Division of Boating and Ocean Recreation

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

BOARD OF LAND AND NATURAL RESOURCES

Suzanne D. Case
Chairperson

CONTRACT SPECIFICATIONS AND PLANS

Job No. LA22-02
Manele Small Boat Harbor Sewage Lift Station Repair
Manele, Lanai, Hawaii

November 2022

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
Honolulu, Hawaii

CONTRACT SPECIFICATIONS AND PLANS

Job No. LA22-02
Manele Small Boat Harbor Sewage Lift Station Repair
Manele, Lanai, Hawaii

Approved: _____

EDWARD R. UNDERWOOD
Administrator
Division of Boating and Ocean Recreation

Approved: _____

FINN MCCALL, P.E.
Engineering Branch Head
Division of Boating and Ocean Recreation

November 2022

CONTENTS

NOTICE TO BIDDERS iii

INFORMATION AND INSTRUCTIONS TO BIDDERS I-1

SPECIAL PROVISIONS SP-1

TECHNICAL SPECIFICATIONS S-1

PROPOSAL (Bound Separately) P-1

PLANS (Bound Separately)

DEPARTMENT OF LAND AND NATURAL RESOURCES INTERIM GENERAL CONDITIONS, DATED OCTOBER 1994. (Bound separately)

NOTICE TO BIDDERS
(Chapter 103D, HRS)

COMPETITIVE SEALED BIDS for Job No. **LA22-02, Manele Small Boat Harbor Sewage Lift Station Repair, Manele, Lanai, 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 Manele Small Boat Harbor, Manele, Lanai, Hawaii.

The purpose of this Invitation for Bids (IFB) is to award to a Contractor work that shall generally consist of demolition work, removal of existing pumps, valves, and piping, installation of new submersible sewage pumps (2 ea.), new control panel, and appurtenant work as show in the plans and in accordance with project specifications.

Due to the nature of work contemplated, bidders must possess a valid State Contractor's license, Classification "A" General Engineering, "C-37" Plumbing, or "C-43" Sewer, sewage disposal, drain, and pipe laying. All electrical work shall be done by contractors who possess a valid State Contractor's license, Classification "C-13" Electrical.

The estimated cost of construction is $200,000.

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

CONTENTS

		Page
A	Project Location and Scope of Work	I-2
B	Sealed Proposals	I-2
C	General Conditions	I-2
D	Proposal Form	I-2
E	Omissions or Erasures	I-2
F	Notice of Intent to Bid and Questionnaire	I-2
G	Bid Security	I-2
H	Contractor's License Required	I-2
I	Irregular Bids	I-3
J	Withdrawal of Bids	I-3
K	Successful Bidder to File Performance and Payment Bonds	I-3
L	Number of Executed Original Counterparts of Contract Documents	I-3
M	Change Orders	I-3
N	Wages and Hours	I-3
O	Permits	I-3
P	Property Damage	I-4
Q	Time	I-4
R	Bidder's Responsibility to Provide Proper Superintendence	I-4
S	Liquidated Damages	I-4
T	Hiring of Local Labor	I-4
U	Water and Electricity	I-4
V	Public Convenience and Safety	I-5
W	Work to be Done Without Direct Payment	I-5
X	As-Built Drawings	I-5
Y	Asbestos Containing Materials	I-5
Z	Worker Safety	I-5
AA	Toilet Facilities	I-5
BB	Signs	I-5
CC	Field Office for Department	I-6
DD	Quantities	I-6
EE	Other Health Measures	I-6
FF	Hawaii Business Requirement	I-6
GG	Compliance With §3-122-112 HAR	I-6

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. Bidders for this project shall possess a valid a Class "A", "C-37", or "C-43" contractor's license. All electrical work shall be done by a contractor possessing a valid "C-13" electrical 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 State will process permit applications whenever possible, and the Contractor shall procure the pre-processed permits and pay the required fees. If permit applications are not processed by the State, the Contractor shall process the permit applications, permits and licenses, and pay all charges and fees. 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. **A project sign is not required for this project.**

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.ehawaii.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 contact. 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 polices.

(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.

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS	SECTION NO.
General Specifications	01019
Standard References	01090
Submittals	01300
Mobilization and Demobilization	01505
Barricades	01530
Environment Control and Permitting	01567
Plumbing	15400
Electrical Work	16010
Electrical General Requirements	16011

SECTION 01090

STANDARD REFERENCES

PART 1 - GENERAL

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

Abbreviation	Company
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

Abbreviation	Company
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
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

Abbreviation	Company
	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
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 IR3, Canada
DEMA	Diesel Engine Manufacturer's Association 122 East 42nd Street New York, NY 10017

Abbreviation	Company
DIS	Division of Industrial Safety California Department of Industrial Relations 2422 Arden Way Sacramento, CA 95825
EEI	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

Abbreviation	Company
	Cleveland, OH 44115
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
NAAMM	National Association of Architectural Metal Manufacturers 100 South Marion Street Oak Park, IL 60302

Abbreviation	Company
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
SAMA	Scientific Apparatus Makers Association One Thomas Circle Washington, DC 20005
SBCC	Southern Building Code Congress 1116 Brown-Marx Building

Abbreviation	Company
	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

Abbreviation	Company
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 01300

SUBMITTALS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product information shall be required for:

1. Section 01530 – Barricades

2. Section 02230 – Aggregate Base Course

3. Section 02520 – Asphalt Concrete Pavement

3. Section 02713 – Water System

5. Section 03330 – Cast-in-Place Concrete Reinforcement

7. Any others as called for in the plans and specifications or by the Engineer

B. Other required submittals shall include:

1. Shop Drawings

2. Certificates of Warranty

3. Barricade Shop Drawings

4. Any others as called for in the plans and specifications or by the Engineer

1.2 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)

PART 4 - PAYMENT (NOT USED)

END OF SECTION

SECTION 01505

MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 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.

1.3 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

3.1 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

1.1 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

2.1 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

3.1 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 (i.e. dead-ends, cul-de-sacs).

   b. Ramps or lanes closed for operational purposes.

   c Permanent or semi-permanent 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.

PART 4 - PAYMENT

Barricades will not be measured and paid for separately, but shall be incidental to applicable items in the Proposal.

END OF SECTION

SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all labor, materials and equipment for complete installation of plumbing system as shown on drawings and specified herein.

B. The work shall include the following but is not necessarily limited to:

1. Provide new plumbing fixtures specified and/or shown in the plans.

2. Provide drain, vent and cold and hot water piping connections to the plumbing fixtures.

3. Disinfect all water supply lines.

4. Testing and adjusting.

5. All other plumbing items indicated on the drawings, specified herein, or needed for a complete and proper plumbing installation in accordance with all pertinent codes and regulations.

1.02 QUALITY ASSURANCE

A. Applicator Qualifications: Use sufficient journeyman plumbers and competent supervisors to ensure proper and adequate installation throughout. In acceptance or rejection of installed plumbing, no allowances will be made for lack of skill on part of workmen.

B. Laws, Regulations and Permits:

1. Comply with requirements of local and State codes, Regulations of State Health Department, Fire Department, ADA, NFPA, and all other applicable codes.

2. Obtain and pay for all fees, permits, licenses, assessments, connection charges and inspections for work.

3. At completion, submit certification from approving agencies that work meets above requirements.

1.03 SUBSTITUTION OF MATERIALS

A. Request for substitutions, complete with catalog data, shall be furnished to the Project Coordinator as required by Section 00700 - GENERAL CONDITIONS.

B. Substitution of another manufacturer's product for materials or equipment specified hereinafter and for items with "or equal" after the brand name requires approval in accordance with the Section 00700 - GENERAL CONDITIONS prior to bidding. No substitutions will be considered after the bid

opening. Products of the following manufacturers are acceptable in lieu of those specified hereinafter by the manufacturer and model number:

1. Valves: Watts, Crane, Walworth, Dezurik, Arrowhead Brass.

2. Pipe Supports: Elcen, Fee and Mason, Grinnell or Unistrut.

3. Fixtures: American Standard, Kohler, Elkay, Crane, Dayton, Just, Eljer, Moen or Haws.

4. Fixture Supports: Jay R. Smith, Zurn or Wade

1.04 SUBMITTALS

A. Shop Drawings and Product Data:

1. Contract Drawings are essentially diagrammatic, indicating general layout locations for establishing the scope of the work; they are not intended to be detailed construction drawings. Reasonable modification to indicated locations and arrangements to suit job conditions shall not constitute basis for requesting of additional funds for extra work.

2. Prior to start of any field work, six (6) copies of each manufacturer's detailed equipment data, and to scale shop drawings showing detailed installation shall be submitted for approval. Submit shop drawings and product data in one complete package. Piecemeal submittals are not acceptable.

3. Dimensioned installation shop drawings to scale showing details where space requirements present problems, proposed departures from the Contract Documents due to field conditions, and requirements for the contract work, access panels, inserts in slabs and openings in structure are required. Drawings shall also indicate adequate clearance for operation, maintenance and replacement of operating equipment. Drawings shall be created at a minimum of ¼-inch scale.

4. Shop drawing review is confined to arrangement of equipment only and will not relieve the Contractor from responsibility for proper fit, performance, or construction. Any deviation from the contract documents including dimensional, performance or material changes shall be clearly noted on shop drawings.

5. Equipment Submittal: Before beginning work, submit for review certified literature showing ratings and dimensions of equipment, a list indicating manufacturer and model of fixtures and trim, and a list indicating all materials and items that are of a different manufacturer or model than those specified.

Submittal shall include the following items:

a. Plumbing fixtures & supports.
b. Piping and accessories.

c. Accessible fixture safety cover.

B. Site Maintained and As-Built Drawings:

1. Maintain an accurate record of all changes made in installation layout and materials shown on the Drawings and/or approved shop drawings.

2. Incorporate all recorded changes made during construction into an As-Built Drawing including all concealed piping. Submit as-built drawings as specified under Section 01770 - CLOSEOUT PROCEDURES. Indicate location of isolating valves and items requiring maintenance or inspection. Dimension underground piping from a visible point on structure. Indicate invert and slope of drainage piping at sufficient locations so that invert can be calculated for any point in system.

3. Submit reproducible copies or these drawings to the Project Coordinator prior to final inspection.

C. Certificates:

1. Furnish certificates for evidence of proper performance compliance with code for the following:

a. Sterilization of pipe lines, water.

1.06 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to protect plumbing materials and fixtures before, during, and after installation and to protect installed work and materials of all other trades.

2. Pipe openings shall be closed with caps or plugs during installation.

B. Replacements: In event of damage, immediately make all repairs and replacements necessary at no cost to the State.

1.07 GUARANTEE

A. Manufacturer's warranty shall apply against defective materials and workmanship for one-year period from date of acceptance of project. This warranty shall include any motor and electrical components for all equipment furnished under this section. This warranty shall also insure the availability of factory-trained personnel to service such warranted equipment.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All materials delivered to the job site and installed shall be new and the best of the respective grade.

2.02 PIPING MATERIALS

A. Sanitary piping below grade and 3-inch and larger above grade shall be service weight cast iron pipe with "No-Hub" pipe conforming to CISPI Standard 301-75 with stainless steel coupling, stainless steel bolts and neoprene gasket. Piping 2-inch and smaller above grade shall be no-hub cast iron. Cast iron pipe and fittings shall be covered inside and outside with a coating of asphaltum.

B. Cold and hot water piping shall be hard drawn copper, Type "K" below grade and Type "L" above grade shall conform to ASTM B88. All joints shall be made with 95-5 solder and wrought pressure solder copper joint fittings conform to ANSI B16.22.

C. Provide where required I.P.S. brass nipples at connections to fixtures, hose bibbs and equipment.

2.03 VALVES

A. General: All valves shall have ratings conforming to the pressure at the locations used, but not less than 125 pounds per square inch working pressure, non-shock for water and shall be Crane, Jenkins, Walworth or equal. Valves shall be provided to isolate each piece of equipment, group of fixtures and risers for repairs and maintenance.

B. Ball Valves: Up to 2-inches; bronze body, stainless steel full bore ball, teflon seats and stuffing box ring, lever handle, solder or threaded ends and 200 psi working pressure. Stockham, Hammond, Victaulic or approved equal. Over 2-inches: same except standard port and up to 3-inch size.

2.04 HANGERS AND SUPPORTS

A. Hangers and supporting rods shall be adjustable wrought ring type or as recommended by the manufacturer for the application indicated. All hangers and supports shall allow for expansion and contraction. Suspended lines shall be suitably braced to prevent vibration and shall maintain required grading by proper adjustment.

B. Exposed Piping: All piping shall be firmly held in place by approved hangers, supports and anchors. All hangers and supports shall be designed to support the weight of the pipe, weight of fluid and weight of the pipe insulation. All hangers shall be so arranged and designed as to prevent transmission of vibration from the piping to the structure. All hangers and supports shall be allowed for expansion and contraction.

C. Supporting rod diameters for pipe: 3/8-inch for pipe 2-inch and smaller; ½-inch for 2-1/2-inch and 3-inch pipe; ¾-inch for 4-inch and larger. Locate supports within 18-inch of each joint. Suspended lines shall be suitably braced to prevent vibration and shall maintain required grading by proper adjustment.

D. Spacing of hangers: On ¾-inch lines, not greater than 6 feet; on pipes up to and including 1-1/2-inch, not greater than 8 feet; on 2-inch and 3-inch and larger pipes, not greater than 10 feet. Provide a hanger at each change of direction.

E. Support vertical lines by a hanger in horizontal line near riser and provide riser clamps.

2.05 CLEANOUTS

A. Floor cleanouts shall be Zurn Z-1400, Jay R. Smith 4023, Wade 7000T or Josam 56010. Nickel bronze top.

B. Wall cleanouts shall be Zurn Z-1440, Jay R. Smith 4422, Wade 8450, Josam 58700, or approved equal with round or square stainless steel access cover and frame.

2.06 UNIONS, FLANGE, AND COUPLINGS

A. Provide unions at all equipment and accessory locations and at screwed Valves.

B. Provide dielectric unions at lines of dissimilar metals.

2.07 PIPING ACCESSORIES

A. Vacuum Breaker: Watts No. 288A or acceptable equal, brass body, heat resisting disc, and disc guide located out of water. Sizes as indicated or as required for the intended application.

B. Water Hammer Arresters or Air Chambers: Smith or approved equal, Water Hammer Arrester shall be tested and certified in accordance with PDI WH-201. Air Chambers shall consist of a 12 inch length of pipe of the same diameter as the branch supply and capped.

2.08 SLEEVES

A. Furnish and install PVC or iron pipe sleeves for all pipes through concrete walls and slabs. Size shall be sufficient to accommodate pipe or pipe and insulation. For fire rated penetrations provide a “Fire Stop System” for all. See Fire Stop Section of specifications.

2.09 HANDICAPPED FIXTURE SAFETY COVER

A. Plumberex Specialty Products "Handy-Shield", Truebro "Handi-Lav-Guard" or approved equivalent for exposed drain and supply lines under handicapped-accessible fixtures; meets **2004 ADAAG**, and American National Standards Institute Document A 117-1-1980. Quick secure fit installation, temper-proof strap, professional finish, flexible to conform with odd piping patterns, and insulating foam meets ASTM Standards D-1667

and D-395. Drain cover, valve and supply cover, extension for drain, and off-set tailpiece cover shall be ivory color or as directed by the Contracting Officer.

2.10 FIXTURES AND EQUIPMENT

A. The Contractor shall furnish and install all plumbing fixtures complete with all accessories and fittings, all as shown on the plans and herein specified. He shall provide all necessary parts for connection and all connections shall be made in a neat, well finished uniform manner. The connection for fixtures of the same type shall be of equal height and spacing, and at right angles to walls, unless otherwise directed by the Project Coordinator at the job. All roughing-in for fixture work shall be carefully and accurately laid out, so that all portions will fit exactly and correctly. All fixtures shall be in the best operating order, without leaks or other defects, before the work will be accepted. Provide and install service stop valves in supplies to fixture whether specifically mentioned or not.

B. All fixtures shall be new and the best of their respective kinds, and shall be what are known commercially as "Grade A" fixtures. They shall be free from all defects such as warpage, crazing, dents, chips or discoloration. All defective and unsatisfactory fixtures shall be removed and replaced with sound satisfactory fixtures. All exposed metal parts shall be chromium plated unless otherwise specified. Fixtures shall be white except where otherwise specified.

C. Fixture Installation:

1. Each fixture installed at the exact height and location shown on architectural drawings, or as directed.

2. Fixture trap and trap arm shall be set square with wall, in line with fixture outlets without any offsets, angles, or bends.

3. Each fixture shall be set level and in continuous contact with floor or wall.

4. Joints between fixtures and walls or floors shall be adequately sealed, forming a smooth, even watertight joint.

5. Wall escutcheons: On all supplies and traps, for plumbing fixtures, exposed above floor, chrome plated brass.

D. Plumbing Fixture List:

1. Accessible Water Closet (A-WC):

Kohler K-4302 “Highcrest”, floor mounted vitreous china, elongated bowl with 1-1/2-in. top spud, 2-1/4-in. passageway, 16-1/2-in. bowl height, 12-inch rough-in, white, closet bolt set with caps, and wax gasket. Maximum 1.6 gallons per flush.

Sloan 111-1.6 "Royal" chrome plated diaphragm type flush valve with vacuum breaker, 1-in. I.P.S. screw driver Bak-Chek angle stop with protective cap,

adjustable tailpiece, vacuum breaker flush connection and spud coupling for 1-1/2-in. top spud, wall and spud flanges. Maximum 1.6 gallon per flush. ADA compliant metal oscillating non-hold open handle with triple seal handle packing. The maximum force required to activate the flush valve shall be 5 lbs per ADAAG 309.4 Operation. Mount flush lever on wide side of stall per ADDAG 604.6 Flush Controls.

Kohler K-4670-SA solid polypropylene plastic, open front seat without cover. With self-sustaining check hinges, anti-microbial agent, stainless steel mounting bolts. White.

Installation shall comply with ADDAG 604.1 General.

2. Accessible Lavatory (A-LAV):

Kohler K-2084-L “Soho” white, single faucet hole with soap dispenser hole on right, wall-mount, vitreous china, and with overflow. Drilled for concealed arm carrier, 20-in. x 18-in. Kohler K-7129 lavatory grid drain with overflow fitting with 1-1/4-in. tail piece.

Chicago Faucets 730-244PLCP deck mounted, single-hole faucet. Polished chrome plated solid brass construction, 3-3/8-in. cast brass spout, 2.2 gpm pressure compensating Softflo aerator, 2-3/8-in. metal lever handle. Rebuildable self-closing cartridge, immediate shut-off, opens and closes 90° bi-directional, features square tapered stem. 1/2-inch MPSM supply inlet with coupling nut for 3/8-in. or 1/2-in. flexible riser.

Watts TCA-411 floor mounted concealed arm lavatory carrier. Epoxy coated, heavy gauge steel offset uprights with welded feet, steel cross plate with integral mounting brackets, sliding adjustable arm brackets and adjustable cast iron concealed arms with mounting clips, leveling screws, and basin locking device.

Aquaflo quarter-turn ball valves or equal, chrome angle stops and stainless steel braid brass coupling faucet connectors. Provide chrome plated brass 17-ga. Tubular P-trap with brass nuts and deep flange, escutcheon plates and all accessories necessary for a complete system.

Accessible lavatories installed height to comply with ADAAG 606.3 Height.

3. Accessible Shower (A-SH):

Speakman SM-3080-ADA shower combination. Anti-scald balanced pressure shower valve and handheld spray combination. Chrome plated brass wall plate with metal index. Chrome plated brass lever handle. Adjustable temperature limit stop, brass body. Pressure balancing and ceramic temperature regulating cartridge with built-in check valves. Four port valve with 1/2” female copper sweat inlets and shower outlet. Shower unit shall be furnished with 1/2 pipe plug, in-line vacuum breaker, VS-100-AF hand shower with flow control device reduces flow to 2.5 gpm maximum, non-positive shut-off to meet ICC/ANSI A117.1 SEC. 608.6 and ADAAG 608.6 Shower Spray Unit and Water, Chrome 5’ metal shower hose, 1/2” NPSF connectors, swivel arm holder, 24” combination slide bar and grab bar, stainless steel and chrome. Shower spray units shall

deliver hot water at a maximum of 120ºF.

Jay R. Smith Fig. 2010C shower drain. Ducco cast iron body with flashing collar and adjustable Nickel-Bronze strainer head, caulk outlet.

4. Accessible Kitchen Sink (A-KS)

   Elkay LRAD372255 Lustertone Equal Double Bowl Top Mount Sink. 18-gauge, type 304 stainless steel with a lustrous highlighted satin finish, full spray sides and bottom for sound deadening, 16" x 16" x 5-3/8" bowl dimensions, 3-1/2" drain opening, 2-faucet holes, U-Channel type mounting system. Sink shall comply with ADAAG 606.1 General.

   Elkay LK35 drain fitting. Type 304 stainless steel body with removable conical basket strainer, metal stem and rubber stopper. Fits 3-1/2" opening with polished finish. Chrome plated brass 1-1/2" x 4" tailpiece.

   Chicago Faucets 895- L8ABCP deck mounted sink faucet. 4-in. fixed centers, 8-in "L" type swing spout, 2.2 GPM aerator, 2-3/8-in. vandal proof lever handles. Quaturn compression operating cartridge with 1/2-in. NPSM supply inlets and coupling nut for 3/8-in. or 1/2-in. flexible riser.

   Aquaflo quarter-turn ball valves or equal, chrome angle stops and stainless steel braid brass coupling faucet connectors. Provide chrome plated brass 17-ga. Tubular P-trap with brass nuts and deep flange, escutcheon plates and all accessories necessary for a complete system.

5. Electric Water Heater (EWH):

   Bradford White KwickShot model EFT-28000-4-T-10 electric water heater. Unit shall have ABS UL 94 Vo rated or enameled-steel cover. Heater body and element shall be glass reinforced UDEL or Fortron. Element shall be replaceable cartridge insert. Unit shall have a replaceable filter in the inlet connector. Element shall be iron free, nickel-chrome material. Heater shall be fitted with compression nuts and sleeves or threaded fittings to eliminate need for soldering. Maximum operating pressure shall be 150 psi.

PART 3 - EXECUTION

3.01 WORKMANSHIP AND INSTALLATION

A. All workmanship shall be of the highest standard. The piping system shall be laid out to insure a neat, systematic and orderly arrangement of all work. Vertical piping lines shall be plumbed and lines that are grouped shall be parallel and as direct as possible. Galvanized sheet metal thimbles shall be provided where pipes pass through masonry and cutting shall be avoided as much as possible. Exposed pipe, where indicated, shall be run parallel with walls.

   The Installation shall comply with the Uniform Plumbing and Building Codes, The Fire Marshal's Regulations of the State of Hawaii, ADA and all other

applicable codes.

The Contractor shall obtain and pay for all permits and licenses for the work. At completion, transmit to the Project Coordinator, applicable certificates of inspections.

B. Cutting and Repairing:

1. The work shall be carefully laid out in advance providing sleeves, templates or details for chases and openings to be left in the walls, floors, structural members or partitions. Any excess cutting of construction will not be permitted. Cutting shall be carefully done, and damage to buildings, piping, wiring or equipment as a result of cutting for installation shall be repaired by skilled mechanics of the trade involved at no additional expense to the State. Written permission from the Project Coordinator's representative shall be obtained before any cutting is done.

C. Protection to Fixtures, Materials and Equipment:

1. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. Upon completion of all work, the fixtures, materials and equipment shall be thoroughly cleaned, repainted as required and adjusted until fully operational.

D. Chlorination:

1. Domestic cold water lines shall be sterilized with chlorine before acceptance of the work. Dosage of chlorine shall not be less than 50 ppm. Chlorinating material shall be introduced into the water lines in a manner approved by the Project Coordinator. After a contact period of not less than eight (8) hours the system shall be flushed with clean water until the residual chlorine content in not greater than 0.2 ppm. All valves in the lines being sterilized shall be opened and closed several times during the contact period. A certificate shall be furnished to the State evidencing proper performance of sterilizations.

E. Pipe Installation:

1. No pipe shall be closed up, furred in, buried or otherwise hidden until it has been inspected, tested and approved by the Project Coordinator or County inspector.

2. Sanitary Piping and Combination Waste Vent Piping shall slope not less than ¼-inch per foot of horizontal run except where indicated. Storm drainage piping shall be sloped as indicated or ½" per foot of horizontal run.

3. Vent pipes shall be graded to expel water.

4. Drain pipes shall be run with easy bends and long radius turns. Offsets shall be made at an angle of 45 degrees or less except where cleanouts

are provided for shorter turns.

5. All piping shall be inspected inside and out before installation and no obstruction shall be allowed. Pipe ends shall be taper reamed to full I.D. and all burrs removed.

6. All exposed piping shall be carefully handled to avoid excessive tool marking and polished fittings shall be handled with extra care so that tool marks do not show. All exposed piping shall be in one length where possible, fittings shall be in walls, under counter cabinet or in furred spaces.

7. Escutcheons: Shall be installed around all exposed pipe passing through a finished floor, wall or ceiling and shall be made of chrome plated brass. Escutcheons shall be of sufficient outside diameter to cover the sleeve opening and shall fit snugly around the pipe.

8. Anchor piping in building with approved clamps or adjustable hangers spaced in accordance with the Plumbing Code. Straps for copper tubing shall be copper or brass, or copper plated. Where copper contacts ferrous material, wrap with two layers of plastic tape.

9. Provide dielectric unions where copper piping is connected to ferrous pipe.

10. Piping to receive insulation:

    a. All aboveground drainage piping receiving condensate or ice water.

11. Provide safety cover in compliance with ADA Standards for all exposed plumbing pipes under all handicapped-accessible plumbing fixtures.

F. Plumbing Fixtures:

1. Furnish, install and properly connect all plumbing fixtures and fittings and/or trim herein specified.

2. Setting of all fixtures shall be done in an approved workmanlike manner. Special attention shall be exercised to the fixture heights. Where definite dimensions are not indicated, consult Architect for exact heights. Joints between fixtures and wall shall be neatly pointed up with plaster of Paris.

3. Fastenings: Where trimming and fixtures are secured to concrete block or concrete, they shall be fastened with 1/4" minimum brass machine screw type expansion bolts sufficiently long to insure that the shield shall be wholly within sound concrete. Where trimmings and fixtures are to be mounted on concrete block or concrete, each fixture shall have the proper cast iron fixture bracket anchored to the masonry wall with 1/4" diameter toggle bolts. All exposed bolt head and nuts shall be chrome plated hexagon brass with round tops. All escutcheons on walls and floor shall be chrome plated cast brass with chrome plated set screws.

4. No wood grounds shall be used for supports of plumbing fixtures.

5. Fixture Supports: The Contractor shall furnish fixture supports as recommended by manufacturer.

6. Plumbing Fixture Schedule: Provide and install shutoff valves to water supply branches to fixtures whether specifically mentioned or not. If fixtures are supplied with hot water supply openings when not required, such openings are to be closed permanently with chrome plated faucet hole covers.

7. Handicapped-accessible fixtures shall be installed in compliance with ADA Standards. Provide Handicapped Fixture Safety Cover for all drainage, water piping and valves below handicapped-accessible fixtures as required to protect user.

G. Roof Openings and Flashings:

1. Furnish and install for each pipe passing through roofing, an approved four-pound lead flashing assembly with 10" skirt and lead counterflashing.

2. Coordination with Roofing: Base and sleeve portions shall be installed as roofing work progresses. Counterflashing shall be installed after roofing is finished and approved by the Architect. Vent pipes through roof shall penetrate center of roof sheet and not at side laps.

3.02 TESTING AND INSPECTION

A. Contractor shall furnish all equipment for tests and any required retests and pay for all cost of repairing any damage resulting from such tests. Contractor shall adjust systems until they are approved. Tests shall be performed in the presence of, and to the satisfaction of, the Project Coordinator and inspector of the official agency involved.

B. Sanitary and water piping shall be tested in accordance with the Plumbing Code. Sanitary drains shall be tested with a minimum of 10 feet of water for 15 minutes. Water piping shall be tested at 150 psig.

3.03 CLEAN-UP

A. Debris shall not be allowed to accumulate as a result of this work. Upon completion of this work, remove all debris and excess materials, tools, etc., resulting from this work from the job site and leave the location of this work broom-clean in an acceptable manner as approved by the Project Coordinator. All work including plumbing fixtures, traps and mechanical equipment shall be thoroughly cleaned and ready for use.

3.04 GUARANTEE AND CERTIFICATE

A. Guarantee:

All work and materials executed under this section shall be guaranteed to be free from defects of materials and workmanship for one (1) year from date of final acceptance of project as a whole. All work or repair and replacement required, including other work damaged by this work defect shall be performed without cost to the State.

B. Certificates:

Furnish certificates for evidence of proper performance compliance with code for the following:

1. Sterilization of pipe lines, water.

2. Water testing of sanitary piping.

3. Water testing of domestic water piping.

END OF SECTION

SECTION 16100 - ELECTRICAL WORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

A. This specification covers the requirements for furnishing and installing all electrical work.

B. Section 16011, "General Electrical Requirements" applies to this section with additions and modifications specified herein.

1.02 APPLICABLE PUBLICATIONS:

The publications cited within this specification form a part of this specification to the extent referenced. Unless otherwise indicated, most recent edition of the publication with current revisions and amendments will be enforced.

1.03 SUBMITTALS:

Submit shop drawings and catalog cuts of the following equipment for approval in accordance with SUBMITTALS section. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. **Incomplete submittals and those without summary sheets will be returned without review.**

1. Junction boxes/handholes, equipment cabinet.
2. Wiring devices.
3. Electric panelboard, metering equipment.
4. Any built-to-order equipment.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

A. Asbestos Prohibition: No asbestos-containing material shall be used in this section. The Contractor shall ensure that all materials incorporated in the project are asbestos-free.

B. Materials and equipment shall be new and equipment satisfying the requirements of NEC Articles 90.7 and 110.3 shall be listed or labeled by a nationally recognized electrical testing laboratory.

C. Brand names and catalog numbers indicate standards of design and quality required. In case of obsolescence, supersedure, or error in catalog number, the associated description and intent implied by the application shall govern.

2.02 WIRING MATERIAL:

A. Conduits: Electrical metallic tubing (EMT) and rigid steel conduit (GRS) shall be 3/4" minimum diameter. Metallic tubing and conduits shall be steel; tubing shall be zinc-coated and conduits shall be hot-dip galvanized.

B. Exterior Underground Raceways: Plastic conduit, polyvinyl chloride, Schedule 40, provide with green equipment grounding conductor.

C. Flexible Conduit: Zinc-coated inside and outside; liquid-tight with factory fitting for, 3/4" minimum diameter.

D. Outlet and Small Junction Boxes: Concealed boxes shall be pressed, zinc-coated steel, 4" sq. minimum nominal size, minimum depth 1-1/2", with raised cover ring for devices set flush in wall. Exposed boxes shall be smooth cast metal, prime painted and enamel finished with hubs for conduit connection with covers.

E. Junction Boxes: Junction boxes, unless otherwise specified, shall be NEMA 1 for interior locations and NEMA 4X stainless steel for exterior locations. NEMA 1 fabricate from galvanized steel, prime painted and enamel finish according to NEMA specifications. Manufacturer and install according to NEC Article 370.

F. Wires and Cables: Conductors shall be copper, No. 12 AWG minimum; No. 10 and smaller, solid and round; No. 8 and larger, 7 or 19 strands, concentric. All conductors shall be Type THWN or XHHW. Fixture wires shall conform to NEC requirements.

2.03 WIRING DEVICES:

A. Duplex Receptacle, Specification Grade: Ivory phenolic molded body, duplex NEMA 5-20R, 20A, 125V, 2-pole, 3-wire, grounded, back and side wiring, U-

shaped grounding slot, parallel double wipe phosphor bronze spring tensioned contacts, heavy-duty corrosion resistant wrap-around body bridge strap with grounding screws and automatic grounding clip, back wiring holes for feed through wiring and rating engraved on body. Install in outlet box with appropriate device or cover plate. Manufacture and install according to NEC Articles No. 200 and 410. Hubbell No. HBL 5362-I.

2.04 MOTOR OR EQUIPMENT CONNECTION:

A. Power connection to motor or equipment from nearest box, disconnect or controller with watertight flexible conduit and locknut type or threaded connector.

2.05 ELECTRICAL APPARATUS:

A. Equipment Disconnect and Fused Switches: Heavy duty, fusible or non-fusible safety switch. Horsepower rated when used as motor disconnect. Contacts shall be lever operated, spring loaded and enclosed in NEMA 1 enclosures for interior locations in ceiling spaces and NEMA 4X, stainless steel enclosures for all other locations. When for use with fuses of current limiting type, clips shall be rejection type. Manufacture and install according to NEC Articles 240, 380 and 430. Provide three (3) spare fuses of each ampere rating. Siemens, Cutler-Hammer, Square-D and General Electric.

B. Control Panel:

1. General: Furnish and install custom control panel as shown on plans including, but not limited to, Flygt Multi-Smart (or approved equal) control panel mounted to door of control panel, flashing alarm beacon mounted to top of control panel, audible alarm horn mounted to side of control panel, alarm silence button mounted to side of control panel, hand-off-auto switches, duplex receptacle for 120-volt, 1 ph. power mounted to door of control panel, pump run-time meters, circuit breakers, relays, 3-point latch on enclosure door, motor starters, voltage monitor, 120VAC-24VDC power supply, uninterrupted power supply, and auxiliary generator receptacle.

   Panelboards shall comply with the following industry standard:

   a. NEMA Standard PB-1

   b. UL Standards; Cabinets and Boxes-UL 50; Panelboards -UL 67

   c. National Electrical Code

Panelboards shall be labeled as suitable for use as service equipment in accordance with Article 384 of the National Electrical Code.

2. Enclosure: The control panel shall be in a NEMA 4X stainless steel enclosure.

3. Interior: All interiors shall be completely factory assembled. The design of the interior shall permit replacement of circuit breakers without disturbing adjacent units and without machine drilling or tapping. All circuit breaker connections shall be in a hole tapped by the manufacturer. Main bus shall be all copper. Branch bus shall be copper only. Sizing of conductor shall be in accordance with UL 67. Bus bars shall be supported by a VO rated, UL recognized, Polymeric material. Bus sequence shall start at the top left phase bus of the interior for both top and bottom fed panels. Panels shall be rated as shown on plans. Interior shall be convertible from main lug to main breaker with the addition of an appropriate field-installable kit. Interior shall be changeable from top to bottom feed and vice-versa, while maintaining readability of dead-front labeling.

   Dead-front shall be provided with a flange for easy attachment of trim. Incoming cable lugs shall be grouped at one end to separate them from the load side cables. Main lugs shall be lay-in construction to facilitate connections. Neutral bussing shall have a lug for each outgoing branch requiring a neutral connection. For easy wiring and shortest cable run possible, load size neutral connection lugs to be split with each side taking 50% of load neutral connections. The interior shall be provided with wing nuts for securing to box without tools.

4. Circuit Breakers: Molded case circuit breakers shall be thermal-magnetic, quick-make, quick- break, trip free. Multi-pole breakers shall be common trip. If current limiting circuit breaker mains are indicated on schedules, provide breakers with inverse time delay, instantaneous circuit protection and limit let-through I^2t to a value less than I^2t of one-half cycle wave of the symmetrical prospective current without any fusible elements. All breakers shall be equipped with antiturn solderless, pressure type connectors. All provisions shall be located at the bottom of the panelboard and be fully bussed complete with all necessary mounting hardware less the breaker.

2.06 HARDWARE, SUPPORTS, BACKING, ETC.:

A. Provide all hardware, supports, backing and other accessories necessary to install electrical equipment. Wood materials shall be plastic lumber or composite wood - polymer material, iron or steel materials shall be galvanized for corrosion protection, and non-ferrous materials shall be stainless steel or bronze. Provide Type 316 stainless steel materials where indicated.

B. Bolt, nuts, washers, and screws used for outside shall be high quality stainless steel or brass.

C. Channel shall be heavy duty, fiberglass, glass reinforced polyester or vinyl ester resin, 1-5/8" x 1-5/8" x ¼", or 1-5/8" x 1-5/8" x 12 gauge stainless steel UNISTRUT and B-Line.

D. Concrete: Ready mix type with 3000 PSI compressive strengths. Concrete material and aggregates shall conform to latest ASTM Specifications. Concrete aggregates for ductlines shall be 3/4" maximum in size.

E. Backfill Material Type A: Black or beach sand, earth or earth and gravel mixture. If earth and gravel mixture, rock size shall be one inch or smaller and shall not contain more than 50% rock particles by volume. This fill shall be used over concrete encased ducts.

PART 3 – EXECUTION

3.01 RACEWAYS:

A. Use PVC, EMT and rigid steel conduits with approved coupling and connectors. All cuts square, using saw. Ream the ends. Bends made with approved tools. Reject flattened or crushed conduit. No running thread. Bushing and two locknuts at connection to boxes and enclosures.

B. Seal against water during construction. Risers must be closed, except when pulling conductors.

C. Exposed conduit runs shall be parallel and/or perpendicular to structural elements.

D. Provide nylon pull string of 200-pound minimum tensile strength in all empty conduits in excess of 15 feet in length.

E. Use PVC underground. Use rigid steel conduits in locations exposed to weather. Use EMT in interior locations.

3.02 BOXES:

Plumb and securely fasten. Remove all debris from interior.

3.03 CONDUCTORS:

A. Lubricants: Non-wax type, chemically neutral to insulation.

B. Clean all raceways, boxes, and enclosures before pulling wires and cables. Form neatly in enclosures for minimum of crossovers.

3.04 MISCELLANEOUS DETAILS:

A. Provide necessary foundations, supports, backing, etc., for all raceways, junction boxes, and equipment. Attach to wood and steel by screws or bolts. Attach to concrete by expansion anchors. Powder charge driven studs and anchors shall not be used.

B. Clean all surfaces of enclosures and equipment.

C. Close all unused knockout holes.

3.05 PAINTING:

A. Wipe clean of dirt, oil, grease, etc., all new electrical equipment and raceways with rag and solvent, prime and finish to match surrounding finish. Do not paint over nameplate.

B. All new surface-mounted boxes and exposed raceways shall be painted to match the color of adjacent surfaces.

3.06 TESTING:

A. Upon completion of this portion of work, and prior to its acceptance by the State of Hawaii, make all required tests and secure all required approval from agencies having jurisdiction. Any deficiencies found shall be rectified and work affected by such deficiencies shall be completely retested at Contractor's expense. Written notification of all proposed tests shall be provided to the Engineer a minimum of 14 days prior to the date of the test.

B. Perform an operational test after completion of the installation in the presence of the Engineer, to assure proper operation of all items of work. Remove all grounds and shorts.

END OF SECTION

SECTION 16011 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

This specification covers the requirements for furnishing and installing all electrical work.

1.02 WORK INCLUDED:

A. The Contractor under this Division shall provide all labor, materials, equipment, supervision and services required for the construction of the electrical systems. The finished installations shall be complete, operable and shall include all work specified herein and shown on the Drawings.

B. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the system and equipment. All systems shall be properly adjusted and in working order at the time of final acceptance.

C. All painting and other finishing work shall conform to the applicable requirements of the specifications as prescribed in appropriate sections.

D. It is the intent of these Specifications and other Contract Documents to require an installation complete in every detail. Consequently, the Contractor will be responsible for minor details or for any special construction which may be found necessary to properly furnish, install, adjust, test, and place in successful and continuous operation, the entire electrical system, and the cost of same shall be included in the contract price.

1.03 DESCRIPTION OF WORK:

Work specified in this Division shall include, but not be limited to the following:

1. Complete disconnecting and rendering safe all existing service equipment, electrical panel, outlets, wiring, lighting fixtures, safety switches, and feeders at the sewage lift station.

2. Complete connection to existing service equipment including reuse of existing junction boxes, conduit, and wiring as shown on plans.

3. Complete removal and disposal of existing sewage lift station control panel and float

switches.

4. Complete installation of new control panel including mounting to existing concrete slab as shown on plans.

5. Complete connection of new control panel to existing power supply including all required splices, junction boxes, wiring, and conduits.

6. Complete installation of new high level float switch and submersible level transducer and connection of new control panel to said float switch and submersible level transducer.

7. Complete testing.

8. Complete as-built drawings.

1.04 REFERENCES:

Comply with the applicable requirements of the following standards unless otherwise indicated:

1. Comply with local ordinances; National Electrical Code; applicable regulations of the National Board of Fire Underwriters; specifications of ANSI, NEMA, and UL and regulations of the County of Kauai and the State of Hawaii.

2. In the event of conflict between pertinent codes and regulations, and the requirements of the referenced standards, or those indicated in Specifications and on drawings, the provision of the more stringent shall govern.

1.05 RELATED WORK:

Division 1: General Requirements. Section
16100 - ELECTRICAL WORK.

1.06 PERMITS AND INSPECTION:

A. Electrical permit required by local ordinances shall be obtained and paid for by the Electrical Contractor.

1.07 COORDINATION:

A. Refer to all project Drawings and to all Sections of the project Specifications. Coordinate and fit all work accordingly so that all electrical outlets and equipment will be properly located and readily accessible. The Drawings indicate the relation of

wiring and connections and must not be scaled for exact locations. Verify all construction dimensions at the project and make changes necessary to conform to the piers as constructed. Work improperly installed due to lack of construction verification shall be corrected at the Contractor's expense.

B. Work shall be scheduled to avoid delays, interferences, and unnecessary work. If any conflicts occur necessitating departures from the Drawings and Specifications, details of departures and reasons therefore shall be submitted immediately for consideration by the Engineer.

1.08 SUBMITTALS:

Submit shop drawings and catalog cuts of the equipment and products identified in each Division 16 technical section for approval in accordance with SUBMITTALS section of these specifications. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. Incomplete submittals and those without summary sheets will be returned without review.

1.09 DELIVERY, HANDLING AND STORAGE:

A. Deliver all materials of this Division in manufacturer's original unopened packages or containers with label intact and legible.

B. Use means necessary to protect the materials of this section before, during and after installation; to protect the installed work and materials of all other trades; and to protect the original structure, work and materials of the State of Hawaii.

C. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the State of Hawaii.

1.10 WARRANTY:

A. Installation shall be complete in every detail as specified and ready for use. Any items supplied by Contractor developing defects of design, construction, or quality within one (1) year of final acceptance by Engineer shall be replaced by such new materials, apparatus or parts to make such defective portion of the

complete system conform to the true intent and meaning of the Drawings and Specifications at no additional cost to the State of Hawaii.

B. The warranty shall be countersigned by the General Contractor.

1.11 SITE CONDITIONS:

The Contractor shall visit the project site before any work has started to determine the site conditions and the extent of the removal and new work required.

1.12 CONTINUITY OF SERVICES, PHASING

A. Execute work using such methods, techniques, connections and tie-ins which will cause least interference with, and interruptions of, existing utilities and services. Schedule all arrangement for work which will cause interferences or interruptions, in advance with the Engineer, all other affected trades and authorities having jurisdiction.

B. Examine site and become familiar with existing conditions affecting work.

C. Examine all Drawings and Specifications, including civil, structural and mechanical, and become familiar with the types and systems of construction to be used. Determine how such types and systems will affect the installation of electrical work.

D. Investigate, determine and verify locations of any utilities in or near project area.

PART 2 - PRODUCTS

2.01 MATERIALS AND WORKMANSHIP:

A. All materials shall conform to the latest issue of all applicable standards as established by NEMA, NFPA, ANSI, IEEE, ASTM and Underwriters' Laboratories, and shall bear the manufacturer's name, trade name and when available, the Underwriters' Label.

B. Within twenty (20) days after the contract has been awarded, or as otherwise directed, forward to the Engineer a complete list of all materials and equipment proposed for installation. Acceptance of list of materials by the Engineer does not relieve the contractor from their responsibility to provide all materials require for complete installation to the satisfaction of the Engineer. List shall include sufficient information to permit ready and complete identification.

After the work is completed, Contractor shall provide drawings showing the as-built conditions.

C. All work not installed and completed in accordance with the latest rules and regulations of the NEC, OSHA, NESC, and all local ordinances shall be removed and reinstalled correctly at the Contractor's expense.

PART 3 – EXECUTION

3.01 GENERAL:

A. Install all electrical materials and equipment in accordance contract drawings, manufacturer's recommendations and as approved by the Engineer.

B. Cut, break, 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. Patch any damaged surfaces to match the adjacent surface.

C. The Electrical Contractor shall coordinate his work with other trades to avoid conflicts with civil, structural, mechanical, and architectural elements of this project.

3.02 JOB CONDITIONS:

A. These specifications are accompanied by construction drawings including plans showing locations of all wiring, outlets, devices, and other electrical equipment. The locations are approximate and before installing, study adjacent structural and architectural details and make installation in most logical manner. Any device and/or wiring may be relocated within 10'-0" before installation at direction of Engineer without additional cost to the State of Hawaii.

B. Before installing, verify all dimensions, sizes, and electrical rating of equipment.

C. Verify that electrical system may be installed in strict accordance with the existing construction, the Drawings and Specifications and the manufacturer's recommendations.

D. In the event of discrepancy, immediately notify the Engineer. Do not proceed

with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.03 DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS:

A. Submit written certification that electrical systems are complete and operational. Submit certification with Contractor's request for final review.

B. At the time of final review of electrical work, demonstrate the operation of electrical systems. Provide labor, apparatus and equipment for systems' demonstration. The various tests shall be under the direction and supervision of the Engineer.

C. The Contractor shall perform start-up and all tests as required to obtain final field acceptance from the State of Hawaii. All tests shall be conducted in the presence of the Engineer or his representative.

D. The Contractor shall be responsible for all tests. Testing shall be performed by and under the immediate supervision of the Contractor.

E. A visual inspection of all electrical equipment, to check for foreign material, tightness of wiring and connection, proper grounding, matching nameplate charts with specification, etc., shall be made prior to actual testing.

3.04 "AS-BUILT" DRAWINGS

Field set and TWO (2) sets of "As-Built" plans indicating all deviations from the construction drawings shall be provided FIVE (5) Working Days prior to the scheduled final inspection. Approved "As-Built" plans shall be submitted TEN (10) working days after final inspection on TWO (2) sets of prints.

END OF SECTION

SECTION 16100 - ELECTRICAL WORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

A. This specification covers the requirements for furnishing and installing all electrical work.

B. Section 16011, "General Electrical Requirements" applies to this section with additions and modifications specified herein.

1.02 APPLICABLE PUBLICATIONS:

The publications cited within this specification form a part of this specification to the extent referenced. Unless otherwise indicated, most recent edition of the publication with current revisions and amendments will be enforced.

1.03 SUBMITTALS:

Submit shop drawings and catalog cuts of the following equipment for approval in accordance with SUBMITTALS section. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. **Incomplete submittals and those without summary sheets will be returned without review.**

1. Junction boxes/handholes, equipment cabinet.
2. Wiring devices.
3. Electric panelboard, metering equipment.
4. Any built-to-order equipment.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

A. Asbestos Prohibition: No asbestos-containing material shall be used in this section. The Contractor shall ensure that all materials incorporated in the project are asbestos-free.

B. Materials and equipment shall be new and equipment satisfying the requirements of NEC Articles 90.7 and 110.3 shall be listed or labeled by a nationally recognized electrical testing laboratory.

C. Brand names and catalog numbers indicate standards of design and quality required. In case of obsolescence, supersedure, or error in catalog number, the associated description and intent implied by the application shall govern.

2.02 WIRING MATERIAL:

A. Conduits: Electrical metallic tubing (EMT) and rigid steel conduit (GRS) shall be 3/4" minimum diameter. Metallic tubing and conduits shall be steel; tubing shall be zinc-coated and conduits shall be hot-dip galvanized.

B. Exterior Underground Raceways: Plastic conduit, polyvinyl chloride, Schedule 40, provide with green equipment grounding conductor.

C. Flexible Conduit: Zinc-coated inside and outside; liquid-tight with factory fitting for, 3/4" minimum diameter.

D. Outlet and Small Junction Boxes: Concealed boxes shall be pressed, zinc-coated steel, 4" sq. minimum nominal size, minimum depth 1-1/2", with raised cover ring for devices set flush in wall. Exposed boxes shall be smooth cast metal, prime painted and enamel finished with hubs for conduit connection with covers.

E. Junction Boxes: Junction boxes, unless otherwise specified, shall be NEMA 1 for interior locations and NEMA 4X stainless steel for exterior locations. NEMA 1 fabricate from galvanized steel, prime painted and enamel finish according to NEMA specifications. Manufacturer and install according to NEC Article 370.

F. Wires and Cables: Conductors shall be copper, No. 12 AWG minimum; No. 10 and smaller, solid and round; No. 8 and larger, 7 or 19 strands, concentric. All conductors shall be Type THWN or XHHW. Fixture wires shall conform to NEC requirements.

2.03 WIRING DEVICES:

A. Duplex Receptacle, Specification Grade: Ivory phenolic molded body, duplex NEMA 5-20R, 20A, 125V, 2-pole, 3-wire, grounded, back and side wiring, U-

shaped grounding slot, parallel double wipe phosphor bronze spring tensioned contacts, heavy-duty corrosion resistant wrap-around body bridge strap with grounding screws and automatic grounding clip, back wiring holes for feed through wiring and rating engraved on body. Install in outlet box with appropriate device or cover plate. Manufacture and install according to NEC Articles No. 200 and 410. Hubbell No. HBL 5362-I.

2.04 MOTOR OR EQUIPMENT CONNECTION:

A. Power connection to motor or equipment from nearest box, disconnect or controller with watertight flexible conduit and locknut type or threaded connector.

2.05 ELECTRICAL APPARATUS:

A. Equipment Disconnect and Fused Switches: Heavy duty, fusible or non-fusible safety switch. Horsepower rated when used as motor disconnect. Contacts shall be lever operated, spring loaded and enclosed in NEMA 1 enclosures for interior locations in ceiling spaces and NEMA 4X, stainless steel enclosures for all other locations. When for use with fuses of current limiting type, clips shall be rejection type. Manufacture and install according to NEC Articles 240, 380 and 430. Provide three (3) spare fuses of each ampere rating. Siemens, Cutler-Hammer, Square-D and General Electric.

B. Control Panel:

1. General: Furnish and install custom control panel as shown on plans including, but not limited to, Flygt Multi-Smart (or approved equal) control panel mounted to door of control panel, flashing alarm beacon mounted to top of control panel, audible alarm horn mounted to side of control panel, alarm silence button mounted to side of control panel, hand-off-auto switches, duplex receptacle for 120-volt, 1 ph. power mounted to door of control panel, pump run-time meters, circuit breakers, relays, 3-point latch on enclosure door, motor starters, voltage monitor, 120VAC-24VDC power supply, uninterrupted power supply, and auxiliary generator receptacle.

   Panelboards shall comply with the following industry standard:

   a. NEMA Standard PB-1

   b. UL Standards; Cabinets and Boxes-UL 50; Panelboards -UL 67

   c. National Electrical Code

Panelboards shall be labeled as suitable for use as service equipment in accordance with Article 384 of the National Electrical Code.

2. Enclosure: The control panel shall be in a NEMA 4X stainless steel enclosure.

3. Interior: All interiors shall be completely factory assembled. The design of the interior shall permit replacement of circuit breakers without disturbing adjacent units and without machine drilling or tapping. All circuit breaker connections shall be in a hole tapped by the manufacturer. Main bus shall be all copper. Branch bus shall be copper only. Sizing of conductor shall be in accordance with UL 67. Bus bars shall be supported by a VO rated, UL recognized, Polymeric material. Bus sequence shall start at the top left phase bus of the interior for both top and bottom fed panels. Panels shall be rated as shown on plans. Interior shall be convertible from main lug to main breaker with the addition of an appropriate field-installable kit. Interior shall be changeable from top to bottom feed and vice-versa, while maintaining readability of dead-front labeling.

   Dead-front shall be provided with a flange for easy attachment of trim. Incoming cable lugs shall be grouped at one end to separate them from the load side cables. Main lugs shall be lay-in construction to facilitate connections. Neutral bussing shall have a lug for each outgoing branch requiring a neutral connection. For easy wiring and shortest cable run possible, load size neutral connection lugs to be split with each side taking 50% of load neutral connections. The interior shall be provided with wing nuts for securing to box without tools.

4. Circuit Breakers: Molded case circuit breakers shall be thermal-magnetic, quick-make, quick- break, trip free. Multi-pole breakers shall be common trip. If current limiting circuit breaker mains are indicated on schedules, provide breakers with inverse time delay, instantaneous circuit protection and limit let-through I^2t to a value less than I^2t of one-half cycle wave of the symmetrical prospective current without any fusible elements. All breakers shall be equipped with antiturn solderless, pressure type connectors. All provisions shall be located at the bottom of the panelboard and be fully bussed complete with all necessary mounting hardware less the breaker.

2.06 HARDWARE, SUPPORTS, BACKING, ETC.:

A. Provide all hardware, supports, backing and other accessories necessary to install electrical equipment. Wood materials shall be plastic lumber or composite wood - polymer material, iron or steel materials shall be galvanized for corrosion protection, and non-ferrous materials shall be stainless steel or bronze. Provide Type 316 stainless steel materials where indicated.

B. Bolt, nuts, washers, and screws used for outside shall be high quality stainless steel or brass.

C. Channel shall be heavy duty, fiberglass, glass reinforced polyester or vinyl ester resin, 1-5/8" x 1-5/8" x ¼", or 1-5/8" x 1-5/8" x 12 gauge stainless steel UNISTRUT and B-Line.

D. Concrete: Ready mix type with 3000 PSI compressive strengths. Concrete material and aggregates shall conform to latest ASTM Specifications. Concrete aggregates for ductlines shall be 3/4" maximum in size.

E. Backfill Material Type A: Black or beach sand, earth or earth and gravel mixture. If earth and gravel mixture, rock size shall be one inch or smaller and shall not contain more than 50% rock particles by volume. This fill shall be used over concrete encased ducts.

PART 3 – EXECUTION

3.01 RACEWAYS:

A. Use PVC, EMT and rigid steel conduits with approved coupling and connectors. All cuts square, using saw. Ream the ends. Bends made with approved tools. Reject flattened or crushed conduit. No running thread. Bushing and two locknuts at connection to boxes and enclosures.

B. Seal against water during construction. Risers must be closed, except when pulling conductors.

C. Exposed conduit runs shall be parallel and/or perpendicular to structural elements.

D. Provide nylon pull string of 200-pound minimum tensile strength in all empty conduits in excess of 15 feet in length.

E. Use PVC underground. Use rigid steel conduits in locations exposed to weather. Use EMT in interior locations.

3.02 BOXES:

Plumb and securely fasten. Remove all debris from interior.

3.03 CONDUCTORS:

A. Lubricants: Non-wax type, chemically neutral to insulation.

B. Clean all raceways, boxes, and enclosures before pulling wires and cables. Form neatly in enclosures for minimum of crossovers.

3.04 MISCELLANEOUS DETAILS:

A. Provide necessary foundations, supports, backing, etc., for all raceways, junction boxes, and equipment. Attach to wood and steel by screws or bolts. Attach to concrete by expansion anchors. Powder charge driven studs and anchors shall not be used.

B. Clean all surfaces of enclosures and equipment.

C. Close all unused knockout holes.

3.05 PAINTING:

A. Wipe clean of dirt, oil, grease, etc., all new electrical equipment and raceways with rag and solvent, prime and finish to match surrounding finish. Do not paint over nameplate.

B. All new surface-mounted boxes and exposed raceways shall be painted to match the color of adjacent surfaces.

3.06 TESTING:

A. Upon completion of this portion of work, and prior to its acceptance by the State of Hawaii, make all required tests and secure all required approval from agencies having jurisdiction. Any deficiencies found shall be rectified and work affected by such deficiencies shall be completely retested at Contractor's expense. Written notification of all proposed tests shall be provided to the Engineer a minimum of 14 days prior to the date of the test.

B. Perform an operational test after completion of the installation in the presence of the Engineer, to assure proper operation of all items of work. Remove all grounds and shorts.

END OF SECTION