DIVISION OF FORESTRY AND WILDLIFE

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

BOARD OF LAND AND NATURAL RESOURCES

Suzanne D. Case
Chairperson

CONTRACT SPECIFICATIONS AND PLANS

Job No. 500CH15A
Puu Waawaa Structure Improvements and Dam Compliance
Puu Waawaa (Mauka), North Kona, Hawaii

Civil Engineer: Inaba Engineering, Inc.
Land Surveyor: Inaba Engineering, Inc.

May 2016

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

CONTRACT SPECIFICATIONS AND PLANS

Job No. 500CH15A
Puu Waawaa Structure Improvements and Dam Compliance
Puu Waawaa (Mauka), North Kona, Hawaii

Approved: _____
DAVID G. SMITH
Administrator
Division of Forestry and Wildlife

Approved: _____
CARTY S. CHANG, P.E.
Chief Engineer
Engineering Division

May 2016

NOTICE TO BIDDERS iii

INFORMATION AND INSTRUCTIONS TO BIDDERS I-1

PROPOSAL P-1

SPECIAL PROVISIONS..... SP-1

DETAILED SPECIFICATIONS S-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 BIDS for Job No. 500CH15A, Puu Waawaa Structure Improvements and Dam Compliance, Puu Waawaa (Mauka), North Kona, Hawaii shall be submitted to the Department of Land and Natural Resources, Engineering Division on the specified date and time through the Hawaii State e-Procurement (HIePRO). HIePRO is accessible through the State Procurement Office website at www.spo.hawaii.gov.

The Department of Land and Natural Resources Interim General Condition, dated October 1994, as amended, and the General Conditions –AG008, latest revision shall be made part of the specifications.

The project is located at TMK (3) 7-1-001:006, 007, Puu Waawaa Forest Reserve, Puu Waawaa (Mauka), North Kona, Hawaii.

The work shall generally consist of construct dam compliance and water system improvements as indicated in the plans, including clearing and grubbing, excavation and embankment, HDPE reservoir liner, HDPE surface catchment liner, HDPE and PVC piping, fittings and accessories, pressure breaker tanks, air release valve units, concrete and cmu catchment gutters, steel water tanks repair and coatings, and all other necessary and appurtenant work related to construction.

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

A voluntary pre-bid conference will be held on May 19, 2016 at 9:00 am just inside the main uphill entrance gate to the Puu Waawaa Forest Reserve (project site), off the Mamalahoa Highway just past the 22 mile marker if you are driving from Kailua Kona. The exact meeting spot will be just inside the gate on the left 100 yards down the road at the hiker-check in station; open the gate – let yourself through and close the gate behind you.

All interested parties are invited to attend a State conducted site visit that will start immediately following the pre-bid conference mentioned above. It is highly recommended that all interested parties attend the site visit to become familiar with the existing field conditions, the possible staging area(s), and work (roadway adjacent to the Lake House Reservoir, Hale Piula catchment and steel tanks, Poohohoo Reservoirs Nos. 1 and 2, waterline alignment, and breaker tank locations). All attendees shall stay the entire site visit due to access through secured gates, and provide their own 4x4 vehicle, food, water, etc. The Site Visit is anticipated to start around 9:30 am and end around 4:00 pm.

Directions to the Puu Waawaa Forest Reserve (project site) for the pre-bid conference and site visit, refer to the "Information and Instruction to Bidders, Item KK".

The estimated cost of construction is $4,000,000.00.

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

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

The estimated cost of construction is $250,000 or more, the apprenticeship agreement preference pursuant to Hawaii Revised Statutes §103-55.6 (ACT 17, SLH 2009) shall apply.

Should there be any questions, please refer to the HIePRO solicitation.

INFORMATION AND INSTRUCTIONS TO BIDDERS

CONTENTS

		Page
A	Project Location and Scope of Work	I-2
B	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	Evaluation Criteria	I-3
L	Method of Award	I-4
M	Successful Bidder to File Performance and Payment Bonds	I-4
N	Number of Executed Original Counterparts of Contract Documents	I-4
O	Change Orders	I-4
P	Wages and Hours	I-4
Q	Permits	I-5
R	Property Damage	I-5
S	Time	I-5
T	Bidder's Responsibility to Provide Proper Superintendence	I-5
U	Liquidated Damages	I-5
V	Hiring of Hawaii Residents	I-6
W	Water and Electricity	I-6
X	Public Convenience and Safety	I-6
Y	Work to be Done Without Direct Payment	I-6
Z	As-Built Drawings	I-6
AA	Asbestos Containing Materials	I-7
BB	Worker Safety	I-7
CC	Toilet Facilities	I-7
DD	Signs	I-7
EE	Field Office for Department	I-7
FF	Quantities	I-7
GG	Other Health Measures	I-7
HH	Hawaii Business Requirement	I-8
II	Compliance With §3-122-112 HAR	I-8
JJ	Securing The Project Site	I-9
KK	Pre-bid Conference and Site Visit	I-9

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. PROPOSALS: Bidders shall submit their bid, including the completed proposal form, bid bond, and any other documents required by the solicitation as part of their bid through the State of Hawaii e-Procurement System (HIePRO). See Item 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 questionnaire. When requested by the State, 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.

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.

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. EVALUATION OF CRITERIA:

1. The total lump sum base bid price and additives will be adjusted to reflect the applicable preferences

2. Evaluating Bids with Additive Bid Items:

a. After bid opening, the State will announce the project control budget. All bids will be evaluated on the basis of the same additive item.

b. After adjusting for applicable preferences, the additives, in their precedence order, are added to the total lump sum base bid price. This (these) sum(s) are compared to the project control budget, and must be within the project control budget.

c. If adding another additive would make the aggregate amount exceed the project control budget for all bidders, no additional additive will be added to the aggregate total amount. This procedure will continue, until adding any remaining additives will result in the aggregate total amount for all the bidders to exceed the project control budget, or until no additional additives remain.

d. The bidder with the lowest aggregate amount, within the project control budget (after application of the various preferences), for the total lump sum base bid plus the additives in their precedence order, is the "Low Bidder" for that project and is designated for award.

e. Additive Bid Example: The project control budget available is $100,000. In the order of precedence, additive bid 1, 2, and 3 are additive bids. After applying the preferences, the bids are ranked lowest price to highest price and are "Bid A", "Bid B", and “Bid C”. Bid A's total lump sum base bid price and three additive bids (in the precedence order) are $80,000, $16,000, $5,000 and $10,000 respectively. Bid B's total lump sum base bid price and three additive bids (in the precedence order) are $82,000, $10,000, $3,000 and $9,000 respectively. Bid C's total lump sum base bid price and three additive bids (in the precedence order) are $85,000, $10,000, $4,000 and $8,000 respectively.

(1) In adding the additives to the bids, the aggregate bid amounts with the first and second additives is under the project control budget for all bids. The third additive is initially skipped since it would cause the aggregate amount of all bids to exceed $100,000.

(2) Bid A's aggregate total is $101,000. Bid B's aggregate total is $95,000. Bid C's aggregate total is $99,000.

(3) Bid B's price including additives 1 and 2 is the lowest bid price (over Bid C) and has an aggregate amount within the adjusted project control budget, and therefore is designated the "Low Bidder" for the project.

L. METHOD OF AWARD:

1. The contract will be awarded to the lowest responsive and responsible Bidder whose bid (including any additive which may be selected) meets the requirements and criteria set forth in the solicitation documents and as determined by the Comptroller.

2. In the event the Lump Sum Base Bid of all bidders exceeds the project control budget, the Department reserves the right to make an award to the bidder with the lowest total lump sum base bid, after application of the preferences is designated, if additional funds are available or by reducing the scope of work through negotiation.

M. 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.

N. 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.

O. 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.

P. 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.

Q. 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.

The Contractor shall obtain and pay for all permits required by the County of Hawaii.

R. 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.

S. 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.

T. 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.

U. 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.

V. HIRING OF HAWAII RESIDENTS: The Contractor shall comply with Act 68, SLH 2010, in the performance and for the duration of this contract. The Contractor shall ensure that Hawaii residents compose not less than eighty percent of the workforce employed to perform the contract work on the project. The eighty percent requirement shall be determined by dividing the total number of hours worked on the contract by Hawaii residents, by the total number of hours worked on the contract by all employees of the Contractor in the performance of the contract. The hours worked by any Subcontractor of the Contractor shall count towards the calculation for this section. The hours worked by employees with shortage trades, as determined by the Department of Labor and Industrial Relations (DLIR), shall not be included in the calculation for this section.

The requirements shall apply to any subcontract of $50,000 or more in connection with the Contractor, that is, such Subcontractors must also ensure that Hawaii residents compose not less than eighty percent of the Subcontractor's workforce used to perform the subcontract.

W. 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.

There is limited catchment water available at the site. Site DOFAW staff, in coordination with the ranch lessee, shall determine the availability of onsite water, if any, for the contractors use. This water is not suitable for any concrete or mortar work, but may be used for dust control, compaction, and other non-concrete/cement activities.

X. 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.

Y. 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.

Z. 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 for review and approval. After the Engineer approves the as-built drawings, the contractor shall submit an electronic copy in Adobe PDF format on CD ROM.

AA. 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

BB. 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.

CC. 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.

DD. 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.

When indicated in the Proposal, the Contractor shall provide a project sign, size 4'-0" x 7'-0" to be placed as directed by the Engineer. The sign shall be constructed in accordance with Section 01581 - Project Sign of these specifications and approved by the Engineer. All wording, type and size of lettering and color selection shall be as specified in these specifications or as approved by the Engineer.

All signs shall be kept neat and clean, and properly erected at all times.

EE. FIELD OFFICE AREA FOR DEPARTMENT: When indicated in the Proposal, the Contractor shall provide a housed working area of at least 100 square feet adjacent to the Contractor's office for the Department's use. This area will be used by the Engineer to perform tests and to store equipment. As a minimum, the field office shall include the following: standard sized office desk and chair, lighting, ventilation, window-type air conditioning rated at 5,000 BTU, door and window with locking hardware, electrical outlets, and working communications facilities (a cellular telephone is acceptable). The Department will pay for all long distance toll charges made by the Engineer.

FF. 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.

GG. 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.

HH. 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.

II. 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 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.

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 the bidder's status is compliant with the requirements of §103D-310(c), HRS, and 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.

JJ. SECURING THE PROJECT SITE: The Contractor shall be responsible to become informed of, follow, and comply with all DOFAW requirements for access to the PuuWaawaa project area. The Contractor shall not hold the State of Hawaii responsible for any damage to, or loss of property or construction equipment and materials due to an unsecured site. The Contractor shall coordinate access with DOFAW staff to gain entry into areas secured with locked gates.

The Contractor must traverse areas that are in active cattle ranching operations. Any damage caused by contractor operations to existing gates, fences, enclosures, waterlines, etc. shall be immediately repaired at the contractors expense. Livestock will be encountered when traversing the site. The Contractor will be held responsible for all injury or loss to livestock as a result of the Contractor's fault or negligence.

KK. PRE-BID CONFERENCE AND SITE VISIT: A voluntary pre-bid conference will be held on May 19, 2016 at 9:00 am just inside the main uphill entrance gate to the Puu Waawaa Forest Reserve (project site), off the Mamalahoa Highway just past the 22 mile marker if you are driving from Kailua Kona. The exact meeting spot will be just inside the gate on the left 100 yards down the road at the hiker-check in station; open the gate – let yourself through and close the gate behind you.

All interested parties are invited to attend a State conducted site visit that will start immediately following the pre-bid conference mentioned above. It is highly recommended that all interested parties attend the site visit to become familiar with the existing field conditions, the possible staging area(s), and work (roadway adjacent to the Lake House Reservoir, Hale Piula catchment and steel tanks, Poohohoo Reservoirs Nos. 1 and 2, waterline alignment, and breaker tank locations). All attendees shall stay the entire site visit due to access through secured gates, and provide their own 4x4 vehicle, food, water, etc. The Site Visit is anticipated to start around 9:30 am and end around 4:00 pm.

Detailed Directions to Puu Waawaa:

From Kona:
From Kona Airport – as you exit Kona International Airport at Keahole, take a right onto Queen Kaahumanu Highway (Highway 19). After less than a minute, take your next left at the light onto Kaiminani Drive. Follow Kaiminani Drive uphill 3.6 miles to the Mamalahoa Highway (also called the Belt Road, or Highway 190), take a left. Follow ~ 12 miles (20 minutes) to Mile Marker 22.
The main entrance to Puu Waawaa Forest Reserve is just after the 22 mile marker on the Mamalahoa Highway (Highway 190). Just past the 22 mile marker on the right side of the road (uphill side) you will see a mail box stand and a metal gate with signs that say: "Keep Gate Closed" attached to the gate. The gate is normally locked 6 pm to 6 am. Open the gate and let yourself through and then close the gate behind you. Travel time from Kailua Kona to Puu Waawaa main entrance takes roughly 40 minutes (19 miles).

From Waimea:
From Waimea, travel 21 miles along the Mamalahoa Highway, heading south. The main entrance to Puu Waawaa Forest Reserve is off of the Mamalahoa highway (Highway 190) just after the town of Puu Anahulu. You will pass the 21 mile marker, then the Big Island Country Club golf course on your right, followed by the Puu Lani Subdivision on your left. The road then curves down the Puu Anahulu bluff past a church on your left and when it straightens out at the bottom you will see a left turn with a metal gate and a mail box stand. The metal gate has signs

that say: “Keep Gate Closed” attached to the gate. The gate is normally locked 6 pm to 6 am. Open the gate and let yourself through and then close the gate behind you. Travel time from Waimea (Kamuela) to the main gate is about 45 minutes (23 miles).

P R O P O S A L
FOR

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
State of Hawaii

JOB NO. 500CH15A
PUU WAAWAA STRUCTURE IMPROVEMENTS AND DAM COMPLIANCE
PUU WAAWAA (MAUKA),
NORTH KONA, HAWAII

_____, 2016

Chief Engineer
Engineering Division
Department of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

Dear Sir:

The undersigned, having carefully examined the local conditions and all available records and information covering conditions which may affect the cost of the work to be performed, and having carefully examined the Plans and Specifications, and other contract documents, hereby proposes to furnish and pay for all materials, tools, equipment, labor and other incidental work necessary to construct dam compliance and water system improvements as indicated in the plans, including clearing and grubbing, excavation and embankment, HDPE reservoir liner, HDPE surface catchment liner, HDPE and PVC piping, fittings and accessories, pressure breaker tanks, air release valve units, concrete and cmu catchment gutters, steel water tanks repair and coatings, and all other necessary and appurtenant work related to construction as required or called for in this Proposal, all according to the true intent and meaning of the Notice to Bidders, Information and Instructions to Bidders, Proposal, Detailed Specifications, Interim General Conditions, Plans, and any and all addenda for:

JOB NO. 500CH15A
PUU WAAWAA STRUCTURE IMPROVEMENTS AND DAM COMPLIANCE
PUU WAAWAA (MAUKA), NORTH KONA, HAWAII

on file in the office of the Engineering Division for the TOTAL SUM BASE BID (Items 1 to 52) of:

_____

_____Dollars ($_____)

and will fully complete all work under this contract within 360 consecutive calendar days from the date of written notice to proceed, including date of said order, said total sum being itemized on the following pages.

ADDITIVE BID ITEMS

The bidder further proposes to incorporate in the work Additive Bid Items (Items 53 to 73) as described on the drawings and specification Section –01230 ADDITIVE BID ITEMS for the following amounts:

For the purposes of bid evaluation, the additives are listed in the order of priority in which they will be added to the Lump Sum Base Bid.

Additive Bid No. 1:

STEEL TANK NO. 2 AND CATCHMENT 2B
Items 53 – 66 inclusive.
Add the sum of:

_____

_____Dollars ($_____)

Additive Bid No. 2:

4" HDPE WATERLINE – POOHOHOO TO LAKE HOUSE
Items 67 - 73 inclusive.
Add the sum of:

_____

_____Dollars ($_____)

The Bidder must completely fill in the dollar amounts for each Additive, where the work will be performed at no cost to the State, fill in "$0.00" as the dollar amount. If additive dollar amounts are left blank, the proposal will be rejected as being an "irregular proposal".

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price

P R O P O S A L

The Contractor shall include furnishing and installing the following items, complete and in place, including, but not limited to, all clearing, grubbing, removal of excess and unsuitable material, excavation, embankments, trench excavation, grading, pipe cushion materials, backfill, compaction testing, pipe materials, pipe brackets, concrete thrust and reaction blocks, joint restraints, fittings, valves, pipes, nipples, testing, site work, HDPE liners, geotextiles, concrete, reinforcing, cmu, crm, steel tank repair and accessories, sand blasting and coatings, and all necessary and required incidentals and appurtenant work, in place complete and operable per plans and specifications. All work shall be according to the Plans, Specifications, and referenced standards, as amended, in place complete and ready for use as intended.

BASE BID:

GENERAL

1.	L.S.	L.S.	Project Sign	Lump Sum	$_____
2.	L.S.	L.S.	NPDES Permit Compliance. Completion of permit information for Contractor specific data such as contractor information and project contacts, site specific BMP's, and Notice of Intent, etc., for construction phase.	Lump Sum	$_____
3.	L.S.	L.S.	Site BMP measures for water pollution and erosion control during construction phase of project, including installation, maintenance, and removal at end of project	Lump Sum	$_____

LAKE HOUSE RESERVOIR

4.	L.S.	L.S.	Site clearing and grubbing, including removal and proper disposal of excess and deleterious material, site preparation for general fill, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
5.	615	C.Y.	Unclassified site and reservoir embankment, including placing, spreading, grading and compacting, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price
6.	64	L.F.	6" PVC Pipe, Schedule 80, (horizontal distance) for future connection, including vertical pipe, fittings, trench excavation, cushion, backfill, testing and all necessary incidental and appurtenant work, in place complete.	$_____	$_____
7.	1	Each	1½" Fire Hose Connection to existing reservoir 6-Inch PVC effluent pipeline, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
8.	3	Each	HDPE Liner Safety Ladder, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
	POOHOHOO RESERVOIR NO. 2				
9.	L.S.	L.S.	Site Clearing and grubbing, vegetation removal and disposal, site preparation for excavation and embankment.	Lump Sum	$_____
10.	L.S.	L.S.	Proper removal and disposing of all existing butyl liner within the abandoned earth reservoir, including all necessary incidental and appurtenant work.	Lump Sum	$_____
11.	7,068	C.Y.	Unclassified Excavation for wall breach work, grading to specified grades, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
12.	7,095	C.Y.	Embankment, fill and backfill work, compaction, finish grading, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
13.	L.S.	L.S.	Site surface restoration of disturbed areas to allow proper regrowth of existing Kikuyu pasture grass, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
	POOHOHOO RESERVOIR NO. 1				
14.	L.S.	L.S.	Vegetation removal for helicopter clear zone, side slopes as indicated on the plans, and reservoir liner areas.	Lump Sum	$_____

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price
15.	L.S.	L.S.	Subgrade preparation prior to installing new liner in reservoir.	Lump Sum	$_____
16.	59,000	S.F.	Non-woven geotextile liner, 10 ounce, for reservoir, preparatory to laying the HDPE liner, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
17.	59,000	S.F.	HDPE smooth liner, 80-mil thickness, for reservoir, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
18.	3	Each	HDPE Liner safety ladder, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
19.	1	Each	3” G.I. Pipe penetration through HDPE liner, including reinforced concrete collar, pipe boot sleeve, stainless steel clamps, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
20.	1	Each	6” PVC Pipe penetration through HDPE liner, including reinforced concrete collar, pipe boot sleeve, stainless steel clamps, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
21.	L.S.	L.S.	Clean and inspect existing 3” galvanized iron pipe effluent, including pressure testing, inlet and outlet fittings, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
22.	145	L.F.	6” PVC pipe, schedule 80, for reservoir effluent, including, trenching, cushion backfilling, proper compaction, inlet and outlet fittings, pressure testing, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
23.	L.S.	L.S.	CRM Headwall for 6” PVC effluent pipe, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
24.	L.S.	L.S.	Water Level Control per Detail Sheet C-7, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price
4" HDPE WATERLINE - HALE PIULA TO POOHOHOO					
25.	11,950	L.F.	4" HDPE DR-9 Pipe, surface installation, joined by thermal butt fusion joints, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
26.	280	L.F.	4" HDPE DR-9 Pipe, trench installation, joined by thermal butt fusion joints, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
27.	1	Each	Air Release Valve Unit with fire hose connection, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
28.	13	Each	Air Release Valve Unit, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
29.	1	Each	Pressure Break Tank Unit, including site preparation, trenching, backfill, piping & valve controls, concrete slab, tank, fencing, and all necessary incidental and appurtenant work, in place complete.	$_____	$_____
30.	1	Each	4" Influent Pipe and Concrete Pedestal Unit, including piping, fittings, valves, straps, and all necessary incidental and appurtenant work, in place complete.	$_____	$_____
31.	L.S.	L.S.	Station ±0+00, Connection to existing steel tank effluent and overflow piping, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
32.	L.S.	L.S.	400 L.F. 4" HDPE Bypass tank piping at Hale Piula Site; install misc. piping, valves, fittings and connections to connect, and bypass Steel Tank No. 1.	Lump Sum	$_____
STEEL TANK NO. 1 AND CATCHMENT 1					
33.	L.S.	L.S.	Vegetation Removal for Helicopter Clear zone and around steel tank and side slopes.	Lump Sum	$_____
34.	L.S.	L.S.	30-feet wide vegetation clear zone around entire Hale Piula site, including clear and grub, grading vehicle access and vegetation removal.	Lump Sum	$_____

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price
35.	L.S.	L.S.	Remove and properly dispose of existing metal roofing for catchment areas 1 and 2B, including gutters, wood framing, (salvage wood if possible), loose metal roofing around site, wire rolls, old fencing, etc.	Lump Sum	$_____
36.	L.S.	L.S.	Vegetation removal and ground preparation for HDPE liner in Catchment Area 1 and 2B, including excavation, embankment, grading, rolling, and all necessary work preparatory to laying HDPE liner.	Lump Sum	$_____
37.	L.S.	L.S.	Maintain steel flume for catchment water flow from Catchment Area 2A into Steel Tank No. 2.	Lump Sum	$_____
38.	L.S.	L.S.	Drain, Clean, Sandblast Steel Tank No. 1, as required, preparatory to properly apply surface coatings, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
39.	15	Units	Remove and replace corroded nuts and bolts, per unit of 100 nuts and bolts replaced, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
40.	L.S.	L.S.	Replace interior and exterior ladder, including safety-climb, safety harness, platforms, railings, etc., including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
41	L.S.	L.S.	Replace water level indicator, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
42.	L.S.	L.S.	Restore, repair, and replace outlet piping and valves, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
43.	L.S.	L.S.	Protective coating for interior of steel tank, base and finish coat per manufacturer requirements, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
44.	L.S.	L.S.	Protective coating for exterior of steel tank, base and finish coat per manufacturer requirements, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price
45.	L.S.	L.S.	Restore and repair inlet flume and support framing, sandblast and paint framing, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
46.	205	L.F.	Catchment Gutter, Reinforced concrete and CMU wall, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
47.	160	L.F.	Reinforced Concrete Anchor Footing for HDPE liner including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
48.	160	L.F.	Patch and seal existing rock wall and concrete/mortar apron along concrete anchor footing, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
49.	L.S.	L.S.	Flume Intake Box, reinforced concrete apron connection including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
50.	124,300	S.F.	Non-woven geotextile liner, 10 ounce, for reservoir, preparatory to laying the HDPE liner, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
51.	124,300	S.F.	HDPE Textured liner, both sides, 80-mil thickness, for reservoir, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
			Sub Sum Base Bid (Items 1-51, inclusive)		$_____
52.	L.S.	L.S.	Mobilization and demobilization. Not to exceed 10 percent of the Sub Sum of Base Bid, excluding the bid price for mobilization and demobilization.	Lump Sum	$_____
			Total Sum Base Bid (Items 1-52, inclusive)		$_____

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price
			ADDITIVE BID NO. 1 STEEL TANK NO. 2 AND CATCHMENT 2B		
53.	L.S.	L.S.	Vegetation Removal around steel tank and side slopes.	Lump Sum	$_____
54.	L.S.	L.S.	Inlet flume temporary bypass. Provide temporary bypass flume/pipe to direct catchment Area 2B water into Catchment Area 1.	Lump Sum	$_____
55.	L.S.	L.S.	Drain, Clean, Sandblast Steel Tank No. 2, as required, preparatory to properly apply surface coatings, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
56.	15	Units	Remove and replace corroded nuts and bolts, per unit of 100 nuts and bolts replaced, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
57.	L.S.	L.S.	Replace interior and exterior ladder, including safety-climb, safety harness, platforms, railings, etc., including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
58.	L.S.	L.S.	Replace water level indicator, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
59.	L.S.	L.S.	Restore, repair, and replace outlet piping and valves, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
60.	L.S.	L.S.	Protective coating for interior of steel tank, base and finish coat per manufacturer requirements, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
61.	L.S.	L.S.	Protective coating for exterior of steel tank, base and finish coat per manufacturer requirements, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
62.	L.S.	L.S.	Restore and repair inlet flume and support framing, sandblast and paint framing, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price
63.	206	L.F.	Catchment Gutter, Reinforced concrete and CMU wall, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
64.	L.S.	L.S.	Flume Intake Box. Reinforced concrete apron connection including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
65.	61,740	S.F.	Non-woven geotextile liner, 10 ounce, for reservoir, preparatory to laying the HDPE liner, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
66.	61,740	S.F.	HDPE Textured liner, both sides, 80-mil thickness, for reservoir, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
			Total Sum ADDITIVE BID NO. 1 (Items 53 – 66 inclusive)	$_____	

ADDITIVE BID NO. 2
4" HDPE WATERLINE – POOHOHOO TO LAKE HOUSE

67.	16,770	L.F.	4" HDPE DR-9 Pipe, Surface installation, joined by thermal butt fusion joints, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
68.	590	L.F.	4" HDPE DR-9 Pipe, Trench installation, joined by thermal butt fusion joints, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
69.	3	Each	Air Release Valve Unit with fire hose connection, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
70.	3	Each	Air Release Valve Unit, including all necessary incidental and appurtenant work, in place complete.	$_____	$_____
71.	3	Each	Pressure Break Tank Unit, including site preparation, trenching, backfill, piping & valve controls, concrete slab, tank, fencing, and all necessary incidental and appurtenant work, in place complete.	$_____	$_____

Item No.	Approx. Quantity	Unit	Description	Unit Price	Total Price
72.	1	Each	4” Influent Pipe and Concrete Pedestal Unit, including piping, fittings, valves, straps, and all necessary incidental and appurtenant work, in place complete.	$_____	$_____
73.	L.S.	L.S.	Connection to Reservoir No. 1 outlet control piping, including all necessary incidental and appurtenant work, in place complete.	Lump Sum	$_____
			Total Sum ADDITIVE BID NO. 2 (Items 67 - 73 inclusive)	$_____	

HAWAII PRODUCTS PREFERENCE AND/OR USE OF HAWAII PRODUCTS

In accordance with Act 175, SLH 2009, the Hawaii products preference is applicable to this solicitation. Hawaii products may be available for items noted on the Offer Form. The Hawaii Products List is available on the SPO web page at http://hawaii.gov/spo. Click on Procurement of Goods, Services and Construction - Chapter 103D, HRS; under Procurement click on Preferences, Hawaii Products and select Hawaii Products List to view.

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

Persons desiring to qualify their product(s) not currently on the Hawaii Product List, shall complete Form SPO-38, *Certification for Hawaii Product Preference*, and submit the completed form to the Procurement Officer providing any additional information required by the Procurement Officer. One form shall be completed and submitted for each product. Form SPO-38 is available on the SPO web page at http://hawaii.gov/spo, under the Quicklinks menu click on Forms for Vendors/Contractors/Services Providers.

For the purpose of selecting the low bid when a solicitation contains both HP and non-HP, the price offered for a HP item shall be decreased by subtracting 10% for the class I or 15% for the class II HP item(s) offered. The lowest total offer, taking the preference into consideration, shall be awarded the contract, unless the offer provides for additional award criteria. The contract amount of any contract awarded, however, shall be the amount of the price offered, exclusive of the preferences.

In the event of any change that materially alters the bidder's ability to supply the Hawaii product(s), the bidder shall immediately notify the procurement officer in writing and the parties shall enter into discussions for the purpose of revising the contract or terminating the contract for convenience.

Item No.	Pre-Approved Hawaii Product Description & Manufacturer	Class (I or II)	Quantity	Unit Measure	Unit Price	Total Price

RECYCLED PRODUCTS PREFERENCE

This project allows a 10% price preference for recycled products in accordance with HRS 103D-1005. Please indicate your recycled or non-recycled product by indicating its cost FOB jobsite unloaded in the schedule below, including applicable General Excise & Use Taxes.

DESCRIPTION	RECYCLED PRODUCT COST	NON-RECYCLED PRODUCT COST
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____
_____	$_____	$_____

The bidder requesting a recycled product preference shall also complete and submit the form "CERTIFICATION OF RECYCLED CONTENT" as shown in the Interim General Conditions and provide all supporting information with this proposal. Additional information may be requested to qualify a product.

The following definitions are applicable to the CERTIFICATION OF RECYCLED CONTENT form:

"Post-consumer recovered material" means any product used by a consumer, including a business that purchases the material, hat has served its intended end use, and that has been separated or diverted from the solid waste stream for the purpose of use, reuse, or recycling.

"Product" includes materials, manufactures, supplies, merchandise, goods, wares, and foodstuffs.

"Recovered Material" means waste material and by-products that have been separated, diverted, or removed from the solid waste stream after a manufacturing process for the purpose of use, reuse, or recycling. Recovered material does not include those materials and by-products that are generated and normally reused on-site or within original manufacturing processes (such as mill broke, in the case of paper products.)

"Recycled content," means the percentage of a product composed of recovered material, or post-consumer recovered material, or both.

"Recycled product," means a product containing recovered material, or post-consumer recovered material, or both.

The bidder agrees that preference for recycled products shall be taken into consideration to determine the low bidder in accordance with said Section and the rules promulgated, however, the award of contract will be in the amount of the bid offered exclusive any preference.

APPRENTICESHIP AGREEMENT PREFERENCE

1. If applicable to this project, any bidder seeking the preference must be a party to an apprenticeship agreement registered with the State Department of Labor and Industrial Relations (DLIR) at the time the bid is submitted for each apprenticeable trade the bidder will employ to construct the project. "Employ," means the employment of a person in an employer-employee relationship.

    a. The apprenticeship agreement shall be registered with the DLIR and conform to the requirements of Hawaii Revised Statutes Chapter 372.

    b. Subcontractors do not have to be a party to an apprenticeship agreement for the bidder to obtain preference.

    c. The bidder is not required to have apprentices in its employ at the time the bid is submitted to qualify for the preference.

2. A bidder seeking the preference must state the apprenticeable trade the bidder will employ for each trade to be employed to perform the work by submitting a completed signed original *Certification Form 1* verifying participation in an apprenticeship program registered with DLIR. "Apprenticeable trade" shall have the same meaning as "apprenticeable occupation" pursuant to Hawaii Administrative Rules (HAR) § 12-30-5.

    a. The *Certification Form 1* shall be authorized by an apprenticeship sponsor listed on the DLIR list of registered apprenticeship programs. "Sponsor" means an operator of an apprenticeship program and in whose name the program is approved and registered with the DLIR pursuant to HAR §12-30-1.

    b. The authorization shall be an original signature by an authorized official of the apprenticeship sponsor.

    c. The completed signed original *Certification Form 1* for each trade must be submitted with the bid. Previous certifications shall not apply.

    d. When filling out the *Certification Form 1*, the name of Apprenticeable Trade and Apprenticeship Sponsor must be the same as recorded in the List of Construction Trades in Registered Apprenticeship Programs that is posted on the DLIR website. ARegistered apprenticeship program@ means a construction trade program approved by the DLIR pursuant to HAR §12-301 and §12-30-4.

    e. The *Certificate Form 1* and the List of Construction Trades in Registered Apprenticeship Programs is available on the DLIR website at: http://hawaii.gov/labor/wdd.

3. Upon receiving the *Certification Form 1*, the Procurement Officer will verify that the apprenticeship program is on the List of Construction Trades in Registered Apprenticeship Programs and that the form is signed by an authorized official of the Apprenticeship Program Sponsor. If the programs and signature are not confirmed by the DLIR, the bidder will not qualify for the preference.

4. If the bidder is certified to participate in an apprenticeship program for each trade which will be employed by the bidder for the project, a preference will be applied to decrease the bidder's bid amount by five percent (5%) for evaluation purposes.

5. Should the bidder qualify for other preferences (e.g. Hawaii Products), all applicable preferences shall be applied to the bid price.

CONTRIBUTIONS BY STATE AND COUNTY CONTRACTORS PROHIBITED

Contractors are hereby notified of the applicability of Section 11-355, HRS, which states that campaign contributions are prohibited from specified State or County government contractors during the term of the contract if the contractors are paid with funds appropriated by a legislative body.

CONDITION OF AWARD

It is understood that the award of the contract will be made on the basis of the lowest responsible Total Base Bid (Items 1 to52), and selected Additive Bid Alternate(s) in accordance to the "Information and Instruction to Bidders," Items, K and L, and as selected by the Board of Land and Natural Resources. Write the total of Base Bid Items 1 to 52 on page P-1 and Additive Bid Items 53 to 73 on page P-2.

In the event the low bid is below the available funds certified by the appropriate fiscal officer, the head of the purchasing agency responsible for the procurement in question is authorized to award Additives to the lowest bidder. The award of Additives may be in any order or combination such that the Base Bid plus Additives do not exceed the available funds

It is understood and agreed that the Board of Land and Natural Resources reserves the right to reject any and/or all bids and waive any defects when in the Board's opinion, such rejection or waiver will be for the best interest of the State of Hawaii.

In the event all bids exceed available funds certified by the appropriate fiscal officer, the head of the purchasing agency responsible for the procurement in question is authorized in situations where time or economic considerations preclude re-solicitation of work of a reduced scope to negotiate an adjustment of the bid price, including changes in the bid requirements, with the low responsible and responsive bidder, in order to bring the bid within the amount of available funds. It is understood and agreed upon that the head of the purchasing agency may delete a portion or all of any item(s) in the proposal at the stated unit or lump sum price as necessary to stay within the available funding. The bidder is responsible to make an earnest effort to represent the actual cost of each item, including all materials, labor, equipment, overhead and profit in their bid proposal to preclude claims of anticipated profit or loss of profit because of an unbalanced bid proposal.

It is also understood that if a mutually agreeable cost for the reduced scope of work necessitated by a lack of available funds cannot be agreed upon between the bidder and the head of the purchasing agency within fourteen (14) calendar days after the bid opening, then the bid may be rejected in the best interest of the purchasing agency, and the head of the purchasing agency may negotiate in progressive order (lowest to highest) with the next lowest responsible and responsive bidder.

It is also understood and agreed that the award of the contract shall be conditioned upon funds being made available for this project and further upon the right of the Board of Land and Natural Resources to hold all bids received for a period of sixty (60) days form the date of the opening thereof, unless otherwise required by law, during which time no bid may be withdrawn.

It is also understood that Notice to Proceed may be delayed up to one (1) year after the bid opening date, and that no additional compensation will be provided for any claim for escalation or delay for issuance of Notice to Proceed on or before that date.

It is also understood and agreed that the quantities given herewith are approximate only and are subject to increase of decrease, and that the undersigned will perform all quantities of work as either increased or decreased, in accordance with the provisions of the Contract Specifications.

It is also understood and agreed that the estimated quantities shown for the items for which a UNIT PRICE is asked in this Proposal are only for the purpose of comparing on a uniform basis, bids offered for the work under this contract, and the undersigned agrees that he is satisfied with, and will at no time dispute

said estimated quantities as a means of claims for anticipated profit or loss of profit because of a difference between the quantities of the various classes of work done or the materials and equipment installed, and the said estimated quantities. On UNIT PRICE bids, payment will be made only for the actual number of units incorporated into the finished project at the contract UNIT PRICE.

After the proposals are opened and read, the figures will be extended and/or totaled in accordance with the bid prices of the acceptable proposals and the totals will be compared. In the comparison of bids, words written in the proposal shall govern over figures and unit prices will govern over totals. Until the award of the contract, however, the right will be reserved to reject any and all proposals and to waive any defects or technicalities as may be deemed best for the interest of the State.

It is also understood and agreed that liquidated damages in the amount of Two Hundred Dollars and no Cents ($200.00) for each and every calendar day in excess thereof prior to completion of the contract shall be withheld from payments due to the Contractor.

It is also understood and agreed that if this bid is accepted, the successful bidder must enter into and execute a contract with the Board of Land and Natural Resources and furnish a Performance and Payment Bond, as required by law. These bonds shall conform to provisions of Section 103D-324 and 325, Hawaii Revised Statutes and any law applicable hereto.

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

It is also understood that by submitting this proposal, the undersigned is declaring that his firm has not been assisted or represented on this matter by an individual who has, in State capacity, been involved in the subject matter of this contract in the past two years.

It is understood that by submitting this proposal in accordance with HAR 3-122-192, the undersigned is declaring that the price submitted is independently arrived without collusion.

It is also understood that by submitting this proposal, a Certification for Safety and Health Programs for bids in excess of $100,000 (in accordance with HRS 396-18), the undersigned certifies that his organization will have a written safety and health plan for this project that will be available and implemented by the Notice to Proceed date of this project. Details of the requirements of this plan may be obtained from the Department of Labor and Industrial Relations, Occupational, Safety and Health Division (HIOSH).

It is further understood and agreed that the successful bidder shall comply with paragraph 3.1.a "SUBCONTRACTING" of the General Provisions which requires that the contractor shall perform with his own organization and with the assistance of workmen under his immediate superintendence, work of a value not less than twenty percent (20%) of the value of all work embraced in the Contract, except that certain contract items of work, if specifically referred to in the special provisions, will be exempted from said twenty percent requirement.

Compliance with §103-310 HRS. As a condition of award all bidders shall comply with all laws governing entities doing business in the State, including Chapter 237 HRS (general excise tax); Chapter 383 HRS (employment security - unemployment insurance); Chapter 386 HRS (workers compensation);

Chapter 392 HRS (temporary disability insurance), and Chapter 393 HRS (pre-paid health care), and shall produce all documents to the State (DLNR, Engineering Division) required to demonstrate compliance with these subsections. Any bidder making a false affirmation or certification under this subsection shall be suspended and may be debarred from further offerings or awards pursuant to §103D-702 HRS.

RECEIPT OF ADDENDA

The bidder also acknowledges receipt of any and all addenda issued by the Engineering Division, by recording the date of receipt of the respective addenda in the space provided below:

Addendum	Date Received	Addendum	Date Received
No. 1	_____	No. 5	_____
No. 2	_____	No. 6	_____
No. 3	_____	No. 7	_____
No. 4	_____	No. 8	_____

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

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

JOINT CONTRACTORS OR SUBCONTRACTORS TO BE ENGAGED IN THIS PROJECT

The Bidder agrees that the following is a complete listing of all joint contractors or subcontractors covered under Chapter 444, Hawaii Revised Statutes, who will be engaged by the Bidder on this project to perform the required work indicated pursuant to Section 103D-302, Hawaii Revised Statutes. It is the sole responsibility of the contractor to review the requirements of this Project and determine the appropriate licenses that are required to complete the Project. The Bidder certifies that the completed listing of joint contractors or subcontractors fulfills the requirements for the project and the Bidder, together with the listed subcontractors or joint contractors have all the specialty contractor=s licenses to complete the work, except as provided for in HRS §103D-302(b). Failure of the Bidder to comply with this requirement may be just cause for rejection of the bid.

"A" General Engineering Contractors and "B" General Building Contractors are reminded that due to the Hawaii Supreme Court's January 28, 2002 decision in Okada Trucking Co., Ltd. v. Board of Water Supply, et al., 97 Haw. 450 (2002), they are prohibited from undertaking any work, solely or as part of a larger project, which would require the general contractor to act as a specialty contractor in any area in which the general contractor has no license. Although the "A" and "B" contractor may still bid on and act as the "prime" contractor on an "A" or "B" project (See, HRS §444-7 for the definitions of an "A" and "B" project.), respectively, the "A" and "B" contractor may only perform work in the areas in which they have the appropriate contractor's license (An "A" or "B" contractor obtains "C" specialty contractor's licenses either on its own, or automatically under HAR § 16-77-32). The remaining work must be performed by appropriately licensed entities.

General Engineering "A" Contractors automatically have these "C" specialty contractor's licenses: C-3, C-9, C-10, C-17, C-24, C-31a, C-32, C-35, C-37a, C-37b, C-38, C-43, C-49, C-56, C-57a, C-57b and C-61.

General Building "B" Contractors automatically have these "C" specialty contractor's licenses: C-5, C-6, C-10, C-12, C-24, C-25, C-31a, C-32a, C-42a and C-42b.

In completing the Joint Contractors or Subcontractors List, describe the specialty contractor's nature and scope of work to be performed for this project and provide the complete firm name of the joint contractor or subcontractor in the respective columns. If the Bidder is a general contractor providing the work of a required specialty contractor, whose license is not automatically held pursuant to HAR 16-77-32, fill in the Bidder's (general contractor's) name and nature and scope of work to be performed on this project.

List only one joint contractor or subcontractor per required specialty contractor's classification, unless within the same specialty, the work of each joint contractor or subcontractor can be described so that there is no overlap in work descriptions.

If a contractor's license is required by law for the performance of the work which is called for in this bid, the bidder and all subcontractors must have the required license before the submission of the bidder's proposal in the case of a non-federal aid project, and for federal-aid projects, the bidder must have the required license prior to the award of the project and all subcontractors prior to the start of the subcontracted work.

BASE BID:

COMPLETE FIRM NAME OF JOINT CONTRACTOR OR SUBCONTRACTOR	NATURE AND SCOPE OF WORK TO BE PERFORMED

ADDITIVE BID NO. 1:

COMPLETE FIRM NAME OF JOINT CONTRACTOR OR SUBCONTRACTOR	NATURE AND SCOPE OF WORK TO BE PERFORMED

ADDITIVE BID NO. 2:

COMPLETE FIRM NAME OF JOINT CONTRACTOR OR SUBCONTRACTOR	NATURE AND SCOPE OF WORK TO BE PERFORMED

Enclosed herewith is a:

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

(Cross Out Those Not Applicable)

_____

_____Dollars ($_____)

as required by law.

Respectfully submitted,

_____
Name of Company, Joint Venture or Partnership

_____
Contractor's License No.

By_____
Signature (*4)

Title: _____

Print Name: _____

Date: _____

Address: _____

_____

Telephone No.: _____

Fax No.: _____

Email Address: _____

(*5)

NOTES:

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

2. Legal tender; or

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

   A. These instruments may be utilized only to a maximum of $100,000.

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

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

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

END OF PROPOSAL

TABLE OF CONTENTS

DETAILED SPECIFICATIONS

Section	Description	Pages
Section 01019 -	General Specifications	4
Section 01090 -	Standard References	4
Section 01100 -	Archaeological Protection	1
Section 01230 -	Additive Bid Items	2
Section 01300 -	Submittals	3
Section 01505 -	Mobilization and Demobilization	1
Section 01530 -	Barricades	3
Section 01567 -	Pollution Control	3
Section 01581 -	Project Sign	4
Section 01715 -	Existing Conditions -	2
	Limited Asbestos and Lead Paint Survey Report	28
Section 02050 -	Demolition	2
Section 02100 -	Site Preparation	2
Section 02200 -	Earthwork	4
Section 02225 -	Trenching, Backfilling and Compacting	6
Section 02310 -	Geotextile Fabrics	5
Section 02600 -	Water System	3
Section 02620 -	HDPE Pipe	3
Section 02776 -	HDPE Liner	14
Section 02920 -	Lawns & Grass	5
Section 03300 -	Cast in Place Concrete	12
Section 04220 -	Concrete Unit Masonry	7
Section 05500 -	Metal Fabrication	8
Section 05600 -	Metal Specialties	1
Section 09900 -	Painting	7
Section 13281 -	Removal & Disposal of Asbestos-Containing Material	22
Section 13282 -	Lead Hazard Control Measures	20
Section 13288 -	Testing/Air Monitoring	12
Section 15400 -	Plumbing	4

SECTION 01019

GENERAL SPECIFICATIONS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 GENERAL

A. Examination of Premises: The Contractor shall contact the Contracting Officer and obtain permission before visiting the site.

B. All lines and grades shall be established by a licensed surveyor , or licensed Civil Engineer, registered in the State of Hawaii. The Contractor shall submit evidence of current and valid registration.

C. Notices: The Contractor shall notify the Contracting Officer and give at least three (3) working days notice before starting any work.

D. Disruption of Utility Services: All work related to the disconnection of the water system shall be pre-arranged with the Contracting Officer and D.O.F.A.W. staff so that any disruption of such services will be kept to a minimum. In the event of temporary water service hook-ups are required, the Contractor shall provide the necessary services.

E. General Project Phasing:

1. The work shall be prioritized as follows:
   a. Dam compliance work
      1. Work at Lake House Reservoir for roadway improvement
      2. Work at Poohohoo Reservoir No. 2 breech improvement

2. Structure Improvements 1: Improvements shall be coordinated and scheduled to store existing water supplies and maintain the ability to catch water and store water during construction activity.
   a. Poohohoo Reservoir No. 1, install new reservoir liner and appurtenances
   b. Install 4" HDPE pipeline from Hale Piula to Reservoir No. 1,
   c. Transfer water from Steel Tank No. 1 to Reservoir No. 1,
   d. Provide temporary bypass and repair Steel Tank No. 1,
   e. Complete surface catchment system for Steel Tank No. 1,
   f. Transfer water from Steel Tank No. 2 to Steel Tank No. 1 or Reservoir No. 1, and begin repairs to Tank No. 2,
   g. complete catchment system for Steel Tank No. 2

`` 3. Structure Improvements 2:
   a. Install 4" HDPE pipeline from Poohohoo Reservoir 1 to Lake House Reservoir.

F. Contractor's Operations

1. The Contractor must employ, insofar as possible, such methods and means of carrying out the work so as not to cause any interruption or interference to the

facility's operations. Where the Contractor's operations would result in interruptions which would hamper the operations of the facilities, the Contractor shall rearrange the schedule of work accordingly.

2. The Contractor shall maintain safe passageway to and from the facility for the user agency personnel and the public at all times.

G. Lead Paint

1. When the project includes paint to be disturbed that was applied prior to 1980, it shall be assumed to contain lead. The Contractor shall inform its employees, subcontractors, and all other persons engaged in the project that lead containing paints are present in the existing structure at the job site and to follow the requirements of the Department of Labor and Industrial Relations, Division of Occupational Safety and Health, Title 12, Subtitle 8,Chapter 148, Lead Exposure in Construction, Hawaii Administrative Rules (Chapter 12-148, HAR).

H. Parking Policy for Contractor

1. The Contractor and its employees will not be allowed to park in zones assigned to facility personnel.

2. Areas to be used by the Contractor shall be as designated by the Contracting Officer. Any lawn damaged by the Contractor shall be restored as instructed by the Contracting Officer at no cost to the State.

I. Toilet Accommodations: The Contractor shall provide toilet facilities and is the Contractor's responsibility to keep same clean and in a sanitary condition at all times.

J. Protection of Property: The Contractor shall continually maintain adequate protection of all its work from damage and shall protect all property, including but not limited to buildings, equipment, furniture, grounds, vegetation, material, utility systems located at and adjoining the job site. The Contractor shall repair, replace or pay the expense of repair of damages resulting from its operations.

K. Use of Power Driven Equipment: The Contractor is cautioned to take all necessary safety precautions to protect the facility personnel, and the public whenever power driven equipment is used.

L. Safety: The Contractor shall carefully read and strictly comply with the requirements of the Hawaii Occupational Safety and Health Law, Chapter 396, Hawaii Revised Statutes, as amended, is applicable and made a part of the Contract.

M. Clean Up Premises: The Contractor shall clean up and remove from premises all debris accumulated from operations as necessary or as directed. See also Section 7.25 of the General Conditions.

N. Responsibility

1. The State will hold the Contractor liable for all the acts of Subcontractors and shall deal only with the prime Contractor in matters pertaining to other trades employed on the job. The Contractor shall be responsible for coordinating the work of all trades on the job.

2. Should the Contractor discover any discrepancy in the plans or specifications, the Contractor shall immediately notify the Engineer before proceeding any further with the work, otherwise, the Contractor will be held responsible for any cost involved in correction of work placed due to such discrepancy.

O. Cooperation With Other Contractors: The State reserves the right at any time to contract for or otherwise perform other or additional work within the contract zone limits of this Contract. The Contractor of this project shall, to the extent ordered by the State, conduct its work so as not to interfere with or hinder the progress or completion of the work performed by other contractors.

P. Division of the Work: The Divisions and Sections into which these Specifications are divided shall not be considered an accurate or complete segregation of work by trades. This also applies to all work specified within each Section.

Q. Drawings and Specifications

1. The Contractor shall not make alterations in the drawings and specifications. In the event the contractor discovers any errors or discrepancies, the Contractor shall immediately notify the Engineer in accordance with the General Conditions.

2. Where devices, or items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items or parts as are required to properly complete the work.

3. Specifications and drawings are prepared in abbreviated form and include incomplete sentences. Omission of words or phrases such as "the Contractor shall", "as shown on the drawings", "a", "an", and "the" are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.

R. Required Submittals

1. Required submittals as specified in the Technical Sections of these specifications include one or more of the following: Shop drawings; color samples; material samples; technical data; schedules of materials; schedules of operations; guarantees; operating and maintenance manuals; and as-built drawings.

2. The Contractor shall make a comprehensive list of the required submittals, by Specification Section, and submit this list to the Engineer within 15 days after notice to proceed.

3. As-Built Drawings: When as-built drawings are required for submittal, the following shall apply:

a. As-built drawings, the intent of which is to record the actual in-place construction so that any future renovations or tie-ins can be anticipated accurately, shall be required.

b. All deviations from alignments, elevations and dimensions which are stipulated on the plans shall be recorded in red on the as-built drawings.

c. The following procedure shall be followed:

1) Immediately after these changes are constructed in place, the Contractor shall record them on the field office plans.

2) Within two weeks after final inspection of the project, the Contractor shall transfer the changes marked on the field office plans onto a clean copy of plans using a red pencil. Any deletions shall be so noted and redrawn as necessary. The Contractor shall stamp or mark the tracings "AS-BUILT", and also sign and date each drawing so marked.

3) The Contractor shall submit the as-built drawings together with the marked-up field office plans to the Engineer.

4) Any as-built drawing which the Engineer determines does not accurately record the deviation shall be corrected by the State, and the Contractor shall be charged for the services.

END OF SECTION

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
AISC	American Institute of Steel Construction 101 Park Avenue New York, NY 10017
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, D.C. 20036
AITC	American Institute of Timber Construction 333 West Hampden Avenue Englewood, CO 80110
ANSI	American National Standards Institute, Inc. 1430 Broadway New York, NY 10018
APA	American Plywood Association 1119 A Street Tacoma, WA 98401
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017

Abbreviation	Company
ASCII	American Standard Code for Information Interchange United States of America Standards Institute 1430 Broadway New York, NY 10018
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
AWS	American Welding Society 2501 N.W. 7th Street Miami, FL 33125
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
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
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

Abbreviation	Company
FEDSTDS	Federal Standards (see FEDSPECS)
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
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
NACE	National Association of Corrosion Engineers P.O. Box 986 Katy, TX 77450

Abbreviation	Company
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
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
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
UMC	Uniform Mechanical Code Published by ICBO
UPC	Uniform Plumbing Code Published by IAPMO

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01100

ARCHAEOLOGICAL PROTECTION

PART 1 - GENERAL

1.01 This section covers the requirements for the protection and preservation of historical sites and values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION METHOD: Representatives of the State will from time to time examine the area as work proceeds. If historical values are noted, the State may order a halt to the work in the vicinity of the historical values until the State can examine further. The Contractor shall notify the State if he finds anything he suspects to be of historic significance and shall discontinue further work in the vicinity of the find until the State can examine the area. In either case, further work in the vicinity of such historical or suspected historical values may proceed only upon approval by the State. Such approval can be normally expected within one week and shall in no case require more than one month.

END OF SECTION

SECTION 01230

ADDITIVE BID ITEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for additive bid items.

B. The description of additive bid items is not intended to give a detailed description of all additional work required by the additive bid item(s), as only the principal features of such additional work are listed.

C. Should anyone or all of the additive bid items become a part of the contract, the cost of all additional work required by the additive bid item(s), even though not specifically mentioned herein, are included in the lump sum bid price.

1.2 DEFINITIONS

A. Additive Bid Item: An amount proposed by Bidders (Offerors) and stated on the Proposal Form for certain work defined in the Bidding Requirements that may be added to the Total Lump Sum Base Bid Price amount if State decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

The cost for each additive bid item is the net addition to the Contract Sum to incorporate additive bid item into the Work. No other adjustments are made to the Total Lump Sum Base Bid Price.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the additive bid item into the Project.

Include as part of each additive bid item, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of additive bid item.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each additive bid item. Indicate if additive bid items have been accepted, rejected, or deferred for later consideration.

C. Execute accepted additive bid items under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Additive Bid Items is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each additive bid item.

PART 2 – GENERAL (Not Used)

PART 3 – EXECUTION

3.1 SCHEDULE OF ADDITIVE BID ITEMS

A. Additive Bid Item 1: Steel Tank No. 2 and Catchment 2B.

B. Additive Bid Item 2: 4” HDPE Waterline – Poohohoo to Lakehouse.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Shop drawings shall be required for:

1. Division 16 - Electrical Work.

2. Any others as called for in the plans, specifications or by the Engineer.

B. Other required submittals shall include:

1. Piping Layout.

2. Manufacturer's Data.

3. Certificates of Warranty.

4. Any others as called for in the plans, 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)

END OF SECTION

SECTION 01505

MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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

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

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

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

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

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

END OF SECTION

SECTION 01530

BARRICADES

PART 1 - GENERAL

1.1 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 (ie. dead-ends, cul-de-sacs).

   b. Ramps or lanes closed for operational purposes.

   c Permanent or semipermanent closure or termination of a roadway.

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

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

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

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

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

END OF SECTION

SECTION 01567

POLLUTION CONTROL

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Rubbish Disposal

1. No burning of debris and/or waste materials shall be permitted on the project site.

2. No burying of debris and/or waste material except for materials which are specifically indicated elsewhere in these specifications as suitable for backfill shall be permitted on the project site.

3. All unusable debris and waste material shall be hauled away to an appropriate off-site dump area. During loading operations, debris and waste materials shall be watered down to allay dust.

4. No dry sweeping shall be permitted in cleaning rubbish and fines which can become airborne from floors or other paved areas. Vacuuming, wet mopping or wet or damp sweeping is permissible.

5. Enclosed chutes and/or containers shall be used for conveying debris from above to ground floor level.

6. Clean-up shall include the collection of all waste paper and wrapping materials, cans, bottles, construction waste materials and other objectionable materials, and removal as required. Frequency of clean-up shall coincide with rubbish producing events.

B. Dust

1. The Contractor shall prevent dust from becoming airborne at all times including non-working hours, weekends and holidays in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 60 - Air Pollution Control.

2. The method of dust control and costs shall be the responsibility of the Contractor. Methods of dust control shall include the use of water, chemicals or asphalt over surfaces which may create airborne dust.

3. The Contractor shall be responsible for all damage claims in accordance with Section 7.16 - "Responsibility for Damage Claims" of the GENERAL CONDITIONS.

C. Noise

1. Noise shall be kept within acceptable levels at all times in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 46 - Community Noise Control for Oahu. The Contractor shall obtain and pay for the Community Noise Permit from the State Department of Health when the construction equipment or other devices emit noise at levels exceeding the allowable limits.

2. All internal combustion engine-powered equipment shall have mufflers to minimize noise and shall be properly maintained to reduce noise to acceptable levels.

3. Pile driving operations shall be confined to the period between 9:00 a.m. and 5:30 p.m., Monday through Friday. Pile driving will not be permitted on weekends and legal State and Federal holidays.

4. Starting-up of construction equipment meeting allowable noise limits shall not be done prior to 6:45 a.m. without prior approval of the Contracting Officer. Equipment exceeding allowable noise levels shall not be started-up prior to 7:00 a.m.

D. Erosion

1. During interim grading and trenching operations, the grade shall be maintained so as to preclude any damage to adjoining property from water and eroding soil.

2. Temporary berms, cut-off ditches, silt fencing and other provisions which may be required because of the Contractor's method of operations shall be installed at no cost to the State.

3. Drainage outlets and silting basing shall be constructed and maintained as shown on the plans to minimize erosion and pollution of waterways during construction.

E. Others

1. Wherever trucks and/or vehicles leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being carried onto the pavement. Waste water shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basins unless treated to comply with the State Department of Health water pollution regulations.

2. Trucks hauling debris shall be covered as required by PUC Regulation. Trucks hauling fine materials shall be covered.

3. No dumping of waste concrete will be permitted at the job-site.

4. Except for rinsing of the hopper and delivery chute, and for wheel washing where required, concrete trucks shall not be cleaned on the job-site.

5. Except in an emergency, such as a mechanical breakdown, all vehicle fueling and maintenance shall be done in a designated area. A temporary berm shall be constructed around the area when runoff can cause a problem.

6. When spray painting is allowed such spray painting shall be done by the "airless spray" process. Other types of spray painting will not be allowed.

7. The Contractor shall submit a project BMP “Best Management Plan” to the Contracting Officer prior to beginning any earthwork.

F. Suspension of Work

1. Violations of any of the above requirements or any other pollution control requirements which may be specified in the Technical Specifications herein shall be cause for suspension of the work creating such violation. No additional compensation shall be due the Contractor for remedial measures to correct the offense. Also, no extension of time will be granted for delays caused by such suspensions.

2. If no corrective action is taken by the Contractor within 72 hours after a suspension is ordered by the Contracting Officer, the State reserves the right to take whatever action is necessary to correct the situation and to deduct all costs incurred by the State in taking such action from monies due the Contractor.

3. The Contracting Officer may also suspend any operations which he feels are creating pollution problems although they may not be in violation of the above-mentioned requirements. In this instance, the work shall be done by force account as described in Subsection 4.2b -"Additional Work" of the GENERAL CONDITIONS and paid for in accordance with Subsection 8.4b - "Force - Account Work" therein. The count of elapsed working days to be charged against the contract in this situation shall be computed in accordance with Subsection 7.18 - "Contract Time" of the GENERAL CONDITIONS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01581

PROJECT SIGN

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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

1.02 SUBMITTAL

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

1.03 LETTER STYLE

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

1.04 ART WORK

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

1.05 TITLES

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

Design should follow the example on page 01581-3.

PART 2 - PRODUCTS

2.01 MATERIALS

A. LUMBER

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

B. PAINTS & INKS

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

COLOR:
1. 1BL10A Bohemian Blue
2. 2H16P Softly (White)

3. 2VR2A Hot Tango (Red)
4. 1M52E Tokay (Gray)

C. CONCRETE

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

PART 3 - EXECUTION

3.01 GENERAL

A. The Project Sign shall be constructed with new materials as specified above.

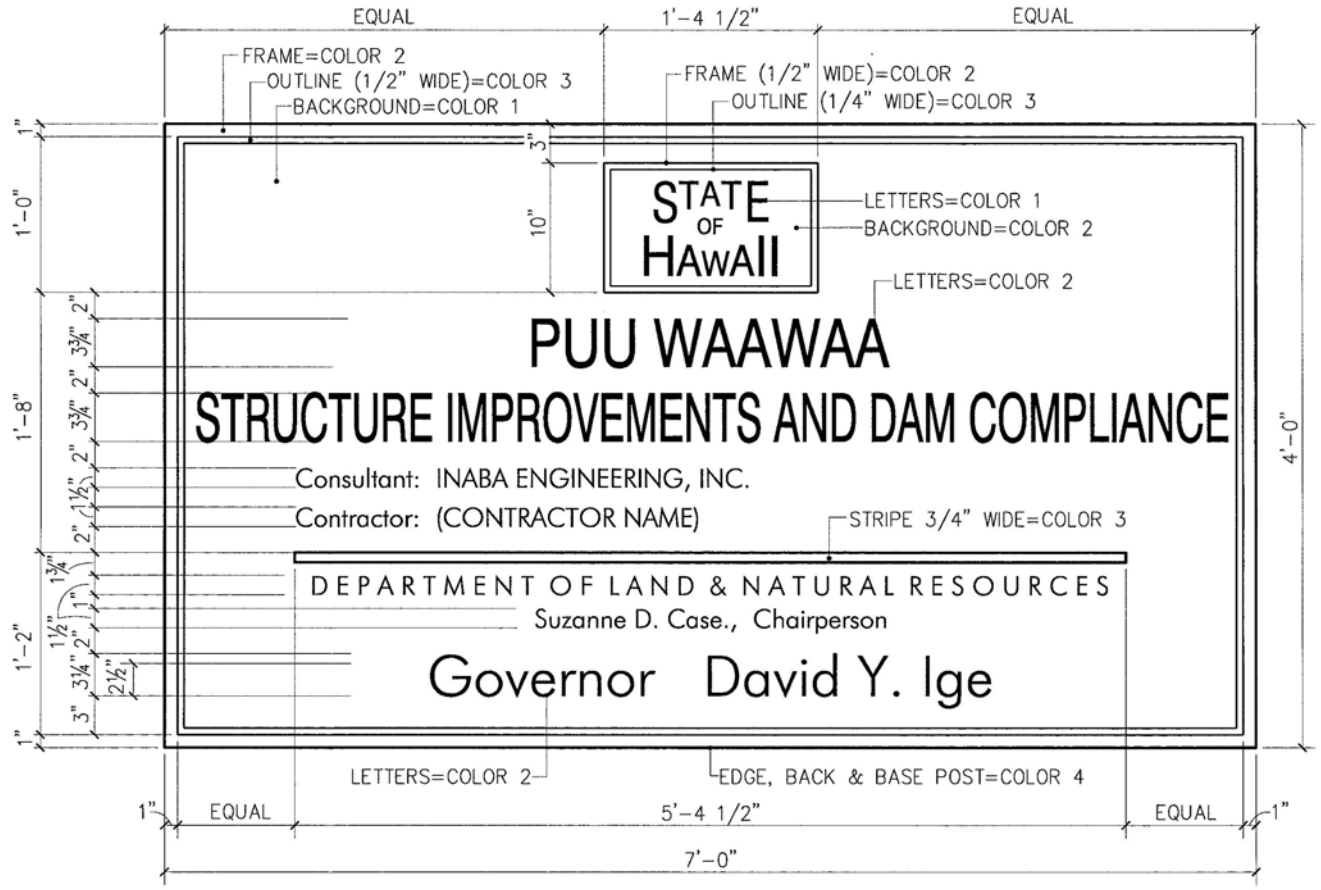
B. The Project sign shall be installed at the location indicated on the drawings or as designated by the Engineer. The project sign shall be erected upon commencement of work.

3.02 MEASUREMENTS AND PAYMENT

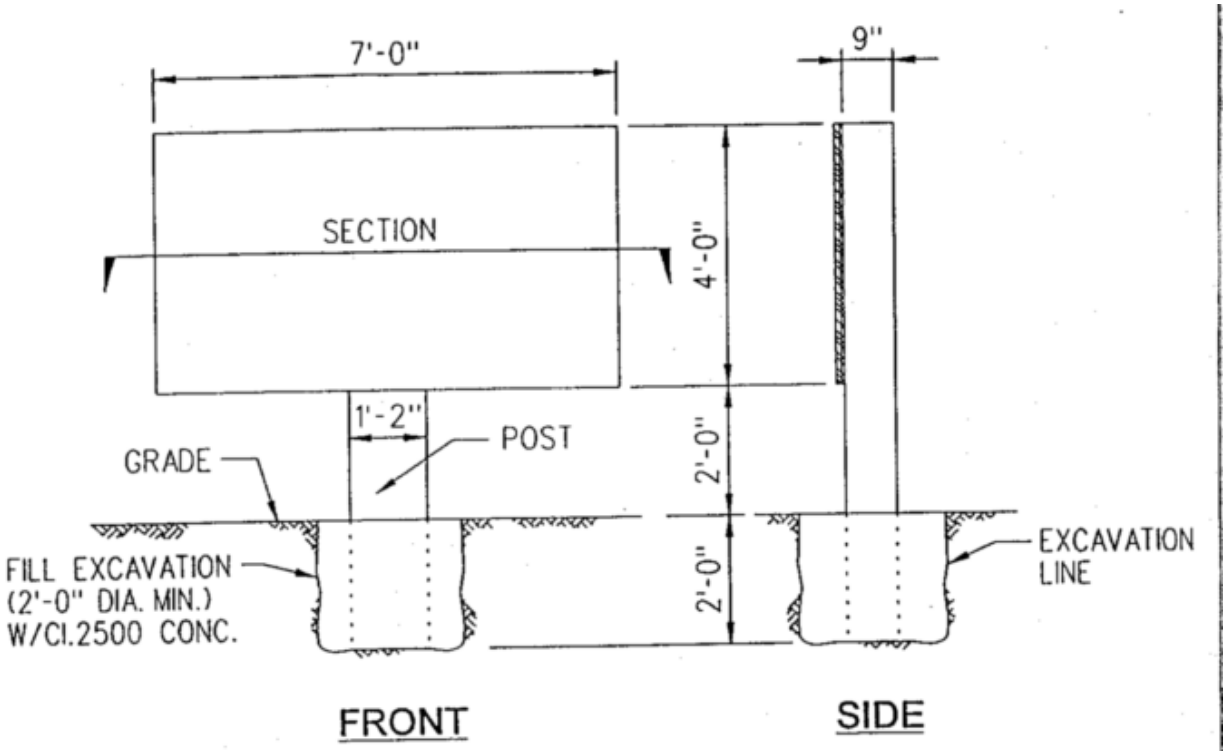
The construction of the project sign, including all equipment, labor and material necessary to furnish and install the project sign will be paid for under the "Project Sign" proposal item.

END OF SECTION

Project Sign
01581-3

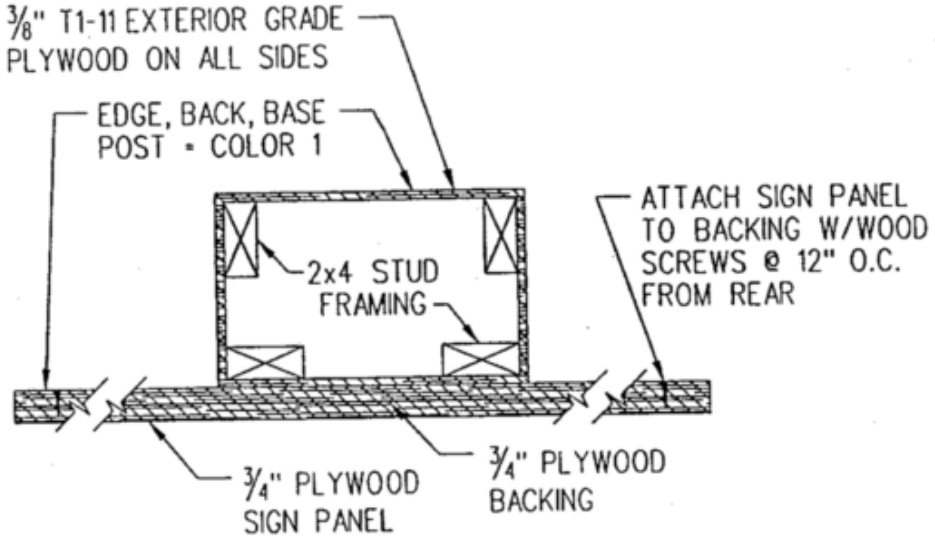


NOTE: Number of signs required 1



ELEVATIONS

NOT TO SCALE



SECTION

NOT TO SCALE

SECTION 01715

EXISTING CONDITIONS -HAZARDOUS MATERIALS SURVEY

PART 1 -GENERAL

1.01 GENERAL CONDITIONS

As specified in SECTION 00700.

1.02 SUMMARY

A. This section includes the results for hazardous materials and is provided for the Contractor's information.

B. Related Work Specified Elsewhere:

1. SECTION 13281 -REMOVAL AND DISPOSAL OF ASBESTOSCONTAINING MATERIAL; for requirements of all work that disturbs Asbestos-Containing Material.

2. SECTION 13282 -LEAD HAZARD CONTROL MEASURES; for requirements of all work that disturbs Lead-Containing Paint.

3. SECTION 13288 -TESTING/AIR MONITORING; for requirements of all work that disturbs Asbestos-Containing Materials and Lead-Containing Paint.

1.03 ASBESTOS-CONTAINING MATERIAL

A. The structures to be renovated under this contract have been surveyed for the presence of asbestos-containing materials (ACM). A copy of the survey report, as well as any subsequent supplemental survey reports if performed are included in the Section. If there is ACM outside of the areas in which work will be performed, this ACM shall not be disturbed in any way.

The reports are included, even when no ACM was found, for the Contractor's information. Review the attached reports for the basis on which the negative ACM finding was made. Contractor may perform further surveys at its own expense if ACM not shown in the reports is suspected in the areas in which work will be performed. If ACM is found, notify the Authorized Representative of the General Contractor immediately.

B. If applicable, the Contractor shall notify his employees, subcontractors and all other persons engaged in the renovation work of the presence of asbestos in accordance with the requirements of Chapter 110, Article 12-110-2 (f) (1) (B) of the Occupational Safety and Health Standards, State of Hawaii.

C. In the event that work is required in any area on the site other than those designated in the project scope, the Contractor shall request copies of the asbestos survey reports for each such area from the Authorized Representative of the General Contractor. Based on the information contained in the additional survey(s), notify all persons on the project as indicated in paragraph 1.03 B. PUU WAAWAA WATER SYSTEM Existing Conditions -Hazardous Materials Survey IMPROVEMENTS 01715-1

1.04 LEAD-CONTAINING PAINT

A. The Contractor shall notify his employees, subcontractors and all other persons engaged in the project that lead-containing paint (LCP) is present in the existing building(s) and at the job site. Conduct work in accordance with the requirements of Title 12 (Department of Labor and Industrial Relations), Subtitle 8 (Division of Occupational Safety and Health), Chapter 148.1 (Lead Exposure in Construction), Hawaii Administrative Rules.

B. The Contractor shall review the attached lead testing data which identifies the locations LCP was found and ensure that he/she understands the contents of the report referring to areas in which work is to be performed. The Contractor shall also understand that all testing was for design purposes only and does not satisfy the requirements of HIOSH Chapter 12-148.1.

C. The Contractor may perform additional lead content testing of existing painted surface at the Contractor’s expense.

PART 2 -PRODUCTS

(Not Used)

PART 3 -EXECUTION

3.01 SURVEY (attached)

Limited Asbestos and Lead Paint Survey, Pu'u Wa'awa'a System Improvements, Big Island, Hawaii, 28 pages, prepared by Lehua Environmental Inc.

END OF SECTION

LIMITED ASBESTOS AND LEAD PAINT SURVEY

PU'U WA'AWA'A WATER SYSTEM IMPROVEMENTS
BIG ISLAND, HAWAII

Prepared for:
INABA ENGINEERING, INC.
273 Waianuenue Avenue
Hilo, Hawaii 96720

Prepared by:

LEHUA ENVIRONMENTAL INC.
P.O. Box 1018
Kamuela, Hawaii 96743

May 28, 2015

TABLE OF CONTENTS

1.0 CERTIFICATIONS AND LIMITATIONS 1

2.0 EXECUTIVE SUMMARY 2

3.0 INTRODUCTION/PURPOSE 5

4.0 METHODOLOGY 6

4.1 ASBESTOS SURVEY 6
4.2 LEAD PAINT SURVEY 6

5.0 RESULTS 7

5.1 ASBESTOS SURVEY 7
5.2 LEAD PAINT SURVEY 7

6.0 RECOMMENDATIONS 8

7.0 REFERENCES 9

TABLES

TABLE 1 ASBESTOS SURVEY RESULTS ..... APPENDIX I
TABLE 2 LEAD PAINT RESULTS ..... APPENDIX I

APPENDICES

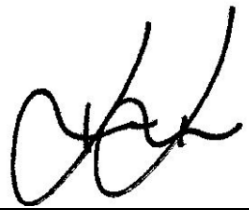
APPENDIX I: TABLE OF RESULTS: TABLE 1. ASBESTOS SURVEY RESULTS
TABLE 2. LEAD PAINT SURVEY RESULTS
APPENDIX II: PHOTOGRAPH LOG 1: IDENTIFIED ACM
PHOTOGRAPH LOG 2: IDENTIFIED LEAD PAINT
APPENDIX III: MAP 1. SUBJECT SITE LAYOUT AND IDENTIFIED ACM
APPENDIX IV: LABORATORY RESULTS AND CHAIN OF CUSTODY

1.0 CERTIFICATIONS AND LIMITATIONS

Lehua Environmental Inc. (LEI) has completed this limited asbestos and lead paint survey for the upper and lower Halepiula water tanks located in Pu'u Wa'awa'a, Big Island, Hawaii. This survey was conducted for the planned Pu'u Wa'awa'a water system improvements project. LEI's findings and recommendations contained herein are based on research, site observations, government regulations and laboratory data, which were gathered at the time and location of the study. Opinions stated in this report do not apply to changes that may have occurred after the services were performed.

Lehua Environmental Inc. has performed specified services for this project with the degree of care, skill and diligence ordinarily exercised by professional consultants performing the same or similar services. No other warranty, guarantee, or representation, expressed or implied, is included or intended; unless otherwise specifically agreed to in writing by both LEI and LEI's Client.

This report is intended for the sole use of LEI's client, exclusively for the Subject Site. LEI's client may use and release this report, including making and retaining copies, provided such use is limited to the particular site and project for which this report is provided. However, the services performed may not be appropriate for satisfying the needs of other users. Release of this report to third-parties will be at the sole risk of LEI's Client and/or said user, and LEI shall not be liable for any claims or damages resulting from or connected with such release or any third party's use or reuse of this report.

Prepared By: 

Kamalana Kobayashi
State of Hawaii Certified Asbestos Inspector/Management Planner
Certification #: HIASB-0613, Expires 11/21/15
State of Hawaii Certified Lead Risk Assessor
Certification #: PB-0132, Expires 5/16/16

Date: May 28, 2015

2.0 EXECUTIVE SUMMARY

LEI has completed this limited asbestos and lead paint survey for the upper and lower Halepiula water tanks located in Pu'u Wa'awa'a, Big Island, Hawaii (Subject Site). On May 20, 2015, LEI personnel performed site reconnaissance to identify and inventory suspect asbestos and lead paint in the specified areas of the Subject Site that may be affected by the planned renovation activities (Specified Areas).

During LEI's survey, Asbestos-Containing Material (ACM) and Lead-Containing Paint (LCP) were observed in Specified Areas of the Subject Site. The following summarizes the ACM and LCP identified during LEI's survey:

Summary of Identified ACM

ACM was identified in the grey sealant located on the large gutters which transfers water to the water tanks at the Subject Site. Map 1 located in Appendix II identifies the locations of identified ACM. Additionally, Photograph Log 1 in Appendix III identifies these ACM with photographs. The following table summarizes these results.

Identified ACM in the Specified Areas
Pu'u Wa'awa'a Water System Improvements
Big Island, Hawaii

Material	*Color*	*Tank*	*Homogeneous Area*	*Friability*	*Type*	*Cond.*	*Est. Amt. of Material (ft^2)*
Large gutter sealant	Sealant-Grey	Upper/Lower	Large Gutter	Category I non-friable	Misc.	Poor	600

Summary of Identified LCP

The grey paint located on the exterior metal panels of the lower and upper water tanks contained lead at levels less than the EPA/HUD guideline of 5,000 mg/kg and are considered Lead-Containing Paint (LCP). Photograph Log 2 in Appendix III lists the photograph of the identified LCP.

The following table summarizes these results.

Identified Lead-Containing Paint in the Specified Areas
Pu'u Wa'awa'a Water System Improvements
Big Island, Hawaii

Location	***Tank***	***Description***	***Color***	***Substrate***	***Cond.***	***Lead Conc. (mg/kg)***
Exterior	Upper	Tank wall	Grey	Metal	Poor	85
Exterior	Lower	Tank wall	Grey	Metal	Poor	76

Recommendations

In summary, asbestos-containing material and lead-containing paint was identified at the Subject Site. Based on LEI's visual survey of the site, inventory of identified potentially hazardous materials, and laboratory data, LEI recommends the following:

- Manage and/or remove and dispose of hazardous and regulated materials in accordance with applicable local, state, and federal regulations, prior to renovation and/or demolition activities that may disturb these materials.
- Remove and dispose of all loose and flaking (poor condition) LCP that may be disturbed during renovation activities in accordance with applicable local, state, and federal regulations.
- Spot remove and dispose of LCP in areas that have the potential to become airborne or otherwise create dust (i.e. from sanding, drilling, friction, etc.) during renovation activities.
- Any friable and non-friable ACM, which could be disturbed during renovation/demolition activities must be removed and disposed of by a qualified asbestos abatement contractor. In addition, the services of a qualified consultant should be obtained to monitor and inspect the removal activities to ensure compliance with applicable Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and Hawaii Occupational Safety and Health (HIOSH) regulations pertaining to the handling of ACM.
- Any abatement and demolition contractor(s) must take appropriate measures to comply with applicable EPA, OSHA and HIOSH regulations pertaining to the handling of asbestos and lead containing materials and worker protection. Note that OSHA and HIOSH regulate activities that disturb paint which contain any detectable concentration of lead.
- Have air monitoring conducted for airborne lead and asbestos by qualified personnel during any lead and asbestos abatement and general renovation activities of areas that were determined to contain these contaminants.

3.0 INTRODUCTION/PURPOSE

The purpose of this limited asbestos and lead paint survey was to investigate the Specified Areas of the Subject Site for the presence of ACM and lead painted surfaces. Specifically, LEI completed the following tasks:

- Performed site reconnaissance at the Subject Site;
- Collected fifteen (15) samples of suspect ACM from the Specified Areas of the Subject Site;
- Submitted the fifteen (15) samples of suspect ACM to Hawaii Analytical Laboratory, LLC for analysis of asbestos via Polarized Light Microscopy (PLM) in accordance with the AHERA protocol and NIOSH Method 600/R-93/116;
- Collected two (2) paint chip samples from the Specified Areas of the Subject Site;
- Submitted the two (2) paint chip samples to Hawaii Analytical Laboratory, LLC for analysis via EPA Method 7420 for total lead content;
- Prepared this report documenting the field activities and the results of the investigation including analytical results, photographs, conclusions, and recommendations.

4.0 METHODOLOGY

4.1 Asbestos

LEI personnel collected a total of fifteen (15) samples of suspect building materials for asbestos analysis. The suspect ACM samples were collected from the Specified Areas of the Subject Site scheduled for renovation activities in general accordance with EPA guidelines and recommendations.

The suspect ACM were wetted with amended water before sample collection. A small piece was then carefully cut out and placed into a labeled re-sealable plastic bag. The sampling equipment was cleaned between each sample collection to avoid cross-contamination between samples. The approximate quantity of each suspect ACM was noted. Sample locations were randomly selected in accordance with EPA protocols and recommendations.

All samples were properly logged and recorded following strict chain of custody procedure and submitted to Hawaii Analytical Laboratories, LLC in Honolulu, Hawaii for analysis by polarized light microscopy in accordance with EPA Method 600/R-93/116. Hawaii Analytical Laboratories, LLC is accredited for bulk asbestos analysis through successful participation in the National Voluntary Lab Accreditation Program (NVLAP).

4.2 Lead Paint

LEI personnel collected and analyzed two (2) paint chip samples from the Specified Areas of the Subject Site.

The suspect lead-containing paints were wetted with amended water before sample collection. Paint was carefully scraped and placed into a labeled re-sealable plastic bag. The sampling equipment was cleaned between each sample collection to avoid cross-contamination between samples. All samples were properly logged and recorded following strict chain of custody procedure and submitted to Hawaii Analytical Laboratories, LLC for analysis in accordance with EPA method 7420.

5.0 RESULTS

5.1 Asbestos Survey

A total of fifteen (15) asbestos samples were collected and submitted for analysis via PLM. ACM was identified in the grey sealant located on the large gutters which transfers water to the water tanks at the Subject Site. The results of this analysis are contained in Table 1 found in Appendix I. In addition, photographs of identified ACM are listed in Photograph Log 1 of Appendix II. Map 1 in Appendix III identifies the locations of these materials.

In accordance with federal and state regulations and industry standard practice LEI determined homogenous areas of each suspect material and collected multiple representative samples of the material from each homogenous area.

5.2 Lead Paint Survey

The grey paint located on the exterior metal panels of the lower and upper water tanks contained lead at levels less than the EPA/HUD guideline of 5,000 mg/kg and are considered Lead-Containing Paint (LCP).

The lead survey results are recorded in Table 2 found in Appendix I. Photograph Log 2 located in Appendix III contains the photographs of the identified LCP.

6.0 RECOMMENDATIONS

In summary, asbestos-containing material and lead-containing paint was identified at the Subject Site. Based on LEI's visual survey of the site, inventory of identified potentially hazardous materials, and laboratory data, LEI recommends the following:

- Manage and/or remove and dispose of hazardous and regulated materials in accordance with applicable local, state, and federal regulations, prior to renovation and/or demolition activities that may disturb these materials.
- Remove and dispose of all loose and flaking (poor condition) LCP that may be disturbed during renovation activities in accordance with applicable local, state, and federal regulations.
- Spot remove and dispose of LCP in areas that have the potential to become airborne or otherwise create dust (i.e. from sanding, drilling, friction, etc.) during renovation activities.
- Any friable and non-friable ACM, which could be disturbed during renovation/demolition activities must be removed and disposed of by a qualified asbestos abatement contractor. In addition, the services of a qualified consultant should be obtained to monitor and inspect the removal activities to ensure compliance with applicable Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and Hawaii Occupational Safety and Health (HIOSH) regulations pertaining to the handling of ACM.
- Any abatement and demolition contractor(s) must take appropriate measures to comply with applicable EPA, OSHA and HIOSH regulations pertaining to the handling of asbestos and lead containing materials and worker protection. Note that OSHA and HIOSH regulate activities that disturb paint which contain any detectable concentration of lead.
- Have air monitoring conducted for airborne lead and asbestos by qualified personnel during any lead and asbestos abatement and general renovation activities of areas that were determined to contain these contaminants.

7.0 REFERENCES

- Code of Federal Regulations. Occupational Safety and Health Standards. Title 29, Part 1910 (1910.1000 TO END). Washington DC. US Government Printing Office, 2001.
- Code of Federal Regulations. Occupational Safety and Health Standards. Title 29, Part 1926.62. Washington DC. US Government Printing Office, 2001.
- Code of Federal Regulations. National Emission Standard for Hazardous Air Pollutants (NESHAP), Asbestos Regulations. Title 40, Part 61, Subpart M. Washington DC. US Government Printing Office, June 19, 1995.
- US Department of Housing and Urban Development. Guidance for the Evaluation and Control of Lead Paint Hazards in Housing, 2001.
- University of Wisconsin-Milwaukee, Department of Environmental Health, Safety and Risk Management website, http://www.uwm.edu/Dept/EHSRM/HAZEXCEPTIONS/a.html, 2000.

Appendix **I**

TABLES OF RESULTS: TABLE 1. ASBESTOS SURVEY RESULTS
TABLE 2. LEAD PAINT SURVEY RESULTS

Table 1. Asbestos Survey Results
Halepiula Water Tanks
Pu'u Wa'awa'a, Big Island, Hawaii

Material	*Color*	*Tank*	*Homogeneous Area*	*Friability*	*Type*	*Cond.*	*Est. Amt. of Material (ft^2)*	*Asbestos Content*	*Sample ID*
Gasket between tank panels	Black	Upper	Throughout	N/A	N/A	Fair	300	None Detected	PW-A1
								None Detected	PW-A2
								None Detected	PW-A3
Asphaltic gravel at tank base	Black	Upper	Throughout tank base	N/A	N/A	Poor	1000	None Detected	PW-A4
								None Detected	PW-A5
								None Detected	PW-A6
Large gutter sealant and mastic	**Sealant-Grey Mastic-Black**	**Upper/Lower**	**Large Gutter**	**Category I non-friable**	**Misc.**	**Poor**	**600**	**Chrysotile 15%**	**PW-A7**
								Not Analyzed	**PW-A8**
								Not Analyzed	**PW-A9**
Gasket between tank panels	Black	Lower	Throughout	N/A	N/A	Fair	300	None Detected	PW-A10
								None Detected	PW-A11
								None Detected	PW-A12
Asphaltic gravel at tank base	Black	Lower	Throughout tank base	N/A	N/A	Poor	1000	None Detected	PW-A13
								None Detected	PW-A14
								None Detected	PW-A15

Bold text *indicated identified ACM.*

Table 2. Lead Paint Survey Results
Halepiula Water Tanks
Pu'u Wa'awa'a, Big Island, Hawaii

Location	***Description***	***Color***	***Substrate***	***Cond.***	***Lead Conc. (mg/kg)***	***Sample ID***
Exterior	Tank wall	Grey	Metal	Poor	85	PW-L1
Exterior	Tank wall	Grey	Metal	Poor	76	PW-L2

Appendix **II**

PHOTOGRAPH LOG 1. IDENTIFIED ACM
PHOTOGRAPH LOG 2. IDENTIFIED LCP

Photograph Log 1. Identified Asbestos-Containing Materials
Upper and Lower Halepiula Water Tanks
Pu'u Wa'awa'a, Big Island, Hawaii

Photo 1. ACM grey sealant on large gutter underside of upper tank.

Photo 2. Close-up of grey sealant on large gutter underside of lower tank.

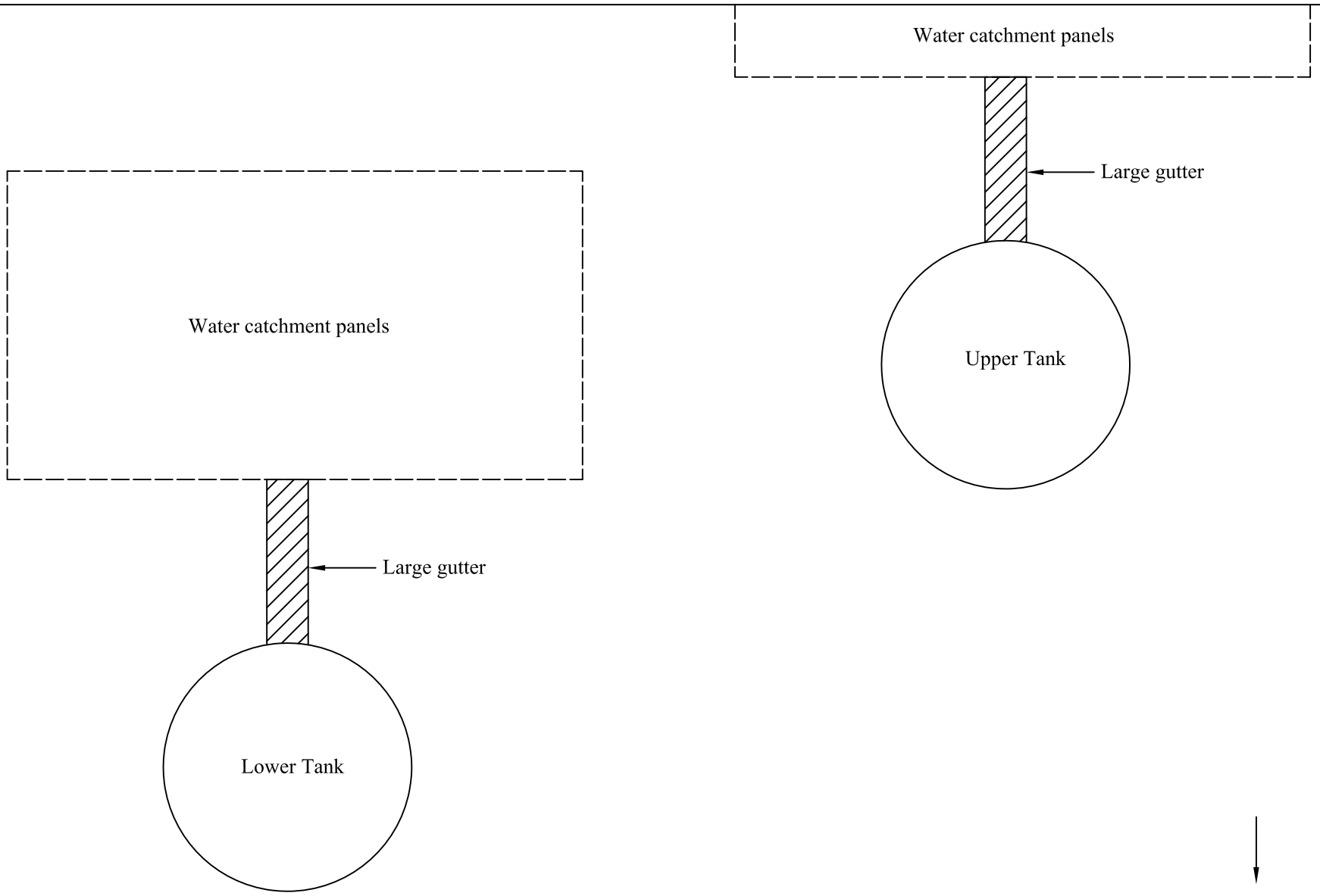
Photograph Log 2. Identified Lead-Containing Paint
Upper and Lower Halepiula Water Tanks
Pu'u Wa'awa'a, Big Island, Hawaii

Photo 1. LCP grey paint in poor condition on the upper water tank.

Photo 2. LCP grey paint in poor condition on the lower water tank.

Appendix **III**

MAP 1. SUBJECT SITE LAYOUT AND IDENTIFIED ACM



Legend

= ACM grey sealant on large gutter underside

Not to Scale

Lehua Environmental Inc.

Inaba Engineering

May 2015

Map 1. Site Layout and Identified ACM Locations Halepiula Water Tanks Pu'u Wa'awa'a, Big Island, Hawaii

Appendix **IV**

LABORATORY ANALYTICAL RESULTS AND CHAIN-OF-CUSTODY FORMS: ASBESTOS LEAD-PAINT

Hawaii Analytical Laboratory
ANALYTICAL REPORT

Friday, May 22, 2015

3615 Harding Avenue, Ste. 308, Honolulu, Hawaii 96816
Phone: (808) 735-0422

Mr. Kama Kobayashi
Lehua Environmental Inc.
P.O. Box 1018

Kamuela HI 96743

Phone Number: (808) 494-0365
Facsimile:
Email: lehuaenvironmental@gmail.com

Lab Job No: 20152534
Date received: 5/21/2015
Your Project: 2015-233, Puuwaawaa Water Tank, 05/19/2015

Bulk Asbestos Determination

Sample No.	Your Sample Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
201512470	**PW - A1**		NONE DETECTED		None detected		Elastomeric binder	5/21/2015
Layer	Black rubbery material							
Comments								
201512471	**PW - A2**		NONE DETECTED		None detected		Asphaltic tar	5/21/2015
Layer	Black mastic							
Comments								
201512471	**PW - A2**		NONE DETECTED		None detected		Elastomeric binder	5/21/2015
Layer	Black rubbery material / white paint							
Comments								
201512472	**PW - A3**		NONE DETECTED		None detected		Elastomeric binder	5/21/2015
Layer	Black rubbery material / white paint							
Comments								
201512473	**PW - A4**		NONE DETECTED		Cellulose (undulose)	**2**	Asphaltic tar + other	5/21/2015
Layer	Black asphaltic tar (1)							
Comments								

Hawaii Analytical Laboratory is a NIST NVLAP accredited laboratory (NVLAP Lab Code 200655-0).
Hawaii Analytical Laboratory is an analytical facility accredited in accordance with the recognized ISO/ IEC 17025:2005.

Mr. Kama Kobayashi
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P.O. Box 1018

Kamuela HI 96743

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Facsimile:
Email: lehuaenvironmental@gmail.com

Lab Job No: 20152534
Date received: 5/21/2015
Your Project: 2015-233, Puuwaawaa Water Tank, 05/19/2015

Bulk Asbestos Determination

Sample No.	Your Sample Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
201512473	**PW - A4**		NONE DETECTED		None detected		Asphaltic tar + paint + other	5/21/2015
Layer	Black asphaltic tar (2) / white paint / rust							
Comments								
201512474	**PW - A5**		NONE DETECTED		Cellulose (undulose)	**2**	Asphaltic tar + other	5/21/2015
Layer	Black asphaltic tar (1)							
Comments								
201512474	**PW - A5**		NONE DETECTED		None detected		Asphaltic tar + paint + other	5/21/2015
Layer	Black asphaltic tar (2) / white paint / rust							
Comments								
201512475	**PW - A6**		NONE DETECTED		Cellulose (undulose)	**2**	Asphaltic tar + other	5/21/2015
Layer	Black asphaltic tar (1)							
Comments								
201512475	**PW - A6**		NONE DETECTED		None detected		Asphaltic tar + paint + other	5/21/2015
Layer	Black asphaltic tar (2) / white paint / rust							
Comments								
201512476	**PW - A7**		NONE DETECTED		Cellulose (undulose)	**2**	Asphaltic tar	5/21/2015
Layer	Black asphaltic tar							
Comments								
201512476	**PW - A7**	**Yes**	Chrysotile	**15**	Cellulose (undulose)	**5**	Calcite + other	5/21/2015
Layer	Gray caulk							
Comments								

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Lab Job No: 20152534
Date received: 5/21/2015
Your Project: 2015-233, Puuwaawaa Water Tank, 05/19/2015

Bulk Asbestos Determination

Sample No.	Your Sample Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
201512476	**PW - A7**		NONE DETECTED		None detected		Calcite + other	5/21/2015
Layer	White friable material							
Comments								
201512479	**PW - A10**		NONE DETECTED		None detected		Vinyl + paint	5/21/2015
Layer	Black covebase / white paint							
Comments								
201512480	**PW - A11**		NONE DETECTED		None detected		Vinyl + paint	5/21/2015
Layer	Black covebase / white paint							
Comments								
201512481	**PW - A12**		NONE DETECTED		None detected		Vinyl + paint	5/21/2015
Layer	Black covebase / white paint							
Comments								
201512482	**PW - A13**		NONE DETECTED		Cellulose (undulose)	**2**	Asphaltic tar + other	5/21/2015
Layer	Black asphaltic tar							
Comments								
201512483	**PW - A14**		NONE DETECTED		Cellulose (undulose)	**2**	Asphaltic tar + other	5/21/2015
Layer	Black asphaltic tar (1)							
Comments								
201512483	**PW - A14**		NONE DETECTED		None detected		Asphaltic tar + paint + other	5/21/2015
Layer	Black tar (2) / lt green paint / rust							
Comments								

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Mr. Kama Kobayashi
Lehua Environmental Inc.
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Phone Number: (808) 494-0365
Facsimile:
Email: lehuaenvironmental@gmail.com

Lab Job No: 20152534
Date received: 5/21/2015
Your Project: 2015-233, Puuwaawaa Water Tank, 05/19/2015

Bulk Asbestos Determination

Sample No.	Your Sample Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
201512484	**PW - A15**		NONE DETECTED		Cellulose (undulose)	**2**	Asphaltic tar + other	5/21/2015
Layer	Black asphaltic tar (1)							
Comments								
201512484	**PW - A15**		NONE DETECTED		None detected		Asphaltic tar + paint + other	5/21/2015
Layer	Black tar (2) / lt green paint / rust							
Comments								

General Comments
The bulk sample[s] analysis subject of this analytical report were conducted in general accordance with the procedures outlined in the United States Environmental Protection Agency's "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (EPA-600/M4-82-020, Dec. 1982) and/ or "Method for Determination of Asbestos in bulk Building Materials" (EPA-600/R-93-116, July 1993). The analysis of each bulk sample relates only to the material examined, and may or may not represent the overall composition of its original source. Floor tile and other resinously bound materials, when analyzed by the EPA methods referenced above may yield false negative results because of limitations in separating closely bound fibers and in detecting fibers of small length and diameter. Alternative methods of identification, including Transmission Electron Microscopy (TEM) may or may not be applicable and suffer from serious analytical limitations of their own including a lack of standardized or accredited methodology. We utilize calibrated visual area estimation on a routine basis and do not conduct point counting unless specifically requested to do so. Estimated error for the visual determinations presented are 50% relative (1 to 5%); 25% relative (6 to 25%) and 20% (>26% v/v). Whole sample percentage results are estimated on the basis of the relative "volume" of each readily discernable layer. We will not separate layers which in our opinion are not readily discernable. This report is not to be duplicated except in full without the expressed written permission of Hawaii Analytical Laboratory. This report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST or any agency of Federal Governement. Unless otherwise indicated, the sample condition at the time of receipt was acceptable.

Results and Symbols Definitions
None Detected = asbestos was not observed in the sample.
Tr = Trace (<1%), i.e., asbestos WAS detected BELOW our quantifiable limits of 1.0%. Point counting and gravimetric reduction, where applicable, are recommended to improve accuracy.
> This testing result is greater than the numerical value listed.
< This testing result is less than the numerical value listed.

Ms. Eva Skogsberg
Section Supervisor

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HAWAII ANALYTICAL LABORATORY, LLC

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Honolulu, HI 96816
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www.analyzehawaii.com

☐ New Client?

Report To*	Kama Kobayashi
Company	Lehua Environmental Inc.
Address*	P.O. Box 1018
	Kamuela, Hawaii96743
Phone / Cell No.*	
Report results to	Kama Kobayashi
via email or fax	

Invoice To*	Kama Kobayashi
Company	Lehua Environmental Inc.
Address*	
Phone / Cell No.*	
Purchase Order No.	
Email Invoice To	

Need Results By*:
- ☐ 5 Working Days (WD)
- ☐ 4 WD
- ☐ 3 WD
- ☑ 2 WD
- ☐ 24 hours
- ☐ 6 hours or less
- ☐ 4 hours or less
- ☐ 1-2 hours

Site/Project Name: 2015-233

Client Project No.: Puuwaawaa Water Tank

Sampled By: Kama Kobayashi

Comments / Special Instructions: STOP @ 1st positive ☐ verbal results needed?

PLM POSITIVE STOP Instructions:
- ☑ Positive stop per SAMPLE
- ☐ Positive stop per LAYER

LAB USE ONLY
Lab Report No.: 20152534

	Sample Identification / Description* (Maxmium of 30 Characters)	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab ID
1	PW-A1	5/20/15	bulk		PLM	Asbestos 7.	201512470
2	PW-A2						201512471
3	PW-A3						201512472
4	PW-A4						201512473
5	PW-A5						201512474
6	PW-A6						201512475
7	PW-A7						201512476
8	PW-A8						201512477
9	PW-A9						201512478
10	PW-A10						201512479
11	PW-A11						201512480
12	PW-A12						201512481

Relinquished By (Print and Sign)	Date/Time	Received By (Print and Sign)	Date/Time
Kama Kobayashi	5/20/15 9a	Rozlyn Luber	05-21-15 13:46 IN

Sample description can be paint chips, concrete, specific sample collection location, etc...
If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.
All samples submitted are subject to Hawaii Analytical Laboratory terms and conditions.
***Required fields, failure to complete these fields may result in a delay in your samples being processed.**

☐ via FedEx ☐ via USPS ☐ via .....

Page: _____ of _____

HAWAII ANALYTICAL LABORATORY, LLC

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Honolulu, HI 96816
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☐ New Client?

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Address*	P.O. Box 1018
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Phone / Cell No.*	
Report results to	Kama Kobayashi
via email or fax	

Invoice To*	Kama Kobayashi
Company	Lehua Environmental Inc.
Address*	
Phone / Cell No.*	
Purchase Order No.	
Email Invoice To	

Need Results By*:
- ☐ 5 Working Days (WD)
- ☐ 4 WD
- ☐ 3 WD
- ☑ 2 WD
- ☐ 24 hours
- ☐ 6 hours or less
- ☐ 4 hours or less
- ☐ 1-2 hours

Site/Project Name: 2015-233

Client Project No.: Puuwaawaa Water Tank

Sampled By: Kama Kobayashi

Comments / Special Instructions: Stop @ 1st positive

☐ verbal results needed?

PLM POSITIVE STOP Instructions:
- ☑ Positive stop per SAMPLE
- ☐ Positive stop per LAYER

LAB USE ONLY
Lab Report No.: 2015253Y

	Sample Identification / Description* (Maxmium of 30 Characters)	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab ID
1	PW-A13	5/19/15	Bulk		PLM	Asbestos).	201512482
2	PW-A14	↓	↓		↓		201512483
3	PW A15	↓	↓		↓		201512484
4							
5							
6							
7							
8							
9							
10							
11							
12							

Relinquished By (Print and Sign)	Date/Time	Received By (Print and Sign)	Date/Time
Kama Kobayashi	5/20/15 9am	Rozlyn Luber	05-21-15 13:46 LN

☐ via FedEx ☐ via USPS ☐ via .....

Sample description can be paint chips, concrete, specific sample collection location, etc...
If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.
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Hawaii Analytical Laboratory
ANALYTICAL REPORT

Friday, May 22, 2015

3615 Harding Avenue, Ste. 308, Honolulu, Hawaii 96816
Phone: (808) 735-0422

Mr. Kama Kobayashi
Lehua Environmental Inc.
P.O. Box 1018

Kamuela HI 96743

Phone Number: (808) 494-0365
Facsimile:
Email: lehuaenvironmental@gmail.com

Lab Job No: 20152535
Your Project: 2015-233, Puuwaawaa Water Tank, 05/19/2015

Lead, total (paint chips)

NIOSH **Method:** 7082m LEAD by FAAS

Sample No.	Your Sample Description	Results	Units	Date Submitted	Date Analyzed
201512485	**PW - L1**	85	mg/kg	5/21/2015	5/22/2015
Comments					
201512486	**PW - L2**	76	mg/kg	5/21/2015	5/22/2015
Comments					

All Quality Control data are acceptable unless otherwise noted.
MRL for lead air is 5ug.
MRL for lead wipe is 10ug.
MRL for lead paint or soil is 40 mg/kg for a 0.25g sample.

General Comments
All analysts participate in interlaboratory quality control testing to continuously document profiency. The sample[s] analysis subject of this analytical report were conducted in general accordance with the procedures associated with the" analytical method" referenced above. Modifications to this methodology may have been made based upon the analyst's professional judgment and / or sample matrix effects encountered. The analysis of sample relates only to the sample analyzed, and may or may not be representative of the original source of the material submitted for our analysis. This report is not to be duplicated except in full without the expressed written permission of Hawaii Analytical Laboratory. This report should not be construed as an endorsement for a product or a service by the AIHA or any affiliated organizations. Sample and associated sampling / collection data is reported as provided by client. Concentration and TWA values have been calculated based on information supplied by the client that the laboratory cannot verify. Results have not been corrected for blank determinations unless noted in remarks. Unless otherwise indicated the sample condition at the time of receipt was acceptable.

Results and Symbols Definitions
> This testing result is greater than the numerical value listed.
< This testing result is less than the numerical value listed.
 # = Analytical methods marked with an "#" are not within our AIHA Scope of Accreditation.
MRL = Method Reporting Limit.

Ms. Jennifer Hsu Liao
Laboratory Manager

Hawaii Analytical Laboratory, is an AIHA CAPT, IHLAP, ELLAP and EMLAP accredited laboratory (Accreditation No. 101812) in the scope of work listed on the AIHA website (www.aiha.org). Hawaii Analytical Laboratory is also an analytical facility accredited in accordance with the recognized ISO/ IEC 17025:2005.

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Phone / Cell No.*	Same as left
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Need Results By*:
- ☐ 5 Working Days (WD)
- ☐ 4 WD
- ☐ 3 WD
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- ☐ 24 hours
- ☐ 6 hours or less
- ☐ 4 hours or less
- ☐ 1-2 hours

Site/Project Name: 2015-233

Client Project No.: Puuwaawaa Water Tank

Sampled By: Kama Kobayashi

Comments / Special Instructions: ☐ verbal results needed?

PLM POSITIVE STOP Instructions:
- ☐ Positive stop per SAMPLE
- ☐ Positive stop per LAYER

LAB USE ONLY
Lab Report No.: 20152535

	Sample Identification / Description* (Maxmium of 30 Characters)	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab ID
1	PW-L1	5/19/15	paint chip		total lead	EPA	201512485
2	PW L2	5/19/15	paint chip		total lead	EPA	201512486
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Relinquished By (Print and Sign)	Date/Time	Received By (Print and Sign)	Date/Time
Kama Kobayashi	5/20/15 9a	Rozlyn Luber	05-21-15 13:46

Sample description can be paint chips, concrete, specific sample collection location, etc...
If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.
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☐ via FedEx ☐ via USPS ☐ via .....

Page: _____ of _____

SECTION 02050

DEMOLITION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

The work includes demolition removal and relocations of all construction indicated on the plans or specified herein. All materials resulting from demolition work, except as indicated or specified otherwise, shall become the property of the Contractor and shall be removed from the limits of Government Property. Remove rubbish and debris from the job site daily, unless otherwise directed. Store materials which cannot be removed daily in areas specified by the Contracting Officer.

1.02 SUBMITTAL:

Submit proposed demolition and removal procedures to the Contracting Officer for approval before work is started. Procedures shall provide for coordination with other work in progress and a detailed description of methods and equipment to be used for each operation, and sequence of operations.

1.03 DUST CONTROL:

Take appropriate action to check the spread of dust to the surrounding area and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions, such as flooding or pollution. Comply with all dust regulations imposed by local air pollution agencies.

1.04 PROTECTION

A. Existing improvements: Protect existing improvements that are to remain in place, that are to be reused, or that is to remain the property of the State by temporary covers, shoring, bracing, and supports. Repair items damaged during performance of the work or replace with new. Do not overload structural elements. Provide new supports or reinforcement for existing construction weakened by demolition, removal, and relocation work. Construction equipment and vehicles shall neither be permitted on, nor shall be stored on the existing work that is to remain in place.

B. Trees: Protect trees within the project site which might be damaged during demolition. Restore trees scarred or damaged by Contractor equipment operations to their original condition or replace as determined by the Contracting Officer. The Contracting Officer shall approve restoration prior to its initiation.

C. Personnel: Where pedestrian and driver safety is endangered in the work or storage areas, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning and such work.

D. Explosives: Use of explosives will not be permitted.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXISTING FACILITIES

A. Demolish and remove portions of existing facilities required to construct new improvements indicated on the plans.

3.02 DISPOSITION OF MATERIALS

A. Title to Materials: Title to all materials and equipment to be removed, except as specified otherwise, is vested in the Contractor upon receipt of the Notice to Proceed. The State will not be responsible for the condition or loss of, or damage to, such property after notice to proceed. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.03 CLEANUP

A. Debris and Rubbish: Remove and transport debris and rubbish in a manner that will prevent spillage into ocean or adjacent areas. Cleanup spillage from ocean and adjacent areas.

B. Regulations: Comply with Federal, State, and Local hauling and disposal regulations.

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

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

1.02 COORDINATION WITH OTHER SECTIONS:

A. Earthwork is specified in Section 02200- EARTHWORK:

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

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

B. Protection: Throughout the progress of the work protection shall be provided for all property and equipment, and temporary barricades shall be provided as necessary. Work shall be done in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, and the State of Hawaii's Occupational Safety and Health Standards, Rules and Regulations.

C. Fires: No burning of fires of any kind will be allowed.

D. Reference Points: Benchmarks, controls, property pins, etc., shall be carefully maintained, but if disturbed or destroyed, shall be replaced as directed at the Contractor's expense.

E. Disposal: All Materials resultant from operations under this Section shall become the property of the Contractor and shall be removed from the site. Loads of materials shall be trimmed and/or covered to prevent droppings from trucks.

3.02 EXISTING UTILITY LINES

A. The existence of active underground utility lines within the construction area is

not definitely known other than that is shown in the plans. Should any unknown line be encountered during excavation, the contractor shall immediately notify the Contracting Officer of such discovery. The Contracting Officer shall than investigate and issue instructions for the preservation or disposition of the unknown line. Authorization for extra work shall be issued by the Contracting Officer only as deemed necessary.

3.03 CLEARING AND GRUBBING

A. The Contractor shall clear the premises of all obstacles and obstructions, the removal of which will be necessary for the proper reception, construction, execution and completions of other work included in this contract.

1. For Helicopter fire fighting purposes, the Contractor shall remove trees and shrubs within a 200 feet radius (as shown on the plans) of Poohohoo Reservoir No.1, and Hale Piula Tanks Nos. 1 & 2. Ground cover within this areas shall remain.

B. The Contractor shall protect from injury and damage all surrounding trees, plants, etc., and shall leave all in as good as condition as at present. Any damage to existing improvements shall be repaired or placed by the Contractor to the satisfaction of the Contracting Officer .

3.04 CLEAN UP OF PREMISES

A. Clean up and remove all debris accumulated from construction operations from time to time as directed. Upon completion of the construction work and before final acceptance of the contract work, remove all surplus materials, equipment scaffolding etc., and leave entire job site raked clean and neat tot he satisfaction of the Contracting Officer.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY:

A. All work in this section includes the furnishing of all labor, materials, tools, and equipment necessary for trench and unclassified excavations, embankments, filling, backfilling, rough and finish grading, and related items necessary to complete all work shown on the Drawings and/or as specified herein.

B. It shall be the responsibility of the Contractor to examine the site and determine for himself the existing conditions.

1.02 ORDINANCES AND PERMITS: The Contractor shall comply with all applicable ordinances and regulations and obtain the required permits.

1.03 SOIL BORING: Soil borings have not been performed. Bidders shall examine the site and shall draw their own conclusions therefrom as to the character of materials to be encountered.

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

1.05 REFERENCES: The publications listed for a part of this specification to the extent referenced. Paragraphs concerning Measurement and Payment in the Sections are not applicable to this project.

A. Applicable Sections of the "Standard Specifications for Public Works Construction" dated September 1986, as revised or amended.

1. Trench Excavation and Backfill . . . Section 11
2. Embankments . . . . . Section 17
3. Soil Preparation . . . . . Section 50

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Yard Fill, Shall have a Plasticity Index of less than 20, expansion less than 3% (CBR method), 3 inch maximum size and be free of deleterious substances.

Yard sub grade fill shall be installed at all open yard areas and topped by yard finishing material to the indicated grades.

B. Embankment: Shall meet the requirements of the Standard Specifications for Public Works Construction Section 17 On-site excavated material may be re-used for yard fill only if reduced to less than six inches in maximum size and approved by the Contracting Officer.

C. Topsoil: Topsoil shall meet the requirements of Section 2920 - Lawns & Grass.

PART 3 - EXECUTION

3.01 GENERAL:

A. All excavation shall be protected and guarded against danger to life, limb and property.

B. Shoring, cribbing and lagging, as required to safely preserve the excavations and earth banks free from damages resulting from the work, shall be provided and installed by the Contractor.

C. The Contractor shall at all times control the grading around construction areas so that the ground is adequately sloped to prevent any water from flowing into unwanted areas and open trench excavations. All excavations shall be kept free from standing water. The Contractor shall do all pumping and draining that may be necessary to remove water to the extent required in carrying on the work.

However, lowering or raising of water table in areas where detrimental effects may be induced is expressly prohibited. In such areas, the excavated spaces shall be sealed prior to the pumping of water or other approved means employed by the contractor. The Contractor shall be responsible for disposal of the pumped liquids.

Construction equipment which require water for their operation shall not be used in the vicinity or within the building area without the approval of the Contracting Officer.

Water shall at no time be conducted onto adjacent building properties.

D. Caution shall be exercised in all excavation work adjacent to existing trees which are to remain. All exposed fibrous and branch-type roots shall be carefully pruned or saw-cut to the extent required for excavation work. Every effort shall be taken to preserve the existing trees and to minimize damage to said trees.

E. The areas not covered by pavement up to the Contract Zone Limit shall be graded to conform to existing contours.

F. Laying Out

1. The laying out of base lines, establishment of grades and staking out the entire

work shall be done by a surveyor or a civil engineer licensed in the State of Hawaii, at the Contractor's expense. The Contractor shall be solely responsible for their accuracy. The Contractor shall erect and maintain substantial batter boards showing construction of lines and levels.

2. Should any discrepancies be discovered in the dimensions given in the plans, the Contractor shall immediately notify the Contracting Officer before proceeding any further with the work, otherwise he will be held responsible for any costs involved in correction of construction placed due to such discrepancies. The Contractor shall be responsible for re-establishing property corners which are destroyed by his operations.

G. Burning of materials or debris is not allowed.

H. Keep the project area free from dust nuisance at all times by watering or other appropriate methods.

I. The Contractor shall protect from damage all surroundings structures, trees, plants, grass, walks, pavement, utility boxes, power poles, guy wires, signs, fences, and footings, etc. Any damages will be repaired or replaced to equal or better condition by the Contractor to the satisfaction of the Contracting Officer.

J. All vegetative materials excavated or cleared by the Contractor shall be hauled away at the Contractor’s expense.

K. Erosion Control: The Contractor shall install, monitor, and maintain erosion control devices and/or structures (ie: silt fencing, gravel filled pouches, sand bags, and filter fabrics) from the beginning of surface disturbance to the stabilization of the finish grade surface. (Ie: from grubbing to re-growth of grassing) The contractor shall install devices or structures to keep erosion from depositing in drainage structures (ie: Grated inlets & drywells). Erosion control system shall be installed and maintained to the satisfaction of the Engineer.

3.02 EXCAVATION

A. General Requirements

1. Excavation shall be done so as to obtain the elevations called for on Drawings, allowing for fill, grading, and drainage as indicated.

2. Usable Materials as approved by the Contracting Officer shall be stockpiled (for later use as fill material) in a location designated by the Contracting Officer. This material may also be excavated directly to fill at the Contractor's option.

3. Non-usable Material such as mud, soft material, and expansive soils shall become the property of the Contractor and shall be properly disposed of outside the project boundary limits.

4. Blasting as a means of excavation shall not be permitted.

5. Unsuitable subgrade soil, as determined by the 3 - 6 mil profile shall be excavated and removed by the Contractor at his expense.

3.03 FILL:

A. General Requirements

1. Filling operations shall be performed so as to bring the entire project area to the finished grades shown on the Drawings, allowing for installation of fencing.

2. All compaction shall be accomplished with the use of approved equipment, tampers or vibrators.

3. At the time of compaction, the moisture content of fill material shall be such that the relative compaction hereinbefore specified can be obtained with the compacting equipment being used. At all times, it shall be the responsibility of the Contractor to employ such means as may be necessary to obtain a uniform optimum moisture content throughout the material being compacted.

B. Yard Fill:

1. Yard fill where no pavement occurs shall be placed in layers, 12 inch loose material layers or 8 inches or less in compacted thickness, and compacted to 90 percent of maximum density as determined by the ASTM D1557 procedure.

A. Top Soil to Finish yard elevations. Areas not covered by asphalt paving, concrete slabs, and structures shall be graded to conform to finish grades and/or contours with allowance for a 6" layer of top soil as required. Compaction shall not be less than 90% of the material's maximum density before placing to soil. Top soil shall be spread evenly, compacted lightly and raked to a uniform plane to required contours and grades.

3.04 REMOVAL AND REPAIR WORK: The Contractor shall exercise every precaution to preserve and protect all structures, walkways, curbs, or utility improvements which are to remain. Portions of walkways, curbs, and pavement which are affected by the work shall be sawcut neat and true to line. The Contractor shall restore affected features to equal or better condition to the satisfaction of the Contracting Officer.

3.05 MAINTAINING TRAFFIC FLOW:

A. The Contractor shall conduct operations with minimum interference to streets, highways, driveways, sidewalks, passages, traffic, and school operations, etc.

B. The Contractor shall provide traffic control measures as required by the Engineer.

END OF SECTION

SECTION 02225

TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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

A. Work included: Trenching for waterlines, excavation, backfill, and compact as specified herein and as needed for installation of water lines, valves, fittings and appurtenances.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the Engineer.

D. Compaction requirements are defined by American Society for Testing and Materials (ASTM) Publication D-1557 “Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10-lb Rammer and 18-inch Drop.”

1.03 SUBMITTALS

A. Shoring and Sheeting Plan: Describe materials of shoring system to be used. Indicate whether or not components will remain after filling or backfilling. Provide plans, sketches, or details along with calculations by a professional engineer registered in Hawaii. Indicate sequence and method of installation an removal.

1.04 PERMITS

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

PART 2 - PRODUCTS

2.01 BACKFILL MATERIALS

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

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

B. Ordinary Material: Material used in the upper portion of the select material to the surface of the ground or subgrade of the road shall not contain stone, rock or other material larger than six inches in its longest dimensions. No wood, vegetable matter or other material which, in the opinion of the Contracting Officer, is unsuitable, shall be included in the backfill. No “adobe” or other materials determined to be deleterious by the Contracting Officer shall be included in the backfill.

C. The Contractor shall obtain the approval of the Contracting Officer of all backfill material to be used.

2.02 OTHER MATERIALS

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

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

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

B. Improved surfaces such as asphalt concrete, concrete, etc. shall be saw cut 12" wider than trench width prior to beginning excavation.

3.02 FINISH ELEVATIONS AND LINES

A. All material excavated shall be considered unclassified, whether consisting of earth, lava, soft rock, decomposed rock, solid rock, boulders, or coral. The excavation shall

be so dug that the foundation, or walkway or stairway, etc., can be properly installed to the alignment and grade specified. Excavation shall commence at the point directed by the Contracting Officer and shall be carried on in an orderly manner. No jumps or spaces will be permitted unless approved by the Contracting Officer. Before proceeding with any excavation under asphaltic concrete and concrete pavements, the Contractor shall cut the edges of the excavation with a power saw to insure a neat cut along the pavement.

B. Excavation Below Grades.

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

3.03 PROCEDURES

A. Utilities.

The existence of active underground utility lines within the construction area is not definitely know other than that the area is unimproved and there are no know utilities. Should any unknown line be encountered during excavation, the Contractor shall immediately notify the Contracting Officer of such discovery. The Contracting Officer shall than investigate and issue instructions for the preservation or disposition of the unknown line. Authorization for extra work shall be issued by the Contracting Officer only as he deems necessary.

1. All excavated areas shall be toned prior to excavation.

2. Unless shown to be removed, protect lines shown on the drawings or otherwise made known to the Contractor prior to excavation. If damaged, repair or replace at no additional cost to the State.

3. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.

4. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the State.

5. Expose existing utilities to confirm clearances as initial trenching work. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Contracting Officer and secure his instructions.

6. Do not proceed with permanent relocation of utilities until written instructions are received from the Contracting Officer.

B. Protection of persons and property.

1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.

2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

C. Blasting:

1. Blasting for excavation will not be permitted.

D. Dewatering:

1. Remove water by pumping or other methods to prevent the softening of surfaces exposed by excavation, prevent hydrostatic uplift, and provide a stable excavated condition for any installation of underground structures and/or foundations. Use screens and gravel packs or other filtering systems on the dewatering devices to prevent the removal of fines from soil.

2. Dispose water at an approved location by pumps, drains, and other approved methods.

E. During the period of construction, the Contractor shall protect the public against mud, dust and similar nuisances and shall take steps to abate such nuisances.

F. Convenient access to public areas along the line of work shall be maintained and temporary approaches shall be provided and kept in order. Temporary bridges for pedestrian traffic shall have handrails securely fastened to them. Handrails shall be free form any projecting nails, splinters, and rough edges.

G. Storing of excavated material shall be done in such a manner as not to obstruct traffic. Whenever, in the opinion of the Contracting Officer, proper storage of excavated material cannot be made alongside the excavation, the material shall be hauled away from the work site. If the excavated material meets the requirements for backfill material and proper storage cannot be made alongside the excavation, the material shall be stockpiled at convenient location for later use in backfill.

H. Surplus Material:

1. Unless otherwise specified in the Plans or Specifications, or ordered by the Contracting Officer, surplus excavated material shall become the Contractor's property and shall be removed from the work site and properly disposed of at no cost to the State.

3.04 EXCAVATION

A. Provide sheeting and shoring necessary for protection of the Work, preventing undermining of existing facilities and for the safety of personnel.

1. Prior to backfilling, remove all sheeting.

2. Do not permit sheeting to remain in the excavation except when, in the opinion of the Contracting Officer, field conditions or the type of sheeting or methods of construction such as use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, the Contracting Officer may permit portions of sheeting to be cut off and remain in the trench.

B. Excavation:

1. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects at no additional cost to the State, as directed by the Contracting Officer.

2. When the void is below the subgrade for the bedding, use select materials and compact to the relative density directed by the Contracting Officer, but in no case to a relative density less than 90% compaction.

3. When the void is in the side of the excavation or open cut, use suitable earth or sand compacted or consolidated as approved by the Contracting Officer, but in no case to a relative density less than 80% compaction.

4. Excavating for appurtenances:

a. Over-depth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the Contracting Officer, and at no additional cost to the State.

D. Depressions:

1. Except where rock is encountered, do not excavate below the depth indicated or specified.

2. Where rock is encountered, excavate rock to a minimum over-depth of 4" below the trench depth indicated or specified.

3.05 BEDDING

A. Provide bedding as indicated on the Drawings.

3.06 BACKFILLING

A. General

1. All backfill material shall be placed by hand or by approved mechanical methods. The compaction of backfill material shall be done by tamping with hand tools or approved pneumatic tampers, by using vibratory compactors, by puddling if the backfill material can be suitably drained, or by any combination of the three. The method of compaction shall be approved by the Engineer and all compaction shall be done to the satisfaction of the Contracting Officer.

2. When removal of unsuitable excavated material creates a shortage of backfill material, the Contractor shall, at no cost to the State, furnish material as specified in this section in the amount required to complete the backfill.

3. When backfill material is delivered by trucks, the material shall not be dumped directly into the excavation but the fall of the material shall be broken at the edge of the excavation. The backfill material shall then be deposited by hand or by approved mechanical methods.

4. Ensure that no damage is done to structures or their protective coatings.

B. Backfilling to Grade:

1. The backfill material shall be placed in layers not to exceed 12 inches in loose lifts. Each lift shall be compacted to a relative density not less than 90%.

2. If the excavation section is flooded, no further backfill shall be placed for two (2) days. After this period, the backfill shall again be thoroughly compacted to a relative density of not less than 90% by a method and with equipment approved by the Engineer Contracting Officer.

3. Other improvements such as driveways, sidewalks, curbs, gutters, stonewalls, fences and other structures damaged during construction shall be replaced or repaired to their original condition or better as approved by the Contracting Officer.

3.10 FIELD QUALITY CONTROL

A. The Contracting Officer will inspect and approve excavation before installation of structures and/or walks and will make the following tests:

1. Assure that excavations are not backfilled until all tests have been completed by the Contractor;

2. Check bedding for proper layer thickness and compaction;

3. Verify that test results conform to the specified requirements, and that sufficient tests are performed;

4. Assure that defective work is removed and properly replaced.

END OF SECTION

SECTION 02310

GEOTEXTILE FABRICS

PART 1 - GENERAL

1.01 DESCRIPTION

This section shall consist of furnishing and installing non-woven geotextile fabric under the membrane water catchment liner as shown in the drawings.

1.02 QUALITY ASSURANCE

A. REFERENCES:

This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the more stringent requirements shall prevail. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ASTM D3776	Standard Test Method for Mass Per Unit Area (Weight) of Fabric
ASTM D4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus
ASTM D4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D4632	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
ASTM D4833	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products ASTM D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics

1.03 SUBMITTALS

Submit manufacturer’s technical information for the products demonstrating compliance with the specifications. Submit two (2) 8-inch by 10-inch product samples. Submit

manufacturers detailed storage and installation instructions for the products. Submittal shall be provided to the Contracting Officer prior to shipment.

1.04 WARRANTY

A. Manufacturer(s) shall confirm in writing, prior to shipment, that the material to be furnished will meet the intent of the specifications, and shall guarantee the material to be free of defects in materials and workmanship at the time of sale and against deterioration due to the effects of ozone, ultraviolet or other normal weathering on a pro-rata basis for a minimum of 5 years from the date of acceptance.

B. The Manufacturer(s) shall furnish a sample warranty for review and approval prior to shipment.

C. The Contractor shall furnish the Contracting Officer a written warranty with a period of at least 2 years against defects in workmanship. Warranty conditions concerning limits of liability will be evaluated and must be acceptable to the Contracting Officer.

PART 2 - MATERIALS

2.01 PRODUCTS

Geotextile fabric under catchment liner shall be non-woven polyester (new or recycled) or polypropylene filaments, formed into a stable network by needle punching. Non-woven geotextile fabric shall be as manufactured by Layfield, Engineered Synthetic Products, or preapproved equal. The non-woven geotextile shall be inert to commonly encountered chemicals and hydrocarbons and shall also be resistant to mildew, rot, ultraviolet light exposure, insects, and rodents.

2.02 MANUFACTURING QUALITY CONTROL

A. Geotextile fabrics shall be manufactured with quality control procedures that meet or exceed generally accepted industry standards.

B. The Contractor shall not accept or install any geotextile fabric that exhibits defects.

C. In the event that any geotextile fabric sample does not comply with these specifications, it will result in rejection of the roll from which that sample was obtained. The Contractor shall replace any rejected rolls at no additional cost to the Contracting Officer.

2.03 LABELING

Geotextile fabrics and their protective covers shall be marked or tagged by the manufacturer with the following information:

1. Manufacturer's Name
2. Product Identification

3. Date of Manufacture
4. Lot Number
5. Roll Number
6. Roll Dimensions
7. Thickness of Material (if applicable)

2.04 HANDLING AND STORAGE:

Geotextile fabric material shall be protected, in accordance with its manufacturer's recommendations, from moisture, excessive heat or cold, puncture, or other potentially damaging or deleterious conditions. All geotextile fabrics shall be stored off the ground and out of direct sunlight. Any additional storage procedures recommended by the manufacturer(s) shall be the obligation of Contractor.

2.05 GEOTEXTILE FABRIC PROPERTIES

A. The non-woven geotextile fabric under the pond liner shall conform with the following specifications:

Geotextile fabric Property	Unit	Test Methods	Minimum Certifiable Value
Weight	oz/sq. yd.	ASTM D 3776	10
Grab Tensile Strength	lb	ASTM D 4632	250
Elongation	percent	ASTM D 4632	50
Trapezoid Tear strength	lb	ASTM D 4533	100
Puncture Resistance	lb	ASTM D 4833	160
Ultraviolet Degradation, Percent 500 hours.	Strength Retained	ASTM D 4355	70

[1] Certifiable values based on a 95 percent confidence level with a sample size of six. Where direction is not specified, the minimum certifiable value represents the lower value of the two directions.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Surface Preparation:

1. The surface of the subgrade layer/cushion soil layer shall be smooth, firm, unyielding, and free of vegetation, construction debris, sticks, sharp rocks, void spaces, abrupt elevation changes, and standing water. Immediately prior to geotextile fabric deployment, the subgrade shall be final graded to fill in all voids or cracks and then smooth-rolled to provide the best practicable surface for the geotextile fabric. At the completion of this activity, no wheel ruts, footprints or other irregularities shall exist in the subgrade. Furthermore, all

protrusions extending more than one-half inch from the surface shall either be removed, crushed or pushed into the surface with a smooth-drum compactor.

2. Special care shall be taken to maintain the prepared soil surface throughout the geotextile fabric installation work.

3. No geotextile fabric shall be placed onto an area which has been softened by precipitation and/or condensation or which has cracked due to desiccation. The soil surface shall be observed daily to evaluate the effects of desiccation cracking and/or softening on the integrity of the soil surface.

4. Any damage to the soil surface caused by installation activities shall be repaired at the Contractor's expense.

3.02 GEOTEXTILE FABRIC INSTALLATION

A. General:

1. Geotextile fabric shall be handled in such a manner as to ensure they are not damaged in any way.
2. Precautions shall be taken to prevent damage to underlying layers during placement of the geotextile fabric.
3. After unwrapping the geotextile fabric from its cover, the geotextile fabric shall not be left exposed for a period in excess of 7 days.
4. If white-colored geotextile fabric is used, precautions shall be taken against "snow blindness" of personnel.
5. Care shall be taken during placement of geotextile fabric not to entrap stones, excessive dust, or moisture in the geotextile fabric during placement.
6. In the presence of wind, all geotextile fabrics shall be weighed with sand bags or the equivalent. Such sand bags shall be installed during placement and shall remain until replaced with other components of the cover system.
7. The Contractor shall examine the entire geotextile fabric surface after installation to ensure that no potentially harmful foreign objects are present. Such foreign objects shall be removed and damaged geotextile fabric shall be replaced.

B. Seams and Overlaps:

1. Overlap the geotextile a minimum of 12 inches and spot weld or stitch together overlapping geotextile sheets over areas approximately 3 inches in diameter and at 2 feet on center. No horizontal seams shall be allowed on slopes steeper than 10 horizontal to 1 vertical (i.e., seams shall be along, not across, the slopes).
2. Polymeric thread shall be used for all sewing. The seams shall be sewn using Stitch Type 401 (i.e., double chain stitch). The seam type shall be Federal Standard Type SSa-1 (i.e., prayer-type seam).

C. Repair:

1. Any holes or tears in the geotextile fabric shall be repaired as follows:
   a. On slopes steeper than 10 horizontal to 1 vertical, a patch made from the same geotextile fabric shall be double seamed into place (with each seam 0.5 inches apart and no closer than 1 inch from any edge). Should any tear exceed 10percent of the width of the roll, that roll shall be removed from the slope and replaced with new material.
   b. On slopes flatter than 10 horizontal to 1 vertical, a patch made from the same geotextile fabric shall be spot-seamed in place with a minimum of 2 feet overlap in all directions.
2. Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile fabric.

3.03 PRODUCT PROTECTION

A. Use all means necessary to protect all prior work and materials and completed work of other Sections.

B. In the event of damage during construction, the Contractor shall make all repairs and replacements necessary, to the approval of the Engineer and at no additional cost to the County.

END OF SECTION

SECTION 02600

WATER SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The work to be performed under this section shall consist of furnishing all labor, tools, materials, equipment, and all incidentals necessary to install waterlines and appurtenances as shown on the plans.

B. It shall be the responsibility of the Contractor to examine the project site and determine for himself the existing conditions.

C. Conditions of the site existing on the date of the bid opening shall be accepted as part of the work, drawings and/or described herein or may vary therefrom.

D. Whenever the Contractor is required by state or local laws or regulations to make a deposit and/or to pay for a permit before proceeding with any work called for under this part of the specifications, the Contractor shall make the necessary deposit and/or pay for obtaining the required permit.

1.02 STANDARDS: The following construction standards, including all amendments with modifications as specified, are incorporated into and made a part of these specifications by reference and shall be applicable to the work.

A. The Department of Water Supply, "Water System Standards", State of Hawaii, dated 2002.

B. The current edition of the Uniform Plumbing Code, as amended by the County of Hawaii.

PART 2 - PRODUCTS

2.01 All materials furnished by the contractor for incorporation in the work shall be new, free of any defects which may render them unfit for installation and/or use, shall conform to the requirements of the plans and/or specifications, and shall be the standard product of a reputable manufacturer or supplier, as specified herein and/or as approved by the Engineer

2.02 All materials shall conform to the " WATER SYSTEM STANDARDS" except as amended in the plans and/or specifications herewith.

A. HDPE piping and molded fittings: SECTION 02620 - High Density Polyethylene (HDPE) pipe.

B. 3,000 gallon polyethylene tank (102" dia x 93" H), Color green with UV inhibitors, and Tie down Lugs. Manufactured by Custom Roto Mold, Part No. CRMI-3000VTHD, or approved equal.

1. Inlet/Outlet Connection: Inlet/Outlet connections shall conform to the sizes and locations specified on the detail sheets. Connections shall be field located and installed with double flange bolting.

2. Hatch: The tank roof shall have a 24" minimum diameter hatch. Hatch may contain a vent. Vent shall be sized to allow the maximum volume of water entering or leaving the tank without creating pressure.

PART 3 - EXECUTION

3.01 Sequence of Work: the Contractor shall submit the sequence and/or schedule of work subject to approval of the Contracting Officer.

3.02 The installation, testing, disinfection and acceptance of waterlines shall be governed by the Water System Standards and the Uniform Plumbing Code, except as specified herein.

3.03 Trenching, pipe cushion and backfilling for waterlines shall be in accordance with the Water System Standards except as amended in the plans and/or specifications herein.

3.04 Contractor shall repair all facilities, and re-plant all grass and plants disrupted by his trenching work. Such replanting shall be to the satisfaction of the Contracting Officer.

3.05 PROTECTION:

A. Adequate precautions shall be taken before commencing and during the course of the work to insure the protection of life, limb and property.

B. The Contractor shall protect from damage all surrounding Structures, trees, grass, plants, sidewalks, pavement, etc. The damage shall be repaired or replaced by the Contractor to the satisfaction of the Contracting Officer.

3.06 MAINTAINING TRAFFIC:

A. The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, and park activities, etc. Existing driveway shall remain open for public use during construction at all times unless otherwise approved by the Contracting Officer.

B. When necessary, the Contractor shall provide erect and maintain lights, barriers, etc., as required with special attention to protection of life.

3.07 LOCATION AND ADJUSTMENT TO EXISTING UTILITY LINES :

A. The Contractor shall be responsible for verifying the locations of waterlines and all other utility lines shown on the drawings. The locations shown on the contract drawings of various existing utility lines which the new lines are to cross over or under or connect to were determined on the basis of the best information available, however, no assurance can be provided that the actual locations will be as precisely as shown on the contract drawings.

B. Where connections of new waterlines to existing waterlines or new crossings with existing utilities are shown on the plans, the Contractor shall expose the existing lines at the proposed connections or crossings to verify their locations and depth prior to trench excavation.

C. In performing all work the Contractor shall exercise due care and caution necessary to avoid any damage to and impairment in the use of any existing utility lines. Any damage inflicted on the existing lines resulting from the Contractor's operations shall be immediately repaired or restored as directed by the Contracting Officer at the Contractor's expense.

3.08 FINAL INSPECTION:

At the time of final inspection, the waterline work covered under this contract shall be complete in every respect and operating as designed. All surplus materials of every character resulting from this work shall be removed and properly disposed of.

3.09 WARRANTY:

The warranty period shall be for one year after written acceptance date of the project. During the warranty period, the contractor shall provide labor and materials as required to repair or replace defects at no additional cost to the State.

END OF SECTION

SECTION 02620

HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and installing high density polyethylene (HDPE) pipe and fittings.

1.02 REFERENCES

A. ASTM F-714: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR). Based on outside diameter.

B. ASTM D-1248: Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.

C. ASTM D-3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

D. CGSB-41-GP-25M:Standard for Pipe, Polyethylene, for the transport of liquids.

E. CSA B137.1: Polyethylene Pipe, Tubing and Fittings for Cold Water Pressure Services.

F. ASTM D-3035: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR). Based on Controlled Outside Diameter.

PART 2 - PRODUCTS

2.01 MATERIALS

A. The pipe shall be made from polyethylene resin compound qualified as Type III, Category 5, Class C, Grade P34 in ASTM D-1248. This material shall have a Long Term Hydrostatic Strength of 1600 psi when tested and analyzed by ASTM D2837.

B. The raw material shall contain a minimum of 2%, well dispersed, carbon black. Additives which can be conclusively proven not to be detrimental to the pipe may also be used, provided the pipe produced meets the requirements of this standard.

C. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification and from the same raw material supplier.

D. Compliance with the requirements of this paragraph shall be certified in writing by the pipe supplier, upon request.

E. The minimum cell classification shall be PE 345434C for PE 3408 materials, per ASTM D 3350.

F. Inspection and Certification: All material furnished under these specifications shall be inspected and tested prior to shipment for conformance to the "Water System Standards," Volume 1, 1985. Each length or every five feet of pipe, whichever is shorter shall be continuously indent printed with the following information.:

1. Name and/or trademark of the pipe manufacturer.
2. Nominal pipe size.
3. Dimension Ratio.
4. The letters PE followed by the polyethylene grade per ASTM D 1248, followed by the Hydrostatic Design basis in 100's of psi e.g. PE 3408.
5. Manufacturing Standard Reference e.g. ASTM F 714.
6. A production code from which the date and place of manufacture can be determined.

The manufacturer of the pipe and fittings shall submit to the Contracting Officer a sworn statement that the inspection and all tests for the pipe have been made and met as specified. The manufacturer shall also submit a warranty guaranteeing his product against production or material defects. This warranty shall be of one year, from date of final acceptance of this project, replacing free of charge all defective materials only. Failure to obtain this material warranty shall be just cause for the rejection of all pipe installed by the Contractor.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Wherever possible the polyethylene pipe should be joined by the method of thermal butt-fusion, as outlined in ASTM-D2657, Heat Joining Polyolefin Pipe and Fittings. Butt-fusion joining of pipe and fittings shall be performed in accordance with the procedures recommended by the manufacturer. The temperature of the heater plate should not exceed 210°C ± 5°C (410°F ± 10°F) and the joining pressure should not exceed 25 pounds per square inch of projected end area, excluding an allowance for friction.

B. The polyethylene pipe may be adapted to fittings or other systems by means of an assembly consisting of a polyethylene stub-end, butt-fused to the pipe, a back-up flange of ductile iron, made to Class 150, ANSI B16.5 dimensional standards with exceptions, bolts of compatible material and a gasket of suitable red rubber compound cut to fit the joint. In all cases, the bolts shall be drawn up evenly and in line.

C. Polyethylene pipes of the same outside diameter but different wall thicknesses shall be joined by means of a flange assembly as designated above.

D. The pipe supplier shall be consulted to obtain machinery and expertise for the joining by butt-fusion of polyethylene pipe and fittings. No pipe or fittings shall be joined by fusion by any contractor unless he is adequately trained and qualified in the techniques involved.

END OF SECTION

SECTION 02776

HIGH-DENSITY POLYETHYLENE LINER

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS: This section covers the requirements for furnishing and installing high-density polyethylene liner.

The entire lining system shall be manufactured and furnished by a single entity. The liner shall be installed by the manufacturer who supplies the liner or by a lining contractor certified by the manufacturer. The certification by the manufacturer shall state at minimum, that the lining contractor/installer is qualified and meets the experience level required in these specifications and upon completion of the lining installation, issue a warranty in accordance with section 3, Warranty & Guarantee.

A. Unless otherwise noted here in this specification section, "lining contractor" shall also refer to the lining installer and not the Contractor.

The work includes furnishing all equipment and materials, providing all labor, supervision, administration and management; and supplying all construction equipment, materials and services necessary to perform the work as detailed in this specification.

Also included in this work shall be an onsite lining superintendent, welding technicians and a lining quality control technician supplied by or certified by the manufacturer of the liner. The lining superintendent and lining quality control technician shall be onsite at all times during the installation and testing of the lining.

The lining installer’s approved drawings for construction shall specify all components and details required to meet specifications. The project requires that the lining manufacturer / installer is responsible for material manufacture, design control, quality control, quality assurance, delivery and installation.

B. Experience: The manufacturer / installer shall have at least five (5) years continuous experience in the manufacture and installation of high-density polyethylene sheets for hydraulic lining installations, and shall have manufactured and installed the material specified for this project.

The manufacturer / installer shall submit a list of ten (10) similar installation which have been in service at least two (2) years. The list shall include the owner's name, location of project, square feet of product installed, and the completion date. Submittals without this required information will not be accepted.

C. Submittals: The lining manufacturer shall submit lining material samples and specifications to the engineer 60 days prior to the start of construction for approval. The specification sheet shall give full details of minimum physical properties and test methods used, site seaming methods, and a certificate confirming compliance of the

material with the minimum specifications. Projects completed in which the manufactured material has been successfully used shall be submitted to the Engineer.

1. Samples and Test Results: The manufacturer / installer shall submit to the Engineer for approval samples and test results of the high-density polyethylene sheet.

2. Shop Drawings: The manufacturer / installer shall submit for approval to the Engineer after award of the contract, six (6) sets of full and complete shop and installation drawings showing a minimum of:

    a. Panel layout of the liner system, including penetrations.

    b. Details of factory and field jointing, liner system, liner anchorages to concrete structures, details of sealing the high-density polyethylene sheets to concrete structures, and any other openings into the structure.

3. Certificates: Certificates of compliance stating that the liner meets the physical property requirements for the intended application and with the requirements of standards and testing methods specified herein shall be submitted prior to delivery. The liner material manufacturer must. satisfy by affidavit to the Engineer and Contractor, jointly, that the material he offers to furnish and install shall meet in every aspect the requirements set forth in the specifications. The Contractor shall transmit to the Engineer the affidavit given him by the manufacturer or supplier prior to approval for the furnishing and installing of any such material.

4. Schedules: The Contractor and manufacturer /installer shall submit a schedule detailing the liner fabrication and installation.

5. Quality Control and Quality Assurance: The lining manufacturer / installer shall submit a quality control program and quality assurance program for monitoring the work during manufacturing the liner and during installation of the liner. The quality assurance personnel shall be identified and shall not be the onsite lining superintendent, nor the lining quality control technician. The quality assurance program shall include performance of the following technical services:

    a. Raw Material Evaluation (Laboratory)
        1. Density
        2. Melt Index
        3. Moisture Content

    b. Sheet Quality Evaluation
        1. Tensile and Elongation Properties
        2. Impact Resistance Properties
        3. Environmental Stress - Crack (Bell Test)
        4. Flexural Fatigue

5. Dimensional Stability
6. Carbon Black Dispersion
7. Carbon Black Content
8. Chemical Compatibility

c. Seam Evaluation (Field and Laboratory)
1. Weld Peel Test
2. Weld Tensile Test
3. Vacuum Pump Test
4. Air Pressure Test

D. Delivery Storage and Handling of Materials

1. Delivery: Materials shall be delivered to the site after the required submittals have been approved.

2. Storage and Handling: Storage and handling of the materials shall conform to the manufacturer's recommendations and shall be done in such a manner as to prevent damage to any part of the work. The manufacturer shall furnish to the Engineer complete written instructions for the storage, handling, installation, repair and seaming of the liner in compliance with this specification and the condition of his warranty.

E. Reference Standards: Reference Standards shall comply with the applicable provisions and recommendations of the American Society for Testing Materials (ASTM), except as otherwise shown or specified.

F. Job Conditions: Prior to the installation of the liner, the Contractor and lining installer shall verify conditions of existing facilities and structures to ensure an adequate subgrade for the liner, as specified in Section 3.01 B of these Specifications.

G. Testing: Destructive and non-destructive testing shall be carried out by trained personnel of the lining manufacturer. Quality control procedures are specified in Section 4.01 of these specifications.

H. Inspection: The State of Hawaii will hire independent inspectors to monitor the lining manufacturer /installer's quality control and quality assurance at the factory and at the project site. The lining manufacturer / installer shall make the factory and project site accessible for the State of Hawaii inspectors to monitor the lining manufacturing and installation process.

PART 2 - PRODUCTS

2.01 MATERIAL SPECIFICATIONS

A. Sheet liner: The lining shall be a high-density polyethylene minimum 80 mil thick. The lining shall contain no additives, fillers or extenders. Carbon black shall be added to the resin for ultraviolet resistance. The lining system shall be

manufactured, furnished and installed by a single contractor. Required physical properties of the HDPE liner are described in Table 1.

The membrane liner shall comprise of HDPE material manufactured of new, first-quality products designed and manufactured specifically for the purpose of liquid containment. The liner material shall be so produced as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter. Labels on the roll shall identify the thickness, length, width and manufacturers mark number.

All compound ingredients of the HDPE materials shall be randomly sampled on delivery to the HDPE manufacturing plant to ensure compliance with specifications. Tests to be carried out shall include Density and Moisture Content and Melt Index ASTM D1238-79 Procedure A, Conditions E & P. The resin used to manufacture the HDPE shall be Phillips TR400, Chevron 9642, Soltex Polymers, or from Novacor, Inc.

Samples of the production run shall be taken and tested according to ASTM D638.82 to ensure that tensile strength at yield and break, elongation at yield and break meet the minimum specifications. A quality control certificate shall be issued with the material.

All welding material shall be of a type recommended and supplied by the manufacturer and shall be delivered in original sealed containers -- each with an indelible label bearing the brand name, manufacturers mark number, and complete directions as to proper storage. The resin used to manufacture the HDPE welding rod shall be the same material as the sheet liner.

B. Extrusion Joining Resin: Resin used for extrusion joining sheets and sheet to pipe shall be HDPE produced from the same resin as the sheet. Physical properties shall be the same as those of the resin used in the manufacture of the HDPE liner.

TABLE 1

Physical Properties
High-Density polyethylene Liner

Properly	Test Method	Value	Unit
Thickness	ASTM D-1593	$\pm$10	%
Nominal Density (Min.) Exclusive of Carbon Black	ASTM D-1505	0.94	gm/cm^3
Melt index	ASTM D-1238 Condition "E"	0.3 Max	gm/10 min.
Minimum Tensile Properties (Each Direction)	ASTM D-638, Type IV		

TABLE 1 (Continued)

Physical Properties
High-Density polyethylene Liner

Properly	Test Method	Value	Unit
1. Tensile at Break		3,500	lb/in^2
2. Tensile Strength at Yield		2,400	lb/in^2
3. Elongation at Break		600	%
4. Elongation at Yield		13	%
5. Modulus of Elasticity	ASTM D-638	80,000	lb/in^2
Dimensional Stability (Each Direction)	ASTM D-1204 100^oC/1 Hour	$\pm$2	%
Volatile Loss of Resin	ASTM D-1203 Method "A"	0.3 Max.HDPE 0.1 Max. HDT	%
Resistance to Soil Burial	ASTM D-3083 (ASTM D-638, Type IV)		
1. Tensile Strength at Break and Yield		$\pm$10	%
2. Elongation at Break and Yield		$\pm$10	%
Environmental Stress Crack	ASTM D-1693 Condition "B"	0 Failures in 2,000 Hours	Hours
Water Vapor Transmission	ASTM E-96 Procedure "B"	0.1 Max.	G/M^2/day

TABLE 1 (Continued)

Physical Properties
High-Density polyethylene Liner

Properly	Test Method	Value	Unit
Ozone Resistance 7 days, 100 pphm, 104^{o} Magnification	ASTM D1149 7X	No Cracks	
Puncture Resistance	FTMS 101B, Method 2065	11.50 (for 2.5mm) 10.5 (for 2.0mm)	Joules Joules
Tear Resistance Initiation (Min. lbs)	ASTM D-1004	65 (for 2.5mm) 55 (for 2.0mm)	lb.
Abrasion Resistance	ASTM D-3389 (Tabor Wear Index)	0.272 (for 2.5mm) 0.377 (for 2.0mm)	gms
Tensile Impact Resistance	ASTM D-1822	180	KJ/M^2
Coefficient of Linear Thermal Expansion	ASTM D-696	2.0 x 10^4 Max.	·C^1
Low Temperature Brittleness	ASTM D-746 -112 Procedure "B"		·F
Hardness	ASTM D-2240	50	Shore D
Carbon Content	ASTM D-1603	2.0 - 3.0	%
Water Absorption	ASTM D570	0.1 (Max.)	%
	HDPE HDT		
Hydrostatic Resistance	ASTM D751 Method A, Procedure 1	490 (for 1.5mm) 500 (for 2.0mm) 810 (for 2.5mm)	
Thermal Stability Oxidative Induction Time	ASTM D3895 130^{o}C	2,000	min
	800 psi O_2 200^{o}C	100	min

C. Sponge Rubber Sheeting: Sponge rubber sheeting shall be type SCE-41, Neoprene/EPT/SBR, Closed Ceil Medium, 1/4-inch thick, one side adhesive.

D. Neoprene Adhesive: PYTHON, neoprene adhesive shall be used for gluing sponge rubber sheeting to concrete and HDPE surfaces.

E. Metal Battens: Batten strips shall be 1/4-inch thick stainless steel type 304 or 316. Width of strips shall be two inches minimum.

F. Metal Fastenings: Product and manufacturer: provide stainless steel fasteners as manufactured by the following or approved equal:

1. Molly Parabolts by USM Corporation
2. Kwik-Bolt Hilti Corporation
3. Ramset, Inc.
4. Or Approved Equal

G. Asphalt Cement.: Wet or dry elastic roof sealer shall be manufactured by Monsey Products, Inc., or approved equal.

PART 3 - EXECUTION

3.01 EXECUTION AND WORKMANSHIP:

A. Inspection of Sheet Liner at Job Site: The lining installer shall be responsible for inspection of the sheet rolls at the job site. Should rolls show damage from transit, they shall be so identified by the lining installer and set aside.

During unrolling of the lining material, the lining installer shall carry out visual inspection of the sheet surface. Any faulty areas shall be marked and repaired in an approved manner by the fining contractor.

B. Area Subgrade Preparation: Surfaces to be lined shall be smooth and free of all rocks, stones, hard objects, sticks, roots, sharp objects, or debris of any kind. The surface should provide a firm, unyielding foundation for the membrane with no sudden, sharp or abrupt changes or break in grade. No standing water or excessive moisture shall be allowed. Stones larger than 3/8 inches in diameter, sharp-edged stones of any size, and hard objects shall not be permitted within six inches of the surface to be lined. The surface shall be compacted to a density to allow the movement of vehicles and welding equipment on it without causing rutting or other deleterious effects. Typically, this is a density of 90 - 95 Modified Proctor. The lining installer and Contractor shall certify in writing that the surface on which the membrane is to be installed is acceptable before commencing work.The surface of all concrete bonding surfaces shall be cleaned and smoothed prior to anchoring the liner.

C. Installation

1. General: The HDPE sheet shall be laid out and installed by manufacturer's trained / certified technicians in accordance with the applicable approved shop drawings.

The sheets shall be placed in the basin to permit termination at the top of the side slopes and adjacent to concrete structures and pipe conduits as shown on the drawings. The layout shall be designed to minimize the number and length of the field joints, consistent with proper methods of liner installation.

The installation of the HDPE shall be done by the manufacturer using the manufacturer's recommended welding equipment and installation methods.

The project superintendent and quality control welding technician each shall have installed at least 5,000,000 square feet of lining material. Each welding technician shall have installed at least 2,000,000 square feet of lining material. Resumes of all field personnel of the lining installation shall be submitted to the Engineer prior to commencement of the work.

2. Field Joints

a. General: Field joints shall be made by overlapping adjacent sheets in accordance with the manufacturer's recommendations and extruding a ribbon of extrusion joining resin between the overlapped sheets or over the seam between the overlapped sheets or over the seam between the sheets where hand welds are required.

Prior to extrusion welding of the seams, all areas which are to ecome seam interfaces shall be cleaned of dust and dirt. The slick surfaces of the HDPE sheet which are to become seam interfaces shall be roughened with a wire brush or other acceptable means recommended by the manufacturer before extrudate is placed between the overlapping sheets or over a lapped seam.

Extrusion joining shall not take place unless the sheet is dry and shall not take place unless the ambient temperature is above 20 degrees F and below 90 degrees F.

The composition of the extrudate shall be identical to the lining material.

b. Field Joints: Joints between the lining sheets shall be field welded using the manufacturers extrusion joining equipment and techniques.

The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the lining material so as to ensure changes in environmental conditions will not affect the integrity of the weld. Only welding systems which utilize the extrusion fusion process shall be used for bonding these lining materials.

No "fish mouths" shall be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped, and an overlap extrusion weld shall he applied. All welds on completion of the work shall be tightly bonded. Any membrane area showing injury due to

excessive scuffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of HDPE membrane.

The joining procedure shall consist of softening the liner material by heated air. The temperature of the air impinging on the sheet for this purpose shall be in accordance with the manufacturer's recommendations. The exact temperature used shall be determined by the installation supervisor. Directly following the application of heat, a strip of the same high-density polyethylene resin from which the sheet is made shall be extruded between the overlapped sheets. The temperature of the resin as it emerges from the extrusion die shall be within the range recommended by the manufacturer. The overlapped sheets shall be then pressed together to form the extrusion joint.

c. Penetrations of Liner Material: Penetrations through the liner for pipe flashings, patches, etc., shall be field-welded using an extrusion hand welder. The joining procedure shall consist of softening the liner material by heated air as described above. Directly following the application of heat, a hot strip of the same material from which the sheet is made will be extruded over the joint to produce the extruded joint.

Any required repair of small holes in the liner surface shall be made with the extrusion hand welder. Liner material shall be cleaned of all dirt, dust, and other foreign material, all smooth sheet surfaces shall be roughened, air-heated to the prescribed temperature, and a strip of HDPE resin extruded over the hole to produce an extrusion weld repair.

Unless indicated otherwise, all pipe penetrations shall be sleeved with HDPE pipe. Each HDPE pipe sleeve shall be sealed to the liquid carrying pipe to prevent leakage. The basin liner shall be anchored to a concrete collar surrounding the penetration. An HDPE sheet apron shall be extrusion welded to the pipe sleeve and shall be extrusion-welded to the base sheet outside of the area where the base sheet is anchored to the concrete collar.

3.02 QUALITY CONTROL SPECIFICATIONS AND PROCEDURES

A. Quality Control of Raw Material by its Manufacturer: The manufacturer of the HDPE resin used in sheet production tests each batch before delivery to ensure a maximum consistency of raw material quality.

The following tests shall be carried out by the producer of the raw material on each batch and the results forwarded to the sheet fabricator.

1. Density Per ASTM Designation D792: The density of the material reflects the degree of crystallinity and, thus, serves as an indirect check of mechanical qualities such as hardness, stiffness and tensile strength.

2. Carbon Black Content per ASTM Designation D-1603-76: Carbon black polyethylene serves primarily as protection against thermal aging and harmful ultraviolet radiation present in outdoor weathering. Thus, quality control of the carbon black ensures the good weathering properties of polyethylene.

3. Melt Index per ASTM Designation D-1238-73: A material's melt index is a measure of its mean molecular weight and rheological properties. Thus, holding the melt index of the base material within a narrow range is a criterion for uniform and optimum HDPE liner production.

4. Bell Test per ASTM Designation D-1693-70: Bell testing is a relatively fast method of testing a material's performance under mechanical stressing in aggressive media.

5. Moisture Content Per ASTM Designation D-570-63: Maintaining a constant moisture content in the base material is necessary for processing, resulting in a pore-free, bubble-free product. Employing only material with a moisture content in a narrow tolerance range is another requirement for consistent product quality.

   The data determined is evaluated by the manufacturer and, if deviating from the agreed tolerance ranges, the tested batch is not delivered. As a result of this testing, the manufacturer is guaranteed consistent base material quality, essential in the light of the demanding conditions prevailing in the various applications of HDPE liners.

B. Quality Control of the Incoming Raw Material by Sheet Manufacturer: The incoming raw material shall be sampled and tested in the lab facilities of the sheet manufacturer. Properties relative to processing shall be determined specifically:

   - Melt Index per ASTM Designation D-1238-73
   - Density Per ASTM Designation D-792
   This testing shall provide further verification of consistent product quality, supplementary to the manufacturer's certificate.

   If the test results are positive, a sample of the batch shall be processed in manufacturing and evaluated as to melting behavior, forming behavior, and the product sheet's visual appearance.

   No batch shall be sent into production before positive results are obtained for the incoming base material and the test processing. If negative results are obtained, the batch shall be excluded from processing and returned to the manufacturer.

   All properties determined in these tests shall be complied in the final sheet certificate.

C. Quality Control of Sheet Production: Automatic control shall be included in the extrusion process and the successive processing stages. Important parameters in all stages of processing shall be controlled by automatic control systems.

Three different qualities of the sheet shall be inspected continuously during production:

- Forming Process
- Surface Appearance
- Sheet Thickness

Processing parameters such as temperature, pressure and speed shall be continuously monitored for each liner produced. A measuring device, such as a strip chart recorder, shall be furnished.

Sheet thickness shall fall within the following parameters: Ninety percent (90%) of the gross sheet area shall be ± ten percent (± 10%) of nominal specified thickness. Ten percent (10%) of the gross sheet area shall be ± fifteen percent (±.15%) of nominal specified thickness.

The following tests shall be carried out for each sheet:

- Tensile Testing per ASTM Designation D-638
- Impact Tensile Testing per ASTM Designation D-1822
- Thickness
- Stress Cracking Resistance (Bell Test) per ASTM Designation D-1693-70

The following supplementary tests shall be carried out for sheet samples from each raw material batch:

- Melt Index per ASTM Designation D-1238-72
- Thermal Shrinkage per ASTM Designation D-1204
- Density per ASTM Designation D-792

Records of this testing shall be a permanent surveillance of the production process and constant product quality, and shall be maintained by the manufacturer.

Narrow tolerance ranges ensure high quality in production. Products deviating from these ranges shall be removed and the cause determined.

D. Quality Control of Installation: Sheet installation work shall be carried out under supervision up to, and including project completion.

The quality control shall be carried out by the onsite personnel as well as outside testing institutions.

Quality control of installation shall be divided into three areas:

1. Checking the sheets delivered to the site for transport damages; checking of sheet identification number with number on certificate.

2. Inspection and continuous control of all welding process parameters.

3. Testing of the completed weld seams.

Onsite welding of the HDPE sheet shall be carried out by an extrusion-welding process. This process shall guarantee consistent weld-seam quality within a wide range of ambient conditions. The control system of the welding machines shall be extensively automated to enable monitoring of the welding process by the operating personnel.

The welds shall be performed in one procedure by means of an automatic welding machine. which preheats the welding surfaces to the desired temperature, injects a ribbon of molted HDPE material and then applies contact pressure to the seam.

The procedure for fillet welds shall be similar in that the welding area shall be preheated and the welded material shall be molted HDPE. The necessary contact pressure shall come from the weight of the hand-welded unit itself. Fillet welds shall be used only for repair work and special designs.

Test welds shall be run preceding all extensive welding to assure good weld quality under the prevailing site conditions; these weld samples shall be subsequently subjected to mechanical testing.

4. Visual Inspection of Welded Seam: The main prerequisite for good bonding shall be continuous monitoring of the welded process parameters, such as hot air temperature, welding speed and contact pressure. This work shall be carried out by specially trained personnel. Visual inspection of the welded surfaces, the welding process and the completed weld by experienced plastic welders, allows a reliable evaluation of seam quality.

5. Quality Control of Welding Seams: Production of a quality welding seam shall start with a preliminary test weld. The machine settings, pretreatment of the weld surfaces and adjustment to environmental effects shall be tested on a sample welding seam. A hand-operable tensile testing machine shall be onsite for confirmation of the joint's tensile strength using strip samples.

   After installation, two major types of quality control shall be available for testing the seams:

   - Destructive material tests of weld samples (spot check)
   - Non - Destructive material tests of all welding seams to ensure watertight homogenous seams.

6. Determination of Mechanical Strength:

   a. Point Stressing: Point stressing of the newly- produced weld shall be sufficient to locate areas of adhesion (i.e., not fully bonded). This shall be accomplished by probing a device along the weld seam between the lower sheet and the extrudate.

   b. Sampling and Testing Requirements for Laboratory Testing and Evaluation of Field Extrusion Welded Seams:

Sample and Test Requirements for Peel and Shear

Slope -- Every 400 linear feet of welding.

Bottom -- Every 3,000 linear feet of welding.

Sample size shall be 10" x 10". Each sample shall be annotated with the following:

1. Seam Number -- Shall be consistent and random
2. Location - E.g., east slope, west slope, southwest corner, etc.
3. Area of sampling -- E.g., toe area, middle section, top of seam, etc.
4. Date and sampling, ambient temperature, welding machine number.

Quality control testing of field seams shall be performed as indicated. More samples shall be taken and evaluated during inclement conditions.

Weld seam samples at least one foot square with a weld seam in the center, along with an accurate drawing of the installation site of the sample, roll numbers of sheets welded, welder number, and technicians involved shall be forwarded to the Quality Control Laboratory for evaluation. These samples shall be taken at the commencement of welding in any installation and shall be forwarded prior to completion of the final welds, to assure immediate repairs should they be necessary. Samples shall be taken throughout the installation to assure as thorough an evaluation as is possible.

c. Random weld samples for every 500 feet shall be tested in the field with a field tensometer.

7. Testing of Seal Continuity: Non-Destructive testing shall be used to verify the continuity (water-tightness). The method of testing shall be as follows:

a. Vacuum Testing: Use vacuum chamber to test 100 percent of the seamed footage to confirm that no voids are present in the seam.

b. Ultrasonic Testing: Ultrasonic testing shall provide information on the homogeneity of the welding seam. The thickness of the weld shall be tested for homogeneity and exclusions by the use of sound waves similar to ASTM E64-74.

c. Pressure Testing for Double Wedge Weld: The minimum air test pressure shall be 25-30 psi, with a drop in pressure not to exceed 3 psi over a period of not less than five (5) minutes.

3.03 WARRANTY AND GUARANTEE

"The Contractor and the manufacturer/installer shall provide the State with a 2-year warranty for the lining material and field seams against defects and failure. The manufacturer/installer shall provide the State with a 20-year warranty for the lining material and field seams against defects and failure. The Contractor and his surety shall not be responsible beyond the two (2) years for the above warranties."

3.04 AS-BUILTS: The Contractor and lining installer shall provide as builts of the lining system showing location of each panel, penetrations, and all samples and test areas.

3.05 MAINTENANCE AND INSPECTION INSTRUCTIONS: The Contractor and manufacturer / installer shall provide a maintenance and inspection handbook describing in detail the necessary precautions and procedures the State of Hawaii will be required to perform to satisfy the requirements of the Contractors and manufacturer's / installer's warranty.

3.06 POST JOINT INSPECTION

Three (3) years after the project acceptance date, the State of Hawaii and the Contractor and manufacturer / installer shall conduct a joint inspection of the lining system. Any defect in the lining material or seams shall be repaired by the Contractor and manufacturer / installer at no cost to the State of Hawaii.

Defects shall be defined as holes, blisters, undispersed raw materials, aging, cracking, or any sign of contamination by foreign matter. The seams shall be vacuum tested.

Submission of Bids constitutes acceptance that any corrective work which might be required shall be started no later than ten (10) working days after receiving formal written notification by the State of Hawaii of discrepancies uncovered after the joint inspection. Should the Contractor fail to begin remedy of any failure or defect described herein above within 10 working days after receipt of notice thereof, the State of Hawaii shall have the right to repair or otherwise remedy such failure or damage at the Contractor's expense.

END OF SECTION

SECTION 02920

LAWNS AND GRASS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Furnish all labor, materials, equipment and tools for grass planting as specified herein. Grass shall be planted in areas indicated on the plans and as listed below:

1. Excavated breech as shown on the plans and all existing grassed areas that are damaged by construction operations;
2. Grassed areas that are dug up for utility trenches;

PART 2 - PRODUCTS

2.01 MATERIALS

A. Grass shall be Kikuyu Grass. At the option of the Contractor, grass planting may be by seeds (plain seeding or by hydro-mulching) or by sprigs.

1. Grass seeds shall be fresh, hulled, and meet the following requirements:
   Pure Seed 95.0% minimum
   Crop Seed 1.0% maximum
   Weed 0.5% maximum
   Inert Material 5.0% maximum
   Germination 85.0% minimum

   Grass seeds shall be delivered to the site in unopened, sealed containers, labeled with the brand name and per cent purity. Labeling shall indicate that the seeds passed a certified germination test no more than 12 months prior to use.

2. Grass sprigs shall be healthy living runners and stolons, a minimum of 6 inches long with at least 3 nodes. After they are dug, they shall be covered and kept moist until planted.

B. Fertilizer shall be pelleted and shall consist of the following percentages by weight of active ingredients:

1. For First Application:
   Nitrogen 16%
   Phosphate 16%
   Potash 16%

2. For Second Application:
   Nitrogen 16%
   Phosphate 16%

Potash 16%

C. Mulch Materials

1. Mulch shall be specially-processed fiber containing no growth or germination-inhibiting factors. It shall be such that any addition and agitation in the hydraulic equipment with seed, fertilizer, water and other additives not detrimental to plant growth, the fibers will form a homogeneous slurry. When hydraulically sprayed on the soil, the fibers shall form a blotter-like ground cover which readily absorbs water and allows infiltration to the underlying soil.

2. Stabilizing and water retaining agent for hydro-mulching option only shall be "Verdyol Super", "Ecology Control M-Binder" or approved equal. Rate of application of "Verdyol Super" shall be 50 lbs./acre and that for "Ecology Control M-Binder shall be 60 lbs./acre.

D. Organic Soil Conditioners

1. Burnt bagasse mix shall be a mixture of sugar cane ash, aged sugar cane trash and milled forest waste products.

2. Redwood shavings shall be a nitrogen-stabilized compost of redwood material passing through a 1/2" screen.

3. Peat Moss.

4. Shredded hapuu shall be finely shredded hapuu fern.

E. Screened soil for repair work shall be a fertile, friable soil of loamy character, and shall contain organic matter. It shall be obtained from well-drained arable land; be free from weeds, stone and debris; and shall pass a maximum l/2" screen. Screened soil shall be capable of sustaining healthy plant life. See Paragraph 3.01.D.5. for application.

F. Water shall be potable.

PART 3 - EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

A. Site Preparation:

1. Placement of screened soil is specified under "Earthwork" Section. The Contractor shall accept the condition of the site prior to starting work.

2. Before soil conditioning and tilling is started, weeds and other obnoxious vegetation shall be removed by manual or chemical methods.

3. Soil Conditioning and Tilling: The Contractor shall notify the Engineer one day before this work is to be done.

A 1"layer of organic soil conditioner shall be placed over all planting areas. The material shall then be roto-tilled a minimum of 2" into the existing soil until the latter is loose and fine textured. All rocks larger than 1" in diameter and all debris such as stumps, roots, wire, grade stakes and other rubbish that are turned up by tilling shall be removed. Tilling shall be omitted on slopes where watering is likely to wash the soil away.

4. Leveling: Any undulations or irregularities in the surface resulting from tilling or other operations shall be leveled out before planting operations are begun.

B. Planting: The Contractor shall notify the Engineer one day before planting of grass.

1. Immediately prior to planting operations, all planting areas shall be cleared of weeds, debris, rocks over 1" in diameter and clumps of earth that will not break up.

2. Option by Grass Seeding: If grass seeds are used, the following procedure shall be used (NOTE: Contractor should exercise caution in seeding slopes where seeds may be washed away):

a. The grass seeds shall be broadcast uniformly by hand or by sowing equipment at the rate of 100 lbs./acre. Half the seeds shall be sown with the sower moving in one direction and the remainder shall be sown at right angles to the first direction.

b. The surface shall then be raked to a smooth even plane while the seeds are simultaneously worked into the soil to a depth of about 1/2".

c. The surface shall then be smoothed and compacted by means of a culti-packer, roller or other similar equipment weighing 60 to 90 pounds per lineal foot of roller.

d. The planted area shall then be watered sufficiently to provide water penetration to a depth of at least 2" and shall then be kept moist until roots are established.

3. Option by Grass Sprigging

a. Furrows shall be placed perpendicular to drainage aisles and parallel to contours on slopes and shall be spaced no more than 4" apart.

b. Fresh sprigs shall be planted in each furrow a maximum of 6" apart and covered with soil to a minimum depth of 2".

c. The surface shall then be smoothed and compacted by means of a culti-packer, roller or other similar equipment weighing 60 to 90 pounds per lineal foot of roller.

d. The planted areas shall be watered immediately after rolling in sufficient quantity to provide water penetration to a depth of at least 2" and shall then be kept moist until roots are established.

e. The area shall then be over seeded with annual rye grass seeds at the rate of 25 pounds per acre.

4. Option by Hydro-Mulching of Grass Seed: This work shall consist of furnishing and applying hulled Bermuda seed, fertilizer, mulch and stabilizing and water retaining agent by hydro-mulching.

a. The seeds shall be applied at the rate of 100 lbs./acre minimum. Mulch shall be applied at a rate of 500 lbs./acre minimum (31 lbs. per 900 sq. ft.). In every application, complete and uniform coverage of the soil shall be attained.

b. First application of fertilizer shall be included with mulch and seed.

c. The hydro-mulch equipment shall be capable of mixing all the necessary ingredients to a uniform mixture and to apply the slurry to provide uniform coverage. Seed, fertilizer, mulch mix and stabilizing water retaining agent shall be applied in one operation by hydraulic equipment made specifically for this use. The equipment shall have a built-in agitation system with an operating capacity sufficient to keep the mix in uniform distribution until pumped from the tank. Distribution and discharge lines shall be large enough to prevent stoppage and shall be equipped with hydraulic discharge spray nozzles which provide a uniform distribution of the slurry.

d. Areas inaccessible to hydro-mulching application shall be seeded or hand sprigged and fertilized by approved hand methods.

e. Water shall be applied immediately following mulching and the planted area shall then be kept moist until roots are established.

C. Application of Fertilizer: The Contractor shall notify the Engineer one day before application of fertilizer.

1. Fertilizer shall be distributed uniformly over the planted area.

2. The first application of fertilizer shall be applied at the rate of 300 pounds per acre about 2 weeks after grassing and shall be followed by watering. (First application of fertilizer if using hydro-mulching option shall be mixed with the seeded mulch.)

3. The second application of fertilizer shall be applied at the rate of 300 pounds per acre about 1 week before the end of the maintenance period and shall be followed by watering.

D. Maintenance:

1. General: The Contractor shall be responsible for the proper care of the grassed areas. Maintenance shall include watering, weeding, moving, repairing, regrassing and protection, and shall be required until the entire project is accepted, but in any event for a period not less than 45 days after planting of grass.

2. Watering: After planting of seeds or grass sprigs or mulching the ground shall be watered as deemed necessary by the Contractor to establish a healthy growth. Watering shall be done in a manner that will prevent erosion due to the application of excessive quantities of water, and the watering equipment shall be of a type that will prevent damage to the finished surface.

3. Weeding: Weeds shall be uprooted and removed completely and in no case shall they be allowed to grow and propagate more seeds. Large holes caused by weeding shall be filled with screened soil and raked level.

4. Mowing: Grass shall be mowed to a height of 1" whenever the height of grass becomes 1-1/2".

5. Repairing and Regrassing: When any portion of the surface becomes gullied or otherwise damaged and grass has failed to grow, such areas shall be repaired with screened soil and replanted with grass. Any area of one foot square or more in which grass has failed to grow after 30 days of maintenance shall be regrassed.

6. Protection: The grassed areas shall be protected against traffic so that the grass establishes a healthy growth. Grassed areas damaged by traffic shall be replanted.

3.02 ACCEPTANCE OF GRASSING

A. At the time of acceptance, the grass shall have been well-established and shall be given a final weeding and a final mowing to a height of 1 inch. If the maintenance period has expired before acceptance of the entire project, the Contractor shall continue to maintain the grass until acceptance of the entire project. If the maintenance period should extend beyond acceptance of the entire project, the Contractor shall continue to maintain the grass until the end of the specified period of time required for maintenance.

B. At the end of the maintenance period, should there appear areas where grass has failed to grow, such areas shall be replanted with grass, re-fertilized and maintained beyond the maintenance period until a healthy growth is established.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 GENERAL

This Section covers the requirements for furnishing all materials, tools, labor, and equipment, to install concrete structures for pressure breaker tanks site, concrete piping blocks, and miscellaneous concrete work as shown on the plans.

1.02 STORAGE OF MATERIALS

A. Cement and aggregates shall be stored in such a manner as to prevent their deterioration or the intrusion of foreign matter. Any material which has deteriorated or which has been damaged shall not be used for concrete and shall be promptly removed from the site.

1.03 TESTS

A. Slump: Standard slump tests as described in ASTM C143 (Modification: Sampling of concrete for slump test shall be taken after at least 1/4 cubic yard of concrete has been discharged) will be made periodically during the placement of concrete by the Engineer to ensure that the slump for which the concrete has been designed is met. Any concrete batch tested and showing slumps exceeding the specified tolerance shall be rejected. Any concrete placed prior to slump testing shall be the sole responsibility of the Contractor and shall be rejected should the subsequent slump test of the batch in question indicate that the slump tolerance is being exceeded. All rejected concrete shall be promptly removed and properly replaced. All costs resulting therefrom shall be borne by the Contractor.

B. Compressive Strength: During the progress of the work compressive strength tests of concrete shall be made in accordance with ASTM C39. 6-inch x 12-inch cylinders shall be taken from each major pour by the Engineer at the rate of 3 cylinders for each 100 cubic yards. Notwithstanding this established rate, however, the Contracting Officer shall take concrete cylinders in whatever quantity he deems fit and/or necessary from any concrete pour. For pours of less than 25 cubic yards the Engineer may omit the taking of cylinders.

1. The Contractor will retain an independent laboratory to make, identify and test all cylinders as directed by the Inspector.

2. Cost of testing will be borne by the Contractor.

3. The standard age for testing the cylinders shall be 28 days. However, 7-day tests may be made for indication of final 28-day strengths.

4. All cylinders shall be made and cured in accordance with ASTM C31.

5. In all cases where the strength of any group of cylinders falls below the minimum compressive strength specified, the Contracting Officer shall have the right to require that test specimens be cut from the structure. Specimens shall be selected by the Contracting Officer from the location in the structure represented by the test specimen or specimens which failed. Specimens shall be secured, prepared, and tested in accordance with ASTM C42 within a period of 60 days after placing the concrete. The testing shall be done by a laboratory approved by the Contracting Officer. Concrete in the area represented by the core tests will be considered structurally adequate if the average strength of 3 cores is no less than 85% and the strength of a single core is no less than 75% of the 28-days strength specified. Should laboratory analysis indicate, however, that the proper concrete mix has not been used by the Contractor, all such concrete placed using the improper mix shall be subject to rejection. The cost of cutting specimens from the structure, patching the resulting holes, and making the analysis, including laboratory and consultation costs, shall be borne by the Contractor.

   The holes from which the cored samples are taken shall be packed solid with no-slump concrete proportioned in accordance with the ACI 211.3 "Standard Practice for Selecting Proportions of No-Slump Concrete". The patching concrete shall have an "extremely dry" consistency and the same design strength as the specified concrete.

6. If the strength of the specimens cut from the structure falls below the requirements stipulated above, the Contracting Officer shall have the right to require any and all defective concrete to be replaced, and all costs resulting therefrom shall be borne by the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement shall conform to the requirements of ASTM C150, Type I, for all concrete work.

B. Concrete Aggregates:

1. Fine Aggregates shall be calcareous or basalt sands, or a combination thereof. They shall meet the grading requirements of ASTM C33 unless the concrete producer can provide past data that shows that a proposed non-conforming gradation will produce concrete with the required strength and suitable workability.

If manufactured sands are used in the concrete mix, the Contractor may select and use a water-reducing and/or an air-entraining admixture as specified hereinafter to provide satisfactory workability in the concrete. The cement content of a mix shall be as specified hereinafter, and the use of an admixture shall in no way result in the reduction of the cement factor.

2. Coarse Aggregates shall be crushed close-grained, blue lava rock meeting the grading requirements of sizes 57 or 67 (ASTM D448) or both. The maximum size of aggregate shall not be larger than 1/5 of the narrowest dimensions between sides of the forms of the member for which the concrete is to be used nor larger than 3/4 of the minimum clear spacing between individual reinforcing bars or bundles of bars.

C. Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials or other substances that may be deleterious to concrete or reinforcement. Non-potable water shall not be used.

D. Expansion Joint Filler: A pre-molded material of 1/2" thickness, unless otherwise noted, composed of fiberboard impregnated with asphalt conforming to ASTM D 1751.

E. Joint Sealing Compound shall be a polysulfide or urethane compound conforming to ASTM C 920 or other approved equal, compatible with the floor finish to be applied. Color to be selected by the Engineer.

F. Bond-Break Filler: Mineral-surfaced roofing cap sheet or coated asphalt felt.

G. Admixture, if used, shall conform to ASTM C494 or ASTM C260 and shall be mixed in proper amount in accordance with directions of manufacturer.

H. Curing Compound shall be compatible with the floor finish to be applied. Unless otherwise required by the floor finish, the compound shall conform to the requirements of ASTM C 309.

I. Cementitious Coatings shall be cement based polymer modified cement finishing materials ("Pro-Finish" by Bonded Materials Company, "Polycoat" by Tremcrete Systems Incorporated, "Durus" by Durus High Tech Cement, or approved equal).

J. Reinforcing Steel shall be deformed bars conforming to ASTM A-615, grade 60, location, size and spacing as shown on plans.

K. Welded wire fabric conforming to ASTM A-185, location, size and spacing as shown on plans

PART 3 - EXECUTION

3.01 DESIGN OF CONCRETE MIXES

A. Ingredients for concrete shall be Portland cement, fine and coarse aggregates and water.

B. Normal weight concrete shall meet the requirements outlined in Subsection C, D and E below.

C. Concrete shall be designed so that the concrete materials will not segregate nor cause excessive bleeding. Slump shall be 4 inches. A tolerance of 1" above the indicated slump will be allowed for individual batches.

For concrete used in ramps or other sloping construction, the slump tolerance shall be waived.

D. For each class of concrete up to Class 4,000, the cement content and the test results for 28-day compressive strength shall meet the following requirements:

28-Day-Compressive-Strength-Test-Results

Class	Min. Cement Contents Per Cubic Yard Sacks	Min. Average for 3 Cylinders, psi	Min. Average for 2 Cylinders, psi
4,000	6.25	4000	27750
3,000	5.5	3000	27750
2,500	5.00	2500	2250

E. For concrete designed for specified strengths in excess of 4,000 psi and/or containing admixtures other than those used exclusively for the purpose of entraining air, mixture proportions to provide the desired characteristics shall be developed in accordance with Sections 5.2, 5.3 and 5.4 of ACI 318-89.

F. The Contractor shall submit for approval by the Contracting Officer the mixes he intends to use at least 14 days before the actual concrete placing operations.

G. The Contractor shall use only approved mixes.

H. Unless otherwise noted, Class 3,000 concrete shall be used for all non-prestressed structural slabs, beams, piers, columns, walls, footings and equipment pads on ground; Class 2,500 concrete for ground floor slabs, post foundations, thrust blocks, and other uses not included under Class 3,000 concrete above.

3.02 JOINTS

A. Construction joints shall be provided as detailed at locations indicated on the plans. Construction joints not shown on the plans shall be so made as to least impair the strength of the structure and shall be approved by the Contracting Officer. Joints shall be perpendicular to the main reinforcement.

B. All reinforcing steel shall be continuous across construction joints. Keys and/or inclined dowels shall be provided as required. Longitudinal keys at least 1-1/2" deep shall be provided in all joints in walls and between walls and slabs or footings. Unless otherwise indicated, joints shall be sealed with joint sealing compound.

C. Expansion joints shall be provided as detailed at locations indicated on the plans. Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors or walls bonded on only one side of joint) shall not be permitted to extend continuously through any expansion joint. Joints shall be sealed with expansion joint filler and sealing compound at least 3/8" deep.

D. Contraction/control joints shall be provided where shown on the plans and shall be 1/4 the depth of the slab or a minimum of 1" deep. Unless otherwise indicated on the plans, joints may either be tooled, formed-in-place or sawcut. When saw-cut joints are provided, cutting shall be timed properly with the set of the concrete so that it is firm enough not to be torn or damaged by the cutting blade and before random shrinkage cracking can form in the slab. In any case, cutting shall be completed not later than 12 hours after the concrete is placed and finished. Unless otherwise indicated on the plans, joints shall be sealed with joint sealing compound.

3.03 MIXING CONCRETE

A. All concrete throughout shall be either job or plant mixture in an approved type of power operated mixer that will ensure uniformity and homogeneity of the concrete produced. The Contractor shall provide a sufficient number of mixers to continuously carry on the work.

B. Mixing at jobsite shall be done in accordance with ACI 304 and as follows:

1. Concrete shall be thoroughly mixed in a batch mixer of an approved type and size which will insure a uniform distribution of materials throughout the mass. The machine shall have a control device to prevent materials from being discharged until they have been mixed for the specified minimum time.

2. The entire contents of the drum shall be discharged before materials of the succeeding batch are placed therein. No mixer Fahrenheit be used which has a rated capacity of less than a 1-sack batch and no mixer shall be charged in excess of its rated capacity.

3. The first batch of materials placed in the mixer after the machine has been cleaned shall contain a sufficient excess of cement, sand and water to coat the

inside of the drum without reducing the required mortar content of the mix. Upon cessation of mixing, the mixer shall be throughly cleaned.

C. Ready Mixed and Mixed-In-Transit Concrete shall be mixed to conform to the provisions of ASTM C94 and as follows:

1. The plant shall have sufficient capacity and transportation equipment to deliver concrete at the rate desired. The interval between batches for a pour shall not exceed 30 minutes.

2. The time elapsed between the introduction of the mixing water to the cement and aggregates or the cement to the aggregates, and the placing of concrete in its final position shall not exceed 90 minutes.

3. In hot weather (more than 90 degrees Fahrenheit ambient temperature) or under conditions contributing to quick stiffening of the concrete, the elapsed time in 2. shall not exceed 60 minutes, if no retarding admixture is used. If an ASTM C494 Type B or D admixture is added to the concrete, the elapsed time in 2. shall remain at 90 minutes.

D. Concrete shall be mixed only in such quantity as is required for immediate use. No retempering will be permitted and concrete that has started to harden shall be discarded and promptly removed from the job.

E. Admixtures conforming to Paragraph 2.01 may be used in the concrete as recommended by the supplier and approved by the Engineer.

F. Hand mixing of concrete will not be permitted except to make up shortages for fence post footings, sidewalks, thresholds, flag pole foundations, curbs and gutters, and thrust blocks.

3.4 PLACING CONCRETE

A. No concrete shall be placed in the absence of the Contracting Officer or his representative who shall be given one day advance notice of starting time of concrete pour. Concrete placed without such notice and approval shall be rejected.

B. Preparation

1. All extraneous matter shall be removed from interior of forms. Struts, stays, bracing, or blocking serving temporarily to hold forms in correct shape or alignment shall be removed when the concrete placing has reached an elevation rendering their services unnecessary.

2. Concrete shall be placed upon clean, damp surfaces with no free water, or upon properly compacted fills but never upon soft mud or dry, porous earth. Before

pouring footings or foundations, bottoms of excavations shall be properly leveled off and tamped.

3. Before depositing new concrete on or against concrete which has set, all accumulations of mortar splashed upon reinforcing steel and the surfaces of forms shall be removed and the forms shall be retightened. The surfaces of previously set concrete shall be thoroughly roughened and cleaned of all foreign matter and laitance, saturated with water and slushed with a coat of cement grout. New concrete shall be placed before the grout has attained its initial set.

C. Conveying

1. Concrete shall be conveyed from mixer to forms as rapidly as practicable by methods that will prevent segregation.

2. Concrete shall be deposited as nearly as practicable in its final position. Extensive spading as a means of transportation shall be avoided and in no case shall vibrators be used to transport concrete inside the forms.

3. Open troughs and chutes shall have a slope not to exceed 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 ft. long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

4. The concrete shall not be allowed to drop freely more than 6 feet except where specifically authorized by the Engineer. When placing operations would involve the dropping of concrete from a height of more than 6 feet, it shall be conveyed through pipes or flexible drop chutes.

5. If any appreciable segregation occurs through the conveying methods employed, their use shall be ordered discontinued by the Engineer and some other satisfactory method of placing concrete shall be used.

6. All chutes, troughs, pipes and other means of conveyances shall be kept clean and free from coatings of hardened cement or concrete by thoroughly cleaning with water and chipping after each pour. Water used for flushing shall be discharged away from the vicinity of the concrete or forms already in place.

D. Depositing

1. Unless adequate protection is provided, concrete shall not be placed during rain. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish. Fresh concrete that has been deposited but has not attained its initial set shall be protected in the event of rain.

2. Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcing. As nearly as practicable, the concrete shall be dropped vertically without hitting reinforcement, sleeves or forms into its final position in order to avoid separation of coarse aggregates from concrete. After the initial set of concrete, the forms shall not be jarred and no strain shall be placed on the projecting reinforcing.

3. Formed concrete shall be deposited in horizontal layers not deeper than 2 feet avoiding inclined layers and inclined construction joints. The depth of layers shall be shallow enough so that the succeeding layer will be placed before the previous layer has attained its initial set. Concrete shall not be allowed nor shall it be caused to flow horizontally or on slopes in the form. Concrete placing on a slope shall begin at the lower end of the slope and progress upward.

4. Construction joints shall be made only where located on the plans unless approved otherwise by the Engineer. Pours shall be planned to provide for the continuous placing of concrete from one construction joint to another. The face edges of all joints that are exposed to view shall be carefully finished true to line and elevation.

5. If depositing of concrete must be stopped short of a full placement, it shall be leveled to a horizontal plane or stopped against a vertical bulkhead. Such bulkhead or horizontal plane shall be located only as approved by the Contracting Officer.

E. Compaction

1. All concrete shall be consolidated by vibration so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. All compaction shall be done by use of high frequency internal vibrators. Where the vibrator cannot be inserted into the concrete, compaction shall be done by spading, rodding or forking.

2. Frequency of vibrator shall be not less than 7,000 inpulses per minute. The Contractor shall provide a sufficient number of vibrators to properly consolidate all concrete immediately after placing. At least one standby vibrator shall be on hand at all times during placement of the concrete.

3. Vibration shall not be applied through contact with reinforcement of forms. Vibration shall penetrate previously deposited concrete sufficiently to prevent pockets or voids or construction joints from occurring between pours, but must not be applied to concrete which has set up sufficiently to cease to be plastic under vibration.

3.05 CONCRETE SLABS ON GROUND

A. Concrete slabs shall be of one lift construction, thickness as shown on the plans with thickened edge, and of Class 3,000 concrete.

B. All reinforcing steel shall be continuous across construction joints. Keys and/or inclined dowels shall be provided as required. Unless otherwise indicated, joints shall be sealed with joint sealing compound.

C. Expansion joints shall be provided as detailed, not more than 32 feet apart; at junctions with curbs; where walks abut buildings, platforms and other fixed structures; and elsewhere as shown in the plans. Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors or walls bonded on only one side of joint) shall not be permitted to extend continuously through any expansion joint. Joints shall be sealed with expansion joint filler and sealing compound at least 3/8" deep.

D. Contraction/control joints shall be provided where shown on the plans and shall be 1/4 the depth of the slab or a minimum of 1" deep. Unless otherwise indicated on the plans, joints may either be tooled, formed-in-place or sawcut. When saw-cut joints are provided, cutting shall be timed properly with the set of the concrete so that it is firm enough not to be torn or damaged by the cutting blade and before random shrinkage cracking can form in the slab. In any case, cutting shall be completed not later than 12 hours after the concrete is placed and finished. Unless otherwise indicated on the plans, joints shall be sealed with joint sealing compound.

E. Concrete shall be tamped and screeded true to grade and section, sufficient mortar brought to the surface for finishing, and the required finish given as specified hereinafter before the concrete sets. Steps in connection with walks shall have same finish as walks. All edges except for those at saw-cut control joints shall be rounded to 1/8" radius. Cross slope for sloped or crowned walks shall be 5/32" per foot. No pedestrian traffic shall be permitted on concrete walks for a period of 3 days after placing.

F. Walks shall be broom finished and scored or finished to match adjacent surfaces.

3.06 FINISHING OF SLABS

A. Light Broom Finish. The concrete slab shall be given a light transverse scored texture by drawing a broom across the surface. The operation shall follow immediately after steel-troweling is performed.

B. Finishing Tolerances for slabs shall be in accordance with the following:

1. Finish shall be true planes within + or - 1/4" in 10 ft., as determined by a 10-ft. straightedge placed anywhere on the slab in any direction.

   Unless otherwise shown on the plans, all slabs shall meet this tolerance. The tolerances will be checked prior to removing of forms or shores.

3.07 REPAIR OF DEFECTS

A. After forms have been removed, any concrete which is not constructed as shown on the plans or is out of alignment or level beyond required tolerances or which shows a defective surface which in the opinion of the Engineer cannot be properly repaired or patched shall be removed.

B. Where cast-in-place concrete which is exposed to view or designated architectural requires repairing or patching, the texture of the surface of such repair or patch shall closely match that of the surrounding surface. If the concrete is to remain unpainted, the surface color shall also be closely matched to that of the surrounding surface.

C. All repairable defective areas shall be patched immediately after form removal as follows:

1. All honeycombed concrete shall be chipped out to sound concrete but in no case to a depth of less than 1 inch. If possible, edges of the chipped-out areas shall be undercut.

2. Rock pockets, form tie holes, deep holes not too large in area, other holes with relatively high ratio of depth to area, and similarly confined areas shall be dry packed.

   After the area to be patched has been thoroughly cleaned and dampened, mortar, which shall consist of 1 part cement, 2-1/2 parts sand passing a #16 screen, and only enough water to produce a mortar that will stick together upon being molded into a ball by slight pressure of the hands, shall be placed in the holes in layers having a compacted thickness of about 3/8". Each such layer shall be solidly rammed over its entire surface using a hardwood stick and a hammer.

3. Shallow depressions where lateral restraint cannot be obtained, voids behind reinforcement, and holes extending <u>through</u> concrete sections shall be patched using a commercially prepared bonding agent, a stiff mortar mix of 1 part cement and not more than 2-1/2 parts sand.

   For filling holes in exterior surfaces, an epoxy bonding agent shall be used. Application of the bonding agent shall be in strict conformance with the manufacturer's instructions.

4. An epoxy-and-sand mixture may be used in lieu of the mortar-and-bonding agent mixture for any of the patching above. The preparation of the surface to receive the patch, as well as the mixture proportions of the epoxy-and-sand, shall be in strict conformance with the manufacturer's instructions.

D. Any concrete which is not constructed as shown on the plans or is out of alignment and/or level beyond allowable tolerances may be patched using an epoxy-and-sand mixture.

The proportions of the mix and the preparation of the surface to receive the patch shall be in strict conformance with the manufacturer's instructions except as or unless otherwise specified herein. The minimum thickness of the patch shall be 1/4". No "feathering" to a lesser thickness will be permitted.

Misalignment which requires correction more than 1 inch thickness shall be repaired in the following manner:

1. The surface of the affected area shall be chipped, etched, or otherwise cleaned and roughened to provide a sound surface for bonding;

2. Concrete nails or other fasteners which can provide positive mechanical bonding of the patch shall be set into the surface at about 18 inches o.c. in all directions with a minimum of 2 rows;

3. Wire mesh reinforcement as approved by the Contracting Officer shall be installed in those portions of the patch which exceed 2-inch thickness;

4. A bonding agent suitable for use in the repair location (epoxy required for exterior use) shall be applied over the entire surface to be patched;

5. Formwork to the true lines called for shall be installed over the area requiring the patch; and

6. Concrete or grout with aggregate sized appropriately for the cavity and which will provide strength equivalent to that of the base surface shall be placed in the form, properly compacted and suitably cured.

3.08 SURFACE FINISHES

A. Surface finishes shall match existing concrete surfaces, unless otherwise directed by the Contracting Officer.

3.09 CURING AND PROTECTION

A. All concrete shall be cured for a period of not less than 7 days by one of the methods listed below. During this curing period, the concrete shall be maintained with minimal moisture loss at a relatively constant temperature. Fresh concrete shall be protected from heavy rains, flowing water, mechanical injury, and injurious action of the sun. Curing method selected must be compatible with the finish to be applied to the concrete.

Curing shall immediately follow the finishing operation.

B. Water Curing - If cured with water, concrete shall be kept wet by mechanical sprinklers, by ponding, or by any other method which will keep the surfaces continuously wet.

C. Saturated Sand Curing - Surfaces cured with sand shall be covered with a minimum of 1-inch thickness of sand which shall be kept uniformly distributed and continuously saturated during the entire curing period.

D. Curing Compounds - Curing compounds shall not be used on concrete surfaces that are to receive paint finish, acid stain or resilient flooring, except those that are recommended by the manufacturer to be compatible with the applied finish.

The Contractor shall submit to the Engineer a letter certifying that the curing compound is compatible with the applied finish. Application shall be in accordance with the manufacturer's recommendations. If curing, sealing or other compounds are used which are incompatible with applied finish, such compound shall be thoroughly removed by grinding with a terrazzo grinder.

E. Waterproof Paper - Waterproof paper or opaque polyethylene film conforming to ASTM C171 may be used. The paper or film shall be anchored securely and all edges sealed or applied in such a manner as to prevent moisture escaping from the concrete. Waterproof paper shall not be used on floors that will be exposed when finished.

3.11 CLEAN UP

Contractor shall clean up all concrete and cement materials, equipment and debris upon completion of any portion of the concrete work and upon completion of the entire concrete and related work.

END OF SECTION

SECTION 04220

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

Provide materials, tools, labor and incidentals to install hose bib pedestals and repair all damages to CMU incurred by the Contractor’s work.

1.02 SUBMITTALS

The masonry manufacturer's certification that the masonry units comply with ASTM C90 and the curing requirements specified herein shall be submitted to the Engineer upon request.

1.03 SAMPLE BLOCKS

A sample of each of the masonry units required shall be submitted for approval to the Engineer upon request.

1.04 DELIVERY, STORAGE AND HANDLING

A. Masonry Units: Masonry units delivered to the jobsite shall conform to the moisture content requirements as specified under ASTM C 90. Masonry units shall be stored off the ground and protected from inclement weather and physical damage. All units shall be handled with reasonable care to prevent marring or damaging of faces, edges and corners of units. In no case shall dumping of units from hand trucks or wheelbarrows be permitted.

   Where used in exposed wall construction, any unit with exposed face or faces having chips, cracks, or other imperfections more than 1 inch in dimension shall be rejected.

B. Mortar and Grout Materials: Portland cement, masonry cement, mortar cement, lime and admixtures shall be stored in such a manner as to prevent deterioration or contamination with foreign matter. Cement which has become caked, partially set or otherwise deteriorated, or any material which becomes damaged or contaminated, shall be rejected.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Hollow Concrete Masonry Units shall be load-bearing units and shall conform to the requirements of ASTM C90, "Standard Specifications for Load-Bearing Concrete Masonry Units," Grade N-II. Units shall be 2-core type, 8-inch nominal height, 16-

inch nominal length and width or single-core type 8-inch nominal length as indicated on the plans. Units for jamb, corner sill, lintel and other special shapes shall be provided as required.

All units shall be sound, free of cracks, straight and true. They shall be either steam-cured or cured under atmospheric conditions for a minimum of 30 days. Color shall be standard with manufacturer.

B. Screen Blocks shall be standard units manufactured to same specifications as non-load-bearing concrete block masonry units, pattern as indicated.

C. Portland Cement shall conform to ASTM C-150, Type I or Type II.

D. Mortar Cement (Type M) shall conform to the requirements of UBC Standard No. 24-19 "Mortar Cement". Conformance to this standard shall be noted on the material package. ("Supermortar" by Hawaiian Cement, or approved equal.)

E. Hydrated Lime shall conform to the ASTM C-207, Type S.

F. Aggregate for use in mortar shall conform to ASTM C-144.

G. Aggregate for use in grout shall conform to ASTM C-404, with grading in accordance with ASTM D-448, No. 10.

H. Water used in mixing mortar or grout shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials or other substances that may be deleterious to either the mortar or reinforcement. Non-potable water shall not be used.

I. Horizontal Reinforcement shall be trussed or ladder design with #9 gauge, deformed side rods and welded #12 gauge or larger cross rods ("Dur-O-Wal", "Blok-Mesh", or approved equal), or as otherwise indicated on the plans.

J. Reinforcing Steel shall be deformed bars conforming to ASTM A-615, grade as shown on plans.

K. Rebar Wire Positioners shall be galvanized, No. 9 gauge wire, manufactured positioners per ASTM A82 or other suitable devices.

L. Additives/Admixtures for mortar shall be "Easy Spred" by American Colloid Co. or approved equal.

PART 3 - EXECUTION

3.01 MORTAR AND GROUT

A. The proportioning of materials for mortar and grout shall be by volume and done in such manner that the specified proportions can be controlled and accurately maintained. Fine aggregate shall be measured in a damp loose condition. Mixing

shall be by a mechanical batch mixer for at least 3 minutes for mortar and 5 minutes for grout, but for not more than 10 minutes. Hand mixing shall be permitted only for small batches of 3 cubic feet or less.

B. Mortar shall be freshly prepared and uniformly mixed in one of the following proportions:

1. Type M - Cement-lime Mortar:
   1 part portland cement
   1/4 part hydrated lime
   3 to 3-3/4 parts mortar aggregate

2. Type S - Cement-lime Mortar:
   1 part portland cement
   1/4 to 1/2 part hydrated lime
   Mortar aggregate: Not less than 2-1/4 and not more than 3 times the sums of the separate volumes of cementitious materials.

3. Type M - Mortar Cement Mortar:
   1 part mortar cement
   2-1/2 to 3 parts mortar aggregate

   Sufficient water shall be used to provide a workable consistency. Mortar shall be used and placed in final position within 1-1/2 hours after mixing.

4. Type M Mortar
   2 sacks portland cement
   1/2 to 1 - 7 lb. bag Easy Spred
   6 cu. ft. mortar aggregate

5. Type M Mortar:
   1 sacks portland cement
   3 ounces MRF
   2-1/4 to 2-3/4 cu. ft. mortar aggregate

6. Type S Mortar:
   2 sacks portland cement
   1 - 7 lb. bag Easy Spred
   9 cu. ft. mortar aggregate

7. Type S Mortar
   1 sack portland cement
   3 ounces MRF
   2-1/2 to 3 cu. ft. mortar aggregate

   The above mixes 5 and 7 shall be prepared strictly in accordance with the manufacturer's instructions. Placement of the mortar shall be completed within 2-1/2 hours after mixing. No materials which start to set shall be retempered.

C. Grout (coarse) mixed on-site shall conform to ASTM C 476 and shall be freshly prepared and uniformly mixed in the following proportion:

1 part portland cement
0 to 1/10 part hydrated lime
Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials.
Course Aggregate: 1 to 2 times the sum of the volumes of the cementitious materials.

Grout designed by Ready-mix suppliers may be used upon approval of the Engineer.

Sufficient water shall be used to produce a consistency just fluid enough for pouring or pumping without segregation. Grout shall be used and placed in final position within 90 minutes after mixing, but shall in no case be used after initial set has occurred.

In any event, the grout shall attain not less than 2,500 psi 28-day compressive strength per ASTM C 1019 unless noted otherwise on drawings.

3.02 REINFORCEMENT

A. Reinforcement shall be free from scale, loose flaky rust or other coatings that will destroy bond. It shall be straight except for bends around corners or where bends or hooks are detailed. Size and spacing shall be as indicated on the drawings.

B. Vertical reinforcement shall be accurately placed and secured against displacement by rebar wire positioners at top and bottom and at intervals not to exceed 200 diameters of the reinforcement (8 feet for #4 bars; 10 feet for #5 bars). Dowels and splices shall be lapped as indicated but not less than 30 diameters or 15 inches, whichever is longer. At jambs of doors, windows and other openings, and corners and ends of walls, including those abutting concrete, one #5 bar shall be installed in the end cell unless heavier reinforcement is otherwise called for on the plans and that cell shall be filled with grout. Bars ajacent to all openings and at corners and ends of walls shall extend the full height of walls.

C. At intersections, corners and splices, horizontal reinforcing shall be placed, bent and lapped as shown on the plans. End laps shall be at least 30 diameters.

3.03 ANCHORS

Work with other trades shall be coordinated as necessary to set into tile walls all anchors, bolts, nailing blocks, etc. Anchors shall be grouted around with sufficient mortar to make them secure.

3.04 LAYING

A. General: All masonry units shall be clean and dry and shall be handled so that edges and faces will not be chipped, spalled, or cracked. All beds on which masonry is to be

laid shall be cleaned. All work shall be built plumb, level, and true, within the tolerances specified below, and shall be laid up with whole units except at closures.

Masonry units in walls shall be laid so that one face of the wall is a true flat plane. Unless otherwise indicated on the plans, this shall be on the inside face. Where one face of a wall is to be plastered or covered, the exposed face shall be the true flat plane. All cutting and fitting as may be required for and necessary to accommodate other trades shall be done neatly using a power driven Carborundum saw. It shall be the responsibility of the Contractor to control any dust pollution caused by the cutting operations. All drilling and cutting of small holes shall be neatly done. Bolts, anchors, ties, conduits, and similar items required for the installation of work under other sections of these specifications shall, as far as practicable, be placed as the work progresses. All walls and partitions shall be carried to the underside of beams, slabs, or joists, as the case may be, and shall be connected at the top as shown on the plans.

B. Allowable Tolerances:

1. Variation from the Plumb

   a. In the lines and surfaces of columns, walls and arises:
      in 10 ft. 1/4"
      in any story or 20 ft. max. 3/8"
      in 40 ft. or more 1/2"

   b. For external corners, control joints and other conspicuous lines:
      in any story or 20 ft. max. 1/4"
      in 40 ft. or more 1/2"

2. Variation from the level or grades indicated on the plans:

   For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:
      in any bay or 20 ft. max. l/4"
      in 40 ft. or more 1/2"

3. Variation of the linear building lines from established position in plan and related portion of columns, walls and partitions:
      in any bay or 20 ft. max. l/2"
      in 40 ft. or more 3/4"

4. Variation in cross-sectional dimensions of columns and in the thickness of walls:
      minus l/4"; plus l/2"

5. For window and door openings:

   a. Maximum variations as specified in Paragraphs B.1. and B.2. for plumb and level of masonry work.

b. Maximum variation of 3/8" in each dimension from that specified or dimensioned.

c. Tolerance requirements for both dimensions and plumb-and-level must be met.

6. Checking and setting:

The following tools and methods shall be the minimum or acceptable type:

a. Plumb and level shall be determined by level and/or pull string method.

b. An instrument at least 4 feet long shall be used for leveling or runs. A shorter level may be used for cross-leveling of units.

C. Masonry units shall not be wet before being used and units which have gotten wet shall be thoroughly dried before being used. Where no bond pattern is shown, the wall shall be laid up in straight uniform course with regular running bond.

D. Masonry units in first course shall be laid with shell mortar beds not exceeding 3/4" in thickness. Webs of adjoining cells containing reinforcement shall also be bedded in mortar to prevent escape of grout.

Vertical head joints shall be mortared well for a thickness equal to the face shell of the block and these joints shall be shoved tightly so that the mortar bonds well to both blocks. Joints shall be solidly filled from the face of the block to the depth of the face shell.

E. If it is necessary to move a block so as to open a joint, the block shall be removed from the wall, cleaned and reset in fresh mortar.

F. Mortar joints shall be straight, clean and in a thickness of 3/8" + 1/8". All exposed horizontal and vertical joints shall be tooled with a l/2" to 5/8" round bar at least 14 inches long to produce a dense, slightly concave surface well bonded to the block at the edges. Tooling shall compact the mortar, pressing the excess mortar out of the joint rather than gouging it out. Use a 3/8" diameter half-round molding to simulate a concave horizontal joint between a concrete bond beam and the hollow tile wall below. Where walls are to receive plaster or where they are not exposed, such as below finish grade and where special glazed finish is indicated, the joints shall be struck flush.

G. All hollow masonry units shall be built to preserve the unobstructed vertical continuity of the cells to be filled. Walls and cross webs forming such cells shall be full-bedded in mortar to prevent the leakage of grout.

H. All cells containing reinforcement shall be filled solidly with grout in lifts not exceeding 8 feet unless otherwise shown on the plans. Other cells, where indicated to be solid for anchors or such items, shall also be filled. When grouting is stopped for

one hour or longer, horizontal construction joints shall be formed by stopping the pour of grout 1-1/2" below the top of the uppermost unit.

I. Care shall be taken to prevent mortar splotches. All forms shall be made tight and concrete or grout spilled on the wall shall be washed off immediately before it can set up. Walls shall be protected against stains and excess mortar shall be wiped off the surface as the work progresses. After the wall is constructed, it shall not be saturated with water for curing, cleaning, etc.

3.05 PROTECTION AND CLEANING

A. While masonry walls are being built, they shall be protected when not being worked on to prevent rain from saturating the wall. Covering of suitable materials such as canvas or plastic sheeting shall be placed atop the wall and shall extend at least two feet on either side of the wall. Covering shall be weighted down to prevent it from being lifted by the wind.

B. At the completion of the work, all holes or defective mortar joints in exposed masonry shall be pointed and where necessary defective joints shall be cut out and repointed. All exposed masonry shall be thoroughly cleaned of mortar drippings, sand and splotches during the course of the work. No smoothing of a wall surface which produces a "bright spot" when painted will be accepted. All adjoining work subject to damage shall be carefully protected.

C. Upon completion of work, all surplus, waste materials, rubbish and debris shall be removed from the premises, leaving same in clean and satisfactory condition.

END OF SECTION

SECTION 05500

METAL FABRICATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and installing galvanized iron tank ladders and platforms and miscellaneous metal work as shown on the plans.

1.02 RELATED SECTION

A. Section 09900 - Painting: Shop priming, field touch-up and finishing.

1.03 REFERENCES

A. American Institute of Steel Construction (AISC):
M011-80 Manual of Steel Construction,"Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings."

B. American National Standards Institute (ANSI):

A10.3-77	Safety Requirements for Powder Actuated Fastening Systems.
A14.3-84	Safety Requirements for Fixed Ladders.
B18.2.1-81	Square and Hex Bolts and Screws Inch Series Including Hex Cap Screws and Lag Screws.
B18.2.2-72	Square and Hex Nuts.
B18.5-78	Round Headed Bolts.
B18.22.1-72	Lock Washers.

C. American Society for Testing and Materials (ASTM):

A 36-84a	Structural Steel.
A 48-83	Gray Iron Castings.
A 53-84a	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
A 120-82	Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.
A 123-84	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.
A 143-74 (84)	Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
A 153-82	Zinc Coating (Hot Dip) on Iron and Steel Hardware.
A 307-86	Carbon Steel Externally Threaded Standard Fasteners.
A 325-86a	High-Strength Bolts for Structural Steel Joints.
A 500-84	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

A 501-84	Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
A 525-86	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
A 526-80	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
A 687-84	Steel Bolts and Studs.
A 780-80	Repair of Damaged Hot-Dip Galvanized Coatings.
A 786-84	Rolled Steel Floor Plates.
B 633-78	Electro deposited Coatings for Zinc on Iron and Steel.

D. American Welding Society (AWS):

B 3.0-77	Welding Procedure and Performance Qualification.
D 1.1-86	Structural Welding Code, Steel.

E. Federal Specification (FS):

FF-P-395B	Pin, Drive, Guided and Pin Drive, Powder Actuated.
FF-S-85C & AM-1	Screws, Cap, Slotted and Hexagon Head.
FF-S-92B & Am-1	Screws, Machine: Slotted, Cross Recessed or Hexagon Head.
FF-S-111D	Screw, Wood.
FF-S-325 & Int. Am-3	Shield, Expansion; Nail, Expansion, and Nail, Drive Screw (Devices, Anchoring, Masonry).
FF-W-84A & Am-3	Washers, Lock (Spring).

F. Occupational Safety and Health Standards, State of Hawaii (OSHS):

Chapter 126	Welding, Cutting and Brazing.

1.04 QUALITY ASSURANCE

A. Qualification of Welding Work: AWS B 3.0, for welding processes and welding operations.

B. Codes and Standards: Comply with codes, specifications and standards, referred to in this specification, except where provisions in this specification or drawings exceed such requirements.

1.05 SUBMITTALS

A. Shop Drawings: Shop drawings for each fabricated items showing fabrication, assembly and erection details, sizes of members, fastening, supports, anchors, clearances, and necessary connections to work of other trades.

B. Product Data: Manufacturer's product data showing references to industry standards for expansion anchor bolts.

1.06 PRODUCT HANDLING

A. Transport and store material with adequate protection against damage. Store items in an enclosed area free from contact with soil and weather.

B. Remove and replace damaged items with new items.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel Shapes, Plates and Bars: ASTM A 36, unless otherwise indicated.

B. Structural Tubing: ASTM A 500, Grade B or ASTM A 501, unless otherwise indicated.

C. Steel Pipes: ASTM A 53, Type E or S, Grade B. Minimum standard weight class, or ASTM A 120 Schedule 40 (standard weight), unless otherwise indicated.

D. Fittings for Steel Pipe: Standard malleable iron fittings, unless otherwise indicated.

E. Steel Rods and Anchor Bolts: ASTM A 36 or ASTM A 307 Grade A, unless otherwise indicated.

F. Bolts and Nuts: ASTM A 325, unless otherwise indicated.

G. Steel Sheets: ASTM A 525 or ASTM A 526 as applicable, commercial quality hot-dipped galvanized steel unless otherwise indicated.

H. Cast Iron Gratings: ASTM A 48, Class 40, gray cast iron, unless otherwise indicated.

I. Floor Plates: ASTM A 786 steel plate. Minimum 14 gauge, unless otherwise indicated.

J. Welding Electrodes: AWS D1.1, E 70 Series Electrodes, unless otherwise indicated.

K. Galvanizing Repair Material: ASTM A 780, zinc based alloys, zinc rich paint or zinc for spraying.

L. Steel and Iron: AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings"; if not specified otherwise, use standard mill finished structural steel shapes or bar iron.

M. Anchors and Fasteners: Where exposed, shall be of same material, color, and finish as metal to which applied. Provide zinc-coated or stainless steel fasteners for exterior use and where built into exterior walls. Select fasteners for type, grade, and class best suited for purpose.

1. Expansion Anchor Bolts: FS FF-S-325, Group II, Type 3, Class 3, made of zinc plated steel, or ASTM B 633, Sleeve type unless shown otherwise on drawings.
2. Lag Screws and Bolts: ANSI B18.2.1.
3. Toggle Bolts: ANSI B18.2.1 and ANSI B18.5.
4. Bolts, Nuts, Studs and Rivets: ANSI B18.2.2 or ASTM A 687.
5. Screws: FS FF-S-85, or FF-S-92, or FF-S-111.
6. Lock Washers: FS FF-W-84, circular washers ANSI B18.22.1.

N. Metal Surface, General: For fabrication of work of this Section which will be exposed to view, use only those materials which are smooth and free from surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness.

O. Platform material: Galvanized, Grip-Strut Plank (grating), 2" depth, by McNichols, or approved equal.

2.02 FABRICATION

A. Shop Fabrication: Fabricate and assemble items in shop to greatest extent possible by mechanics skilled in trade and in accordance with manufacturer's directions. Form metalwork to shape and size, with sharp lines, angles, and true curves. Fabricate work to allow for expansion and contraction of materials. Provide welding and bracing of adequate strength and durability, with tight, flush joints, dressed smooth and clean.

B. Metal Surfaces: Shall be clean and free from mill scale, flake rust and rust pitting; well formed and finished to shape and size, with sharp lines, angles, and smooth surfaces. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Use welds and flush rivets and finish flush and smooth on surfaces that will be exposed after installation. Do not use screws or bolts where they can be avoided; when used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening.

C. Construction: Thickness of metal and details of assembly and supports shall give strength and stiffness for minimum loads specified or indicated. Joints exposed to weather shall be formed to exclude water.

D. Fastening: Provide necessary rabbets, lugs, and brackets so that work can be assembled in a neat and substantial manner. Drill holes for bolts and screws. Form joints exposed to weather to exclude water. Conceal fastening where possible.

E. Welding: AWS D1.1 for welding of steel. Weld to prevent permanent distortion of connected parts. Weld continuously along entire area of contact (except where tack welding is permitted. Do not tack weld exposed connections). Grind smooth visible

welds in finished installation and clean welds immediately by chipping or wire brushing. Comply with OSHS, Chapter 126.

2.03 TREATMENT

A. Ferrous Metal Surfaces:

1. General: Metal fabrications made of ferrous metals shall be galvanized except items embedded in concrete and unless otherwise indicated.

B. Galvanizing:

1. Surface Preparation:

a. Prepare surfaces as required by initial surface condition.
b. Pre-clean steelwork utilizing an alkaline cleaner, acid pickle and flux.

2. Coating Application:

a. ASTM A 123, galvanize steel members, fabrications, and assemblies after fabrication where practicable by the hot dip process.
b. ASTM A 153, galvanize bolts, nuts and washers and iron and steel hardware components.
c. ASTM A 525, galvanize steelsheets.
d. ASTM A 143, safeguard products against steel embrittlement.

3. Coating Weight:

a. ASTM A 123, paragraph 5.1 of ASTM A 123 or ASTM A 153, Table 1 as appropriate.
b. ASTM A 525, for steel sheets ASTM A 525, minimum G 90 weight.

4. Surface Finish: Continuous, adherent, as smooth and evenly distributed as possible and free from any defect detrimental to stated end use of coated article.

5. Adhesion: Withstand normal handling consistent with nature and thickness of coating and normal use of article.

6. Treatment: Do not treat freshly galvanized or passivated surfaces with oils, grease, or chemicals which might interfere with adhesion of subsequent paint primers and coatings.

7. Galvanizing Repair: ASTM A 780, whenever damage exceeds 3/16 inch in width, repair galvanized items damaged by welding cutting or by excessively rough handling during shipping or installation. Do not heat surfaces that repair paint has been applied to.

2.04 ANCHORAGE, FASTENINGS, AND CONNECTIONS

A. Anchorage: Provide anchorage for fastening work securely in place. Set anchors in concrete as the work progresses and space maximum 2 feet on centers, unless indicated otherwise. Sizes, kinds, and spacings of anchors not indicated or specified shall be as necessary for purpose, as approved. Anchorage not otherwise specified or indicated includes slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Provide inserts of suitable and approved types where required for support or anchorage of equipment and finish construction. Inserts shall be gray or malleable iron castings or galvanized steel unless indicated or specified otherwise. Slotted inserts shall be of types required to engage with anchors, except where specified otherwise, anchors and anchor bolts in exterior walls shall be zinc-coated and all other anchors and anchor bolts shall be as a minimum heavily coated with bituminous paint.

B. Fastenings: Do not use wood plugs in any material. Use non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, and harmonizing with material to which fastenings are applied. Conceal fastenings where practicable. Drill and punch to produce clean true lines and surfaces. Countersink metalwork to receive hardware.

C. Threaded Connections: Make threaded connections up tight so that threads are entirely concealed. Make bolted work up tight and nick threads or bush stem to prevent loosening. Shoulder and head, dowel and pin abutting bars. Pass small bars through larger bars and pin. Rivet, bolt, and screw heads shall be flat and countersunk in exposed work and elsewhere as required. Machine removable members and fit and secure by screws or bolts of proper size and approved spacing.

D. Anchors and Connecting Members: Provide in concrete or masonry as work progresses, to avoid unnecessary cutting and drilling. Cut, fit, and drill as necessary so materials are properly set in place and to permit engaging work to be properly installed.

E. Design Connections: Where not shown or indicated, connection details shall be in accordance with AISC M011 and connections shall be provided using common steel bolts. Provide necessary holes for securing work to building. Use lock washers under nuts.

2.05 TEMPLATES

A. Furnish templates, other devices and instructions necessary for the setting of anchors and anchor bolts where required to accurate locations.

2.06 MISCELLANEOUS ITEMS

A. Handrails and Railings:

1. Steel Rails, Including Carbon Steel Inserts: Steel rails, including inserts in concrete, shall be steel angles conforming to ASTM A 53 or structural tubing

conforming to ASTM A 500, Grade A or B of equivalent strength. Steel railings shall be hot-dip galvanized unless otherwise indicated.

2. Fabrication: Jointing of posts, rail, and corners shall be by one of the following methods:

a. Flush-type rail fittings of commercial standard, welded and ground smooth with railing secured with 3/8-inch hexagonal-bolts.

b. Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Railing splices shall be butted and reinforced by a tight fitting interior sleeve minimum 6 inches long.

c. Post maybe cut and welded to provide bends, groove welding joints, and grinding smooth.

B. Miscellaneous Plates and Shapes: ASTM A 36. Provide for items that do not form a part of structural steel framework, such as lintels, sill angles, support framing for ceiling-mounted items, miscellaneous mountings and frames.

PART 3 - EXECUTION

3.01 INSPECTION

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

3.02 PREPARATION

A. Field Verification: Verify measurements in field, as required, for work fabricated to fit job conditions. Examine adjoining work on which metal fabrication work is in any way dependent on for workmanship or fit. Provide corrective work as may be necessary.

B. Coordination: Coordinate placement of anchorage in concrete or masonry construction with other trades.

3.03 INSTALLATION

A. General: Install plumb, square, straight, rigid, and true; accurately fit with tight joints and intersections. Brace work adequately, reinforce, and anchor in place.

B. Isolation of Metals: Where dissimilar metals are in contact with one another, or with concrete, separate for prevention of corrosion by approved methods and/or materials.

C. Support and Anchors: Provide supporting members, fastenings, framing, hangers, bracing, brackets, straps, bolts, angles and similar items required to set or connect

miscellaneous metal items including suitable anchors, expansion shields and similar items for attachment to structure. Install expansion anchor bolts as recommended by manufacturer.

D. False Work: Provide guys, braces and false work for temporary support of parts of the work and remove when work is self-supporting.

3.04 FIELD TOUCH UP

A. Provide field touch up on galvanized metals not embedded in concrete or masonry as specified under item "Galvanizing Repair."

B. Provide field touch up on ungalvanized metals not embedded in concrete or masonry as specified under Section 09900-Painting.

C. After erection, prime bolts, anchors, field welds and abrasions with same primer as used for metal work.

3.05 TANK PLATE BOLT REPLACEMENT:

A. After steel tank surface preparation for painting (rust removal), the Contracting Officer shall inspect the tank bolts for replacement.

1. Contractor shall remove rusted bolts, clean & prepare bolt hole and surrounding area, prime bare surface, and install new galvanized bolts, Contractor shall pattern bolt removal to maintain integrity of tank joints.

END OF SECTION

SECTION 05600

METAL SPECIALTIES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

The work includes providing and installing ladder safety climbing devices for all interior and exterior ladders and ladder guards for all exterior ladders.

1.02 SUBMITTAL:

A. Submit manufacturer's data for ladder safety climbing system including installation instructions.

B Submit shop drawings showing ladder guard, materials, dimensions, and connection details to tank or ladder. Or if pre-manufactured, manufacturer's data showing same.

PART 2 - PRODUCTS

A. Safety climbing device with Top/Bottom bracket, quick Link, shock absorber, rung clamps, cable assembly, lifeline tensioner, Cable guide, automatic pass-through cable sleeve with swivel & carabineers, and all appurtenances. Automatic Vi-Go Ladder Safety System, by Miller fall protection, or approved equal.

B. Contractor shall provide two climbing harness per tank. (4)

C. Ladder guard shall be a minimum of 6 feet high x ladder width and constructed of galvanized metal with hinges and locking hasp. Guard may be mounted to the ladder or tank to prevent unauthorized access.

PART 3 - EXECUTION

A. Cable safety climb device shall be installed per manufacturer's requirements and recommendations.

B. Ladder guard shall be located on the bottom of exterior ladders covering the access to ladders.

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

This section covers the requirements for furnishing and installing of paints.

1.02 RELATED DOCUMENTS

The General Provisions of the Contract, including General and Special Provisions and General Requirements of the Specifications, apply to the work specified in this section.

1.03 SUBMITTALS

A. Schedule of Finishes

1. 4 sets of proposed painting finish schedules shall be submitted to the Contracting Officer for approval.

B. Color Samples

1. 3 sets of each color Finish sample shall be submitted to the Contracting Officer for approval.

2. After the color finish sample has been approved, one set of color finish samples painted onto 8-1/2"x 11" cardboard shall be submitted to the Contracting Officer. The cardboard shall be divided into 4 horizontal strips and painted as follows:

a. Prime 3 strips starting from the bottom.
b. 1st coat bottom 2 strips.
c. 2nd coat bottom strip.

C. Schedule of Operations

1. Before work on the project is commenced, 4 complete sets of a work schedule showing his sequence of operations and dates shall be submitted by the Contractor to the Contracting Officer .

D. Guarantee

1.3 copies of a written guarantee shall be submitted to the Contracting Officer.

1.04 ANALYZING AND TESTING

All paints shall be subject to laboratory tests whenever the Contracting Officer deems necessary to determine conformation to the requirements of these specifications. Cost of testing will be borne by the State. All rejected materials shall be removed from the job site immediately. Surfaces painted with rejected material shall be redone at no additional cost to the State.

1.05 GUARANTEE

A. The Contractor shall guarantee that the work performed under this section conforms to the contract requirements and is free of any defect of material or workmanship performed by the Contractor. Such guarantee shall continue for a period of 2 years from the date of project acceptance during which period the Contractor shall remedy at his own expense any such failure to conform or any such defect.

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

C. Should the Contractor fail to remedy any failure or defect described in Paragraph A above within 10 working days after receipt of notice thereof, the State shall have the right to repair or otherwise remedy such failure or damage at the Contractor's expense.

1.06 SPECIAL REQUIREMENTS

A. Codes

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

2. Any violations of the above regulations or codes shall be dealt with as mentioned in the Special Provisions Section and the Environmental Protection Section of these specifications.

B. Protection

1. Persons

a. The Contractor shall take all necessary precautions to protect public pedestrians including tenants from injury.

b. The Contractor shall provide, erect and maintain safety barricades around scaffolds, hoists and wherever Contractor's operations create hazardous conditions in order to properly protect the public and tenants.

2. Completed Work: The Contractor shall provide all necessary protection for wet paint surfaces.

3. Protective Covering: The Contractor shall provide and install protective covering over furniture, equipment, floor and other areas that are not scheduled for treatment. Protective covering shall be clean sanitary drop cloth or plastic sheets. Paint applied to surfaces not scheduled for treatment shall be completely removed and surfaces shall be returned to original condition.

4. Safeguarding of Property: The Contractor shall take whatever steps may be necessary to safeguard his work and also the property of the State and other individuals in the vicinity of his work area during the execution of this Contract. He shall be responsible for and make good on any and all damages and for losses to work or property caused by his or his employee's negligence. Also see "Protection of Property" in the Special Provision Section.

5. Fire Safety: The Contractor shall direct his employees not to smoke in the vicinity and exercise precautions against fire at all times. Waste rags, plastic (polyester sheets), empty cans, etc. shall be removed from the site at the end of each day.

C. Storage Area for Materials: No paint material, empty cans and paint brushes and rollers may be stored in buildings, but shall be stored in separate storage facilities away from the buildings.

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

D. Right of Rejection: The Contracting Officer shall have the right to reject all work which is not in compliance with the plans and specifications. Rejected work will be redone at no additional cost to the State.

E. Sequence of Operations: The sequence of operations shall divide the surfaces into work areas and present a schedule for:

1. Surface preparation and spot prime.
2. Prime coat.
3. First finish coat.
4. Second finish coat.

Minimum interior work area shall be the complete inside surfaces of one tank. Minimum exterior work area shall be exterior surfaces of one tank.

F. Inspection and Approvals: The Contractor shall obtain written approval from the Contracting Officer upon completion of each phase of work (phases of work are: surface preparation and spot prime, prime, first finish coat, second finish coat) before proceeding into the next phase work. The Contractor shall give the Contracting Officer one day (24 hours minimum) advance notice of completion of any phase of work for a

area only when he deviates from the previously-submitted work schedule. The Contractor shall provide necessary access to areas to be inspected.

Failure to obtain approval of any phase of work for a work area may result in redoing the operation at no cost to the State.

PART 2 - PRODUCTS

2.01 PROHIBITION OF HAZARDOUS MATERIALS

A. Lead Content: Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

B. Chromate Content: Do not use coatings containing zinc-chromate or strontium-chromate.

2.02 PAINTS

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

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

C. Sinclair paint is indicated for standard of quality and color, only. Comparable high quality top line paints manufactured by Devoe, Fuller O'Brien, Benjamin Moore, Sinclair, Spectra-Tone or approved equal.

D. Thinning of paint shall be done using material recommended by the manufacturer. Mix proprietary products according to manufacturer's printed specifications. Compound thinnet, mineral oil, kerosene, refined linseed oil, or gasoline shall not be used for thinning.

E. Except for metal primers, all paint shall contain mildewcide equal in strength to 2 oz. of Super Ad-It per gallon of paint pre-mixed by supplier.

F. The supplier shall submit a signed certification that the paint materials contains mildewcide equal in strength to 2 oz. of Super Ad It.

2.03 SCHEDULE OF FINISHES

A. The Schedule of finishes is made for the convenience of the Contractor and indicates the types and quality of finished to be applied to the surfaces.

B. Any surface not specifically noted in the finish schedule shall be finished to match adjoining work.

2.04 PAINT SCHEDULE

A. Interior Tank Surface (Metal)

1. Primer Coat: B67WX0235-Dura-Plate@ 235 NSF Multi Purpose Epoxy (Part A), Mill White, 2-3 mil profile
2. First Finish Coat: B65H00920-SherFlex Repair Elastomeric Polyurethane Beige Part A, 5 - 30 mil profile
3. Second Finish Coat : B65H00920-SherFlex Repair Elastomeric Polyurethane Beige Part A, 5 - 30 mil profile

B. Exterior Tank Surface (Metal)

1. Primer Coat: B62S00100 - Epoxy Mastic Aluminum II (Part A) apply by brush/roll, 5 - 7.5 mil profile
2. First Finish Coat: B65W00311 - Hi-Solids Polyurethane Gloss (Part S) Extra White/Tint Base Part S , 3 - 6 mil profile
3. Second Finish Coat: B65W00311 - Hi-Solids Polyurethane Gloss (Part S) Extra White/Tint Base Part S, 3 - 6 mil profile

C. Steel - Galvanized (Fuller O'Brien Specifications)

1. Pretreatment - 321-60 Vinyl wash primer
2. First Coat - 221-12 Zinc rich primer
3. Second Coat - 312-XX Heavy duty enamel
4. Third Coat - 312-XX Heavy duty enamel

D. Color of paints shall be as approved by the Contracting Officer.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES

A. Existing Ferrous Metal:

1. Existing Exterior paint on tanks have been found to contain hazardous materials, Contractor shall comply with “Limited Asbestos and Lead Paint Survey, Pu’u wa’awa’a System Improvements, Big Island , Hawaii”, By Lehua Environmental, Inc. And sections of specifications regarding removal, handling, and disposal of hazardous materials.

2. Hand Tool Cleaning: Hand Tool cleaning removes all loose rust, and other detrimental foreign matter. It is not intended that adherent will scale, rust, and

paint be removed by this process. Mill scale, rust and pint are considered adherent if they cannot be removed by lifting with a dull putty knife. Before hand tool cleaning, remove visible oil, grease, soluble residues, and salts by the methods outlined is SSPC-SP1. For complete instructions, refer to Steel Structures Paint Council Surface Preparation Specification No. 2 (SSPC-SP2).

3. Near white Blast Cleaning: A Near white Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods. For complete insructions refer to Joint Surface Preparation standard (SSPC-SP10/NACE No.2)

B. Galvanized Metal:

1. Remove from surface to be painted all foreign matter such as tape, gum, and burrs.

2. Remove all rust to bare metal. Remove all loose, blistered, scaled, crazed, chalky finish to a tight and firm finish.

3. Minimum preparation shall be as required by paint manufacturer’

3.02 PAINT APPLICATION

A. General

1. All work shall be done in a workmanlike manner by skilled and experienced mechanics and shall conform to the best painting practices.

2. All materials shall be applied in accordance with the manufacturer's specifications and the finished surfaces shall be free from runs, sags, drops, ridges, waves, laps, streaks, brush marks and variations in color, texture and finish (glossy or dull). The coverage shall be complete and each coat shall be so applied as to produce a film of uniform thickness. No paint, varmsh or enamel shall be applied until the preceding coat is thoroughly dry and approved.

3. No exterior painting of unprotected surfaces shall be done in rainy, damp weather. Coats shall be applied only to surfaces that are thoroughly dry.

B. Application: Shall be by brush or roller only. Airless spraying may be permitted, but only with the approval of the Contracting Officer for otherwise inaccessible areas.

C. Colors: Each coat shall be tinted a different shade from the preceding coat. Colors shall be as selected by the Contracting Officer .

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

E. All mixing shall be done outside the tank.

3.03 CLEAN-UP

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

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

END OF SECTION

SECTION 13281

REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING MATERIAL

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in SECTION 00700.

1.02 SUMMARY

A. Furnish all labor, materials, and equipment necessary to carry out the safe removal and disposal of Asbestos-Containing Materials (ACM) in compliance with all applicable Federal, State and Local laws and regulations from the areas affected by the Project. ACM is identified in the hazardous materials report, Limited Asbestos and Lead Paint Survey, Pu'u Wa'awa'a System Improvements, Big Island, Hawaii, 28 pages, prepared by Lehua Environmental Inc.

B. The asbestos abatement work shall include, but may not be limited to:

1. Removal and disposal of ACM grey sealant located on the gutters which transfer water from the water catchment panels to the water tank. Estimated amount of ACM is 600 square feet.

2. The Contractor is responsible for conducting his own site visit to verify all quantities and material locations. There will be no change orders issued for the abatement of additional ACM discovered in the course of the abatement activities.

3. The Contractor is responsible for conducting all work without disturbing ACM to remain in place.

C. Cleaning shall include the pre-cleaning, wet wiping and HEPA vacuuming of surfaces where abatement will take place.

D. The asbestos abatement work shall include removal of all ACM and materials containing any detectable level of asbestos within the work area as specified herein.

E. Contractor shall comply with all Federal, State and local regulations pertaining to asbestos removal. If there is a conflict with the Specifications, the more stringent requirement shall apply.

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

1. Worker protection.

2. Decontamination system.

3. Preparation of work area.

4. Removal and disposal of ACM.

5. Removal of protective sheeting.

G. Related Work Specified Elsewhere:

1. SECTION 01715 - EXISTING CONDITIONS - HAZARDOUS MATERIALS SURVEY.

2. SECTION 13282 - LEAD HAZARD CONTROL MEASURES; for requirements of all work that disturbs Lead-Containing Paint.

3. SECTION 13288 - TESTING/AIR MONITORING; for requirements of all work that disturbs Asbestos-Containing Materials and Lead-Containing Paint.

1.03 SUBMITTALS

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

B. Detailed Schedule: Submit the actual start date and completion dates for each phase of the asbestos removal.

C. Notices: As regulated by each agency and before commencement of any on-site project activity send written notice of the proposed asbestos abatement work as early as possible but at least 10 working days prior to commencement of work in accordance with Hawaii Administrative Rules, Title 11, 501. Send notice with copies to the Authorized Representative of the General Contractor and to the following agencies:

State of Hawaii, Department of Health, “Notification of Demolition and Renovation” form. Send to: Noise, Radiation and Indoor Air Quality Branch, Asbestos Abatement Office, State of Hawaii, 591 Ala Moana Blvd., Honolulu, Hawaii 96813.

D. Permits and Licenses: Submit copies of all permits, licenses and arrangement for removal, transportation and disposal of ACM no later than 20 consecutive working days from notice of award unless otherwise instructed in writing by the Authorized Representative of the General Contractor.

E. Landfill Approval: Submit written evidence that the landfill for disposal is approved for asbestos disposal by the EPA and Hawaii regulatory agency(s).

F. Manufacturer’s Data: Submit copies of manufacturer’s specifications, installation instructions and field test materials for all equipment related to asbestos handling and abatement, including any other data that may be required to demonstrate compliance with these Specifications and proposed uses.

G. Samples: Submit samples of the following items for approval prior to ordering materials:

1. Asbestos Encapsulant(s): Copies of manufacturer's literature including all laboratory data, MSDS, and application instructions.

2. Plastic Sheeting: Three 8-1/2 by 11-inch pieces of each thickness and type with labels indicating actual mil thickness.

3. Surfactant: Copies of manufacturer's literature including all laboratory data, MSDS, and mixing and application instructions.

4. Tapes and Adhesives: Copies of manufacturer's literature including all laboratory data.

5. Warning Labels and Signs.

6. Protective Clothing: Copies of manufacturer's literature on all protective clothing and one sample of each item. Samples submitted will be returned to the Contractor.

7. Respiratory Equipment: Copies of manufacturer's literature on all respiratory equipment and one sample of each item along with a description of where and how each item will be used. Samples submitted will be returned to the Contractor.

H. Shop Drawings: Submit no later than 10 consecutive working days from award notice, copies of shop drawings for the following items as a minimum:

1. Description of any equipment to be employed not discussed in this Section.

2. Security provisions, if any, in and around the project area.

3. Outline of work procedures to be employed.

4. Location and construction of all airtight barriers.

5. Staging of the work.

6. Entrances and exits to the work place.

7. Location and construction of worker and equipment decontamination units.

8. Type of respiratory protection to be used.

9. Water filtration system for all contaminated water.

10. Existence and location of negative air exhaust ports and containment.

I. Asbestos Abatement Plan: Contractor shall develop, submit for approval to the Authorized Representative of the General Contractor no later than 15 consecutive days from notice of award, and implement a work procedure for abatement work describing work practices and engineering controls to be used to prevent emissions of

asbestos from the work site, ensure maximum site safety and safeguard the public, workers and the environment from asbestos exposure. The Asbestos Abatement Plan will be a detailed plan of the safety precautions such as lockout-tagout, fall protection, and equipment, and work procedures to be used in the removal of ACM. The plan shall be prepared, signed, and sealed by a State of Hawaii Certified Project Designer. Such plan shall include but not be limited to the precise personal protective equipment protection, the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, and a detailed description of the method to be employed in order to control environmental pollution. This plan must be approved in writing prior to starting any asbestos work. The Contractor and the Authorized Representative of the General Contractor shall meet prior to the start of work to discuss in detail the standard operating procedures. Once approved by the Authorized Representative of the General Contractor, the plan will be enforced as if an addition to the Specification.

J. Documentation of Training: Submit no later than 10 consecutive working days from notice of award, documentation that each and every individual, including foreman, supervisors, other company personnel or agents, and any other individual who may be exposed to airborne asbestos fibers and who may be responsible for any aspects of abatement activities which may occur, has currently attended and passed the AHERA Abatement Worker and/or AHERA Abatement Contractor/Supervisor course, whichever is relevant to that workers responsibilities, as specified in Hawaii Administrative Rules, Title 11, 504 and 40 CFR Part 763, “Asbestos Materials in Schools”. These courses shall be approved by the State of Hawaii Department of Health in the most current listing of the Federal Register. Also submit documentation that all individuals have current certification for the appropriate course from the State of Hawaii. No worker shall be allowed on site if they are found to have either an expired certification or do not comply with the requirements set forth in Hawaii Administrative Rules, Title 11, 501-504 and 40 CFR Part 763 on training. The Contractor shall be responsible for keeping the documentation up to date and submitting subsequent documentation to the Authorized Representative of the General Contractor before any additional employee or individual, not currently on the list, is allowed within the project site.

K. Documentation of Instructions: Submit no later than 10 consecutive working days from notice of award, documentation that all personnel or agents who may be exposed to airborne asbestos fibers and who may be responsible for any aspects of abatement activities which may occur have had instructions on the nature of the activities and operations which create a risk of asbestos exposure and the necessary protective steps, on use and fitting of respirators in accordance with qualitative procedures as detailed in HIOSH 12-145.1 Appendix C, Qualitative and Quantitative Fit Testing.

L. Monitoring Specialist Qualifications: The Contractor shall submit no later than 10 consecutive working days from notice of award the Contractor’s Monitoring Specialist’s name, contact information, valid qualifications, and current certification as a Hawaii Department of Health certified Asbestos Contractor Supervisor.

M. Documentation from Physician: Submit no later than 10 consecutive working days from notice of award, documentation from a licensed medical doctor that all employees or agents who may be required to wear a respirator have been provided with an opportunity to be medically monitored to determine whether they are physically capable of working while wearing the required respirator without suffering adverse health effects. In addition, document that all individuals permitted within the project site have received medical monitoring or had such monitoring made available to them as required in HIOSH 12-145.1. The Contractor must be aware of and provide information to the examining physician about unusual conditions in the work place environment (e.g. high temperatures, humidity, chemical contaminants) that may impact the employee's ability to perform work activities. The Contractor shall keep and make available to all affected individuals a record and the results of such examinations.

N. Medical Surveillance Program: Submit no later than 10 consecutive days from notice of award, all medical examinations for employees to be used on this project and a copy of the Contractor's medical surveillance program prepared in accordance with all applicable Federal, State and local laws.

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

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

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

R. HEPA Vacuums: Submit no later than 10 consecutive working days from notice of award, manufacturer's certification that vacuums conform to ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems as applicable to this project.

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

T. Testing Laboratory: Submit no later than 10 consecutive working days from notice of award name, address and telephone number of testing laboratory responsible for analysis and report of airborne fiber concentration for compliance with HIOSH 12-145.1 and this specification, along with evidence that the air monitoring testing laboratory is a successful participant in the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) program for phase contrast microscopy (PCM).

U. Emergency Planning and Procedures: The Contractor shall submit an emergency plan prior to abatement initiation for review and acceptance by the Authorized Representative of the General Contractor.

1. Emergency procedures shall be in written form and prominently posted adjacent to the Health and Safety Plan. Prior to entering the work area, everyone must read and sign these procedures to acknowledge receipt of emergency exits and emergency procedures.

2. Emergency planning shall include notification of police, fire, and emergency medical personnel of the work schedule of the planned abatement activities, and of the layout of the work area, particularly any barriers that may affect response capabilities.

3. Emergency planning shall include considerations of fire, explosion, toxic atmosphere, electrical hazards, slips, trips and falls, confined spaces, and heat related injury. Written procedures shall be developed and employee training procedures shall be provided in the Contractor's plan.

V. Visitor/Worker Entry Log: Maintain a log of all personnel including the Contractor's employees and agents who enter the work area while asbestos abatement operations are in progress, until final clearance is passed. The log shall contain the following information as a minimum and certified copies shall be submitted to the Authorized Representative of the General Contractor weekly:

1. Date of visit.

2. Visitor's name, employer, business address, and telephone number.

3. Time of entry and exit from work area.

4. Purpose of visit.

5. Type of protective clothing and respirator worn.

6. Certificate of release signed and filed with the Contractor.

W. Field Test Reports:

1. Employee Exposure Sampling Results: Submit test results to the Authorized Representative of the General Contractor and the affected Contractor's employees within three (3) working days, signed by the testing laboratory employee performing the analysis.

2. Asbestos Disposal Quantity Report.

X. Waste Disposal Manifest Forms: Submit copies of all transport manifests, trip tickets and disposal receipts for all asbestos containing waste materials no later than 10 consecutive working days from the date the waste is removed from the work area during the abatement process.

1.04 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only, and include but are not limited to, the following:

1. Code of Federal Regulations (CFR):

29 CFR 1926.103 Respiratory Protection
29 CFR 1926.51 Sanitation
29 CFR 1926.200 Accident Prevention Signs and Tags
29 CFR 1926.59 Hazard Communication
29 CFR 1926.1101 Asbestos, Tremolite, Anthophyllite, Actinolite
29 CFR 1910. 134 Respiratory Protection
40 CFR 61-SUBPART A General Provisions
40 CFR 61-SUBPART M National Emission Standard for Asbestos
40 CFR 763 Asbestos Containing Material in Schools
49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
49 CFR 178 Shipping Container Specification

2. Environmental Protection Agency (EPA):

EPA 560/5-85-024 Guidance for Controlling ACM in Buildings

3. Hawaii Occupational Safety and Health (HIOSH):

12-114.2 Personal Protective Equipment
12-121.2 Fall Protection
12-122.2 Materials Handling, Storage, Use, and Disposal
12-145.1 Asbestos
12-151 Hazardous Waste Operations and Emergency Response
12-206-13 Asbestos

4. American National Standards Institute (ANSI):

ANSI Z9.2 (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
ANSI Z88.2 (1992) Respiratory Protection

5. American Society for Testing and Materials (ASTM):

ASTM E 1368 (1990) Visual Inspection of Asbestos Abatement Projects
ASTM E 1494 (1992) Encapsulants for Spray- or Trowel-Applied Friable Asbestos-Containing Building Materials

6. Underwriters Laboratories Inc. (UL):

UL 586 (1990) High-Efficiency, Particulate, Air Filter Units

1.05 DEFINITIONS

A. Abatement: Procedure to control fiber release from asbestos containing material.

1. Removal: Shall adhere to all specified procedures herein and shall include the proper removal and disposal of asbestos containing material as per all applicable Federal, State and local rules, regulations, and industry standards.

2. Post-Removal Surface Encapsulation: Procedures necessary to coat surfaces from which ACM have been removed to control any residual fiber release.

B. Amended Water: Water containing a wetting agent or surfactant with a maximum surface tension of 2.9 Pa (29 dynes per square centimeter) when tested in accordance with ASTM D 1331.

C. General Contractor: General Contractor for the Site.

D. Area Sampling: Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

E. Asbestos: The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered.

F. Asbestos-Containing Material (ACM): Materials that contain more than one percent asbestos as determined by Polarized Light Microscopy or Transmission Electron Microscopy. For the purposes of this specification, material with any detectable amount of asbestiform material, including Wollastonite, shall be treated as ACM.

G. Asbestos Control Area: That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

H. Asbestos Fibers: Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by NIOSH Method 7400.

I. Asbestos Permissible Exposure Limit (PEL): 0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

J. Authorized Representative of the General Contractor: the person or persons designated by the General Contractor to act on its behalf and who is a Qualified Environmental Consultant (QEC), hired by the General Contractor, who performs air monitoring and inspection activities during abatement and renovation work and shall have the authority to initiate engineering controls.

K. Background: The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background

concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

L. Certified Clean: Certification that a work area has no visible signs of fibrous materials or other contamination, and does not have levels of airborne fibers above the defined air clearance criteria.

M. Competent Person: As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of asbestos hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the asbestos hazards. The Contractor's Competent Person shall possess current certification as a State of Hawaii Department of Health Asbestos Contractor Supervisor.

N. Contractor: The Contractor is that individual, or entity engaged under contract to the Owner or General Contractor to remove, encapsulate and/or dispose of ACM.

O. Decontamination Facility (DF) or Area: A series of connected rooms or spaces including Clean, Shower, and Contaminated Equipment Areas, used for both the decontamination of all workers, equipment and their personal protective equipment upon departing an asbestos removal work area, and for access to such work areas.

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

Q. Friable Asbestos Material: ACM that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

R. High Efficiency Particulate Air (HEPA) Filter Equipment: HEPA filtered vacuum and/or exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

S. Monitoring Specialist: The Contractor’s Competent Person, who enters the work area to set up personal air monitoring devices and then collects the personal air samples to be sent to the laboratory for analysis. The monitoring specialist has working experience in the asbestos abatement industry and a working knowledge of all applicable State and Federal occupational safety and health regulations and formal training in occupational safety and health. The Monitoring Specialist shall also have demonstrable experience in asbestos air monitoring techniques and respiratory protection. The Contractor's Monitoring Specialist shall possess current certification as a State of Hawaii Department of Health Asbestos Contractor Supervisor.

T. Non-Friable ACM: ACM in which the asbestos fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that Non-Friable ACM may release asbestos fibers under other conditions such as demolition, removal, or mishap.

U. Owner: Department of Land and Natural Resources.

V. Personal Sampling: Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

W. Post-Removal Encapsulant: A liquid material applied to surfaces from which ACM has been removed, to control the possible release of residual fibers, either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components (penetrating encapsulant).

X. Qualified Environmental Consultant (QEC): A State of Hawaii certified Asbestos Project Monitor who is an Industrial Hygienist or similar safety professional with experience in enforcing asbestos safety regulations and performing airborne asbestos sampling including clearance sampling.

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

Z. Wetting Agent: A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied.

1.06 ABBREVIATIONS

A. ANSI: American National Standards Institute, Inc.

B. CFR: Code of Federal Regulations.

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

D. EPA: U.S. Environmental Protection Agency.

E. NESHAP: National Emission Standards for Hazardous Air Pollutants.

F. NIOSH: National Institute for Occupational Safety and Health.

G. OSHA: Occupational Safety and Health Administration.

H. T he State: The State of Hawaii.

1.07 AUTHORITY TO STOP WORK

The Authorized Representative of the General Contractor has the authority to stop the abatement work at any time they determine that conditions are not within the drawing/specification requirements and applicable regulations. The work stoppage shall continue until corrective steps have been taken and specified conditions restored to the satisfaction of the Authorized Representative of the General Contractor. Standby time required to resolve violations shall be at the Contractor's expense. Stop Work Orders may be issued for, but shall not be limited to the following:

1. Excessive airborne fibers inside (>0.5 f/cc) and/or outside (>0.01 f/cc) the work area.

2. Visible emissions of dust or debris going beyond the work area boundaries.

1.08 PRODUCT HANDLING

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

1.09 PROTECTION

A. Site Security:

1. The work area is to be restricted only to authorized, trained, and protected personnel. These may include the Contractor's employees, the Authorized Representative of the General Contractor, State and local inspectors and any other designated individuals. A list of authorized personnel shall be established prior to job start.

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

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

4. The Contractor shall have control, subject to approval of the Authorized Representative of the General Contractor, of security in the work area and in proximity of Contractor's equipment and materials.

B. Site Protection and Safety: As a minimum, follow the requirements of all applicable Federal, State and local regulations. Take all necessary precaution to ensure there is no asbestos contamination to those areas not included in the work schedule.

C. Protective Covering: The Contractor shall provide and install protective covering as required or upon request by the Authorized Representative of the General Contractor. Protective covering shall be unused plastic sheets.

D. Safeguarding of Property: The Contractor shall take whatever steps necessary to safeguard his work area, any property of the Owner, and all other individuals in the vicinity of his work area during the execution of this Contract. The Contractor shall be responsible for and shall compensate to the injured party's satisfaction any and all damages resulting from their employee's negligence.

1.10 ADDITIONAL REQUIREMENTS

A. The Contractor shall examine and have at all times in his possession at his office (one copy) and in view at each job site office (one copy) the following materials:

1. Hawaii Administrative Rules, Title 11, Chapters 501, 502, 503 and 504;

2. Title 29 Code of Federal Regulations Part 1926.62; Safety and Health Standards;

3. Title 29 Code of Federal Regulations Part 1926.1101; Asbestos;

4. Title 29 Code of Federal Regulations Part 1910.134; Respiratory Protection;

5. Title 40 Code of Federal Regulations Part 261; Identification and Listing of Hazardous Waste;

6. Title 40 Code of Federal Regulations Part 262; Standards Applicable to Generators of Hazardous Waste;

7. Title 40 Code of Federal Regulations Part 263; Hazardous Waste Transporters;

8. Copies of any other applicable Federal, State and local regulations, standards, documents and codes;

9. Documentation of the adequacy of compressed air systems and respiratory protection system including a list of compatible components and specifications of the types and maximum number of respirators that may be used with the system;

10. Copies of the procedures for the use of the decontamination enclosure system or any other procedures which have been established to prevent contamination or areas outside the work area;

11. Copies of procedures to be followed during medical emergencies, including phone numbers of the nearest hospital or other emergency facility, which shall be posted by the nearest telephone;

12. Copies of the Contractor’s Respiratory Protection Program, Hazardous Communication Program, Safety Program and Asbestos Abatement Plan;

13. Copies of Material Safety Data Sheets for all chemicals used;

14. Copies of all relevant certificates held by abatement workers and abatement contractors/supervisors actively engaged in the abatement project;

15. Certification of the Project Designer who wrote procedures for the job;

16. Copies of bulk sampling results, including inspector and laboratory names, of all suspect material to be disturbed that is not assumed to be asbestos-containing; and

17. Records of all air sampling as required in HIOSH section 12-145.1-5.

B. The Contractor shall comply with the above requirements and any applicable Federal, State and local regulations. Where there is any conflict or inconsistency among requirements, the more stringent requirement shall apply. Ignorance of the above requirements and any applicable State and County Regulation resulting in additional cost to the Contractor shall not be reimbursable or billable to the Owner.

C. All regulations shall govern over these Specifications, except when the Specification is providing greater protection against asbestos exposure, injury, loss or liability. Any question regarding conflict or inconsistency between Specification and/or regulations should be directed to the Authorized Representative of the General Contractor.

D. Whenever approval of the Authorized Representative of the General Contractor is required prior to proceeding with other work, the Contractor shall comply with the following:

1. The Contractor shall give, at a minimum, five (5) days notification to the Authorized Representative of the General Contractor prior to the start of any asbestos work.

2. The Contractor shall not begin any work without the Authorized Representative of the General Contractor present onsite.

3. The Contractor shall allow the Authorized Representative of the General Contractor 24 hours from notification to respond to the request for site inspection(s).

4. The Contractor shall designate one person (either a foreman or superintendent) who will be authorized to request inspections. The name of the designated person shall be submitted in writing to the Authorized Representative of the General Contractor prior to commencing work. Requests from any other person will not be considered official requests.

5. The designated person requesting an inspection shall provide the following information:

   a. Name of caller.
   b. Building and rooms to be inspected.
   c. Work phase of inspection, as specified.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plastic Sheeting: 6-millimeter-minimum-thickness polyethylene film.

B. 6-mil Plastic Bags: Transparent, 6-millimeter minimum thickness, seamless bottomed polyethylene bags. All bags used to transport ACM must carry the DOT class 9 label, a space for generator information and the following warning:

DANGER CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

C. Tape: Tape shall be capable of sealing joints of adjacent sheets of polyethylene, attaching polyethylene sheeting to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions such as when amended water is used.

D. Adhesives: Adhesive shall be capable of sealing joints of adjacent sheets of polyethylene, attaching polyethylene sheeting to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions such as when amended water is used.

E. Post-Removal Encapsulation: The encapsulant shall be capable of being applied to surfaces from which asbestos-containing material has been removed to control the possible release of residual fibers. The encapsulant shall be capable of either creating a membrane over the surface (i.e. a bridging encapsulant) or by penetrating into the material and binding its components (i.e. a penetrating encapsulant) and shall be compatible with the existing finishes.

F. Surfactant (Wetting Agent): 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether, or pre-approved equal, and shall be mixed with water to provide a minimum concentration of one ounce of surfactant to five (5) gallons of water.

G. Warning Labels, Tape and Signs: As required by OSHA 29 CFR 1926.1101 and HIOSH regulation 12-145.1.

H. Protective Clothing: The Contractor shall have all the coveralls required for this project on site prior to the start of work.

I. Other Products: Provide all other materials including but not limited to, lumber, plywood, nails, fasteners, metal studs, hardware, sealants, and caulking which may be required to properly prepare and complete this project.

2.02 TOOLS AND EQUIPMENT

Provide sufficient and suitable tools for the asbestos abatement procedures, including but not limited to:

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

2. Paint/Encapsulant Sprayer: Airless type only.

3. HEPA vacuum.

4. Negative Air Pressure Units: Portable "exhaust units with air purification equipment in accordance with "Guidance for Controlling Asbestos Containing Materials in Buildings" (the Purple Book) EPA 560/5-85-024 June 1985, Appendix J - Recommended Specifications and Operating Systems Procedures for the Use of Negative Air Pressure Systems for Asbestos Abatement. Ensure that at least one functional back-up negative air pressure unit is on-site.

5. Ladders or Scaffolds: All ladders and scaffolds shall be OSHA approved, and shall be of sufficient dimensions and quantities so that all work surfaces can be easily and safely accessed by the workers, the Authorized Representative of the General Contractor and other inspectors. Scaffold joints and ends shall be sealed with tape to prevent migration of asbestos fibers.

6. Electrical Equipment: All electrical equipment shall be Underwriter's Laboratory listed and approved, and shall have ground fault circuit interrupter protection, installed by a licensed electrician.

7. Hand Power Tools: All hand power tools shall be equipped with HEPA-filtered local exhaust ventilation if used to drill, cut or otherwise disturb ACM.

8. Other tools and equipment as necessary.

2.03 ELECTRICAL EQUIPMENT PROTECTION

A. Non-current carrying metal parts of the Contractor's fixed, portable and plug-connected equipment shall be grounded. Portable tools and appliances protected by a UL approved system of double insulation need not be grounded. All light and power circuits in the asbestos removal area shall be protected by ground fault circuit interrupters.

B. Extension cords shall be the 3-wire type, protected from damage, and shall not be fastened with staples, hung from nails, or suspended with wires. Splices shall have soldered wire connections with insulation equal to the cable. Worn or frayed cords shall not be used.

C. As necessary, safe lighting equipment for each work area shall be provided by the use of wire guard protected floodlights. Temporary wiring shall be properly insulated and substantially supported. Circuits shall be properly designed and fused. All temporary lighting inside the asbestos removal area shall be weather-proofed.

2.04 PERSONAL PROTECTION REQUIREMENTS

A. The Contractor acknowledges that he alone is responsible for instruction and for enforcement of personal protection requirements and that these specifications provide only a minimum acceptable standard.

B. Personal Protective Equipment (PPE):

1. Respirators: Provide personnel engaged in pre-cleaning, cleanup, handling, removal and demolition of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101, - 29 CFR 1926.103 and 29 CFR 1910.134. Respirators shall be worn at all times within the work area and any other areas where workers may be exposed to asbestos.

2. Outer Protective Clothing: Provide personnel exposed to asbestos with disposal "non-breathable," whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposal plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape. Reusable whole body outer protective clothing shall not be used.

3. Additional safety equipment (e.g. hardhats meeting the requirements of ANSI Z89.11981, eye protection meeting the requirements of ANSI Z41.1-1967, disposable PVC gloves), as necessary, shall be provided to all workers.

PART 3 - EXECUTION

3.01 DECONTAMINTATION AREA

A. T he decontamination area as outlined below shall be employed during removal work involving only exterior materials that do not extend to the interior, where all work is performed from the exterior and the work area is fully sealed off from the interior.

B. General: The Contractor shall construct the decontamination area, acceptable to the Authorized Representative of the General Contractor, adjacent to the work area. The decontamination area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

C. Access: In all cases, access between contaminated rooms or areas and clean rooms or areas shall be through the decontamination system.

D. Cleaning: Work clothing and personal protective equipment must be cleaned in the decontamination area with a HEPA vacuum prior to removal. All equipment and surfaces or containers filled with ACM must be cleaned in the decontamination area prior to removal.

E. Clean Area: The Contractor shall establish a clean area adjacent to the decontamination area with sufficient space for storage of any worker's and agent's street clothes, personal effects and other non-contaminated items.

3.02 DECONTAMINATION ENCLOSURE SYSTEM

A. The decontamination enclosure system as outlined below shall be employed during any removal work involving indoor materials, including materials extending from the exterior to the interior such as window or vent sealant, except where openings to the interior are fully sealed and all work is performed from the exterior of the building.

B. General: The Contractor shall construct the decontamination enclosure system or use portable units acceptable to the Authorized Representative of the General Contractor that are connected to the work area with framed-in or accordion tunnels. The Contractor shall line all tunnels with 6-mil plastic and shall seal this lining with tape at all joints. All vertical surfaces subject to observation from the exterior, non-contaminated areas shall be constructed of opaque materials.

C. Access: In all cases, access between contaminated rooms or areas and the decontamination enclosure unit shall be through an airlock. In all cases, access between any two rooms/areas within the decontamination enclosure unit shall be through a curtained doorway.

D. Decontamination Unit: Provide personnel decontamination unit within the asbestos control area in an area approved by the Authorized Representative of the General Contractor. The Unit shall contain the following:

1. An Equipment Area with two doorways, one leading to the Work Area and another leading to the Shower Area.

2. A Shower Area with two doorways, one leading to the Equipment Area and another leading to the Clean Area. An adequate supply of soap shall be maintained within this Shower Area. The Contractor must ensure that no leakage from the shower area occurs and that all wastewater shall be disposed of as contaminated or filtered through the wastewater filtering system.

3. A Clean Area with two doorways, one leading to the Shower Area and another leading to a non-contaminated area outside the asbestos work area. The Clean Area shall have sufficient space for storage of any worker's and agent's street clothes, personal effects and other non-contaminated items.

3.03 NEGATIVE PRESSURE SYSTEM

A. The negative pressure system outlined below shall be employed for all interior asbestos removal work, including materials extending from the exterior to the interior such as window or vent sealant, except where openings to the interior are fully sealed and all work is performed from the exterior of the building.

B. Local Exhaust System: Provide a local exhaust system in the asbestos control area in accordance with ANSI Z9.2 and 29 CFR 1926.1101 that will provide at least six air changes per hour within the negative enclosure. Local exhaust equipment shall be operated continuously until the asbestos control area is removed and shall be leak proof. To lengthen the life of the HEPA filter, the local exhaust system shall be equipped with a 10 micron particle arrestance pre-filter, a 5 micron particle arrestance secondary filter placed ahead of the HEPA filter. Maintain a minimum pressure differential in the work area of -0.08 inches of water gauge relative to the air

pressure outside the work area. HEPA filters shall conform to ANSI Z9.2 and UL 586.

C. Location of Exhaust Units: Locate units to ensure that the flow of air moves from the decontamination unit and passes through as much of the work area as is possible. The local exhaust system shall not terminate in an occupied space or near a ventilation intake.

D. Filter Replacement: Change filters in the local exhaust units in accordance with the manufacturer's recommendations or when there is a loss of negative pressure. With the unit in operation change the prefilter and check for pressure drop. If the pressure drop remains, with the unit in operation change the secondary filter. If the pressure drop still remains, stop work, shut off the unit and replace the HEPA filter as per the manufacturer's recommendations. All used filters are to be disposed of as asbestos waste.

3.04 WASTEWATER FILTERING SYSTEM

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

B. One spare set of 100-micron prefilters shall be maintained at the site at all times to replace prefilters during cleaning. Maintain at least one set of 0.5-micron or equivalent filters at the site at all times for replacements as necessary.

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

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

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

3.05 WORK AREA PREPARATION

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

B. Inspection of Building Openings: At the beginning of each work day, the Contractor shall inspect and ensure that all doors, windows and other openings of affected buildings are closed and locked.

C. Critical Barrier Enclosures: Cover all openings including, but not limited to, glazed openings, doors, corridors, ducts, grilles, floor drains or plates, diffusers, vents, windows, electrical outlets, and any other penetrations to the work areas with two layers of 6-mil plastic and seal with tape.

D. Decontamination Area/Enclosure System: Provide a decontamination area as described in item entitled "DECONTAMINTATION AREA" hereinabove for exterior work and decontamination enclosure system as described in item entitled "DECONTAMINATION ENCLOSURE SYSTEM" hereinabove for interior work.

E. Pre-Cleaning/Wet-Wiping:

1. Pre-clean fixed objects within the work area by using HEPA vacuum equipment and then wet-wiping as appropriate. All such fixed object will then be covered in 6-mil plastic sheeting and sealed with tape.

2. Clean the work area using HEPA vacuum equipment and the wet-wiping as appropriate. Do not use dust generating methods such as dry sweeping or non-HEPA vacuuming.

F. Plastic: Objects which may be contaminated during abatement or will be difficult to clean after abatement shall be taped and sealed in 6 mil plastic.

G. Temporary Electricity: Existing Electrical service to the facility may be used for temporary electrical power during abatement and replacement work. However, the electrical power within the work area must be shut off. The Contractor shall verify the locations of available electrical service or use generators as needed.

H. Temporary Light: Provide a minimum of 35 foot-candles of illumination on surfaces for finishing operations and 100 foot-candles of illumination for removal operations. Provide 24 volt safety lighting.

I. Temporary Water: Existing water services to the facility may be used as a temporary water source during construction. Locations of line tie-ins must be approved by the Authorized Representative of the General Contractor.

J. Temporary Sanitation Facilities: The Contractor shall provide toilet facilities for the use of Contractor personnel and agents during abatement work. Maintain toilet facilities in a clean and sanitary condition in compliance with all applicable Federal, State and local regulations.

K. Temporary Fire Protection: The Contractor shall provide and maintain temporary fire protection equipment during the asbestos abatement operations. Equipment shall be of the appropriate type to fight fires associated with the materials to be found within the work area.

L. Work Area Isolation and Protection: The Contractor shall isolate the work area for the duration of the project. The work area shall be protected subject to the approval of the Authorized Representative of the General Contractor.

M. Warning Signs: The Contractor shall post warning signs that meet the requirements of OSHA 29 CFR 1926.1101 (k)(1) and (k)(2)(ii) at the outside door to the Decontamination System. The Authorized Representative of the General Contractor may also require that the Contractor post additional warning signs around the work area or at other potential exposure points.

AFTER THE POSTING, SEALING AND TEMPORARY FACILITY WORK HAS BEEN COMPLETED, NOTIFY THE AUTHORIZED REPRESENTATIVE OF THE GENERAL CONTRACTOR FOR APPROVAL BEFORE PROCEEDING WITH THE ABATEMENT.

3.06 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, Hawaii Administrative Rules, Title 11, 501, and as specified herein. Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, drinking, chewing gum, using tobacco, or applying cosmetics shall not be permitted in asbestos work or regulated area. Personnel of other trades not engaged in the removal of ACM shall not be exposed at any time to airborne asbestos unless all the personal protection and training provisions of this Specification are complied with. Establish critical barriers over all openings and penetrations which may lead to areas outside the asbestos control area. If an asbestos fiber release or spill occurs outside the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Authorized Representative of the General Contractor prior to resumption of work.

3.07 REMOVAL OF ASBESTOS-CONTAINING MATERIALS

A. Surfaces to remain in areas where asbestos containing materials will be removed shall be covered with one layer of 6-mil plastic sheeting. Ventilation intake air sources shall be isolated or the system shall be shut down.

B. Wet the asbestos containing materials with a wetting agent (amended water) using a fine mist sprayer prior to the start of abatement. Wetting agent shall continuously be applied to control the release of asbestos fibers from the ACM prior to and during removal.

C. Carefully remove asbestos containing materials by lifting them in whole and unbroken pieces to the greatest extent possible. Continue to apply the wetting agent during removal to control dust. Avoid breaking and pulverizing the material.

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

E. Waste debris shall be double bagged and sealed leak-tight in properly labeled 6-mil plastic bags immediately after removal. The Contractor shall not allow removed ACM to accumulate in work area. All gross debris created by the removal process

shall be bagged and sealed before the main break and again at the end of each workday.

F. ACM that has been removed from elevated locations shall not be dropped or thrown to the ground. Material shall be carried or passed to the ground by hand or lowered to the ground via covered, dust-tight chute, crane or hoist.

G. Intact asbestos containing roof materials and any debris that is not intact shall be lowered to the ground as soon as is practicable, but in no event later than the end of the work shift. While the material is on the roof it shall either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting. Once lowered, unwrapped material shall be transferred to a closed receptacle.

H. After inspection and approval by the Authorized Representative of the General Contractor, the Contractor shall seal all abated and cleaned surfaces with at least one (1) coat of an approved penetrating encapsulant.

I. The Contractor shall minimize contamination of the work floor, the exterior of disposal containers, and all other surfaces within the work area.

3.08 CLEANUP

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

3.09 CLEARANCE OF EXTERIOR REMOVAL WORK AREA

A. Remove all visible accumulation of ACM and debris by HEPA vacuums, sponging, and wet-wiping.

B. The Authorized Representative of the General Contractor will visually inspect the affected areas for residual asbestos debris and waste. The Contractor shall re-clean areas showing asbestos debris and waste. If re-cleaning is required, the Authorized Representative of the General Contractor will visually inspect for asbestos debris and waste after re-cleaning. This process will be repeated until the Authorized Representative of the General Contractor deems the area free of visible asbestos debris and waste.

C. The work area shall be totally visibly clean before the remaining material is encapsulated. After the visual inspection has been passed, encapsulate all remaining materials.

D. The Contractor shall remove all signs, temporary barriers and materials when their use is no longer required.

3.10 DISPOSAL OF ASBESTOS-CONTAINING MATERIAL

A. Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne

concentrations of asbestos fibers and place them in properly labeled transparent 6-mil plastic seamless bottomed bags. Wastes within the bags must be adequately wet in accordance with 40 CFR 61-SUBPART M.

B. Affix a warning and Department of Transportation (DOT) label to each bag or use bags preprinted with the approved warnings and DOT labeling. The name of the waste generator and the location at which the waste was generated shall be clearly indicated on the outside of each container.

C. Vehicles used for transporting waste to the disposal sites shall have a completely enclosed, lockable storage compartment. Storage compartments shall be covered and sealed with a minimum of one layer of 6-mil plastic sheeting on the sides and top and two layers of 6-mil plastic sheeting on the floor. The compartments shall be thoroughly wet-cleaned and HEPA vacuumed following the disposal of each load at the approved disposal sites.

D. Workers unloading bags at the disposal sites shall wear full body protective clothing and dual HEPA cartridge full-face air purifying respirators.

E. Waste disposal manifest forms shall be properly completed to verify custody and ensure disposal of all ACM and asbestos contaminated waste at approved disposal sites. Forms shall be kept on file as directed by the Authorized Representative of the General Contractor. Copies shall be submitted to the Authorized Representative of the General Contractor no later than the next working day after each trip. It is the Contractor's responsibility to assure that any landfill used for disposal of asbestos containing or asbestos contaminated waste is approved for that purpose.

3.11 PAYMENT

Payment for removal and disposal of ACM shall be included in the lump sum bid. The final payment will not be made until proper documentation of the disposal of ACM and related waste are submitted to the Owner.

END OF SECTION

SECTION 13282

LEAD HAZARD CONTROL MEASURES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in SECTION 00700.

1.02 SUMMARY

A. The Contractor shall ensure all work is in compliance with all applicable Federal, State and local laws and regulations concerning lead, including all incidental and pertinent operations during the renovation of structures located at the Site.

B. Lead was detected at various concentrations on painted surfaces of structures at the Site as specified in the hazardous materials report, Targeted Hazardous Materials Survey, Limited Asbestos and Lead Paint Survey, Pu'u Wa'awa'a System Improvements, Big Island, Hawaii, 28 pages, prepared by Lehua Environmental Inc.

C. The Contractor shall furnish all labor, materials and equipment necessary to complete the safe removal, transportation and disposal of lead-containing paint (LCP) in areas that may be affected by the renovation activities. These areas include any lead-containing paint that is loose and flaking or areas where lead-containing paint has the potential to become airborne or otherwise create dust (i.e. from sanding, drilling, friction, etc.) during the renovation activities.

D. The work specified herein shall include the preparation of work areas and removal, transportation and disposal procedures. All work shall be performed as required of lead-containing and lead-contaminated materials by persons trained, knowledgeable and qualified in the techniques of handling and disposing of LCP and lead-contaminated materials and in the subsequent cleaning of lead-contaminated areas.

E. The Contractor shall ensure that workers are trained in accordance with 29 CFR 1926.62 and HIOSH 12-148.1 before work starts.

F. This Specification covers the requirements and procedures for limiting occupational and environmental exposure to lead during renovation of LCP painted structures at the Site.

G. In performing the renovation and disposal of components with lead-containing paint, all possible safeguards, precautions and protective measures should be utilized to prevent exposure of any individual to lead particulates.

H. The Contractor shall review the hazardous materials report, Limited Asbestos and Lead Paint Survey, Pu'u Wa'awa'a System Improvements, Big Island, Hawaii, 28 pages, prepared by Lehua Environmental Inc., and ensure that he/she fully understands where LCP has been identified, that the testing was for design

purposes only, and that the results do not satisfy any of the requirements of Title 12, (Department of Labor and Industrial Relations), Subtitle 8 (Division of Occupational Safety and Health), Chapter 148.1 (Lead Exposure in Construction), Hawaii Administrative Rules.

I. Debris and waste resulting from renovation work, except as otherwise specified, shall become the property of the Contractor. The Contractor shall be required to separate renovation debris, steel components and miscellaneous metal elements and recycle them as scrap metal.

J. The Contractor shall conduct TCLP tests for lead of a representative sample of the debris waste stream of each structure and of any lead-contaminated chips or debris generated through abatement to determine whether the waste is hazardous or non-hazardous.

K. Related Work Specified Elsewhere:

1. SECTION 01715 - EXISTING CONDITIONS - HAZARDOUS MATERIALS SURVEY.

2. SECTION 13281 - REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING MATERIAL; for requirements of all work that disturbs Asbestos-Containing Material.

3. SECTION 13288 - TESTING/AIR MONITORING; for requirements of all work that disturbs Lead-Containing Paint and Asbestos-Containing Materials.

1.03 SUBMITTALS

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

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

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

D. Notifications: When required, provide the Hawaii State Department of Health written notice of any on-site project activity involving the disturbance of lead-containing paint as early as possible but at least 10 working days prior to commencement of work. Submit a copy of the written notification to the Owner.

E. Respiratory Protection Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor’s Respiratory Protection Program prepared in accordance with all applicable laws. The Contractor shall also submit

fit test records on all employees to be used on this project who may be required to wear a respirator.

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

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

H. Lead-Containing Paint Disturbance/Removal Plan: Submit no later than 10 consecutive days from notice of award, a copy of the Contractor's Lead Paint Disturbance/Removal Plan, including a written Compliance Program which meets the specifications of 29 CFR 1926.62.

I. Work Procedure Plan: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Work Procedure Plan. The Following are required components of a Work Procedure Plan:

1. A sketch showing the location, size, and details of lead control areas, signage, security, decontamination and support areas including eating, drinking, smoking, and restroom areas;

2. Procedures, interface of trades, sequencing of lead-related work, respirators, protective equipment;

3. A detailed description of the methods of control of the work to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded;

4. Work plan and schedule for waste containment and disposal including daily cleanup and disposal of stray paint chips and paint dust;

5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment;

6. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes;

7. Estimated quantities of wastes to be generated and disposed of as well as a description of the methods used to identify hazardous wastes encountered with the work;

8. Spill prevention, containment, and cleanup contingency measures to be implemented;

9. Description of procedures to stop work in the event that area monitoring and laboratory analysis indicate air concentrations of lead in excess of the action level; and

10. Methods to eliminate runoff of the water used to minimize dust created by renovation work, and collection and disposal plan for wastewater and paint debris.

J. Rental Equipment: When rental equipment is to be used during lead-containing paint handling and disposal, a written notification concerning intended use of the rental equipment must be provided to the rental agency with a copy submitted to the Authorized Representative of the General Contractor.

K. HEPA Vacuums: Submit no later than 10 consecutive working days from notice of award, manufacturer's certification that vacuums conform to ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems as applicable to this project.

L. Contractor's Competent Person's Qualifications: The Contractor shall submit no later than 10 consecutive working days from notice of award the Contractor's Competent Person's name, contact information, valid qualifications, and current certification of completion of the Hawaii Department of Health Lead Supervisor and/or Inspector/Risk Assessor course.

M. Contractor's Monitoring Specialist Qualifications: The Contractor shall submit no later than 10 consecutive working days from notice of award the Contractor's Monitoring Specialist's name, contact information and current completion of the Hawaii Department of Health Lead Supervisor course.

N. Certification of Medical Examinations: The Contractor shall submit documentation from a physician that all employees or agents who may be exposed to airborne lead-containing dust or fumes have been medically monitored to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects. In addition, the Contractor shall document that his personnel have received medical monitoring as required in the HIOSH lead standard (12-148.1).

O. Employee Training Certifications: Submit documentation within 10 consecutive calendar days of award, satisfactory to the Authorized Representative of the General Contractor, that the Contractor's employees and any other company personnel or agents who may be exposed to airborne lead dust or who may be responsible for any aspects of lead-containing paint removal activities, have received training in accordance with OSHA 29 CFR 1926.62 and the HIOSH lead standard (12-148.1) within the past year. Training shall include, but not be limited to, the dangers of lead exposure, respirator use and decontamination procedures.

P. Lead Supervisor Certification: Submit documentation within 10 consecutive calendar days of award, satisfactory to the Authorized Representative of the General Contractor, the Contractor's Lead Supervisor's current certification.

Q. Laboratory Qualifications:

1. Personal Air Monitoring Laboratory: Submit name, address and telephone number of testing laboratory responsible for analysis of personal air monitoring samples and reporting concentrations of airborne lead.

The laboratory shall be accredited under the EPA's National Lead Laboratory Accreditation Program (NLLAP) by the American Industrial Hygiene Association's (AIHA's) Environmental Lead Laboratory Accreditation Program (ELLAP) and successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program for each lead matrix analyzed by the laboratory. The laboratory shall fulfill all requirements of accreditation for analyzing lead in air. Laboratory personnel performing the work shall have been judged proficient in the analysis of lead in air by successful participation within the last year in AIHA's ELPAT.

2. TCLP Testing Laboratory: Submit name, address and telephone number of testing laboratory responsible for TCLP analysis.

   The laboratory shall be experienced in and analyze TCLP samples using the EPA Method 1311/6010.

R. Personal Air Monitoring Results: Submit test results to the Authorized Representative of the General Contractor and the affected Contractor's employees within three (3) working days of collection, signed by the testing laboratory employee performing the analysis and the Contractor's Monitoring Specialist. Test results for the first two full days of initial personal air monitoring shall be submitted to the Authorized Representative of the General Contractor within 48 hours after completion of sampling.

S. TCLP Results: Submit test results to the Authorized Representative of the General Contractor within three (3) working days of collection, signed by the testing laboratory employee performing the analysis and the Contractor's Competent Person.

T. Log of Lead Disturbance Work: Complete and submit a daily log of all lead disturbance work performed.

1.04 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only, and include but are not limited to, the following:

1. Code of Federal Regulations (CFR):

   29 CFR 1926.21 Safety Training and Education
   29 CFR 1926.33 Access to Employee Exposure and Medical Record
   29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists
   29 CFR 1926.59 Hazard Communication
   29 CFR 1926.62 Lead Exposure in Construction
   29 CFR 1926.65 Hazard Waste Operations and Emergency Response
   29 CFR 1926.103 Respiratory Protection
   40 CFR 260 Hazardous Waste Management Systems: General
   40 CFR 261 Identification and Listing of Hazardous Waste
   40 CFR 262 Generators of Hazardous Waste

40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restriction
40 CFR 745	Lead; Requirement for Lead-Based Paint Activities
49 CFR 172	Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
49 CFR 178	Shipping Container Specification

2. Hawaii Occupational Safety and Health Division (HIOSH):

12-114.2	Personal Protective Equipment
12-121.2	Fall Protection
12-122.2	Materials Handling, Storage, Use, and Disposal
12-148.1	Lead
12-151	Hazardous Waste Operations and Emergency Response
12-202-33.1	Lead

3. American National Standards Institute (ANSI):

ANSI Z9.2	(1979; R 1991)	Fundamentals Governing the Design and Operation of Local Exhaust Systems
ANSI Z88.2	(1992)	Respiratory Protection

4. Department of Housing and Urban Development (HUD):

HUD Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing

5. Underwriters Laboratories Inc. (UL):

UL 586 (1990) High-Efficiency, Particulate, Air Filter Units

1.05 DEFINITIONS

A. Action Level: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period.

B. Area Sampling: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel (approximately 1.5 to 1.8 meters above the floor).

C. Authorized Representative of the General Contractor: A QEC, hired by the General Contractor, who performs air monitoring and inspection activities during lead abatement and/or disturbance work and shall have the authority of initiate engineering controls.

D. Authorized Visitor: The Authorized Representative of the General Contractor, Inspector, air monitoring personnel, or a representative of any regulatory or other agency having jurisdiction over the project.

E. Competent Person: As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations, has the authority to take prompt corrective actions to control the lead hazards and is an Hawaii Department of Health certified lead supervisor, lead inspector or risk assessor.

F. Contaminated Area: An area where unwanted toxic or harmful substance exists.

G. Contractor: For this project, the Contractor is that individual, or entity under contract to the General Contractor to perform the herein listed work.

H. EPA: United States Environmental Protection Agency.

I. High Efficiency Particulate Air (HEPA) Filter: HEPA filtered vacuuming equipment with a filter system capable of collecting and retaining lead-contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

J. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds.

K. Lead-Based Paint (LBP): Protective or decorative coating which contains at least 1.0 mg/cm2 of lead by area or at least 0.5 percent (5,000 mg/kg) of lead by weight.

L. Lead-Containing Paint (LCP): Protective or decorative coating which contains any detectable quantity of lead; includes Lead-Based Paint.

M. Lead Control Area: A temporary area or structure or containment, sometimes equipped with HEPA filtered local exhaust, that prevents the spread of lead dust or debris. Usually critical barriers and physical boundaries are employed to isolate the lead control area and to prevent migration of lead contamination and unauthorized entry of personnel.

N. OSHA: United States Department of Labor, Occupational Safety and Health Administration.

O. Owner: State of Hawaii Department of Land and Natural Resources.

P. Permissible Exposure Limit (PEL): 50 micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more or less that 8 hours in a work day, the PEL shall be determined by the following formula:

PEL (micrograms per cubic meter of air) = 400 divided by the number of hours worked per day

Q. Personal Sampling: Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees work tasks. The breathing zone shall be considered an area within 12 inches of the nose or mouth of an employee.

R. Physical Boundary: Area physically roped or partitioned off around lead control area to limit unauthorized entry of personnel.

S. Qualified Environmental Consultant (QEC): A Hawaii Department of Health certified Lead Inspector and/or Risk Assessor who is an Industrial Hygienist or similar safety professional with a minimum of 5 years of experience in enforcing lead safety regulations and performing airborne lead sampling.

T. Qualified Testing Laboratory:

1. Environmental and Work Area Monitoring Laboratory: The testing laboratory employed by the Authorized Representative of the General Contractor to perform analysis of environmental and work area air monitoring samples and report concentrations of airborne lead.

   The laboratory shall be accredited under the EPA's National Lead Laboratory Accreditation Program (NLLAP) by the American Industrial Hygiene Association's (AIHA's) Environmental Lead Laboratory Accreditation Program (ELLAP) and successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program for each lead matrix analyzed by the laboratory. The laboratory shall fulfill all requirements of accreditation for analyzing lead in air. Laboratory personnel performing the work shall have been judged proficient in the analysis of lead in the applicable parameter by successful participation within the last year in AIHA's ELPAT.

2. Personal Air Monitoring Laboratory: The testing laboratory utilized by the Contractor's Monitoring Specialist to perform analysis of personal air monitoring samples and report airborne concentrations of lead. Collection of the Contractor's OSHA personal air samples will be performed by the Contractor's Competent Person and/or Monitoring Specialist.

   The laboratory shall be accredited under the EPA's National Lead Laboratory Accreditation Program (NLLAP) by the American Industrial Hygiene Association's (AIHA's) Environmental Lead Laboratory Accreditation Program (ELLAP) and successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program for each lead matrix analyzed by the laboratory. The laboratory shall fulfill all requirements of accreditation for analyzing lead in air. Laboratory personnel performing the work shall have been judged proficient in the analysis of lead in air by successful participation within the last year in AIHA's ELPAT.

3. Toxicity Characteristic Leaching Procedure (TCLP) Testing Laboratory: The testing laboratory employed Contractor to perform TCLP tests of a representative sample of the debris waste stream of each structure and of any

lead-contaminated chips or debris generated through abatement to determine whether or not the waste is hazardous or non-hazardous. The laboratory shall be experienced in and analyze TCLP samples using the EPA Method 1311/6010.

U. Site: Pu'u Wa'awa'a Water System, Big Island, Hawaii.

V. State: The State of Hawaii and/or its representative.

1.06 QUALITY ASSURANCE

A. Authorized Representative of the General Contractor Responsibilities:

1. Review and approve Contractor personnel training;

2. Review and approve Contractor's Work Procedure Plan for conformance to the applicable reference standards;

3. Inspect work for conformance to the Contractor's approved Work Procedure Plan;

4. Schedule and conduct required air monitoring, inspection and reporting;

5. Monitor work to verify that work is performed at all times in accordance with the requirements of this Specification;

6. Monitor work to verify that adequate control is being maintained at all times of hazardous exposure to employees and to the environment;

7. Perform area air monitoring during lead abatement activities;

8. Be onsite during all worksite preparation and cleaning, be available by telephone, pager or answering service at all other times during the work and able to be present at the work site in no more than 2 hours; and

9. After final cleanup, verify that the lead control area is free of any visible lead paint chip debris, waste or dust.

B. Safety and Health Compliance:

1. In addition to the detailed requirements of this Specification, the Contractor shall comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials.

2. Comply with the applicable requirements of the current issue of 29 CFR 1926.62, HIOSH 12-148.1, and HIOSH 12-202-33.

3. Where requirements of this Specification and the referenced documents vary, the most stringent requirement shall apply.

C. Pre-Construction Conference:

1. The Authorized Representative of the General Contractor may meet with the Contractor and General Contractor to discuss in detail the work procedures, precautions and area and personal air monitoring to be employed.

2. If rental equipment is to be used during lead-containing paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Submit a copy of the written notification to the Authorized Representative of the General Contractor.

1.07 CONTRACTOR'S RESPONSIBILITIES

The Contractor acknowledges that he alone is responsible for the instruction of personnel in and enforcement of personal protection requirements. The Contractor shall comply with all requirements of 29 CFR 1926.62 and HIOSH 12-148.1. The Contractor shall also be responsible for complying with all applicable EPA regulations in regards to lead-containing materials.

1. Respirators: Use appropriate respirators and filters which meet all requirements of OSHA 29 CFR 1926.62 and HIOSH 12-148.1.

2. Protective Clothing: Use appropriate personal protective clothing (disposable suits, eye protection, gloves, etc.) as required by OSHA 29 CFR 1926.62 and HIOSH 12-148.1.

1.08 REQUIREMENTS

A. Notification: The Contractor shall notify the General Contractor 15 days prior to the start of any abatement, renovation or demolition work involving LCP painted materials. When required, notify the Department of Health a minimum of 10 working days prior to disturbance of any LCP.

B. Certification: The Contractor's Lead Supervisor shall possess current Hawaii Department of Health lead supervisor certification. The Lead Supervisor shall be present onsite during all work site preparation and post-removal and lead paint disturbance cleanup of work areas, available on-call at other times and able to be present within two hours of request.

C. Training: The Contractor shall be solely responsible for complying with all OSHA 29 CFR 1926.62 and HIOSH 12-148.1 requirements to train each employee. Training shall include, but not be limited to, the hazards of lead; safety and health precautions; and the use and requirements for protective clothing, equipment, and respirators. Training shall be current within the past year.

D. Medical Examinations: Before exposure to lead-contaminated dust, the Contractor shall provide his employees with a comprehensive medical examination as required by 29 CFR 1926.62 and HIOSH 12-202-33. The examinations will not be required if records show that Contractor's employees have been examined as required by 29 CFR 1926.62 within the last year.

E. Respiratory Protection Program: The Contractor shall establish and implement a Respiratory Protection Program as required by ANSI A88.2, 29 CFR 1910.134, 29 CFR 1926.62, and HIOSH 12-148.1.

F. Hazard Communication Program: The Contractor shall establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

G. Safety Program: Contractor shall establish and implement a Health and Safety Plan which meets the specifications of 29 CFR 1926 Subparts C and D.

H. Lead Paint Disturbance and Removal Plan: The Contractor shall establish and implement a Lead Paint Disturbance and Removal Plan. This shall include a written Compliance Program which meets the specifications of 29 CFR 1926.62.

I. Applicable Standards and Guidelines: All work under this contract, and any other trade work conducted with the project, shall be done in strict accordance with all applicable Federal, State and local regulations, standards, documents and codes governing the preparation, removal, renovation, treatment, transportation and disposal of lead-containing and lead-contaminated materials. The most recent edition of any relevant regulation, standard, document or code shall be applicable.

J. The Contractor shall examine and have at all times at his office (one copy) and in view at each job site (one copy) the following materials:

1. State of Hawaii Department of Labor and Industrial Relations; Occupational Safety and Health Standards; Part 8, Section 12-148.1;

2. Department of Housing and Urban Development; Office of Public and Indian Housing; Lead Paint Guidelines;

3. Title 29 Code of Federal Regulations Part 1926.62; Safety and Health Standards;

4. Title 29 Code of Federal Regulations Part 1910.134; Respiratory Protection;

5. Title 40 Code of Federal Regulations Part 261; Identification and Listing of Hazardous Waste;

6. Title 40 Code of Federal Regulations Part 262; Standards Applicable to Generators of Hazardous Waste;

7. Title 40 Code of Federal Regulations Part 263; Hazardous Waste Transporters;

8. Title 40 Code of Federal Regulations Part 745; Lead; Requirement for Lead-Based Paint Activities;

9. Copies of any other applicable Federal, State and local regulations, standards, documents and codes;

10. Copies of the procedures to be followed during medical emergencies, including phone numbers of the nearest hospital or other emergency medical facility, which shall be posted by the nearest telephone;

11. Copies of the Contractor's Respiratory Protection Program, Hazardous Communication Program, Safety Program, and Work Procedure Plan;

12. Copies of Material Safety Data Sheets for all chemicals used;

13. Copies of the Contractor's Competent Person's qualifications and employee Hawaii Department of Health Lead Worker and Supervisor Certificates; and

14. Copies of Personal Air Monitoring results.

1.09 CONTRACTOR USE OF PREMISIS

A. General: The Contractor shall cooperate fully with the Owner during project execution to minimize conflicts.

B. Pollution Control: The Contractor shall not contaminate the air, water, soil or other items with hazardous materials such as cleaning solutions, lead-containing paint or lead-contaminated debris and wastes, etc. The Contractor shall immediately clean the contaminated area and dispose of the waste in compliance with all Federal, State and local laws, ordinances, rules and regulations at his or her own expense.

C. Use of Site:

1. Confine operation at the site to the areas permitted under the contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting work while at the project site.

2. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage to the areas authorized by the Authorized Representative of the General Contractor.

1.10 COMMENCEMENT OF WORK

Each time work that calls for the disturbance of lead-containing paint is to begin in a new work area the Contractor shall not commence work unless the following requirements have been met.

1. Submittals: All submittals, notifications, posting and permits must be provided and be satisfactory to the General Contractor.

2. Equipment: All equipment required for the work such as removal, clean-up and disposal must be on hand.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS

A. Respirators: Select respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. Respirators shall comply with the requirements of 29 CFR 1926.62 and HIOSH 12-148.1. For this project, respirators shall be worn at all times throughout the renovation or as deemed necessary by the Contractor's Competent Person.

B. Protective Clothing: Furnish personnel exposed to lead dust with appropriate personal protective equipment as required by 29 CFR 1926.62 and HIOSH 12-148.1. For this project, respirators shall be worn at all times throughout the renovation or as deemed necessary by the Contractor's Competent Person.

C. Chemicals: Submit applicable Material Safety Data Sheet for all chemicals used on this project. Use the least toxic product approved by the Authorized Representative of the General Contractor.

PART 3 - EXECUTION

3.01 POTENTIAL LEAD HAZARDS

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

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

3.02 LEAD-CONTAINING PAINT

A. Various LCP painted structures exist at the Site as specified in the hazardous materials report, Limited Asbestos and Lead Paint Survey, Pu'u Wa'awa'a System Improvements, Big Island, Hawaii, 28 pages, prepared by Lehua Environmental Inc.

B. Remove loose and flaky LCP paint as necessary for the safe renovation of LCP painted structures or areas where LCP has the potential to become airborne or otherwise create dust (i.e. from sanding, drilling, friction, etc.) during the renovation activities. Use wet methods or HEPA vacuum attached mechanical equipment to remove LCP.

3.03 LEAD CONTROL AREA REQUIREMENTS

A. Boundary Requirements:

1. Establish a lead control area to contain renovation operations by demarcating a boundary around the structure to be demolished or renovated in accordance with the Contractor's approved Work Procedure Plan. The lead control area shall be isolated by physical boundaries, such as temporary fencing, boundary tape and rope, to prevent unauthorized entry of personnel. If the work practice relating to lead-containing paint will create airborne dust, create a full containment with critical barriers, HEPA filtered exhaust, negative pressure enclosure and decontamination facilities.

2. Post Warning and Danger signs in accordance with 29 CFR 1926.62 and HIOSH 12-148.1. Signs shall be placed at all approaches to lead control area and at the boundary of the lead control area. Signs shall be posted at all locations where airborne lead concentrations may exceed ambient background levels. Locate signs at such a distance that personnel may read the sign and take necessary protective measures to avoid exposure. In addition, post signs with "Authorized Entry Only, Lead Control Area" and "PPE Required" at every entry point.

B. Personal Protection Requirements:

1. No one will be permitted in the lead control area unless they have been given appropriate training, Personal Protective Equipment (PPE) and medical examinations. PPE is required for all employees and persons within the lead control area.

2. Eating, drinking, smoking and application of cosmetics shall be permitted only in areas designated by the Contractor, approved by the Authorized Representative of the General Contractor, and which are free of dust generated by the renovation. Eating, drinking, smoking and application of cosmetics are not permitted in the lead control area.

3. Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

4. Instruct and train each worker in proper respiratory use and that each worker wears a proper fitted respirator in the Work Area. Use respiratory protection appropriate for the airborne lead levels encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.

    a. Air Purifying Respirators:

        1. Respirator Bodies: Provide half face or full face respirators. Equip full face respirators with a nose cup or other anti-fogging device as appropriate.

        2. Filter Cartridges: Provide, at a minimum, HEPA filters labeled with National Institute for Occupational Safety and Health (NIOSH) Certification for "Radionuclides, Radon Daughters,

Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with ANSI Z228.2. In addition, a chemical cartridge section may be added, as required for solvents in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH Certification.

3. Non-permitted Respirators: Do not use single use, disposable or quarter face respirators.

4. Require that respiratory protection be used at all times that there is any possibility of disturbance of LCP materials whether intentional or accidental.

5. Regardless of Lead Dust Levels: Require that the minimum level of respiratory protection used be half-face air purifying respirators with HEPA filters.

5. Furnish personnel exposed to lead dust with disposable protective whole body clothing, head covering, gloves, and foot coverings. Furnish disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after documented approval from the Authorized Representative of the General Contractor.

C. Environmental Protection Requirements:

1. Ensure airborne lead levels outside the lead control area are below the Action Level.

2. Perform work without damage to or contamination of the areas adjacent to locations where lead-containing or lead-contaminated material will be disturbed as a result of renovation activities. If any part of the work area is damaged or contaminated during the disturbance of lead paint, restore the damaged or contaminated area to its original condition or better, as determined by the Authorized Representative of the General Contractor.

3. Drainage inlets, downspouts, and all entrances to underground utilities which lie within, or provide drainage for, a lead control area shall be sealed until that lead control area has been cleaned, visually inspected and cleared.

4. Within a lead control area, any windows, doors or vents shall be sealed and air-conditioning units with intake or exhaust in a lead control area shall be shut down and sealed until that lead control area has been cleared with a level of airborne lead below the background level.

D. Exit Procedures: Whenever personnel exit the lead control area, they shall perform the following procedures and shall not leave the work place wearing any clothing or other equipment worn in the lead control area.

1. Vacuum themselves off with HEPA-filtered vacuum equipment, using UL-586 labeled HEPA filters;

2. Remove protective clothing in the designated changing area within the lead control area and place them in an approved impermeable disposal bag;

3. Wash their hands and faces in the designated changing area before exiting to the designated clean area outside of lead control area; and

4. Prevent migration of mud, dust and/or debris carried on work boots, clothing or equipment from the renovation site into areas beyond the lead control area.

3.04 LEAD-CONTAINING PAINT DISTURBANCE

A. Perform lead work as specified herein. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when renovation is performed in accordance with 29 CFR 1926.62 and as specified herein.

B. Disturbance of LCP as a result of renovation activities shall be kept to a minimum. Water spray, vacuuming and other engineering controls shall be used to minimize airborne lead dust. Care shall be taken to avoid pulverizing, scraping, or crumbling lead painted debris.

C. Dispose of all LCP and associated waste in compliance with all Federal, State and local requirements.

D. Clean, as needed, all floor surfaces adjacent to the lead control area using a HEPA filtered vacuum.

E. Use 6-mil polyethylene sheeting to cover ground underneath the work area.

F. Use 6-mil polyethylene sheeting to cover any surfaces and equipment that will not be painted, disturbed or utilized during disturbance of lead-containing paint. After completion of work, the Contractor shall repair all damage from fastening and sealing and remove all adhesive residue from surfaces at no additional cost to the Owner.

G. Manual or power sanding, grinding, abrasive or sand blasting of interior and exterior painted surfaces is not permitted. Select paint removal processes (describe in the Work Procedure Plan) to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste.

H. Open flame burning or torching of lead-containing paint is prohibited.

I. The use of heat guns or hot knives which reach temperatures above 650 degrees Fahrenheit, on surfaces containing lead-containing paint, is prohibited.

J. Use of vacuum equipment without HEPA filters in areas containing lead-containing paint is prohibited.

K. The use of chemical paint strippers containing methylene chloride is prohibited.

L. Control of Airborne Lead Level: The Contractor shall control the lead level outside of the work boundary to less than the action level at all times.

M. Control of Visible Emissions: The Contractor shall control lead dust emissions from the project site so that no visible lead dust emissions leave the project work areas during renovation work. Wet methods or other engineering controls shall be used to control the emission of dust and/or debris from the renovation site in accordance with all applicable Federal, State, and local regulations. Emissions in excess of the above shall be cause for immediate shut down of the project until corrective measures are implemented.

N. Control of Water Runoff: Water used to control emissions of dust from the renovation activities shall not be allowed to flow uncontrolled from a lead control area, to any adjacent area or to enter the sanitary or storm water sewer system. All water runoff from lead control areas shall pass through a filter berm to remove particulate matter prior to discharge to water sewer system. The Contractor shall use only sufficient water to adequately control dust. Under no conditions shall wastewater be disposed of in storm drains or dumped on the ground.

O. Perform renovation involving lead containing paint as indicated in Federal, State, and local regulations. The worksite preparation (barriers or containments) shall be job dependent.

3.05 WORK PROCEDURE

Perform renovation work in accordance with approved Work Procedure Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when renovation work is performed in accordance with 29 CFR 1926.62 and as specified herein. Dispose of all material containing lead and associated waste in compliance with Federal, State, and local requirements.

3.06 CLEANUP

A. Clean surfaces and surrounding ground within the lead control area daily. Do not allow paint chips, dust and debris to accumulate.

B. Restrict and minimize the spread of dust and debris. Keep waste from being distributed over the general area. Do not dry sweep or use compressed air to clean the area.

C. When the operation has been completed, the area will be cleaned of all visible lead paint contamination. The Authorized Representative of the General Contractor will visually inspect the affected areas for residual lead paint chips and the Contractor shall re-clean areas showing residual paint chips and debris.

D. If re-cleaning is required, the Authorized Representative of the General Contractor will visually inspect for lead debris after the re-cleaning. This process will be repeated until the Authorized Representative of the General Contractor deems the area free of visible paint chips and debris.

E. Do not remove the lead control area barriers or roped-off perimeter and warning signs prior to the Authorized Representative of the General Contractor lead clearance certification.

3.07 VISUAL CLEARANCE

A. The Contractor shall visually inspect the affected surfaces for residual lead paint chips and accumulated dust resulting from the Contractor's lead paint disturbance activities. Before the removal of the lead control area and dust barriers, the Contractor's Competent Person and the Authorized Representative of the General Contractor shall jointly inspect the Work Area and Site.

B. In settling any disputes, indoors lead dust wipe samples will be collected and analyzed using EPA method SW 846-7420, or equivalent. The State may perform the following:

1. Take lead dust wipe sample(s) on uncarpeted interior floors. Lead dust wipe sample results for uncarpeted floors shall be less than 40 micrograms per square foot.

2. Take lead dust wipe sample(s) on a horizontal surface such as a window sill. Lead dust wipe sample results for horizontal surfaces shall be less than 250 micrograms per square foot.

3. Take one lead dust wipe sample on a window trough per room. Lead dust wipe sample results for window troughs shall be less than 400 micrograms per square foot.

4. The lead dust wipe sample results will be obtained within 24 hours.

C. The Contractor's Competent Person and the Authorized Representative of the General Contractor shall visually inspect exterior areas adjacent to the work area for lead paint chips or debris. The Contractor shall restore any areas impacted by lead dust or debris from the lead paint disturbance work to their original condition.

D. The Authorized Representative of the General Contractor shall bear the costs of all subsequent laboratory analyses taken as deemed necessary. However, the costs of all subsequent sampling and laboratory analyses taken because the limits specified were exceeded on the initial tests shall be borne by the Contractor. Additionally, the Contractor shall bear all costs associated with the clean-up of areas impacted by the lead dust and debris resulting from the lead paint disturbance work.

3.08 DISPOSAL

A. Disposal of Non-Hazardous Painted Construction Debris (TCLP for Lead Not Exceeding EPA Limit of 5.0 Milligrams per Liter):

1. Remove non-hazardous lead waste including debris, scraps, waste materials, rubbish, and trash from the site and dispose of such waste at a landfill approved for such purposes.

2. The Contractor shall submit to the Owner documentation that the lead-containing waste material removed from the work area has been accepted by the landfill owner.

B. Disposal of Hazardous Painted Construction Debris (TCLP for Lead Exceeding EPA Limit of 5.0 Milligrams per Liter):

1. Collect lead-contaminated wastes, scraps, debris and any other lead-contaminated materials and place into U.S. Department of Transportation approved and appropriately labeled containers.

2. Store lead wastes and debris in U.S. Department of Transportation approved containers in an interim storage area assigned by the Authorized Representative of the General Contractor at the site. Any and all hazardous wastes shall be removed from the site to an EPA approved disposal facility within 90 days of the removal work (as applicable).

3. Handle, store, transport, and dispose of lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

4. The Contractor shall contact the Owner, to obtain the Owner's EPA ID Number and to sign the hazardous waste manifest. Hazardous waste will not be removed from site without proper manifest documentation and verification of waste destination by the Owner.

5. The Contractor shall submit to the Owner, documentation that the lead-containing waste material removed from the work area has been accepted by the landfill owner.

6. Owner will review for equitable adjustment of contract amount upon evaluation and acceptance of the TCLP results to determine the hazard characteristics. If the waste is determined to be Resource Conservation and Recovery Act (RCRA) hazardous waste, waste shall be disposed of at an off-island EPA-acceptable facility.

3.09 CERTIFICATION

A. The Contractor or his authorized representative shall certify in writing that the regions both inside and outside of the lead control area have airborne lead concentrations below the background level, that the respiratory protection for the employees was adequate, and that the work procedures were performed in accordance with 29 CFR 1926.62 and this Specification.

B. Upon inspection and approval of the area by the Authorized Representative of the General Contractor, the Contractor shall certify that there were no visible accumulations of lead-contaminated paint, dust and debris remaining on the work-site.

C. The Contractor shall not remove the lead control area boundary and warning signs prior to the submittal and approval by the Authorized Representative of the General Contractor of the Contractor's certification that there were no visible accumulations of lead contaminated paint, dust and debris remaining on the work-site.

D. The Contractor shall re-clean areas showing residual paint chips, debris or wastes. Chips, debris and wastes shall be disposed of properly, in accordance with this Specification and all applicable Federal, State and local regulations.

3.10 MEASUREMENT AND PAYMENT

Payment for transportation and disposal of all lead-related wastes will not be measured and paid for separately, but shall be incidental to applicable items under renovation work in the contract. The final payment will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-contaminated material delivered is submitted to the Owner.

END OF SECTION

SECTION 13288

TESTING/AIR MONITORING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in SECTION 00700.

1.02 SUMMARY

A. This section specifies the Contractor's Responsibilities for personnel monitoring and record keeping.

B. This section specifies project air monitoring and inspectional services for the purposes of:

1. Verifying compliance with SECTION 13281 - REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING MATERIAL and SECTION 13282 - LEAD HAZARD CONTROL MEASURES.

2. Ensuring that the Owner's legally required documentation is collected.

3. Providing engineering control during the project.

C. Related Work Specified Elsewhere:

1. SECTION 01715 - EXISTING CONDITIONS - HAZARDOUS MATERIALS SURVEY.

2. SECTION 13281 - REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING MATERIAL; for requirements of all work that disturbs Asbestos-Containing Material.

3. SECTION 13282 - LEAD HAZARD CONTROL MEASURES; for requirements of all work that disturbs Lead-Containing Paint.

1.03 SUBMITTALS

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

B. As specified in SECTION 13281 - REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING MATERIAL, SECTION 13282 - LEAD HAZARD CONTROL MEASURES, and SECTION 13288 - TESTING AND AIR MONITORING.

1.04 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only, and include but are not limited to, the following:

1. Code of Federal Regulations (CFR):

29 CFR 1926.21 Safety Training and Education
29 CFR 1926.33 Access to Employee Exposure and Medical Record
29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59 Hazard Communication
29 CFR 1926.62 Lead Exposure in Construction
29 CFR 1926.65 Hazard Waste Operations and Emergency Response
29 CFR 1926.103 Respiratory Protection
29 CFR 1926.51 Sanitation
29 CFR 1926.200 Accident Prevention Signs and Tags
29 CFR 1926.59 Hazard Communication
29 CFR 1926.1101 Asbestos, Tremolite, Anthophyllite, Actinolite
29 CFR 1910. 134 Respiratory Protection
29 CFR 1910.1018 Inorganic Arsenic
40 CFR 61-SUBPART A General Provisions
40 CFR 61-SUBPART M National Emission Standard for Asbestos
40 CFR 763 Asbestos Containing Material in Schools
40 CFR 260 Hazardous Waste Management Systems: General
40 CFR 261 I dentification and Listing of Hazardous Waste
40 CFR 262 Generators of Hazardous Waste
40 CFR 263 Transporters of Hazardous Waste
40 CFR 264 Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265 Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268 Land Disposal Restriction
40 CFR 745 Lead; Requirement for Lead-Based Paint Activities
49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
49 CFR 178 Shipping Container Specification

2. Environmental Protection Agency (EPA):

EPA 560/5-85-024 Guidance for Controlling ACM in Buildings

3. Hawaii Occupational Safety and Health (HIOSH):

12-114.2 Personal Protective Equipment
12-121.2 Fall Protection
12-122.2 Materials Handling, Storage, Use, and Disposal
12-145.1 Asbestos
12-148.1 Lead
12-151 Hazardous Waste Operations and Emergency Response
12-206-13 Asbestos

4. Department of Housing and Urban Development (HUD):

HUD Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing

5. American National Standards Institute (ANSI):

ANSI Z9.2 (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
ANSI Z88.2 (1992) Respiratory Protection

6. American Society for Testing and Materials (ASTM):

ASTM C 732 (1995) Aging Effects of Artificial Weathering on Latex Sealants
ASTM D 532 (1993;Rev. A) Mandrel Bend Test of Attached Organic Coatings
ASTM D 1331 (1989; R 1995) Surface and Interfacial Tension of Solutions of Surface-Active Agents
ASTM D 2794 (1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM E 84 (1995;Rev. B) Surface Burning Characteristics of Building Materials
ASTM E 96 (1995) Water Vapor Transmission of Materials
ASTM E 119 (1995; Rev. A) Fire Tests of Building Construction and Materials
ASTM E 736 (1992) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E 1368 (1990) Visual Inspection of Asbestos Abatement Projects
ASTM E 1494 (1992) Encapsulants for Spray- or Trowel-Applied Friable Asbestos-Containing Building Materials

7. Underwriters Laboratories Inc. (UL):

UL 586 (1990) High-Efficiency, Particulate, Air Filter Units

1.05 DEFINITIONS

A. Action Level - Lead: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period.

B. Area Sampling: Sampling of concentrations which is representative of the airborne concentrations but is not collected in the breathing zone of personnel (approximately 1.5 to 1.8 meters above the floor).

C. Authorized Representative of the General Contractor: the person or persons designated by the General Contractor to act on its behalf and who is a Qualified Environmental Consultant (QEC), hired by the General Contractor, who performs air monitoring and inspection activities during abatement and renovation work and shall have the authority to initiate engineering controls.

D. Background: The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background

concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

E. Competent Person - Asbestos: As used in relation to asbestos, refers to a person employed by the Contractor who is trained in the recognition and control of asbestos hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the asbestos hazards.

F. Competent Person - Lead: As used in relation to lead, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations, has the authority to take prompt corrective actions to control the lead hazards and is an HDOH certified lead supervisor, lead inspector or risk assessor.

G. Contractor: For this project, the Contractor is that individual, or entity under contract to the General Contractor to perform the herein listed work.

H. Monitoring Specialist - Asbestos: A Competent Person, hired by the Contractor, who enters the work area to set up personal air monitoring devices and then collects the various air samples to be sent to the laboratory for analysis. The monitoring specialist has working experience in the asbestos abatement industry and a working knowledge of all applicable State and Federal occupational safety and health regulations and formal training in occupational safety and health.

I. Monitoring Specialist - Lead: A Competent Person, hired by the Contractor, who performs personal air monitoring and inspection during lead abatement work.

J. Owner: State of Hawaii Department of Land and Natural Resources.

K. Permissible Exposure Limit (PEL) - Asbestos: 0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

L. Permissible Exposure Limit (PEL) - Lead: 50 micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more or less that 8 hours in a work day, the PEL shall be determined by the following formula:

PEL (micrograms per cubic meter of air) = 400 divided by the number of hours worked per day

M. Personal Sampling: Air sampling which is performed to determine concentrations within the breathing zone of a specific employee. Samples shall be representative of the employees work tasks. The breathing zone shall be considered an area within 12 inches of the nose or mouth of an employee.

N. Qualified Environmental Consultant (QEC) - Asbestos: A State of Hawaii certified Asbestos Project Monitor who is an Industrial Hygienist or similar safety

professional with experience in enforcing asbestos safety regulations and performing airborne asbestos sampling including clearance sampling.

O. Qualified Environmental Consultant (QEC) - Lead: An HDOH certified Lead Inspector/Risk Assessor who is an Industrial Hygienist or similar safety professional with experience in enforcing lead safety regulations and performing airborne lead sampling.

P. Qualified Testing Laboratory - Asbestos:

1. Environmental and Work Area Monitoring Laboratory: The testing laboratory employed by the Authorized Representative of the General Contractor to perform analysis of environmental and work area air monitoring samples and report concentrations of airborne lead.

   The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA) for each type of asbestos analysis performed by the laboratory.

2. Personal Air Monitoring Laboratory: The testing laboratory utilized by the Monitoring Specialist retained by the Contractor to perform analysis of personal air monitoring samples and report airborne concentrations of asbestos.

   The laboratory shall be a successful participant in the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) program for phase contrast microscopy (PCM).

Q. Qualified Testing Laboratory - Lead:

1. Environmental and Work Area Monitoring Laboratory: The testing laboratory employed by the Authorized Representative of the General Contractor to perform analysis of environmental and work area air monitoring samples and report concentrations of airborne lead.

   The laboratory shall be accredited under the EPA's National Lead Laboratory Accreditation Program (NLLAP) by the American Industrial Hygiene Association's (AIHA's) Environmental Lead Laboratory Accreditation Program (ELLAP) and successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program for each lead matrix analyzed by the laboratory. The laboratory shall fulfill all requirements of accreditation for analyzing lead in air. Laboratory personnel performing the work shall have been judged proficient in the analysis of lead in the applicable parameter by successful participation within the last year in AIHA's ELPAT.

2. Personal Air Monitoring Laboratory: The testing laboratory utilized by the Monitoring Specialist retained by the Contractor to perform analysis of personal air monitoring samples and report airborne concentrations of lead.

The laboratory shall be accredited under the EPA's National Lead Laboratory Accreditation Program (NLLAP) by the American Industrial Hygiene Association's (AIHA's) Environmental Lead Laboratory Accreditation Program (ELLAP) and successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program for each lead matrix analyzed by the laboratory. The laboratory shall fulfill all requirements of accreditation for analyzing lead in air. Laboratory personnel performing the work shall have been judged proficient in the analysis of lead in air by successful participation within the last year in AIHA's ELPAT.

3. Toxicity Characteristic Leaching Procedure (TCLP) Testing Laboratory: The testing laboratory employed Contractor to perform TCLP tests of a representative sample of the debris waste stream of each structure and of any lead-contaminated chips or debris generated through abatement to determine whether or not the waste is hazardous or non-hazardous. The laboratory shall be experienced in and analyze TCLP samples using the EPA Method 1311/6010.

1.06 ABBREVIATIONS

A. ANSI: American National Standards Institute, Inc.

B. CFR: Code of Federal Regulations.

C. HDOH: Hawaii Department of Health.

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

E. EPA: U.S. Environmental Protection Agency.

F. NESHAP: National Emission Standards for Hazardous Air Pollutants.

G. NIOSH: National Institute for Occupational Safety and Health.

H. OSHA: Occupational Safety and Health Administration.

I. State: The State of Hawaii.

1.07 COORDINATION

The Contractor shall coordinate with the Authorized Representative of the General Contractor for the testing/air monitoring requirements included in these specifications for testing/air monitoring consultants or inspectors and all applicable Federal, State and local regulations.

1.08 PRE-CONSTRUCTION CONFERENCE

A conference may be held prior to construction and shall be conducted by the Owner's Project Manager assisted by the Authorized Representative of the General Contractor.

1. Attendance: The Contractor, Project Designer, the Owner's representative, industrial hygienist, Authorized Representative of the General Contractor and air monitoring personnel shall also attend.

2. Agenda:

   a. Review final schedule for project.
   b. Verify legal requirements and special conditions.
   c. Verify compliance with pre-construction requirement.
   d. Obtain copies of all mandatory notifications.
   e. Inspect sample respiratory equipment and other abatement equipment.
   f. Review procedures and responsibilities.
   g. Clarify the scope of work and its best impact on the users of the building.

1.09 DESCRIPTION OF WORK

A. Furnish all labor, materials, and equipment necessary to carry out the personnel monitoring, record keeping, air monitoring and inspectional services in compliance with all applicable Federal, State and Local laws and regulations during the performance of the project.

B. Contractor shall comply with all Federal, State and local regulations pertaining to asbestos removal. If there is a conflict with the Specifications, the more stringent requirement shall apply.

1.10 REQUIREMENTS

A. The Contractor shall comply with the above requirements and any applicable Federal, State and local regulations. Where there is any conflict or inconsistency among requirements, the more stringent requirement shall apply. Ignorance of the above requirements and any applicable State and County regulation resulting in additional cost to the Contractor shall not be reimbursable or billable to the Owner.

B. All regulations shall govern over these Specifications, except when the Specification is providing greater protection against hazardous materials exposure, injury, loss or liability. Any question regarding conflict or inconsistency between Specification and/or regulations should be directed to the Authorized Representative of the General Contractor.

C. Whenever approval of the Authorized Representative of the General Contractor is required prior to proceeding with other work, the Contractor shall comply with the following:

   1. The Contractor shall give, at a minimum, five (5) days notification to the Authorized Representative of the General Contractor prior to the start of any work.

   2. The Contractor shall not begin any work without the Authorized Representative of the General Contractor present onsite.

3. The Contractor shall allow the Authorized Representative of the General Contractor 24 hours from notification to respond to the request for site inspection(s).

4. The Contractor shall designate one person (either a foreman or superintendent) who will be authorized to request inspections. The name of the designated person shall be submitted in writing to the Authorized Representative of the General Contractor prior to commencing work. Requests from any other person will not be considered official requests.

5. The designated person requesting an inspection shall provide the following information:

    a. Name of caller.
    b. Building and rooms to be inspected.
    c. Work phase of inspection, as specified.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.01 OWNER RESPONSIBILITIES

Owner will review the Toxicity Characteristic Leaching Procedure (TCLP) results and waste documents. In the event that the waste is determined to be hazardous, Owner shall consider equitable adjustment to the contract.

3.02 AIR SAMPLING AND TESTING - ASBESTOS

A. Sampling for airborne concentrations of asbestos fibers shall be performed by the Authorized Representative of the General Contractor. Sampling of airborne concentrations of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101 and as specified herein. Unless otherwise specified, NIOSH Method 7400 will be followed for all sampling and analysis.

    1. Sampling Prior to Asbestos Work: Baseline air sampling may be conducted by the Authorized Representative of the General Contractor one-day prior to the masking and sealing operations for each removal site. Baseline air sampling will include a minimum of three (3) high volume continuous flow samples taken per estimated work area with a minimum volume of 2,000 liters.

    2. Sampling During Asbestos Work: The performance and execution of the Contractor's work shall be closely and continuously monitored by the Authorized Representative of the General Contractor. Air monitoring and inspection by the Authorized Representative of the General Contractor shall be performed inside the work area, in the work area surroundings and in any occupied adjacent buildings to ensure full compliance with the Specification and all applicable regulations. The Contractor shall provide full cooperation

and support to the Authorized Representative of the General Contractor and to their technicians throughout the work. Air samples shall a minimum volume of 480 liter.

B. Air Monitoring With Respect To Contractor's Employees:

1. The Contractor shall be responsible for all personal air monitoring as required by OSHA regulations. All personal air monitoring will be conducted by an agent of the Contractor.

2. The Contractor shall provide own personal sampling of 25 percent of his workers or minimum of two workers, whichever is greater as indicated in 29 CFR 1926.1101 and governing environmental regulations.

3. Laboratory performing analysis shall be an independent party, not financially or managerially connected with the Contractor. Laboratory shall also be approved by the Authorized Representative of the General Contractor and AIHA accredited in the type of analysis being performed.

4. At the conclusion of each day's sampling, copies of all air monitoring records shall be provided to the Authorized Representative of the General Contractor.

5. Results of sample analysis shall be provided to the Authorized Representative of the General Contractor within forty-eight (48) hours of collection.

C. All other air sampling for compliance with the Specification shall be performed by the Authorized Representative of the General Contractor.

D. Costs involving investigations, air monitoring and testing due to Contractor failure to control hazards shall be borne by Contractor, and shall be deducted from the final contract payment.

3.03 AIR SAMPLING AND TESTING - LEAD

A. Environmental and work area air monitoring of airborne lead concentrations shall be performed by the Authorized Representative of the General Contractor in accordance with 29 CFR 1926.62 and as specified herein.

1. Sampling Prior to Lead Work: The Authorized Representative of the General Contractor may collect area air samples outside the work area prior to the start of work in order to establish the background level of lead in the air. The samples shall be analyzed by the Environmental and Work Area Monitoring Laboratory for the airborne concentration of lead. This concentration shall be the background level.

2. Sampling During Lead Work: The Authorized Representative of the General Contractor shall perform area air monitoring during the entire renovation operation. The Contractor shall allow access to the work area and assist the Authorized Representative of the General Contractor as needed.

a. Sufficient area air monitoring shall be conducted at the border of the lead control area to ensure unprotected personnel are not exposed to lead concentrations above 30 micrograms per cubic meter of air at all times. As a minimum, conduct area monitoring in areas immediately adjacent to the lead control area daily during each shift in which renovation operations are performed. At least one sample on each shift shall be taken on both the downwind side and upwind side of the lead control area.

b. If the outside boundary of the lead control area is determined to have air lead levels above the background levels the Contractor shall be required to adequately correct the conditions causing the increased lead levels. Any work necessary to correct the condition will be completed by the Contractor at no additional cost to the Owner.

c. If the outside boundary of the lead control area is determined to have air lead levels at or above 30 micrograms per cubic meter of air, the Contractor shall immediately stop work and correct the conditions causing the increased level.

d. Work shall resume only when approval is given by the Authorized Representative of the General Contractor.

B. Air Monitoring with Respect to Contractor's Employees:

1. The Contractor's Competent Person shall perform initial personal air monitoring to determine employee exposure during renovation work. During initial personal monitoring, the first two full days of work (two 8-hour work shifts), all workers shall be provided with a minimum of air-purifying half-mask respirators and disposable protective clothing.

2. Personal monitoring samples shall be taken on at least 25 percent of the employees or a minimum of 2 employees, whichever is greater, or a representative sample of employees with the greatest potential for exposure as determined by the Authorized Representative of the General Contractor during each work shift.

3. At the end of the period of initial determination all results shall be submitted to a laboratory for analysis by NIOSH Method 7082.

4. Results from the first two full days (two 8-hour work shifts) of initial air monitoring, signed by the testing lab employee performing the analysis and the Competent Person, shall be provided to the Authorized Representative of the General Contractor within 48 hours after completion of sampling. Results of initial air monitoring shall be used by the Contractor's Competent Person to determine appropriate worker protection requirements for similar work activities. Determination shall be submitted to the Authorized Representative of the General Contractor within 48 hours.

5. Regardless of initial air monitoring results, continue personal air monitoring during the entire renovation operations.

6. If the personal air monitoring tests covering a period of two full work days (two 8-hour work shifts) show airborne lead concentrations below the action level, the Contractor's Competent Person may determine that the use of HEPA-filtered air purifying respirators is not required. Other elements of protective clothing shall continue to be worn throughout the renovation operation.

7. If exposure to lead at or in excess of 30 micrograms per cubic meter of air as an 8-hour time weighted average is indicated, the Contractor's Competent Person will immediately notify the Contractor and Authorized Representative of the General Contractor. The Contractor will provide and require all persons exposed to this concentration of airborne lead dust to wear, at a minimum, half mask air purifying respirators with HEPA filters. In addition, the Contractor's work procedures will be immediately reviewed by the Authorized Representative of the General Contractor and the Contractor and modifications in the Contractor's work performance shall be implemented to lower the concentration of airborne lead.

8. Results of air monitoring shall be submitted to the Authorized Representative of the General Contractor within three (3) working days of collection, signed by the testing lab employee who performed the analysis and the Competent Person.

C. Costs involving investigations, air monitoring and testing due to Contractor failure to control hazards shall be borne by Contractor, and shall be deducted from the final contract payment.

3.04 LEAD WASTE CHARACTERIZATION

A. TCLP testing of the gross solid lead renovation debris shall be performed by the Contractor to characterize the debris as either non-hazardous or hazardous waste. Metal items to be demolished and removed shall be recycled.

B. The Contractor shall not concentrate, treat, or intermix wastes from outside this project with the debris and wastes generated by this project.

C. For lead-containing paint wastes generated by renovation operations, including used disposal PPE, lead paint chips and waste from paint stripping operations, TCLP testing of the waste shall be provided and paid for by the Contractor as specified herein.

D. All TCLP test samples shall be collected by the Competent Person in accordance with SW 846, "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods."

E. All TCLP test samples shall be analyzed for lead concentration using EPA Method 1311/6010 by the TCLP Testing Laboratory.

F. Submit results of TCLP tests to the Authorized Representative of the General Contractor within 3 working days of collection, signed by the testing lab employee performing the analysis and the Contractor's Competent Person.

3.05 PAYMENT

Payment for abatement monitoring shall be included in the lump sum bid. The final payment will not be made until proper documentation of the disposal of hazardous waste is submitted.

END OF SECTION

SECTION 15400

PLUMBING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Submittal of manufacturers project literature, specifications data and warranty certificates.

a. Plumbing work as indicated on the drawings, including tightness test, disinfection of potable water lines, clean-up, and record drawings.

2. The Contractor shall maintain continuous water service to all existing operating pipelines during the construction period.

1.03 STANDARDS: Installation shall conform to all applicable provisions of the latest editions of the following:

A. County of Hawaii Plumbing Code.

B. State of Hawaii, Title 11 Administrative Rules, Department of Health.

C. Water System Standards, State of Hawaii

D. American Water Works Association Standards.

E. American Society for Testing and Material (ASTM) Standards.

F. American National Standards Institute (ANSI) Standards.

G. Hawaii County Energy Code.

H. All Other Applicable Codes and Standard.

Where the Specifications indicate materials or construction in excess of code requirements the Specifications shall govern. The Contractor shall be responsible with conforming to all codes and standards regulating this work whether specifically mentioned or not in these specifications.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall be new, free of defects and conform to the Local Codes. Materials that are defective or unsatisfactory to the Contracting Officer shall be replaced at no additional

cost to the State. Where applicable, materials supplied shall comply with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) as required.

B. These product specifications are general and encompass piping items found in typical commercial work. Some items may not be applicable to this particular project. Contractor shall also provide any other products, not specifically mentioned here, which are part of normal accepted trade practice for the installation of a functioning plumbing system.

2.02 WATER PIPING

A. Water Lines: within building lines shall be copper Type “L” hard drawn, outside building lines shall be Copper Type “K” or HDPE pipe as specified in Section 2620.

B. Fittings: Shall be wrot copper or molded HDPE unless otherwise specified on the plans.

C. Hose Bibs: shall be brass with non-removable vacuum breakers or Non-threaded spigot as directed by the Enginee Contracting Officer.

D. Valves: shall be brass ball valves, standard bore, Class A, Type II.

E. Pipe Fasteners: shall be as follows:

1. For copper pipe lines 1" Dia. and smaller shall be 2-hole copper or plastic straps.

2. For copper pipe lines larger than 1"

a. Polyester, fire rated channel, stainless steel bolts

b. Polyurethane fiber reinforced strap, with stainless steel nut & bolt.

D. Dielectric Fittings: shall be installed at all connections of dissimilar metals.

PART 3 - EXECUTION

3.01 WORKMANSHIP AND COORDINATION

A. All work shall be of the highest standard. Poor workman-ship will be rejected by the Contracting Officer and shall be replaced at no additional cost to the State.

B. Coordinate this work with schedules of other trades, specifically sanitary and water lines below concrete slabs or concealed in walls.

C. Lay out piping to insure a neat and orderly arrangement, with vertical lines plumb.

D. Carefully handle all exposed piping to avoid tool marking. Handle polished fittings with extra care so tool marks do not show.

3.02 PIPING INSTALLATION

A. Cutting and Patching:

1. Cutting and patching to accommodate this work shall be done by that trade experienced in the particular type of work required.

B. Roughing-In:

1. Proceed with the rough-in work as rapidly as general construction will permit and have all of the roughing-in stubbed out and tested before any finished work are in place.

C. General Installation Guidelines:

1. Inspect all pipes fully inside and out for defects. Ream out ends of pipe and remove all burrs. Water lines shall be protected during construction to prevent contamination of interior surfaces.

2. Do not close up before pipe inspection and approval is given by the Contracting Officer.

3. Provide pipe sleeves where pipes pass through masonry below grade. Fill annular space within sleeves with non stick grout or fire stop.

4. Protect copper tubing from coming in contact with dissimilar metal with dielectric union. Provide plastic sleeves for underground copper lines.

5. Underground water lines below pavement shall be of type K copper tubing with #4 manufactured sand cushion and minimum 18-inch cover.

6. All piping shall be properly and safely supported. Horizontal pipes above grade shall be supported with hangers or clamps not more than 18 inches from every joint. Provide seismic sway bracing at all horizontal supported piping.

3.03 FIXTURE INSTALLATION

A. Set all plumbing fixtures in an approved workman like manner. Point up edges against mounting surface with approved sealant.

B. Adjust equipment and plumbing fixtures to operate properly and clean all fixtures just prior to final inspection.

3.04 DISINFECTION OF WATER LINES

A. Flush out water lines to remove foreign matter. After flush water runs clear, disinfect the lines with chlorine in accordance with AWWA Standard C601, pertaining to methods, concentrations, and contact times. Flush out until residual is reduced to 0.3 ppm.

B. Submit results of bac-t tests, performed by a lab acceptable to the Department of Health and to the Contracting Officer. Chlorination shall be repeated until bac-t results are acceptable to the Department of Health

3.05 TESTS AND ACCEPTANCE INSPECTIONS

A. Test all new plumbing lines in accordance with methods described in Section 318 of the Plumbing Code.

B. Contractor shall arrange for inspections by the State and conduct required tests in the presence of the Contracting Officer and inspectors from the State.

C. Tests shall be repeated as necessary to satisfy the Contracting Officer, or such tests shall be made by the State and charged to the Contractor.

3.06 CLEAN-UP AND REPAIRS

A. Upon completion of the work, remove all debris, excess materials, tools, etc., resulting from this work from the jobsite, and leave the location broom-clean in a manner acceptable to the Contracting Officer.

B. Clean all fixtures and equipment of oil, grease, stains, paint, etc. All equipment piping and lines shall be thoroughly cleaned before leaving the work.

END OF SECTION