shall be built as shown on the plan to facilitate installation of new finger pier.

3.03 PAYMENT

Payment will be full compensation for the work prescribed in this section and the contract documents.

END OF SECTION

SECTION 10120 – FLOATING DOCK SYSTEM

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. This section covers the requirements for furnishing and installation of engineered aluminum floating dock system, pile guides, cleats and appurtenances, including all materials, labor, equipment and services necessary to complete this work.
- B. The successful Contractor shall be fully responsible for the design, furnishing, delivery and installation of the complete and fully functional new floating dock system with concrete pile anchor systems and appurtenances in accordance with the contract specifications and plans for Lahaina Small Boat Harbor Front Row Piers and Dingy Dock Repairs, Lahaina, Maui, Hawaii, Job No. B46CM71B.

The completed and ready to assemble floating dock system and appurtenances, as called for in the bid documents, shall be delivered to the Lahaina Small Boat Harbor, Maui, Hawaii. The floating dock system shall be fully assembled to the maximum extent possible prior to being transported to the project site to avoid impacting harbor activities. The Contractor will be provided with an area to unload the floating dock system and appurtenances at Lahaina Small Boat Harbor, Maui, Hawaii.

- C. The design of the structures and components of the floating dock system shall comply with the minimum requirements of the Aluminum Association, Aluminum Construction Manual, latest edition or approved equal.
- D. In the case of conflict between the drawings and the specifications, the more restrictive documents shall prevail.
- E. A certified welder according to American Welding Society, AWS D1.2 – Structural Welding Code, Aluminum or approved equal, shall make all aluminum welding. Welders shall be currently certified to weld the various materials to be incorporated in the work, mainly aluminum.
- F. The dock manufacturer/contractor after the bid opening and prior to the award of the contract shall submit the drawings showing the following:
 - 1. Floating dock pier typical cross section;
 - 2. Cleat details
 - 3. Typical connection to concrete guide piles;
 - 4. Details of floating unit, including thickness of floating unit;
 - 5. Copy of the welder certification
 - 6. Typical connection detail between the gangway and the concrete walkway.

- G. Following the award of the contract, the dock manufacturer/Contractor shall furnish detailed drawings of the engineered floating dock system, float positions on the structures, accessories plus detailed installation and connection to the concrete guide piles and appurtenances; structural design calculations as available; specifications; installation instructions and catalog data to the State for review and approval. All drawings shall bear the seal of dock manufacturer's Professional Engineer and shall be reviewed, stamped and signed by a State of Hawaii licensed Structural Engineer. This cost shall be paid for by the dock manufacturer/Contractor.

The dock manufacturer/Contractor shall design and detail all floating structures such that there are no crevices and pockets where salt water can collect. Also, there shall be no part of the aluminum frame in direct contact with seawater.

The dock manufacturer/Contractor shall furnish to the satisfaction of the State a preliminary construction schedule done in the form of a bar graph and which identifies each major critical activity.

The dock manufacturer shall submit a qualified "Quality Control Program", which includes continual inspection and documentation.

- H. With design drawing submittal, the dock manufacturer/Contractor must submit the following warranties:

1. Furnish a minimum two (2) year warranty guaranteeing that the structure shall be free of defects in materials, workmanship and/or design from the date of final acceptance by the State.
2. Furnish a minimum ten (10) year warranty guaranteeing the proper performance of the polyethylene float.
3. Furnish a minimum five (5) year warranty against pitting and corrosion of all the aluminum members.

- I. Prior to final acceptance, the dock manufacturer/Contractor shall turn over to the State, the CADD files (.DGN), Microsoft Word (.DOC) or Microsoft Excel (.XLS) files version 2000 or higher in connection with the work performed under this section. The electronic files shall be submitted on a CD at no additional cost to the State.

- J. Submittal of Plans and Specifications: The Contractor shall submit to the DLNR, the SER's (Structural Engineer of Record) complete calculations, plans and specifications for the floating dock system and concrete landing for their review and approval to ensure compliance with the plans and specifications, prior to the fabrication for these items. All documents submitted shall bear the professional seal and signature of the SER with the Statement: "This work was prepared by me or under my supervision and construction of this project will be under my observation." The SER shall be the Contractor's State of Hawaii Licensed Structural Engineer who will be the Structural Engineer of Records (SER) for the floating dock system and concrete landing.

- K. Upon completion of construction, the successful bidder shall provide two (2) copies of written instructions in the form of a manual, defining the maintenance and operations for the floating dock system to the Engineer.

1.02 FLOATING DOCK SYSTEM

- A. Experience: The floating dock system shall be manufactured by a firm with a minimum of ten (10) years experience designing, engineering, and manufacturing aluminum floating dock systems for use in ocean waters.
- B. Pre-Qualified Manufacturers:
1. Blue Water Marine and Dock Specialties
350 Ward Avenue, Suite 106
Honolulu, Hawaii 96814
Telephone Number: (808) 237-4504, Fax No. (808) 237-4545
 2. METALU Industries international
B P. 53-Les Prairies De Grand'Ville
44250 St. Brevin Les Pins, France
Telephone Number :(33)02 40 39 18 40, Fax No. (33) 02 40 27 02 47
 3. Poralu Marine Inc.
381 Boul. Industriel, Bur. 2
St-Eustache, Quebec, Canada J7R 6C9
Telephone Number: (450) 491-6506, Fax No. (450) 491-3379
 4. Raven Marine, Inc.
3295 Orange Avenue
Kissimmee, FL 34744
Telephone Number: (407) 935-9799, Fax No. (407) 935-9436
 5. Technomarine Manufacturing, Inc.
598 Leclerc
Repentigny, Quebec, Canada J6A 2E5
Telephone number: (450) 585-6114, Fax No. (450) 585-6840
 6. Water Ventures USA
23192 Alcalde Drive, Suite G
Laguna Hills, CA 92653
Telephone Number: (949) 470-3299, Fax No. (949) 470-3699
Hawaii Representative Telephone number: (808) 352-6427, Fax No. (808) 953-2196
 7. Shore Master
1025 International Drive, P.O. Box 358
Fergus Falls, MN 56538-0358
Telephone Number: (218) 739-4641, Toll Free: 1-800-328-8945, Fax no. (218) 739-4008
 8. Bellingham Marine
5500 Nordic Way

Ferndale, WA 98248

Telephone Number: (360) 392-1432, Fax: (360) 384-8134

- C. For Manufacturers other than those listed above who wish to have their floating dock system considered, the contractor shall have the system approved by completing all of the following:
1. Fifteen (15) working days (not including Saturday, Sunday or holidays) prior to the scheduled bid opening date, the Manufacturer/Contractor shall furnish and submit complete and detailed information describing their proposed floating structures applicable in salt water, including but not limited to the specifications and construction drawings. Submittal shall clearly demonstrate that the floating dock system shall respond to the specific requirements of this project. The burden of proof of merit of the proposed system is with the Manufacturer/Contractor. The Engineer's decision will be final. The Engineer's written approval, if given, will be issued in an addendum.
 2. Evaluation of the floating dock system by the Engineer will include, but not be limited to the following factors:
 - a. Dock dimensions
 - b. Weight and Stability
 - c. Safety
 - d. Durability
 - e. Maintenance requirements
 - f. Aesthetics
 - g. Company experience
 - h. Warranty
 - i. Compliance with specified design requirements
 - j. Delivery dates
 3. The Manufacturer/Contractor must submit the following:
 - a. Drawing(s) showing the layout of the floating structure in salt water, gangway and gates.
 - b. Catalogue data showing commercial equipment incorporated into the design.
 - c. List of completed projects. Include the name, location, date completed and description of the floating dock project in salt water.
 - d. Warranty
 - 1) Furnish a minimum two (2) year warranty guaranteeing that the structure shall

be free of defects in materials, workmanship and/or design from the date of final acceptance by the State.

- 2) Furnish a minimum ten (10) year warranty guaranteeing the proper performance of the polyethylene float.
- 3) Furnish a minimum five (5) year warranty against pitting and corrosion of all the aluminum members.
- 4) Furnish a minimum two (2) year warranty for polyethylene floats, elastic mooring system and helical anchors.

1.03 SITE SURVEY

- A. The Contractor shall retain a professional surveyer and survey all the existing conditions, including the locations of the existing, temporary and permanent gangway connection to the engineered aluminum floating dock and location of helical anchors.

1.04 ENGINEERING

- A. Design Criteria:

1. Wind Load:

- a. Basic wind speed shall be 95 mph, basic wind speed 3 second gust @33' height above ground. Importance factor $I=1.0$. Wind load forces shall be design in accordance with ASCE/SEI 7-05 "Minimum Design Loads for Buildings and other Structures," when vessels are moored to the docks.
- b. Basic wind speed shall be 105 mph, basic wind speed 3 second gust @33' height above ground as defined in International Building Code 2006 and ACSE/ SEI 7-05 "Minimum Design Loads for Building and other Structures," when vessels are not moored to the docks."
 - i. Importance factor $I=1.0$. Wind load forces shall be design in accordance with 2006 International Building Coad and SCSE/SEI 7-05 "Minimum Design Loads for Buildings and other Structures
 - ii. The wind load includes the wind forces in the transverse or longitudinal direction
 - iii. Shielding effects of berthed boats between adjacent rows of slips on the dock system may be included in determining the total wind load. Shielding coefficient for the windward most row of slips shall be 1.0. Wind load on the second row of slips (first shielded row) shall be calculated with a shielding coefficient of not be less than 0.5 Wind loads on subsequent rows of slips shall be calculated with a shielding coefficient of not less than 0.3

2. Wave Height:

- a. The dock system shall be capable of sustaining continuous waves of up to 1-foot and occasional waves of up to 2-feet for a period of four (4) hours.
 - i. Wave loads shall be determined for all portions of the dock system based on fully occupied slips with 1 foot waves with a return period between 1 and 3 seconds.
 - ii. The wave load includes forces in the longitudinal and transverse directions to the considered dock or portion of dock

3. Surge Height: 8.0 feet MLLW. (8.0 Feet is the desired design surge height. The minimum acceptable design surge height will be 8.0 feet, this includes high tide. The manufacturer shall include the design surge height for the system with the submittal of construction details for the floating dock.)
4. Vertical Loads:
 - a. Dock floatation shall be designed to support the dead weight of the complete dock, including any permanently attached accessories, plus an additional uniform live load of 30 pounds per square foot over the main walkway, 30 pounds per square foot over the finger pier, 100 pounds per square foot over knee brace deck and gangway, and meet the freeboard requirements identified in Section 1.4C.
 - b. The deck and structural components shall also be designed to support dead load plus a uniform distributed live load of 50 pounds per square foot or concentrated vertical live load of 400 pounds applied at any point on the deck not closer than 12-inches from any edge. The dock frame shall be designed for torsional stability against concentrated vertical live load. The uniform and concentrated live loads need not be applied simultaneously.
 - c. An additional vertical load from gangway shall be considered as an additional vertical dead load besides distributed live load and 400 pounds of concentrated additional live load.
 - d. Main walkway frame shall be designed for a live load of minimum 50 pounds per square foot of deck area.
 - e. Dead load: Actual dead load for floating dock to be provided.
5. Seismic Load: Zone 2A (Soil Profile Type SE)
6. Ocean Current: 1 mph.
7. Wave Forces: 40 psf acting on total vertical surface area (above and below water).
8. Horizontal Loads: 150 pounds per lineal feet acting simultaneously on the main walkway and finger piers or the combined loads from wind, surge and current acting simultaneously on the main walkway and finger piers, whichever is greater.
9. Connections: Connection between finger and main walkway shall be semi-rigid or hinged. Connections shall be designed to resist all external loads listed above.
10. Cleats: Shall resist a minimum of 5,000 pounds of force in all directions.
11. Design Vessel: Design vessels shall be determined based on slip length in accordance with ACSE manual No. 50

- B. Foundation Investigation Report: Available subsurface information within the project site is provided in a report entitled "Geotechnical Investigation: Port Allen Small Boat Harbor Peir Improvements, prepared by HIRATA & Associates, Inc. dated February 26, 2014". This report is made available for Bidder's information only. The State does not guarantee that the borings and test results on consolidation and direct shear indicate actual soil properties except for the locations where and at the time the borings were taken. The Bidder is solely responsible for all assumptions, deductions or conclusions which the Bidder makes or derives from the examination of the subsurface information and data furnished in this report.
- C. The Contractor shall be responsible for engaging and paying for the services of a geotechnical engineer and qualified divers to perform such subsurface exploration, investigation, testing and analysis as the Contractor deems necessary for the design and installation of the anchorage for the elastic mooring system.
- D. Freeboard:
1. Nominal freeboard under combined dead and live load shall be greater than 10 inches.
 2. Dead load freeboard of each pier shall be noted on the submittal drawings and at the end of the two (2) year warranty period shall be within 2 inches of that noted freeboard.
 3. Actual dead load freeboard may vary plus or minus 1 inch from the average freeboard listed on the manufacturer's approved submittal drawings.
 4. In addition to the above freeboard restrictions, the main walkway shall not slope more than 1 inch in 8 feet over their length or width at the time of acceptance or 1-½ inches in 8 feet at the end of the five (5) year warranty period.
 5. Finger piers shall have their outer levels with, or no more than 2 inches higher than, the elevation of the main walkway, where they attach.
 6. Deck surfaces between adjacent dock units shall be at the same elevation. A difference of 1/8 inch or more is unacceptable.
 7. The outer corner ends of finger piers shall be as close as possible to being level with each other but in no case shall there be a difference of more than ½ inch for each 3 feet of width under dead load at the time of acceptance nor ¾ inch for each 3 feet at the end of the five (5) year warranty period.
 8. The main walkway unit under the gangway shall have extra floatation provided so that the supporting dock unit is no less than the designated freeboard nor more than 2 inches above that designated freeboard under full dead load, including hanging utilities.
 9. With a 400# load applied 1 foot from the end of the finger piers, at the center, the end of the finger pier shall lose no more than 4 inches of freeboard at the time of acceptance nor 5 inches at the end of the five (5) year warranty period.
 10. With a 200# load on one outer corner of the finger pier, there shall be no more than 2 inches of difference in freeboard between the outer corners at the end of the finger piers at the time of acceptance nor 3 inches at the end of the two (2) year warranty period.
 11. The deck of the float system on all accessible routes shall not exceed 1:50 (2%) for any cross slope under any loading combination defined herein.

12. Water Surface Evaluation. The floating dock system should be designed for a water surface which varies between -0.98 feet and =3.67 feet Mean Lower Low Water (MLLW). The floating dock system shall not rest on the sea bed at any time when the water surface elevation is within this range. Sea bed elevation in the dock vicinity is approximately -10 feet MLLW.

1.05 SUBMITTALS

- A. Submit under provisions of SECTION 01300 – Submittals.
- B. Floating Dock System:
 1. Drawings: The Contractor shall submit six (6) sets of drawings and structural design calculations, specifications, catalog data and details of installations of gangways, access gates and floating dock system and appurtenances to the Engineer for review and approval. All drawings shall bear the seal of a Professional Engineer of dock manufacturer and shall be reviewed, stamped and signed by a State of Hawaii licensed Structural Engineer. This cost shall be paid for by the Contractor.
 2. Samples: The Contractor shall submit two (2) sets of samples for all the members and parts including one (1) each of four (4) feet long full size mock sample of gangway, finger pier and half width of main walkway and one (1) each of sample of power center, cleat and fender, etc. to the Engineer for review and approval.
 3. Prior to the fabrication of the floating dock system components, the Dock System Supplier shall submit final design calculations along with shop drawings indicating layout and connecting details, sections and methods for attaching utilities and accessories. Submit shop drawings for all specially fabricated items and catalog sheets for all standard manufactured items that are to be incorporated into the floating dock system. Final design calculations shall be as hereinafter described in the paragraph titled Design of System components in Part 3.
 4. Submit certified test reports for the following:
 - a. Structural products and coatings
 - b. Floatation unit materials
 - c. Fasteners
 - d. Decking

PART 2 – PRODUCTS

2.01 GENERAL

- A. Aluminum Members: Aluminum extrusions for dock and gangway structures shall be aluminum alloy 6061-T6 conforming to ASTM B 309, 6005-T5 conforming to the provisions in ASTM B 221 or 6063-T6 conforming to the provisions in the ASTM B221. Welding of aluminum shall comply with AWS D1.2. Alloy 6061-T6 shall be extruded in accordance with the requirements of applicable sections of Federal Specification QQ-A-200.

- B. Floating Units: The buoyant units of the docks shall be encased with polyethylene having a thickness of 0.15-inches. The floats shall conform to ASTM D 1238 and shall be manufactured in such a way as to be resistant to UV radiation from sunlight for 20 years. The floats shall be completely filled with expanded polystyrene. The expanded polystyrene shall be produced by a manufacturer who has been continuously engaged in production of expanded polystyrene for floatation for at least ten (10) years. The foam shall have a minimum density, in place, of 0.9 pounds per cubic foot; a maximum density of 1.5 pounds per cubic foot; compressive strength of 15 to 20 p.s.i.; and maximum water absorption of 20% by volume, and shall pass Hunt Test.
- C. Dock Fender:
1. Dock fendering shall be composed of non-marring, non-yellowing marine grade extruded OZC (PVC nitrile) with a durometer of eighty (80) plus minus five (5) and a minimum tensile strength of 700 pounds per square inch. The fender shall be fastened to the side member on two (2) dovetail grooves or by stainless steel fastener of Type A316.
 2. Alternate dock fender shall be non-marring black PVC fender with ultra-violet light inhibitors and fungus additives: Edge Pro Deck Edging No. 5008 by K&R Manufacturing Company or approved equal.
- D. Mooring Cleats: Cleats shall be composed of ALMAG 35 cast aluminum alloy meeting the requirements of the Federal Specification QQ-A-371F and QQ-A-601E. The mooring cleat shall support 5,000 pound of force in any direction. Remove burrs and rough spots. Grind smooth to prevent chafing of boat lines.
- E. Bolts: Galvanized steel bolts shall not be used for any purpose for the floating dock system.
1. Aluminum Bolts: Aluminum bolts, rods, nuts, washers and screws shall be alloy 6061-T6 conforming to ASTM B 316.
 2. Stainless Bolts: Stainless bolts, rods, nuts, washers and screws shall be Type 316.
- F. Plates: Plates for gangways shall be Ultra High Molecular Weight (UHMW) polyethylene with black ultra-violet light inhibitors added and 1 inch minimum thickness.

2.02 TOP DECKING MATERIAL

- A. Composite deck material shall be 1 inch thick Composite Deck "Moisture Shield" produced by A.E.R.T., Inc. or approved equal. The walking surface shall be smooth with a maximum deviation of 1/16-inch. Decking shall be set with a 1/8 inch joint.
- B. Alternative Deck Materials:
1. IPE hardwood deck material shall be nominal size of 5/4 x 6.
 2. Trimax - recycled plastic deck of 1¼ inch thick manufactured by Earth Safe, Inc.
 3. Polypropylene Injection Molded Composite Decking of 23 inch x 19 inch x 2 inch manufactured by PORALU MARINE.

C. Utility Trench Cover:

1. Utility trench cover shall be Fiber Reinforced Plastic GLOBALGRID Decking, manufactured by FRP Resource, 11A El Dorado Street, Arcadia, CA 91006, Telephone: 626-698-6151, Fax: 625-445-2198 or approved equal.
2. It should be composed of molded fiberglass grating (5/8 inch thick) and an integral fiberglass cover plate (1/8 inch thick) with grit surface. With double thickness (patent pending) for cross bar and bearing bar at every 1 foot interval.

2.03 DISSIMILAR MATERIALS

- A. Where dissimilar metals are in contact, or where aluminum is in contact with concrete, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint to prevent galvanic action.

2.04 PONTOONS

- A. Pontoon shells shall be black in color and manufactured as described in the following paragraph:
- B. Encasement shall consist of concrete or linear, low , medium or high density polyethylene shells consistent with the following standards:

Normal thickness	.150 inch
Construction	Rotational
Minimum Density	.937 gms/cc ASTM D1505-68
Stress Cracking F-50	800 hr- ASTM D1693-70
Tensile Strength	3600 psi-ASTM D638
Flexural Modulus	175,00 ASTM D790

- C. Polythelene shells shall be of one-piece construction with six sides and completely filled with expanded polystyrene. Foam core shall have a density between 0.95 and 1.10 pcf. Units shall be securely bolted to the structural frame. Expanded modified polystyrene floatation billets 1.0 lbs per cubic foot density. 100% virgin material securely fastened to the substructure. Water absorption shall not exceed 0.1lbs. per cubic foot, in 48 hours. At a 10 foot head. Floatation shall not support combustion without external heat source/
- D. The pontoon used shall carry an unconditional warranty for five (5) years after project acceptance.

2.08 FIRE EXTINGUISHER CABINETS

- A. Fire extinguisher cabinets shall be manufactured by Henderson Marine Supply (800-523-1586), or approved equal. Fire extinguisher cabinets shall be yellow in color to match existing fire extinguisher cabinets. Cabinets shall be supplied with , brass fittings rated at 150 psi, hose rack, a minimum 100 feet of 1 1/2 lined hose, fog nozzle and 10 pound, ABC type fire extinguisher.

PART 3 – EXECUTION

3.01 FABRICATION REQUIREMENTS

A. Accessories:

1. Cleats on aluminum framed docks shall be bolted with stainless steel bolts, nuts and washers.
2. Any potentially corrosive installation of dissimilar materials shall be properly insulated to minimize or eliminate corrosion in a marine environment.
3. Lock washers shall be used on the main walkway and finger pier bolted connections.
4. Dock boxes shall be secured to top decking member with stainless steel bolt of Type 316.

B. Structures:

1. Floating docks shall be sequentially numbered in the shop, as shown on the shop drawing, prior to shipment.
2. Each floating dock unit shall be interchangeable and replaceable for maintenance and repair work.
3. The floating dock system shall be designed and constructed so that there are no crevices and pockets where salt water can collect and no galvanic corrosion.
4. The floating dock system and appurtenances shall be fully assembled to the maximum extent possible prior to being transported to the project site.

3.02 CONSTRUCTION REQUIREMENTS

- A. Aluminum floating docks shall be restrained laterally by concrete guide piles. Floating docks must move freely vertically while remaining in nearly the same position horizontally during the entire cycle of water level.
- B. The gangway, including the required connections shall be designed to move freely during changes in water surface levels. The gangway connections and supports shall be designed and supplied by the dock manufacturer/Contractor to be securely fastened to the gangway support concrete pad as shown on the plans. The Contractor shall submit anchoring details to the Engineer for approval.
- C. Both seagrass and large coral heads are present in the waters at the construction site, in order to protect these species, a line with a weight attached to the end must be dropped in the water at the intended location of the helical anchor before the placing and drilling of said anchor. A diver must be present in the water in order to determine if the intended location of the anchor coincides with coral heads or seagrass. If the location of the anchor coincides with either coral heads or seagrass, the location of the helical anchor must be adjusted to avoid the coral heads and seagrass.

- D. The Contractor is responsible to coordinate and pay for the shipping of the floating dock systems, and appurtenances. The floating dock system shall be fully assembled to the maximum extent possible prior to being transported to the project site to avoid impacting harbor activities. The Contractor will be provided an area to unload the floating dock system and appurtenances at the Lahaina Small Boat Harbor. The Contractor is responsible to repair and/or replace any of above items damaged during the shipping, unloading, and/or storage to the satisfaction of the State.

3.04 FLOATING DOCK SYSTEM PARTS LIST

- A. Provide a floating dock system parts list for all manufactured components, in accordance with the following list. Parts shall be identical to those items used on the original construction?
 1. Component name and description
 2. Manufacturer
 - i. Address
 - ii. Telephone Number
 3. Model number or Part Number
 4. Local Supplier

3.05 PAYMENT

- A. Payment will be full compensation for the work prescribed in this section and the contract documents.
- B. After partial payment is made for furnishing material of floating dock, the Contractor is still responsible for storing, protecting and repairing, if necessary, of the material.

END OF SECTION

SECTION 10200 – PRECAST PRESTRESSED CONCRETE PILING

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

The work shall include the furnishing of all labor, materials, and equipment necessary to furnish and install all precast, prestressed concrete piling, including all predrilling, grouting, pile cut-off, disposal of pile butts, and all other work required for the installation of the piles, etc., as indicated on the plans and as specified herein complete in place. Piling shall be precast prestressed concrete of the shape and dimensions shown and reinforced and prestressed as indicated on the plans.

1.02 SHOP DRAWINGS

The Contractor shall submit (6) sets of complete shop drawings for piles showing the placement of steel. Drawings shall show the use of special embedded or attached lifting devices, the employment of pick-up points, support points other than pick-up points, or any other method of pick-up on the shop drawings. Drawings shall conform to ACI 315.

1.03 GEOTECHNICAL ENGINEERING EXPLORATION

A geotechnical engineering exploration and analysis program shall commence once the Contractor's barge is available for use by the Geotechnical Engineer, Kokua Geotech LLC. The purpose of the exploration and analysis program is to evaluate the subsurface conditions at the project site and assist the Structural Engineer, KAI Hawaii, in the design of the precast, prestressed concrete piling based on the findings of the program.

The Geotechnical exploration program consists of drilling and sampling over two phases, Phase 1 and 2:

Phase 1: includes two borings, designated as Boring Nos. 1 and 2, extending to depths of about 100 and 100.5 feet below the existing ground surface, respectively. The approximately boring locations are shown on the drawings. The borings were drilled using a truck-mounted drill rig equipped with a continuous flight augers, coring tools, and an extension platform to drill borings in the water beyond the edge of the existing bulkhead wall. Subsurface conditions and laboratory testing findings can be found in the Geotechnical Data Report for Lahaina Small Boat Harbor Replacement of Front Row Piers, Lahaina, Maui, Hawaii dated October 29, 2024.

Phase 2: will include three in-water borings extending to depths ranging from about 80 to 100 feet below the existing ground surface or water surface. The boreholes will be drilled using a truck-mounted drill rig equipped with coring tools. The Contractor will provide in-water geotechnical support for up to 10 working days for

the Phase 2 borings, including the use of a barge capable of supporting the truck-mounted drill rig at no cost to the Geotechnical Engineer. In-water geotechnical support does not include UXO clearance with divers and/or UXO downhole magnetometer, as encountering UXO at boring locations are unlikely.

The Geotechnical Engineering cost for Phase 1 and Phase 2, excluding the Contractor's in-water geotechnical support is covered under a separate contract.

Following the Phase 2 borings, the Geotechnical Engineer will log the borings and perform laboratory tests on selected soil samples obtained during the field exploration. Based on their evaluation and analysis of the field and laboratory data, the Geotechnical Engineer will provide geotechnical engineering recommendations for the precast prestressed concrete piles to the Structural Engineer within 10 days from the completion of the laboratory tests.

PART 2 – MATERIALS

2.01 MATERIALS

- A. Prestressed piles shall be cast as monolithic units of homogeneous high strength concrete from head to tip and stressed with high tensile cold drawn steel strands. Reinforcing steel and pile pick up points shall be added in those piles where shown on the drawings.
- B. Splicing of piles is not allowed.
- C. See drawings for prestressed pile materials and workmanship.
- D. Corrosion inhibitor admixture is not required for the prestressed concrete piles.

2.02 FABRICATION

- A. General: Piles shall be 16.5-inch minimum octagonal pretensioned concrete piles. Workmanship shall conform to standard commercial practice in prestressing plants.
- B. Formwork: Provide forms of metal, well braced and stiffened against deformation, accurately constructed, watertight, and supported on unyielding casting beds. Forms shall permit movement of the pile without damage during release of the prestressing force. Dimensional tolerances for manufacturing of piles shall be as follows:
 - 1. Length - 3/8 inch per 10 feet of length.
 - 2. Cross Section - +1/2 inch to -1/4 inch.
 - 3. Deviation from Straight Lines - Not more than 1/8 inch per 10 feet of length.
 - 4. Pile Head - +1/4 inch per foot of head dimension from true right-angle plane. Surface Irregularities - +1/8 inch.

5. Location of Reinforcing Steel - Main Reinforcement Cover - 1/8 to 1/4 inch. Spacing for Spiral - +1/2 inch.
- C. Pretensioning: Anchorages for tensioning the prestressing steel shall be a type approved by the Engineer. Measure the tension to which the steel is to be pretensioned by the elongation of the steel and verify by the jack pressure reading on a calibrated gage. The gage shall have been calibrated within the last six months by a laboratory approved by the Engineer. Provide means for measuring the elongation of the steel to at least the nearest 1/8 inch. When the difference between the results of measurement and gage reading is more than 3 percent, determine the cause of the discrepancy and correct. Give the tensioning steel a uniform prestress prior to being brought to design prestress. Induce the same initial prestress in each unit when several units of prestressing steel in a pile are stretched simultaneously.
- D. Casting
1. Convey concrete from the mixer to the forms as rapidly as practicable by methods which will not cause segregation or loss of ingredients. Deposit concrete as nearly as practicable to its final position in the form. At any point in conveying, the free vertical drop of the concrete shall not exceed 3 feet. Clean conveying equipment thoroughly before each run. Remove concrete which has segregated in conveying.
 2. Perform concrete casting within 3 days after pretensioning the steel; however, do not deposit concrete in the forms until the placement of reinforcement and anchorages has been inspected and approved by the pile manufacturer's quality control representative. Produce each pile of dense concrete straight with smooth surfaces with the reinforcement retained in its proper position during fabrication. Vibrator heads shall be smaller than the minimum distance between steel for pretensioning. The plane of the heads of piles shall be perpendicular to the axis of the pile. Chamfer, a minimum of 5/8 inch, the ends of all piles and the corners of square piles. Do not remove concrete piles from the forms until the concrete has attained a compressive strength of at least 4,500 psi.
- E. Curing of Piles: Moist or steam cure piles.
1. Moist Curing: Moist curing using water, moist burlap coverings, plastic sheeting, or membrane curing compound for a period of 21 days.
 2. Steam Curing: After placement of concrete, moist cure for a period of 4 hours. Steam cure for a period of 12 hours. Enclose the casting bed for steam curing with a suitable enclosure. During application of steam, increase the air temperature at a rate not to exceed 60 degrees F per hour. Steam cure, at a maximum temperature of 160 degrees F until the concrete has reached the specified release strength. Reduce the temperature at a rate not to exceed 60 degrees F per hour until a temperature of 20 degrees F above ambient air temperature is reached. After steam curing, moist cure using either water or membrane curing until a total steam and moist curing time of 72 hours is achieved.

- F. Detensioning - Perform releasing of prestressing steel in pretensioned piles in such an order that eccentricity of prestress will be a minimum. Release tension in the strands from the anchorage gradually. Do not release stress after casting without approval by the pile manufacturer's quality control representative. Perform the transfer of prestressing force when the concrete has reached a compressive strength of not less than 4,500 psi. Following the detensioning and cut-off of the strands, coat or seal the ends of the strands with rust prohibiting compound.
- G. Bid lengths for all pilings shall be as shown on the drawings.

2.03 PILE DRIVING SYSTEM

- A. The Contractor shall provide the Engineer with pile driving equipment, as specified on the drawings.
- B. The State urges the Contractor to study all available information including soil conditions and thoroughly investigate the site so that he can determine the proper equipment that will enable him to install the piles, free of any defects, and in accordance with the requirements of this section.

PART 3 – EXECUTION

3.01 PILE INSTALLATION

- A. Pile Installation Testing Program:
- B. Piles shall be driven to the depths required with allowance in the length of piles for cut-off at top of finish elevation for the piles.
- C. Driving shall not be permitted until the piles concrete has attained a minimum strength of 7,000 psi, or seven days after casting, whichever is later. Piles shall be handled, supported, and stored in such a manner as to avoid excessive bending stresses that can cause cracking. Pick up points shall be as shown in the shop drawings.
- D. Pile heads shall be protected from direct impact of the hammer by a pile cushion so arranged that any strands or reinforcing bars projecting above the piles will not be displaced or deformed in driving.
- E. Piles shall be secured against lateral movement by fixed leads during driving. Piles shall be driven straight and true. Maximum allowable total deviation for pile location is one inch. Any driven pile exceeding the 1-inch deviation shall be pulled out and re-driven by the Contractor at his expense.
- F. All piles shall be driven full length to the pile tip elevation as shown on the plans. Each pile shall be driven continuously without interruptions. Any pile damaged in

driving or handling to impair its usefulness shall be replaced by a new pile at the Contractor's expense to the complete satisfaction of the Engineer.

- G. The tops of all piles projecting above the cut-off elevation after piles have been accepted by the Engineer shall be cut-off at the proper elevation and the cut-offs shall be removed from the site. Pile cut-offs and other debris shall not be allowed to fall into the harbor. If pile cut-offs or debris fall into the harbor, the Contractor shall remove them immediately. All pile strands not to be embedded into pile cap shall be cut off at least one inch below the top of the piles and patched with an epoxy grout mixture. Cutting of piles shall be with pneumatic tools or other acceptable methods. Piles that need to be cut-off shall be cut-off in a neat workmanship manner.

3.02 PREDRILLING AND BACKFILLING AROUND PILES

- A. Piles shall be driven through predrilled holes as required at the Contractor's own expense to facilitate the installation of the piles. Material resulting from drilling holes shall be disposed of as directed by the engineer.
- B. The Contractor shall anticipate encountering boulders and basalt rock formation to create the predrilled holes. Difficult drilling conditions shall be anticipated. In addition to conventional augers, rock augers, core barrels, and other tools necessary for removal of the cored material will be required for predrilling.
- C. The predrilled hole shall be relatively clean before placing the pile into the hole. The Contractor shall recognize that loose soil and boulders above the basalt rock formation may slough into the predrilled holes and should select a predrilling method that will minimize the sloughing.

3.03 EXTENSION OF PILES

If extension of piles, where tops of piles are below the required cut off elevation are required, the Contractor shall submit details of pile extensions to the Engineer for review.

3.04 PILE DRIVING RECORDS

The Geotechnical Engineer keeps a pile driving record of each pile driven, including dates, locations, length of piles, pile tip elevations, and blow count vs. depth. Pile driving records shall be signed by the responsible person in charge certifying to the accuracy of the records.

3.05 METHOD OF MEASUREMENT

- A. All concrete piling shall be measured by the lineal foot for furnishing and for installing.

- B. The quantity of piling furnished will be measured for payment by the total number of lineal feet of piles as itemized in the order list furnished by the Contractor in accordance with an itemized order list approved by the Engineer.
- C. The quantity of piling installed shall be measured by the actual length of pile embedded into the ground and left in the structure, measured from the tip of the driven pile to the cut off elevation.

3.06 METHOD OF PAYMENT

The accepted quantities of piling shall be paid for at the contract unit price per unit of measurement for each of the pay items listed below.

<u>PAY ITEM</u>	<u>PAY UNIT</u>
Precast Prestressed Concrete Piling, installed	\$50,350.00 Each

Spudding, pre-drilling, cut-off and exposing of strands, will not be paid for separately but shall be included in the unit piling installed.

Should extensions of the prestressed concrete piling be necessary to increase their individual lengths over those shown on the itemized order list, such extensions, approved by the Engineer in writing, will be at the Contractor's own expense.

END OF SECTION

SECTION 10300 - FIBER REINFORCED PLASTIC

PART 1 – GENERAL

1.01 GENERAL

This section covers the furnishing and installation of fiber reinforced polymer (FRP) grating as shown on the plans and ANSI/ACMA/FGMC FRP Composites Grating Manual for Pultruded and Molded Grating and Stair Treads.

1.02 SHOP DRAWINGS

The Contractor shall submit:

- A. Shop drawings of all fabricated pultruded gratings shall be submitted to the Engineer for approval in accordance with the requirements of Section 01300-Submittals. Fabrication shall not start until receipt of Engineer's approval marked "Approved As Submitted" or "Approved As Noted".
- B. Manufacturer's catalog data showing:
 - 1. Materials of construction
 - 2. Dimensions, spacings, and construction of grating, handrails and building panels.
- C. Detail shop drawings showing:
 - 1. Dimensions
 - 2. Sectional assembly
 - 3. Location and identification mark
 - 4. Size and type of supporting frames required
- D. Samples of each type of product shall be submitted for approval by the Engineer.

1.03 QUALITY ASSURANCE

- A. The material covered by these specifications shall be furnished by an ISO-9001 certified manufacturer of proven ability who is regularly engaged in the manufacture, fabrication and installation of FRP systems.
- B. Substitution of any component or modification of system shall be made only when approved by the Engineer.
- C. Fabricator Qualifications: Firm experienced in successfully producing FRP fabrications similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.

- D. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.04 DESIGN CRITERIA

- A. The design criteria of the FRP pultruded grating, including connections, shall be in accordance with governing building codes and accepted standards in the FRP composites industry.
- B. Gratings: Design live loads of FRP gratings for walkway applications shall be 60 psf (2.87 kN/m²) uniformly distributed load per ASCE 7 or as required by the governing building code with a maximum deflection of 0.25" (6.4mm) at the center of a simple span.
- C. Structural support members shall not deflect more than L/180 of span for structural members unless specifically stated otherwise in drawings and/or supplementary conditions. Connections shall be designed to transfer the design loads.

PART 2 – MATERIALS

2.01 MATERIALS

- A. General
 - 1. Grating shall be shipped from the manufacturer, palletized and banded with exposed edges protected to prevent damage in shipment.
 - 2. Each piece shall be clearly marked showing manufacturer's applicable drawing number.
 - 3. The grating type and color shall match the FRP grating installed on the Outer Marginal Wharf. **The color shall be brown.**
 - 4. Grating shall be DURADEK as manufactured by Strongwell or approved equal.
- B. Design
 - 1. Grating panels shall be selected by the Contractors Structural Engineer from Strongwell's Fiberglass Grating brochure.
 - 2. The bearing bars shall be joined into panels by passing continuous length fiberglass pultruded cross rods through the web of each bearing bar. A continuous fiberglass pultruded bar shaped section shall be wedged between the two cross rod spacers mechanically locking the notches in the cross rod spacers

to the web of the bearing bars. Continuous adhesive bonding shall be achieved between the cross rod spacers and the bearing web and between the bar shaped wedge and the two cross rod spacers locking the entire panel together to give a panel that resists twist and prevents internal movement of the bearing bars. Each stair tread shall utilize a box-shaped nosing on its lead edge to enclose cross rods and ensure a smooth vertical edge.

3. The top surface of all panels shall have a non-skid grit affixed to the surface by an epoxy resin followed by a baked-on top coat of epoxy resin.
4. Surface should have a Wear Index of less than 1.0 when tested to ASTM D4060 (Before and after 750 hours of UV exposure per ASTM D4329 cycle A).
5. Panels shall be fabricated to the sizes shown on the drawings.
6. Hold down clamps shall be type 316L stainless steel clips provided by the grating manufacturer. Use 2 at each support with a minimum of 4 per panel.
7. Color shall be brown (custom color to match the Outer Marginal Wharf).
8. All bearing bars that are to be exposed to UV shall be coated with polyurethane coating to provide additional UV protection.

C. Products

1. The Pultruded FRP grating shall be fabricated from bearing bars and cross rods manufactured by the pultrusion process. The glass fiber reinforcement for the bearing bars shall be a core of continuous glass strand rovings wrapped with continuous strand glass mat. With the exception of grating and stair treads manufactured using phenolic resin, a synthetic surface veil fabric shall encase the glass reinforcement.
2. Fiberglass Grating
 - a) Fiberglass grating shall be made from a chemical resistant, fire retardant resin system to meet the flame spread rating of 25 or less in accordance with ASTM E-84 testing, the flammability characteristics of UL 94 V0 and satisfies the self-extinguishing requirements of ASTM D-635. UV inhibitors are added to the resin to reduce UV attack.

3. Grating with SAFPLATE®
 - a) Grating shall be the same as described above in this section.
 - b) SAFPLATE® shall be made from EXTREN® as manufactured by Strongwell.
 - c) SAFPLATE® shall be manufactured using a premium polyester, vinyl ester or phenolic resin with fire retardant additive to meet Class 1 flame spread rating of 25 or less as tested by ASTM E-84 and meet the self-extinguishing requirements of ASTM D-635. All plate shall contain a UV inhibitor.
 - d) SAFPLATE® shall be epoxy bonded to the grating, and a non-skid grit shall be affixed to the top surface of the assembly.
4. All cut and machined edges, holes and abrasions shall be sealed with a resin or compatible coating with the resin matrix used in the bearing bars and cross rods.
5. All panels shall be fabricated to the sizes shown on the approved shop drawings.

PART 3 – EXECUTION

3.01 SHIPPING AND STORAGE INSTRUCTIONS

- A. All gratings and components shall be shop fabricated and assembled into the largest practical size suitable for transporting.
- B. All materials and equipment necessary for the fabrication and installation of pultruded gratings and treads and appurtenances shall be stored before, during, and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping or damage of any kind to the materials or equipment, including damage due to over exposure to the sun. Any material which, in the opinion of the Design Engineer, has become damaged as to be unfit for use, shall be promptly removed from the site of work, and the Contractor shall receive no compensation for the damaged material or its removal.
- C. Identify and match-mark all materials, items and fabrications for installation and field assembly.

3.02 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction.
- B. Coordinate delivery of such items to project site.

3.03 INSPECTION AND TESTING

- A. The Engineer shall have the right to inspect and test all materials to be furnished under these specifications prior to their shipment from the point of manufacture.
- B. All labor, power, materials, equipment and appurtenances required for testing shall be furnished by the Contractor at no cost to the State.

3.04 INSTALLATION

- A. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous FRP fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as determined by the Engineer.
- B. Cutting, fitting and placement: Perform cutting, drilling and fitting required for installation of miscellaneous FRP fabrications. Set FRP fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true and free of rack; measured from established lines and levels.
- C. Penetrations through grating may require additional supports in order to meet design criteria. The Engineer shall follow manufacturer recommendations for each occurrence.
- D. If required, all field cut and drilled edges, holes and abrasions shall be sealed with a catalyzed resin compatible with the original resin as recommended by the manufacturer.
- E. Install items specified as indicated and in accordance with manufacturer instructions.
- F. The grating shall be laid out and installed in good workmanlike manner, as shown on the plans. Adjustments shall be made by the Contractor at his expense and to the satisfaction of the Engineer.

- G. A sufficient amount of fasteners/clips shall be used to ensure that the grating is securely fastened to the aluminum structure and/or concrete pile cap.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16000 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. As specified in Section 01001.

1.02 SUMMARY

- A. Electrical Work: Provide all articles, materials, equipment operators, systems and services specified herein, and on the Drawings, and as normally required by accepted industry standard practices, including all labor taxes, fees, insurance, warranties and incidentals required to complete all electrical work.
- B. In general, the following work is included:
 - 1. Demolish existing electrical connections and equipment as indicated on the drawings.
 - 2. Provide complete general use electrical system for the new piers.
 - 3. Provide saw cutting (where required), excavation, shoring, bracing, suitable backfill material, concrete encasement, backfilling, compacting, and patching (where required) and concrete patching (where required) for complete duct system installation.
 - 4. Coordinate work with Hawaiian Electric Company, Hawaiian Telcom, the State of Hawaii, and the County of Maui electrical inspectors.
- C. Furnish required submittals and samples, operations and maintenance manuals, and "As-built" Drawings.
- D. Coordinate work with other trades to avoid omissions and overlapping of responsibilities.
- E. Apply for, obtain and pay for all County fees, permits, licenses, utility fees, assessments and inspections required for this work.
- F. Pay for all temporary construction and testing power.
- G. Before bidding, visit project site, carefully review each section of the Specifications and all Drawings of this Contract. Verify details, report any error, conflicts or omissions to the Engineer at least 10 calendar days before submission of bids for interpretation or clarification. If errors or omissions are not reported, Contractor shall provide necessary work at no additional cost to the State to properly complete intent of Specifications and Drawings. By submitting a proposal of the work included in this contract, the Contractor shall be deemed

to have made such examination and to be familiar with and accept all conditions of the job site.

1.03 INTENT OF SPECIFICATIONS AND DRAWINGS

- A. Specifications and Drawings are prepared in abbreviated form and include incomplete sentences. Omission of words or phrases such as “the Contractor shall”, “as shown on the drawings”, “a” and “the” are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.
- B. Specifications and Drawings complement each other and what is specified, scheduled or mentioned on one shall be binding as if called for by both.
- C. Discrepancies and Interpretations:
 - 1. Should the Contractor find any discrepancies in or omissions from any of the documents or be in doubt as to their meaning, he shall advise the State who will issue any necessary clarification within a time period which does not disrupt the progress of the work.
 - 2. All interpretation and supplemental instructions will be in the form of a written addendum to the Contract Documents.
 - 3. Should any discrepancies arise from the failure of the Contractor to notify the Engineer, the higher quality or larger quantity of item shall prevail. The Engineer shall make the final interpretation and judgment.
 - 4. In the event of a discrepancy between small scale drawings and large scale details, or between Drawings and Specifications, of which is in violation of any regulations, ordinances, laws or codes, the discrepancy, if known by the Contractor, shall be immediately brought to the attention of the Engineer for a decision before proceeding with the particular work involved. Work carried out disregarding these instructions will be subject to removal and replacement at the Contractor's expense.

1.04 DEFINITIONS

- A. Provide: “Furnish and install, test and deliver to the Engineer in operating and ready to use condition.”
- B. Wiring: “Provide all raceways, junction boxes, conductors, devices, protection equipment, installation of motor controllers (furnished by others) when required, etc., including testing for a complete, operative and ready to use electrical system.”
- C. Equal: “Material, equipment or system, including all necessary labor, modifications and accessories satisfying the requirements of the contract documents, the design intent, and to provide features or have operating characteristics equal or better than that specified.”

- D. Complete: "Furnish installation that is operative, tested, and ready to use and which satisfies the intent of the contract documents, including all necessary accessories and modifications."
- E. Contractor: "General Contractor responsible for all work shall assign work to Sub-Contractors. Except where noted, work of this section shall be assigned to the Electrical Sub-Contractor."
- F. HECO/MECO: Hawaiian Electric Company

1.05 QUALITY ASSURANCE

- A. Government and Utility Requirements: Comply with all requirements of the State of Hawaii, County of Maui, Disability and Communication Access Board (DCAB), and respective utility company rules and regulations.
- B. Specifications are accompanied by architectural, civil, mechanical, landscape, and audio-visual plans of the buildings, site, and diagrammatical electrical plans showing locations of luminaries, standards, outlets, feeder runs, devices and other electrical equipment. Locations are approximate and before installation, Contractor shall study adjacent construction details and make installation in the most logical manner. Prior to installation and at the direction of the Engineer, relocate any device, equipment, feeder, or circuit within 10'-0" of the location presently shown without added cost to the State.
- C. Prior to start of the rough-in work, verify all dimensions and equipment sizes with the approved shop drawings including equipment furnished by others. Circuits and raceway routes are diagrammatic and may be altered in any logical manner. However, all changes from the contract documents shall be subject to review and acceptance of the Engineer and indicated on the "As-built" Drawings.
- D. Feeders and branch circuits for equipment furnished by others were sized for the anticipate equipment. Verify electrical requirements of all equipment furnished by others prior to rough in and prior to ordering of the electrical distribution equipment. Re-size affected feeders and branch circuits at no additional cost to the State.
- E. Materials and Equipment: Materials and equipment shall conform to requirements of applicable technical specification sections, publications specified therein and shall be as shown on the drawings. Materials and equipment shall be new and shall be the product of manufacturers regularly engaged in the manufacture of such products.

All items shall essentially duplicate materials and equipment which have been in satisfactory use at least two years prior to bid opening and shall be supported by a service organization that is located reasonably close to the site of installation.

- F. Substitutions:
 - 1. Where items are specified by manufacturer's name or catalog number, substitutions require written permission by the Engineer prior to bidding.

Brand names, manufacturer's names and catalog numbers indicate the standard of design and quality required. List of substitute materials together with qualifying data shall be submitted for review at least twelve (12) working days before bid date. Failure to submit for review substitute materials prior to bidding shall mean that materials, as specified, will be provided. Substitute materials submitted and rejected shall not be resubmitted in any modified form.

2. Samples of proposed substitute items may be required and shall be submitted by the Contractor at his expense as soon as practicable after they are requested.
 3. Burden of proof of equality of proposed substitutions will be the responsibility of the Contractor. Submittals shall be sufficiently detailed to permit evaluation of the proposed items. Inadequacy of submittals shall be sufficient cause to reject a proposed substitution.
 4. All prospective bidders must submit descriptive information on proposed material for pre-bidding acceptance where an item is detailed but no manufacturer is named.
 5. Costs to review any contractor submitted value engineering change proposals shall be paid by the Contractor.
- G. Prevention of Corrosion: All metallic materials shall be protected against corrosion. Exposed metallic parts of equipment, apparatus, devices, mounting hardware, and fasteners that are provided in damp, wet, or corrosive areas shall be constructed from 316 or 316L stainless steel. All such parts as boxes, bodies, fittings, guards and miscellaneous parts shall be constructed of 316 or 316L stainless steel. The Contractor shall not join dissimilar metals that will result in deterioration due to galvanic corrosion.

1.06 DEPARTURES

- A. Departures resulting from the substitution of materials or systems shall be accompanied by appropriate changes in all affected work of every trade and shall include stamped and signed drawings by a licensed engineer for any portion of the project requiring re-design. Such changes shall be done at no increase to the contract amount and shall be the responsibility of the Sub-Contractor or supplier responsible for the departures. Changes proposed by the Contractor shall be based on a system approach and may be allowed if implemented without decrease in quality, performance and operations, increase in utility costs or adverse effect on the available physical space to install the equipment. Such departures shall be submitted and noted in shop drawings for review and acceptance by the Engineer. 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. Submission for departure shall be as follows:

EXAMPLE:

<u>Item</u>	<u>Manufacturer and Catalog Number Specified</u>	<u>Substitute Manufacturer and Catalog Number</u>
Cable:	John Doe - No. 3200	King - No. 2200

- B. The General Contractor shall be responsible to coordinate, approve and select systems that do not impose unaccounted for impacts on the electrical work. It shall be understood that after the award of contract, all departures having electrical impact, unless otherwise noted, have been reviewed and approved by the General Contractor.

1.07 SUBMITTALS

- A. Submit in accordance with Section 01300 - SUBMITTALS. All submittals shall be reviewed and approved by the general contractor and the electrical contractor. Partial submittals or submittals lacking the general contractor's and electrical contractor's approvals will not be acceptable. Submit for approval six (6) complete sets of submittals as described below. Annotate descriptive data to show the specific model, type, option, and size of each item the Contractor proposes to furnish. Do not commence work until each system, including all the various components, have been approved. The Engineer will review and approve all submittals. Before the materials are ordered or the work is commenced the shop drawings must be approved.
- B. List of Materials and Equipment: Submit in accordance with Section 01300 - SUBMITTALS. These lists shall include manufacturer's names and material or equipment identification such as styles, types, or catalog numbers to permit ready and complete identification. Original catalog cuts or brochures shall be provided. Scanned or photocopied submittals will be rejected without review.
- C. Product Data: Shall be sufficiently comprehensive and detailed to permit evaluations, otherwise the item may be rejected, and shall include, as applicable, the following:
1. Original catalog cuts or brochures shall be provided. Scanned or photocopied submittals will be rejected without review.
 2. Each submittal shall contain an itemized list of each item being submitted. Each item shall be identified with the complete manufacturer's ordering number including all options.
 3. Dimension outlines of all enclosures.
 4. Dimension drawings of components such as switchboard, motor control center, panelboards, transformers, enclosed circuit breakers, safety disconnect switches, inverters, and generators.
 5. Scaled drawings showing the layouts and arrangement of equipment in all electrical rooms, telecom rooms, and generator rooms.

6. Operating and electrical characteristics including interrupting ratings and impedances.
- D. Certificate of Compliance: Where required by the section specifying the equipment, the Contractor shall submit six (6) copies of certificates of compliance in accordance with the requirements of the GENERAL REQUIREMENTS. The certificates shall include but not be limited to factory test reports.
- E. Installation, Operation and Maintenance Data: Six (6) copies of installation, operation and maintenance data shall be submitted for equipment specified to require such data. The data shall be in the form of manuals and shall indicate installer's name, address, and contact information; supplier's name, address, and contact information; instructions for operating, maintaining, repairing, recommended inspection points, periods for inspection, and all related spare parts in a practical, complete and comprehensive manner. The information shall be arranged in a logical, orderly sequence, including a general description of the equipment and significant technical characteristics.

Test, adjustment and calibration information shall be furnished and identified to specific equipment. The installation, operation and maintenance data shall be as required by the General Requirements.

- F. Acceptance Requirements: Acceptance for material and equipment will be based on manufacturer's published data. Where materials or equipment are specified to be constructed and tested, or both, in accordance with the standards of the National Electrical Manufacturers Association (NEMA) or the American National Standards Institute (ANSI), the Contractor shall submit proof that the items furnished under this section of the specifications conform to such requirements. A certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard by a company listed as a member company of NEMA for the section whose standards cover the item under construction, will be acceptable as sufficient evidence that the item conforms to the requirements of the National Electrical Manufacturers Association. A manufacturer's statement indicating complete compliance of each item with the applicable NEMA, ANSI or other commercial standard specified shall be submitted and will be acceptable proof of compliance. Conformance with the agency requirements does not relieve the item from complying with any other requirements of the specifications.
- G. Nameplates:
 1. General: In addition to standard manufacturer's nameplate, permanent corrosion resistant nameplates shall be provided for each enclosed circuit breaker, safety switch, panelboard, lighting contactor, inverter, telecom junction box, and other major pieces of equipment. Nameplates shall designate the function of the equipment for which they are used. The designation shall be submitted for review and acceptance with the shop drawings.
 2. Material and Lettering: 1/16" thick, laminated plastic, black-white-black. Nameplate lettering shall be 1/4" high upper-case.

3. Fastening: Nameplates shall be fastened stainless steel (316) screws.
4. Hand lettering or stick-on embossed marking tape is not acceptable.
5. Provide laminated tape labeling for all new receptacles on coverplates. Identify associated panel name and circuit number.

H. Labels:

1. Provide labels as required by the latest version of the National Electrical Code adopted by the County of Maui.
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.
 - d. NFPA 70E – Section 130.
3. Labels shall be provided for, but not limited to:
 - a. Available fault currents at the service equipment per 2020 NEC 110.24(A).
 - b. Arc Flash warning labels shall be provided per 2020 NEC 110.16 and 2021 NFPA-70E 130.5. The contractor shall obtain all information required for the calculations, perform the calculations, and provide the labels at no additional cost.
 - c. Source and location of feeder serving switchboards and panelboards per NEC 408.4(B).
 - d. Method utilized for conductor identification per 2020 NEC 210.5(C).
4. Label materials shall be provided similar to nameplates except that labels for wires, conductors, and cables shall be of the printed tape type.

I. Factory Tests and Inspection:

1. The equipment furnished shall be inspected mechanically and electrically, and all manufacturers' routine factory tests shall be performed to verify conformance with the specified requirements. The test equipment and test methods shall conform to the requirements of standards specified. The contract price shall include cost of performing all tests.

2. The Contractor shall furnish, at time of equipment delivery, six (6) certified copies of all test results.
- J. Equipment Guarantees: Installation shall be complete in every detail and ready for use. Any item furnished or provided by the Contractor developing defects within one (1) year after final acceptance by the Engineer shall be replaced by materials, apparatus and parts including installation labor costs to make such defective portion of the completed system conform to the true intent and meaning of the drawings and specifications, without additional cost to the State. The Contractor shall guarantee all equipment provided from the date such equipment is accepted by the Engineer, against defects in materials, design, performance and workmanship. Guarantees shall be supported by manufacturer's written warranties and shall be signed by an official of the manufacturer's organization. Replacement parts shall be delivered and repairs shall be made promptly upon receipt of notice of failure under normal and proper use and maintenance. All costs of replacement and repair shall be borne by the Contractor provided that a report substantiating such defect or failure to conform to specifications is promptly given to the Contractor.

1.08 CODES, REGULATIONS AND STANDARD SPECIFICATIONS

- A. Work shall conform to the Hawaii Revised Statutes, the Ordinances of County of Maui; the International Conference of Building Officials (ICBO) International Building Code (IBC); and the latest edition of National Electrical Code (NEC).
- B. Applicable rules, standards and specifications of following associations shall apply to materials, workmanship, and procedures:

American National Standards Institute (ANSI)
Illuminating Engineering Society of North America (IESNA)
National Electrical Manufacturer's Association (NEMA)
National Fire Protection Association (NFPA)
Underwriters' Laboratories, Inc. (UL)

1.09 ACKNOWLEDGEMENT

- A. By bidding on this project and or by providing this work the Contractor acknowledges that:
 1. The Designer is not responsible for the means and methods employed by the Contractor and that the Contractor is responsible for his means and methods.
 2. The Designer is not responsible for job site and worker safety and that the Contractor is responsible for job site and worker safety.

1.10 WARRANTY

- A. Defective materials and workmanship shall be removed and replaced at no cost to the State. For period of one year after acceptance of work by Engineer, materials and workmanship developing defects and malfunctions shall be

repaired and/or replaced, to conform with intent of the specification and drawings, at no additional cost to the State.

PART 2 - PRODUCTS

2.01 MATERIALS

All materials shall be new, except as specifically noted, and shall bear the label of Underwriter's Laboratories, Inc., wherever standards have been established and label service is normally and regularly furnished by the agency. See the respective technical sections for the electrical material specifications.

PART 3 - EXECUTION

3.01 MATERIALS AND EQUIPMENT PROVIDED BY THE CONTRACTOR

The electrical installation shall be complete and operable and shall conform to the requirements of the contract drawings. The Contractor shall provide all electrical equipment and materials, wiring, supports and such additional parts as are necessary to make the installation complete. All Contractor furnished materials and equipment are subject to review and acceptance by the Engineer.

3.02 PROTECTION DURING STORAGE

Store all materials and equipment in a safe manner. Provide weather, dehumidification, and fire protection for all materials. Store all materials above grade to avoid damage by moisture. Cover all materials to avoid damage from sunlight.

3.03 PROTECTION OF WORK IN PROGRESS

All electrical materials and equipment shall be completely protected during installation. Equipment shall be securely protected against physical or chemical damage. In areas exposed to weather, materials unused at the end of each day's work shall be protected by weatherproofed installations. All unprotected conduits shall be sealed to prevent water and foreign debris from entering conduits. Damage to materials and equipment due to Contractor's neglect shall be repaired or replaced by and at the expense of the Contractor.

3.04 PROGRESS OF WORK AND COORDINATION

The Contractor shall prepare a schedule identifying the sequence of electrical work. The electrical work shall be coordinated with the work of other Contractors and other trades. The schedule shall be submitted prior to beginning installation and shall be subject to review and acceptance by the Engineer.

3.05 RULES

The entire electrical installation shall conform to the applicable rules and regulations of the State Fire Code and the standards and publications specified in the technical sections.

3.06 COORDINATION

The contract drawings indicate the extent and general location and arrangement of equipment, conduit and wiring. Lighting fixtures, outlets and electrical equipment shall be located so as to avoid interference with architectural, mechanical and structural features. The Engineer may request any device, equipment, circuit, or feeder to be relocated within 10'-0" of the location shown on the Drawings before installation is initiated and without increase in contract amount.

3.07 WORKMANSHIP

- A. All materials and equipment shall be installed in accordance with printed recommendations of the manufacturer and shall conform to the requirements of the contract drawings. The installation shall be accomplished by workers skilled in this type of work. For actual fabrication, installation and testing of the Electrical Work, use only thoroughly trained and experienced workmen completely familiar with items to be installed and with manufacturers' recommended methods of installation. In acceptance or rejection of installed work no allowance will be made for lack of skill on part of workmen.
- B. Inspection: Skill and competency of workmanship shall be subject to the approval of the Engineer, the State, and the County of Maui. The contractor shall open all electrical equipment, cabinets, junction boxes, and devices as required by the Engineer or inspector for inspection. All equipment shall be de-energized prior to inspection unless voltage and current measurements are required. The Contractor shall be responsible for all electrical and arc flash safety at the project site.

3.08 FIELD TESTS

- A. After the installation is completed, and at such time the Engineer may direct, the Contractor shall conduct field tests for acceptance by the Engineer. When the tests are specified to be performed under the supervision of the equipment manufacturer, the Contractor shall cooperate with the Engineer during tests and shall place at the manufacturer's disposal, all assistance, materials and services required to perform such tests. The tests shall be performed in the presence and to the satisfaction of the Engineer. The Contractor shall furnish all necessary electric power, fuel, instruments, equipment, and personnel required for the tests and shall pay for all power and fuel.
- B. Insulation Tests: The insulation of all conductors shall be tested with a megger insulation tester. Submit results of tests to the Engineer.

- C. Operating Tests: The equipment and systems shall be demonstrated to operate in accordance with the requirements of the technical sections in which the equipment or systems are specified.
- D. Ground Resistance Test: Test ground resistance by three-point method. Results of test shall be submitted to the Engineer. Ground Resistance: Ground resistance measurements of each ground rod shall be taken and certified by the Contractor. Upon completion of the project, the Contractor shall submit in writing to the Engineer, the measured ground resistance of each ground rod and grounding system, as well as the resistance and soil conditions at the time the measurements were made. Ground resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds.
- E. Test all 600 volt class conductors to verify that no short circuits or accidental grounds exist. Make tests using an instrument which applies a voltage of approximately 500 volts to provide a direct reading in resistance, and measure the insulation resistance from phase to phase and phase to neutral. All test results shall be recorded and submitted to the Engineer.
- F. Wherever test or inspection reveals faulty materials or installation, Contractor shall take corrective action, at his own expense, repairing or replacing materials or installation as directed. The materials or installation shall then be retested.

END OF SECTION

SECTION 16050 – BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

The Contractor shall furnish all labor, materials (except as hereinafter noted), tools, equipment and appliances required to provide and install all electrical work, complete, as indicated on the drawings and/or as herein specified. The drawings note various sizes of equipment as determined for basis of design; the electrical work, however, shall be installed to comply with the equipment furnished by the successful supplier. The work shall include but not necessarily be limited to, the following:

1. Provide complete general use electrical system for the new piers.
2. Complete secondary electric system including trenches, ducts, conductors, and enclosures
3. Connection and testing of appliances and equipment furnished by others requiring electrical connections.
4. Pass test mandrel through all new ducts and conduits, and make corrections as directed by inspectors and the State.
5. Provide pulling wire, No. 12 AWG galvanized steel or polypropylene cord, in all empty ducts and conduits, unless indicated otherwise.
6. Before bidding on this work, carefully examine each of the drawings and the site. By submitting a proposal of the work included in this Contract, the Contractor shall be deemed to have made such examination and to be familiar with and accept all conditions of the job site.
7. Prior to ordering equipment, the Contractor shall examine the plans to verify the amount of space allocated for the electrical equipment and to determine if the material proposed will fit within the allotted space. It shall be the Contractor's responsibility to provide equipment that will fit within the allotted space.

1.02 SUBMITTALS

- A. Submit under provisions of Section 01300 – SUBMITTALS.
- B. Shop Drawings: Submit complete shop drawings and manufacturer's literature for Engineer's review before any work is fabricated. Comply with all requirements of Section 01300 – SUBMITTALS. Submit manufacturer's literature for the following:
 1. Metering/Distribution Switchboards.
 2. Precast Concrete Pull boxes.
 3. Circuit Breakers.

4. Disconnect Switches
5. Receptacles
6. Large Junction Boxes / Cabinets / Enclosures.
7. Electrical Wiring.
8. Modular Marine Power Centers.
9. Meter Sockets

C. Intent of Shop Drawing and Catalog Cut Review:

1. Shop drawing and catalog cut submittals processed by the Engineer are not Change Orders. The purpose of the submittals by the Contractor is to demonstrate to the Engineer that he understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.
2. If deviations, discrepancies or conflicts between shop drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed.
3. Prequalification: Where materials or products specified herein are designated by manufacturer's name, any request to substitute materials or products other than those specified shall be approved by the Engineer during the bidding period, as specified in the SPECIAL PROVISIONS. Burden of proof of equality of proposed substitutions will be the responsibility of the Contractor.
4. Shop drawings and catalogue cuts for substitute materials shall clearly specify compliance with and/or deviation from specified material. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; and "achieve the same end use and results as materials formulated in accordance with the referenced publications". Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance. Review of shop drawings and catalogue cuts shall not release Contractor from complying with intent of drawings and specifications.

1.03 GUARANTEE AND CERTIFICATE

Any item of material, apparatus, equipment furnished and installed, or construction by the Contractor showing defects in design, construction, quality or workmanship within one year from the date of final acceptance by the State shall be replaced by such new material, apparatus or parts as may be found necessary to make such defective portion of the complete system conform to the true intent and meaning of

the specification and/or the drawings. Exceptions shall be fluorescent, high intensity discharge and incandescent lamps which shall be guaranteed for one half the manufacturer's listed life time. Such repairs or replacement shall be made by the Contractor, free of all expense to the State.

1.04 COORDINATION WITH UTILITY COMPANIES AND OTHER TRADES

During bidding and construction, Contractor shall coordinate his work with utilities, and other trades to avoid omissions and overlapping of responsibilities.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials shall be new, except as specifically noted, and shall bear the label of Underwriters Laboratories (UL) whenever standards have been established and label service is normally and regularly furnished by the agency.
- B. Raceways:
 - 1. Conduits: Galvanized rigid steel, 3/4" minimum diameter.
 - 2. Non-Metallic Conduit: PVC Schedule 40.
 - 3. Concrete Encased Ducts: Ducts for electric systems shall be round bore, PVC (polyvinyl chloride) Schedule 40 plastic or equal acceptable to the State.
 - 4. Conduit and Duct Accessories: Couplings, spacers, bonding agents, plugs, and accessories shall be as recommended by the manufacturer of conduits and ducts.
- C. Conductors and Cables:
 - 1. Electrical Conductors: Conductors shall be copper, No. 12 AWG minimum; No. 10 AWG and smaller, solid; No. 8 AWG and larger, stranded. Conductors shall be type RHW-USE for exterior use.
- D. Enclosures and Cabinets: Enclosures and cabinets for panelboards, enclosed circuit breakers, and safety disconnect switches shall be NEMA type, fabricated from galvanized steel, or as indicated, prime painted and enamel finished according to NEMA specifications. For dry interior locations, enclosures shall be NEMA 1. For exterior, damp, wet, or corrosive locations, enclosures shall be NEMA 4X stainless steel (316) with stainless steel (316) fasteners and hardware, pad lockable. Provide enclosures made of continuous welds. Enclosures made of bolted panels/parts will not be allowed.
- E. Outlet and Small Junction Boxes: In all conditions and for all cases, outlet and junction boxes shall be increased in size to conform with NEC Article 314 fill requirements. Boxes shall be cast iron or ferrous alloy, prime painted and enamel finished, with threaded hubs for conduit connection.
- F. Large Junction Boxes: For exterior and wet locations, the box shall be NEMA 4X type 316 stainless steel. All screws shall be stainless steel type 316.

- G. Device and Cover Plates: Plates for exposed, damp, or wet installations shall be weatherproof with lockable U.V. stabilized covers. Covers shall permit plugs to be connected without compromising the integrity of the protective nature of the cover.
- H. Convenience Duplex Receptacles: Single or duplex as indicated, 20-ampere, 125-volt, back and side wired, 3-wires, in ivory plastic body with parallel and ground U-shaped slots, specification grade. Ground fault interrupting receptacles shall have test and reset switches. Maximum allowable leakage current shall be 5 milliamperes. Enclose in outlet box and device plate.
- I. Modular Marine Power Center: Provide pre-assembled Eaton Lighthouse SS pedestal unit or approved equal.
1. Housing: 16-gauge, 316L low carbon stainless steel housing with UV resistant polyester resin powder coating, stainless steel hinges for receptacle doors. Enclosure shall be rated as a type 3R weatherproof enclosure.
 2. Bus Bars: Copper bus bar for terminating incoming electrical feeder. Rating as required to accommodate electrical feeder conductors
 10. Circuit Breakers: All circuit breakers for receptacles shall be thermal-magnetic type, 10,000 AIC and UL listed.
 4. Receptacles: Receptacles shall be mounted under a lockable weatherproof, hinged door. Shore power and general purpose receptacles shall not be mounted under a common cover.
 - a. Shore power receptacles shall be twist-lock, 125V, 30A or 250V, 50A as noted on the drawings.
 - b. General purpose receptacles shall be 120V, 20A, GFI type.
 5. Lighting: The lighting top housing shall be constructed of 316L low carbon stainless steel and shall be coated with UV-resistant polyurethane resin a powder coating. It shall be UL listed as a type 3R weatherproof enclosure. The power pedestal shall include two LED light fixtures with photocell control and protected by a 20A, single pole breaker.
 6. Wiring: The power center shall be completely pre-wired from the factory to the load side of the compression lug assembly on the bus bar. All wiring shall be high-stranded tin-plated copper. Maximum size of line wiring shall be 350 MCM direct feed or #4/0 loop feed.
 7. Water: The power pedestal shall include provisions for water line connections consisting of one or two $\frac{3}{4}$ " ball valves and a $\frac{3}{4}$ " female NPT fitting, hose bibs, and aluminum hose hangers capable of holding 50' of 5/8" water hose or 50' of 50-amp, 4-conductor boar SO cord. The water assembly shall be isolated from the electrical access area.
 8. Computer: Provide a desktop computer preloaded with all software required to view, archive, and edit the electric metering data. Computer shall be

installed at the Harbor office as directed by the Engineer.

a. Hardware:

- (1) Central Processing Unit (CPU): Minimum 8 core CPU with 16MB cache memory, integrated graphics. Intel Core i7, AMD Ryzen 7 or approved equal.
- (2) Random Access Memory (RAM): Dual-channel, DDR5, 4GB minimum. The system shall include a minimum of 2 RAM modules for dual channel applications.
- (3) Graphics Accelerator: Integrated with the CPU with HDMI or display-port connection ports
- (4) Audio: Integrated with main system board. The system shall have rear and front mounted audio outputs.
- (5) Hard Disk Drive: 1TB (1,000GB) Solid-State Drive (SSD) minimum operating system drive with additional 2TB (2,000GB) SSD storage drive.
- (6) External Interfaces: The main system board shall be equipped with a minimum of 4 Universal Serial Bus 3.0 (USB) ports and 1-USB-C port with a minimum of 1 port of each on the front of the system case.
- (7) Display: Light-Emitting Diode display (LED), minimum 27" diagonal, 1920 x 1080 minimum resolution, HDMI or Display Port interface.
- (8) Input Devices: Provide US standard mouse and keyboard with USB interface.

b. Software:

- (1) Operating System: Licensed copy of Microsoft Windows 11 Professional, 64-bit or better.
- (2) Office Suite: Licensed copy of Microsoft Office 365 or better.
- (3) Security: System shall be preloaded with an anti-virus program with a license of 1 year minimum.

J. Metering/Distribution Switchboard: Provide universal, building type switchboard.

1. Short Circuit Ratings: Switchboard shall have UL-integrated equipment rating equal to or greater than indicated on the drawings. The short circuit rating specified shall apply to the short circuit capability of the complete assembly, including bussing, feeder devices, incoming mains, enclosures and all other components which must stand up to short circuit duty. In no case shall protective device interrupting ratings be less than the specified overall short circuit rating.

2. Configuration: Switchboard shall have front and rear alignment. All main and feeder connections shall be accessible from the front only.
 3. Structure: Formed-up steel channels bolted together to form a rigid structure to which formed up fronts, side sheets and rear covers are bolted. 316 stainless steel mounting channels on bottom, rear, left and right sides to close all openings at the bottom. Conform to NEMA 3R type.
 4. Bussing: ASTM 70 process 55 percent conductivity aluminum electrical alloy sized to provide 55 degrees C rise over a 40 degrees C ambient. Provide main horizontal bussing that is fully rated throughout the length of the switchboard, and is not located below the vertical midpoint. Provide a full-length ground bus.
 5. Terminations: Provide proper lugs to accommodate all wires that are to be installed.
 6. Circuit Protective Devices: Circuit breakers shall be molded case type, rated for 600 volts.
 7. Utility Metering Compartment:
 - a. Provide utility metering compartments as indicated on the drawings for HECO. CTs, which conform to all requirements of HECO.
 - b. Bussing: CT bus bars shall be mounted on high-impact glass fiber polyester-molded insulators and arranged in an edgewise plane. Drill CT bars as required by HECO. for transformers and NEMA terminations.
 - c. Barriers: Provide bottom, top and side barriers to isolate these compartments from all other compartments of the switchboard.
 - d. Lock: Provide a double locking padlock hasp for locking and sealing these compartments with both HECO and State locks.
 8. Finish: Entire structure shall be 316 stainless steel.
 9. Outer Enclosure: The metering/distribution switchboard shall be provided within a NEMA 3R type 316 stainless steel enclosure that has removable rear panels for access in securing the enclosure to the concrete equipment pad. The enclosure shall be fully gasketed on all sides including the bottom of the enclosure.
- K. Individual Circuit Breaker: 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.
- L. Kilo-Watt Hour Meter Socket: Number of jaws and current rated or current transformer (CT) rated as indicated on Drawings, EUSERC, test-isolation bypass

facilities for current rated sockets, per KIUC standards/requirements, NEMA 3R stainless steel 316 enclosure. 304 stainless steel will not be approved. Eaton Cutler-Hammer, Square-D, General Electric, or approved equal.

- M. Equipment Disconnect Switches: Heavy duty non-fusible safety switch as indicated, minimum ampacity, poles, and voltage shall match over-current protection device being served from. Horsepower rated when used as motor disconnect. Contacts shall be lever operated, and spring loaded. Enclosed in NEMA 1 enclosure for interior locations and NEMA 4X stainless steel (316) enclosure for exterior, damp, wet, or corrosive locations. Provide provisions for pad locking enclosure door if doors are not bolted closed as with NEMA 4X enclosures. Provide pad lock to secure enclosure door and key all pad locks alike. Manufacture and install according to NEC Article 240 and 430. Siemens, General Electric, Eaton, and Square-D or approved equal.
- N. Nameplates: Laminated nameplates shall be provided for panelboards and circuit breaker enclosures. Nameplate shall be 1/8-inch thick melamine plastic, black and white center core. Size of nameplate shall be 1-inch by 2-1/2-inches minimum. Lettering shall be 1/4-inch high block lettering. Equipment designations shall be as indicated on the drawings.
- O. Ground Rod: Rod shall be of copper clad steel conforming to UL 250 not less than 3/4-inch in diameter by 10 feet in length. Sectional type driven fully into the earth.
- P. Hardware, Supports, Backing, Etc.: All hardware, supports, backing and other accessories necessary to install electrical equipment shall be provided. Wood materials shall be "wolmanized" treated against termites, iron or steel materials shall be galvanized for corrosion protection, and non-ferrous materials shall be brass or bronze.
- Q. Concrete: Concrete for ductline jackets shall be 3,000 psi minimum compressive strength in 28 days with aggregates of #3 fine size, provided in accordance with the "Concrete Section".
- R. Backfill Material:
 - a. Backfill Material, Type "A": Backfill material shall be non-expansive and 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. This fill shall be used over concrete encased and direct buried ducts after backfill Type B has been placed.
 - b. Backfill Material, Type "B": Backfill material shall be non-expansive and 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. This fill shall be used all around direct buried ducts.
 - c. 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.
- S. Caulking Compound: Compound for the sealing of conduits, ducts, pipes, and

sleeves shall conform with Fed. Spec. SS-S-210 and shall be of a putty-like consistency workable with the hands at temperatures as low as 35 degrees F., shall not slump at a temperature of 300 degrees F., and shall not harden materially when exposed to air. The compound shall readily calk or adhere to clean surfaces of the following: asbestos-cement conduit; vitrified clay tile; fiber conduit; fire-clay cement conduit; plastic conduit; concrete; masonry; lead; rubber; polyethylene polychloroprene; or polyvinyl-chloride sheaths of cables; and the common metals. The compound shall form a seal with the foregoing without dissolving, noticeably changing characteristics, or removing any of the ingredients. The compound shall have no injurious effect upon the hands of workmen or upon the materials.

- T. Ground Rods: UL 467. Diameter shall be adequate to permit driving to full length of the rod, but not less than $\frac{1}{2}$ " in diameter unless otherwise indicated. Ground rods shall be 5/8" x 8'-0" copper-cladded steel core unless otherwise indicated.
- U. Identification Tags: Each set of cables in pullboxes, handholes and manholes shall be identified by a noncorrosive metal tag. Letters shall be minimum $\frac{1}{4}$ - inch high identifying the cable as to use and/or voltage. Tags shall be wrapped around the cables and taped. Tags for power cables shall be red.
- V. Low Voltage Connectors and Terminals: Shall be designed and approved for use with the associated conductor material, and shall provide a uniform compression over the entire contact surface. Solderless terminal lugs shall be used on all stranded conductors. Crimp type connectors will be acceptable, however, the type which makes only one indentation will not be acceptable. The crimping tool shall make a minimum of four indentations around the circumference of the cable. In addition, crimp type connectors to be used on 250 MCM and larger conductors shall have adequate length for two sets of indentations on each half of the connector.
- W. Waterproof Connection Kits: Shall be quick disconnect in-line fuse holder (6 ampere fuse link unless indicated otherwise) fused for hot leg. The fuse holder body shall be molded plastic made in two sections where lead side section shall have a captive nut and waterproofing ring. Fuse holder shall be TRON and manufactured by BUSSMANN, or equal acceptable to the State.

PART 3 - EXECUTION

3.01 GENERAL

- A. Rules and Permit: The entire installation shall be made in strict accordance with the latest rules and regulations of the National Board of Fire Underwriters, the currently adopted edition of the National Electrical Code (NEC) and the local Electrical Bureau. All work shall be inspected by the proper local authorities as it progresses. The Contractor shall pay all inspection fees and shall deliver certificates of completion and inspection to the Engineer before final payment will be made. Costs of permits and inspection fees shall be included in the Contractor's bid price.
- B. Qualification of Installers:

1. For actual fabrication, installation and testing of the work of this section, use only thoroughly trained and experienced workmen completely familiar with items required and with manufacturers' recommended methods of installation. In acceptance or rejection of installed work, no allowance will be made for lack of skill on part of workmen.
2. Workmanship shall meet the approval of Engineer who shall be afforded every opportunity to determine skill and competency. Concealed work shall be reopened at random during formal inspection by Engineer at his request.

C. Construction Methods:

1. Construction shall conform to construction practices as recommended by the American Electricians Handbook by Croft (latest edition), Edison Electric Institute, National Electrical Code, National Electrical Safety Code and applicable instructions of manufacturers of equipment and material supplied for this project.
2. Existing Underground Utilities: Underground utilities indicated on plans are approximate in location. It is not the intention of plans to imply that all existing utilities are drawn and located. It shall be the responsibility of Contractor to coordinate locations of existing utilities prior to doing any excavation work. Any damage to existing utilities shall be promptly repaired by Contractor at no cost to the State. In any event, the Contractor shall immediately notify the State of any such damage.

Prior to penetration of existing and new manholes or handholes, the Contractor shall coordinate proposed penetration locations with the Engineer. Provide butterfly diagrams of proposed penetration locations complete with wall dimensions and conduit location dimensions for acceptance by the Engineer.

3. Trench Excavation:
 - a. Dimensions and locations of trenches for ductlines shall be as indicated on drawings. Trench width and depths shall be sufficient to accommodate proper installation of conduit banks.
 - b. Should material at bottom of trench for direct buried conduits not be equal to backfill material Type "B", the trench shall be excavated an additional 3" to permit backfilling with Type "B" backfill.
 - c. Where a trench is excavated on slope, sides are to be vertical, and depth measured at lowest side. All measurements are to be based on final grades.
 - d. Bottom of trenches to be flat and smooth
 - e. Sheathing and bracing as required shall be provided to support sides of excavations from cave-ins

- f. Provide drainage and pumps to keep trenches dry.
 - g. Saw cut all edges of existing sidewalks and pavement before trenching.
 - h. Excavated material may be placed alongside trench; however, it shall not interfere with vehicular or pedestrian traffic.
 - i. Cover all trenches with suitable bridging material; trenches shall not be left uncovered overnight or over the weekend.
4. Backfill:
- a. Duct installations shall be accepted by the Engineer prior to backfilling.
 - b. Should material below direct buried conduits not be equal to 3" (thickness) of backfill material Type "B", trench shall be deepened by 3", and backfilled with Type "B" backfill.
 - c. Backfilling shall be to finished grades indicated on accompanying drawings, and matching existing conditions.
 - d. Backfill material shall be completely free of wood or other debris.
 - e. Backfill material shall be placed in maximum of 8" layers in loose thickness before compacting. Backfill shall be thoroughly compacted with hand or mechanical tampers to 95% of ASTM D1557 maximum dry density. In no case shall tamping be accomplished by using the wheels or tracks of a vehicle.
 - f. Backfill over conduit bends at transformer pads shall be Type A or better.
 - g. Backfill over direct buried conduits shall be 8" thickness of backfill Type "B".
 - h. Backfill over concrete encased ducts and balance of fill over backfill Type "B" (over direct buried conduits) shall be backfill Type "A".
 - i. At road crossings, backfill shall be 8" thickness of backfill Type "B" and remaining backfill may be normal road base course.
5. Installation of Conduit and Duct Bank:
- a. Bottom of trench shall be clean, smooth, well-graded.
 - b. Saw cut, ream and taper ducts and conduits with manufacturers' approved tool.

- c. Couplings and bells shall be tight to prevent entry of dirt or concrete into ducts and conduits.
- d. Apply thin coat of sealing compound on ducts and conduits at couplings and bells.
- e. Stagger the joints of the conduits by rows and layers so as to provide a ductline having the maximum strength.
- f. Provide spacers to maintain proper separation between ducts.
- g. Except at conduit risers, changes in direction of runs exceeding a total of ten degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 25 feet, unless indicated otherwise. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
- h. Duct lines shall have a continuous slope downward toward manholes and away from building(s) with a pitch of not less than three inches in 100 feet.
- i. Ducts shall be clean and free from debris and rubbish.
- j. After each day's work, provide temporary conduit plugs at the end of conduit banks to prevent entry of dirt, rubbish, debris, or concrete.
- k. Mandrel Test: Pass a test mandrel conforming to the utility company or the Engineer's requirements, through the entire length of each duct or conduit to test for burrs and obstructions. Unless indicated otherwise, mandrel shall be 14" long and shall have diameter of $\frac{1}{2}$ " less than inside diameter of duct. If burrs or obstructions are encountered, that section shall be replaced at no additional cost to the State.
- l. Unless indicated otherwise, install #12 AWG galvanized iron pulling wire or polypropylene cord in each conduit after testing.
- m. Ducts Ending in Manholes, Handholes and Pullboxes: Shall be terminated with conduit end bells. End bells, terminators or ducts shall be flush to inside wall surfaces; duct extension into boxes is not acceptable.
- n. Conduits Stubbed for Future Connections: Shall be plugged and marked with concrete marker.
- o. Securely anchor duct banks prior to pouring concrete encasement to prevent ducts from floating.

- p. When pouring concrete, prevent heavy masses of concrete from falling directly on ducts. If unavoidable, protect ducts with plank.
- q. Direct flow of concrete down sides of duct bank to bottom, allowing concrete to rise between ducts, filling all open spaces uniformly.
- r. To insure against voids in concrete, work a long, flat splicing bar or spatula liberally and carefully up and down the vertical rows of ducts. Mechanical vibrators shall be used for stacked duct banks of three ducts or higher.
- s. Cure concrete for a minimum of 72 hours before permitting traffic and/or backfilling.
- t. Warning Tapes: Provide warning tapes about twelve inches below the top of the trench in the backfill. For electric ducts, provide a 6-inch wide warning tape, red in color with a black imprinted message "CAUTION -- ELECTRIC LINE BURIED BELOW, placed 12" below finish grade over electric ducts or the concrete jacket for electric ducts for the entire length of ductline installation. Warning tape shall be constructed with a metallic core sandwiched between the printed polyethylene tape above and a clear polyethylene tape below.
- u. Ducts Entering Existing Manholes, Handholes and Pullboxes: The Contractor shall exercise due care in constructing the new duct openings into the existing manholes/handholes. Existing reinforcing steel in the handhole wall shall be cut and bent so that maximum strength can be obtained in joining the new concrete work to the existing concrete. The new rebars in the new ductlines shall be extended to within two inches of the inside face of the concrete manhole/handhole wall. Suitable patching shall create a waterproof joint between the new and existing concrete.

6. Concrete and Brick Work:

- a. Concrete, ready mixed according to ASTM C94
- b. Concrete shall be composed of fine aggregate, coarse aggregate, Portland cement, and water so proportioned and mixed as to produce a plastic, workable mixture. Fine aggregate shall be of hard, dense, durable, clean, and uncoated sand. The coarse aggregate shall be reasonably well graded from 3/16-inch to 1-inch. The fine and coarse aggregates shall be free from dirt, vegetable matter, soft fragments or other deleterious substances.
- c. Water shall be fresh, clean, and free from salts, alkali, organic matter, and other impurities. Concrete shall have compressive strength as indicated. Slump shall not exceed three inches.

- d. Retampering of concrete will not be permitted. Exposed uniformed concrete surfaces shall be given a smooth, wood float finish.
- e. Convey concrete from mixer to forms rapidly to prevent segregation. Free drop shall be limited to five feet, unless authorized by inspector.
- f. Placing:
 - (1) Clean and remove all debris from inside forms and trenches before placing concrete.
 - (2) Place concrete only on clean damp surfaces, free from water.
 - (3) Place concrete in forms, in horizontal layers not exceeding 18" thickness.
 - (4) Place concrete to avoid segregation of materials and displacement of ducts, inserts and reinforcing.
 - (5) Vibrate structural concrete thoroughly during and immediately after placing to insure dense watertight concrete.
- g. Forming:
 - (1) Clean and remove all debris from inside forms and trenches before placing concrete.
 - (2) Place concrete only on clean damp surfaces, free from water.
 - (3) Place concrete in forms, in horizontal layers not exceeding 18" thickness.
 - (4) Place concrete to avoid segregation of materials and displacement of ducts, inserts and reinforcing.
 - (5) Vibrate structural concrete thoroughly during and immediately after placing to insure dense watertight concrete.
- h. Patching: Patch all voids, pour joints and holes before concrete is thoroughly dry. Use mortar of same proportions as original concrete.
- i. Curing: Curing of concrete shall be accomplished by impervious membrane method with liquid membrane compound. Apply two or

more coats to obtain a total of one gallon for each 150 square feet of concrete

j. Reinforcing Steel:

- (1) Clean reinforcing of mil or rust scale and form to dimensions indicated.
- (2) Install reinforcing in proper locations and secure in place to prevent movement during concrete placing or vibrating.

k. Concrete Brick and Hollow Concrete Block Work:

- (1) Concrete brick and hollow block shall be laid in full bed of mortar, both horizontally and vertically.
- (2) Mortar shall be one part (by volume) cement and three parts (by volume) fine aggregate, thoroughly mixed and used when fresh. Retampering will not be allowed. Mortar shall have a minimum 28 days strength of 2,500 psi.
- (3) Setting bed shall be of depth required to bring top of blocks flush with finish line.

7. Electrical Equipment Pads:

- l. Slope of lots/ area for concrete equipment pads shall not exceed one-inch rise in one foot run.
- m. Grade sufficiently around equipment pad area to prevent future filling of lot/area.
- n. Concrete equipment pads shall be installed level. Pad shall be installed as indicated on drawings.

8. Cable Tags: Cables provided in the manholes, handholes, and pullboxes shall be provided with cable tags to identify the cables. Tags shall be fabricated of lead strips long enough to fit loosely around the cables after the tag ends have been soldered together. Data to be stamped on the tags shall include feeder designation, voltage, quantity of conductors, conductor size and type of insulation. Where two different sizes of cable are spliced together, separate markers shall be provided at each end of the splice.

9. Cleaning and Repairs:

- a. During the progress of work, all rubbish, waste lumber, displaced materials, etc. shall be removed as soon as possible. Upon completion of the work, Contractor shall remove from the State's property and from all public and private property, at his own expense, all temporary structures, tools, rubbish and waste

material, etc., resulting from his operations, and leave the premises in broom clean condition.

- b. The Contractor shall restore all removed or damaged pavement, gutters, curbs, sidewalks, walls, sign posts, trees and landscape damaged by his operations to as near their original condition or better.
- c. Concrete sidewalks, curbs and gutters shall be repaired using 3,000 psi concrete as specified herein. Sidewalk thickness and curb and gutter cross-sections shall match existing, but shall be at least six inches.
- d. Graded aggregate base course shall have maximum aggregate size of 1-½ inches. Thickness of base course shall match existing, but shall be at least six inches. Base course shall be primed with emulsified asphalt prior to paving.
- e. Asphalt concrete shall be hot plant mixed and hot laid. Maximum aggregate size shall be ½-inch and match existing. Pavement thickness shall match existing, but shall be at least six inches.
- f. Contractor shall begin sodding no more than one week after ground has been compacted. In the areas where seeding is recommended, the process for seed shall begin within the same time frame. The Contractor shall be responsible for complete restoration of the re-landscaped area until such time as the area has returned to the normal conditions that were present before construction.

10. Grounding:

- a. All services, motors, metallic enclosures, raceways, and electrical equipment shall be grounded according to requirements of National Electric Code. At buildings, ½" x 8' copperweld ground rods, Copperweld Steel Company, shall be driven with top 12" below finished grade and shall be connected together with bare No. 3/0 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. Connect ground to nearest cold water pipe and to electrical service equipment, raceways, equipment, grounding type receptacles, and other metallic parts directly exposed to ungrounded electric conductors. Connection shall be made by continuous metal raceways or with conductors.
- b. Make grounding connections which are buried or otherwise normally inaccessible, and excepting specifically those connections for which access for periodic testing is required, by exothermic type process. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which have "puffed up" or which show convex surfaces, indicating improper

cleaning, are not acceptable. No mechanical connector is required at exothermic weldments.

In lieu of an exothermic type process, a compression ground grid connector of a type which uses hydraulic compression tool to provide the correct circumferential pressure may be used. Tools and dies shall be as recommended by the manufacturer. An embossing die code or other standard method shall provide visible indication that a connector has been adequately compressed on the ground wire.

- c. All grounding wire runs shall be run together with circuit conductors.
- d. Resistance to solid earth ground for noncurrent carrying metallic parts associated with electrical equipment shall not exceed the following:

	<u>Ohms</u>
Ground in manholes, handholes and vaults	10
Grounding other metal enclosures for primary voltage electrical and electrically operated equipment	10
Grounding secondary distribution system neutral and noncurrent carrying metal parts associated with distribution systems and grounds not otherwise covered.	25

D. Field-Posted As-Built Drawings: The Contractor shall maintain an accurate and adequate record of each change as it occurs, regardless of how ordered and submit as-built drawings after project completion.

(1) Plans and Specification: This specification is intended to cover all labor, materials and standards of workmanship to be employed in the work indicated on the plans and called for in the specification or reasonably implied therein. The plans and specification supplement one another. Any part of the work mentioned in one and not represented in the other, shall be done the same as if it had been mentioned in both. The Contractor shall not make alterations to the drawings and specification.

(2) Discrepancies and Interpretations:

- 1. Should the Contractor find any discrepancies in or omissions from any of the documents or be in doubt as to their meaning, he shall advise the Engineer who will issue any necessary clarification within a time period which does not disrupt the progress of the work.
- 2. All interpretation and supplemental instructions will be in the form of a written addenda to the Contract Documents.

3. Should any discrepancy arise from the failure of the Contractor to notify the Engineer, the higher quality or larger quantity of item shall prevail. Engineer shall make the final interpretation and judgment.
 4. In the event of a discrepancy between small scale drawings and large scale details, or between drawings and specification, on which is in violation of any regulations, ordinances, laws or codes, the discrepancy, if known by the Contractor, shall be immediately brought to the attention of the Engineer for a decision before proceeding with the particular work involved. Work carried out disregarding these instructions will be subject to removal and replacement at the Contractor's expense.
- G. Symbols: The standard electrical symbols together with the special symbols, notes and instructions shown on the drawings indicate the work required and are all to be included as a part of this specification.
- H. Coordination: This specification is accompanied by floor plans of the affected buildings, elevations, and site plans indicating locations of all boxes, electrical connections, service runs, and other electrical apparatus. These locations are approximate and, before installing, the Contractor shall study the adjacent architectural details and actually make the installation in the most logical manner. The circuit routing is typical only and may be varied in any logical manner.

3.02 INSTALLATION

- A. Grounding:
1. All metallic enclosures, raceways, and electrical equipment shall be grounded according to requirements of NEC Article 250. Final connection to equipment, raceways and other metallic parts directly exposed to ungrounded electric conductors shall be No. 12 AWG minimum, copper, NEC type TW, green insulation. Use approved bonding terminal at panels.
 2. All grounding wire runs within building shall be routed together with circuit conductors.
 3. Bond and ground all feeder conduit to panelboard enclosures.
- B. Wiring System:
1. Below grade or in slab, use Schedule 40 PVC. Provide separate ground wire and rise out of ground with rigid steel conduit.
 2. Rigid steel conduit shall be used where run is exposed in exterior locations except within the pier structure.
 3. Conduit shall be cut square and inner edges reamed. Butt together evenly in couplings.
 4. Bends and offsets shall be made with hickey or conduit bending machine. Do not use vise or pipe tee. Bends shall be made so that interior cross-sectional areas will not be reduced. Radius of curve of inner edge of field bend shall not be less than ten times internal diameter of conduit.

5. Use of running threads and set screw couplings will not be permitted. Where conduit cannot be joined by standard threaded couplings, approved watertight conduit union or compression couplings shall be used.
6. Cap conduit, during construction, with plastic or galvanized pipe caps to prevent entrance of dirt or moisture. All conduits shall be swabbed out and dried before wires or cables are pulled in.
7. Conduit shall be mounted clear of other piping, valves or mechanical equipment.
8. Fish wires, cords strings, chains or the like shall not be placed or inserted into the conduit system during installation. Insulating bushings and two locknuts shall be installed on the end of every run of conduit at sheet metal enclosures and boxes.
9. Securely fasten conduit to junction boxes and to structure support. Project adequate number of conduit threads through box for bushings. Anchorage for 1-1/2" and smaller conduit shall be made with two-hole type 316 stainless steel conduit straps or clamps. Two-inch and larger conduits shall be anchored with one-hole type 316 stainless steel clamps or equal fittings.
11. Exposed conduit shall be parallel with, or at right angles to, structural or architectural elements, and securely fastened in place with two-hole galvanized pipe straps with screws, or with approved beam clamps, or approved single or gang pipe hangers spaced not more than five feet apart, as conditions required. Vertical runs shall be supported at intervals not exceeding five feet approved clamp hangers.
11. Pullwire shall be installed in empty conduit. Pullwire shall be #12 AWG type TW insulated wire or nylon pull line. Pullwires shall be tagged at conduit terminations to identify conduit use (i.e. power, telephone, data, etc.).

C. Conductors:

1. Mechanical means for pulling shall be torque-limiting type and not used for #2 AWG and smaller wires.
2. Pulling tension shall not exceed wire manufacturer's recommendations.
3. Where necessary, powdered soapstone may be used as a lubricant for drawing wires through conduit. No other means of lubricating will be allowed.
4. Form neatly in enclosures for minimum of crossovers. Tag all feeders.

D. Splicing of Wire and Cable:

1. Wires shall be formed neatly in enclosures and boxes.
2. Splices made according to NEC Article 110.
3. Splices shall be reinsulated. Remove all sharp points that can pierce tape. Use Minnesota Mining and Manufacturing Co. "Scotch" #33 tape, or equal.

Splices in boxes for exterior locations shall be water-tight.

E. Trench Excavation:

1. Dimensions and locations of trenches for pullboxes and ductlines shall be as indicated on drawings. Trench width and depths shall be sufficient to accommodate proper installation of conduit banks and cables.
2. Where a trench is excavated on slope, sides are to be vertical, and depth measured at lowest side. All measurements are to be based on final grades.
3. Bottom of trenches to be flat and smooth.
4. Trenches shall be widened at pullbox sites to permit proper entry of ducts.
5. All excavations for pullboxes in excess of the required depths shall be filled with concrete.
6. Sheathing and bracing as required shall be provided to support sides of excavations from cave-ins.
7. Provide drainage and pumps to keep trenches dry. During high-tide conditions trenches may fill up with water. Contractor to schedule work during low-tide conditions to minimize water infiltration into the trench.
8. Excavated material may be placed alongside trench.

F. Backfill:

1. Backfilling shall be to finished grades indicated on accompanying drawings, and matching existing conditions.
2. Backfill material shall be completely free of wood or other debris.
3. Backfill material shall be placed in maximum of 12" layers in loose thickness before compacting. Backfill shall be thoroughly compacted with hand or mechanical tampers, and in no case shall tamping be accomplished by using the wheels or tracks of a vehicle.

G. Conduit and Duct Bank:

1. Bottom of trenches for all systems shall be clean, smooth and well graded prior to installation of conduits.
2. Saw cut, ream and taper ducts and conduits with manufacturers' approved tool.
3. Couplings and bells shall be tight to prevent entry of dirt into ducts and conduits.
4. Provide spacers to maintain proper separation between ducts.

5. Changes in direction of greater than 5° shall be accomplished by using special couplings or bends manufactured for this purpose. Where ducts enter pullboxes, they shall be terminated in end bells. Ducts shall be thoroughly cleaned before laying. When it is necessary to cut tapered end of duct at site, cut shall be made with saw and tapered with lathe designed to match original taper. Coordinate placement of duct runs with other utilities, building structures, existing facilities and landscaping elements to avoid conflicts. When necessary, obtain acceptance from the Engineer for relocation and adjustments at no additional cost to the State.
6. Ducts shall be clean and free from debris and rubbish.
7. After each day's work, provide temporary conduit plugs at the end of conduit banks to prevent entry of dirt, rubbish, or debris.
8. Pass smooth bullet-shaped, blunt tip wooden test mandrel through the entire length of each duct or conduit to test for burrs and obstructions. Unless indicated otherwise, mandrel shall be 14" long and shall have diameter of 2" less than inside diameter of duct or conduit. If burrs or obstructions are encountered, that section shall be replaced at no additional cost to the State.
9. Unless indicated otherwise, install #12 AWG galvanized iron pulling wire or polypropylene cord in each conduit after testing.
10. Apply thin coat of sealing compound on ducts and conduits at couplings and bells.
11. Provide duct seals at each entry point into pullboxes to prevent water from flowing between pullboxes.
12. A 4" wide warning tape, with black imprinted message "WARNING - ELECTRICAL LINE BELOW" shall be placed 12" below finish grade over electrical ductlines. Color shall be as noted on drawings.

H. Finishing:

1. All cutting that may be required for complete installation of the electrical work shall be carefully performed, and all patching shall be finished in first-class condition by the Contractor.
2. Close unused knockouts in boxes or enclosures with metal cap.
3. Wipe clean all exposed raceways and boxes with rag and solvent. Unfinished raceways and boxes shall be prime-painted and finished to blend into background.

I. Miscellaneous Details:

1. Cut, drill and patch as required to install electrical system. Repair any surface damaged or marred by notching, drilling or any other process necessary for installation of electrical work. Cutting, repairs and refinishing subject to the approval of the Engineer. Need for remedial work determined by Engineer as attributable to poor coordination and workmanship shall be cause for reconstruction to the satisfaction of the State of Hawaii.
2. Attachment of electrical equipment to wood by non-ferrous wood screws. Attachment to concrete by expansion anchors. Powder-charge-driven studs and anchors permitted only with prior approval.
3. Complete all panel circuit directories, using typewriter. Verify "room" and "use" designations before typing.
4. All grounding wire within building run in rigid steel conduit, and where practicable, routed together with circuit conductors.
5. Furnish necessary test equipment and make all test necessary to check for unspecified grounding, shorts and wrong connections. Correct faulty conditions, if any.

3.03 TESTING AND INSPECTION

- A. If the State (or its representative) discovers any errors, the Contractor, at his own expense, shall go over all similar portions of the entire job, taking the necessary or directed remedial action.
- B. The Contractor shall retape splices which have been bared for inspection. The Contractor shall test all portions of the electrical system furnished by him for proper operation and freedom from accidental grounds. All tests shall be subject to the approval of the Engineer.
- C. Wherever test or inspection reveals faulty equipment or installation, the Contractor shall take corrective action, at his own expense, repairing or replacing equipment or installation as directed.

END OF SECTION