DIVISION OF STATE PARKS

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. F70C616E
SAND ISLAND STATE RECREATION AREA
SEWER SYSTEM IMPROVEMENTS
PHASE 2: PUMP STATION 3 RELOCATION
AND FORCE MAIN 3 REPLACEMENT
Honolulu, Oahu, Hawaii

Design Team

Prime Consultant & Civil Engineer:	R.M. Towill Corporation
Soil Engineer:	Geolabs, Inc.
Electrical Engineer:	Ron N.S. Ho & Associates, Inc.

February 2021

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

CONTRACT SPECIFICATIONS AND PLANS

Job No. F70C616E
SAND ISLAND STATE RECREATION AREA
SEWER SYSTEM IMPROVEMENTS
PHASE 2: PUMP STATION 3 RELOCATION
AND FORCE MAIN 3 REPLACEMENT
Honolulu, Oahu, Hawaii

Approved: _____

CURT A. COTTRELL
Administrator
Division of State Parks

Approved: _____

CARTY S. CHANG, P.E.
Chief Engineer
Engineering Division

February 2021

NOTICE TO BIDDERS
(Chapter 103D, HRS)

COMPETITIVE BIDS for Job No. F70C616E, Sand Island State Recreation Area Sewer Improvements Phase 2: Pump Station 3 Relocation and Force Main 3 Replacement, Oahu, 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 Sand Island State Recreational Area, 1640 Sand Island Parkway, TMK (1) 1-5-041:006, Honolulu, 96819, Oahu, Hawaii.

The work shall generally consist of replacing existing gravity sewer pipes and sewer force mains, installing a grinder pump, sewer manholes, a new pump station, and other various repair work to the existing sewer system.

To be eligible to submit a bid, the Bidder must possess a valid State of Hawaii Contractor's license classification "A".

A voluntary pre-bid conference will be held at the Sand Island State Recreational Area, located at 1640 Sand Island Parkway, TMK (1) 1-5-041:006, Honolulu, 96819, Oahu, Hawaii, on February 10, 2021, at 11.00 A.M. The pre-bid conference will be at Comfort Station No. 6. To protect public health and safety, all attendees must wear a mask and follow social distancing practices by maintaining six (6) feet of space between individuals during the site visit.

All interested parties are invited to attend a State conducted site visit. The site visit will be held at the project site on February 10, 2021 after the voluntary pre-bid conference. To protect public health and safety, all attendees must wear a mask and follow social distancing practices by maintaining six (6) feet of space between individuals during the site visit.

The estimated cost of construction is $2,100,000.

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.

Since 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

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. 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.

L. NUMBER OF EXECUTED ORIGINAL COUNTERPARTS OF CONTRACT DOCUMENTS: If requested by the Board, six copies of the Contract, performance and payment bonds shall be executed.

M. CHANGE ORDERS: No work of any kind in connection with the work covered by the plans and specifications shall be considered as change order work, or entitle the Contractor to extra compensation, except when the work has been ordered in writing by the Chief Engineer (Engineer) and in accordance with sub-section 4.2 of the General Conditions.

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

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

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

No work shall be done on Saturdays, Sundays, legal State holidays, and/or in excess of eight (8) hours each day without the written consent of the Engineer. Should permission be granted to work at such times, the Contractor shall pay for all inspection administrative costs thereof. No work shall be done at night unless authorized by the Engineer.

O. PERMITS: The State will process permit applications whenever possible, and the Contractor shall procure the pre-processed permits and pay the required fees. If permit applications are not processed by the State, the Contractor shall process the permit applications, permits and licenses, and pay all charges and fees. In all cases, the Contractor shall give all notices necessary and incident to the due and lawful prosecution of the work.

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

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

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

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

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

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

Phase 1 of the project shall start in April 2021 and must be completed by June 25, 2021. Notice to Proceed shall be given in April 2021 to ensure the Phase 1 work will start promptly. We suggest the Contractor be prepared to start Phase 1 work promptly in April 2021.

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

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

S. LIQUIDATED DAMAGES: Liquidated damages in the amount specified in the Proposal will be assessed for each and every calendar day from and after the expiration of the time period stated in the Contract for the completion of Phase 1 and the other phases of the project.

T. 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.

U. WATER AND ELECTRICITY: The Contractor shall make all necessary arrangements and pay all expenses for water and electricity used in the construction of this project.

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

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

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

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

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

AA. TOILET FACILITIES: All toilet facilities constructed or provided 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. Any costs for temporary toilet facilities shall be incidental to the project and be paid for by the contractor.

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

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.

CC. 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.

DD. QUANTITIES: All bids will be compared on the basis of quantities of work to be done as shown in the Proposal; the quantities shown in the Unit Price items are estimated, being given as a basis for comparison of bids. The Board reserves the right to increase or decrease the quantities given under the items or delete items entirely as may be required during the progress of the work.

EE. OTHER HEALTH MEASURES: Forms of work site exposure or conditions which may be detrimental to the health or welfare of workers or of the general public shall be eliminated or reduced to safe levels as required by the DOH codes, standards, and regulations. Suitable first aid kits and a person qualified to render first aid, as specified in the DOH regulations, shall be provided at all times when work is scheduled.

FF. HAWAII BUSINESS OR COMPLIANT NON-HAWAII BUSINESS REQUIREMENT: Bidders (Contractors) shall be incorporated or organized under the laws of the State or be registered to do business in the State as a separate branch or division that is capable of fully performing under the contract, as stipulated in §3-122-112 HAR.

GG. COMPLIANCE WITH §3-122-112 HAR:
As a condition for award of the contract 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 $12.00 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.

P R O P O S A L

FOR

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
State of Hawaii

JOB NO. F70C616E
SAND ISLAND STATE RECREATIONAL AREA SEWER SYSTEM IMPROVEMENTS
PHASE 2: PUMP STATION 3 RELOCATION AND FORCE MAIN 3 REPLACEMENT

_____, 2021

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 replace existing gravity sewer pipes and sewer force mains, install a grinder pump, sewer manholes, a new pump station, and other various repair work to the existing sewer system, 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. F70C616E
SAND ISLAND STATE RECREATIONAL AREA SEWER SYSTEM IMPROVEMENTS
PHASE 2: PUMP STATION 3 RELOCATION AND FORCE MAIN 3 REPLACEMENT

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

_____

_____Dollars ($_____)

and will fully complete all work under this contract within 540 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. Phase 1 of the project must be completed by June 25, 2021 as stated in the plans and specifications.

BASE BID

CIVIL AND MECHANICAL WORK

Item No.	Quantity	Unit	Description	Unit Price	Total
1.		LS	Temporary Erosion Control, including installing and maintaining all temporary erosion control measures as specified in the construction plans, and removing all measures upon full establishment of permanent vegetative cover and permanent erosion control measure.		$_____
2.		LS	Demolish and remove existing sewer pump station 3, including abandoning wetwell.		$_____
3.		LS	Abandon existing preloader 2, CSLM filled.		$_____
4.		EA	Abandon existing special sewer manhole, CSLM filled.	$_____	$_____
5.	500	LF	Lin. Ft., Clean and CLSM fill in place existing 4" sewer gravity line.	$_____	$_____
6.	600	LF	Lin. Ft., Demolish and remove in place existing 4" force main.	$_____	$_____
7.		LS	Pump Station 3, inclusive of enclosure, controls, pumps, motors, in place complete.		$_____
8.		LS	Grinder pump station at Comfort Station 6, inclusive of vent line, controls, electrical connections, concrete ballast, in place complete.		$_____
9.	350	LF	8-inch gravity PVC sewer line installed by open trenching, inclusive of bypassing, electronic markers, backfilling, restoration, and all incidentals, in place complete.	$_____	$_____
10.	25	LF	4-inch gravity PVC sewer line installed by open trenching, inclusive of bypassing, electronic markers, backfilling, restoration, and all incidentals, in place complete.	$_____	$_____
11.	1,840	LF	6-inch HDPE SDR 11 (avg. inner diameter of 5.35-inch) sewer force main installed by open trenching, inclusive of bypassing, electronic markers, fittings, backfilling, restoration, and all incidentals, in place complete.	$_____	$_____

Item No.	Quantity	Unit	Description	Unit Price	Total
12.	300	LF	4-inch HDPE SDR 11 (avg. diameter of 3.63-inch) sewer force main installed by open trenching, inclusive of bypassing, electronic markers, fittings, backfilling, restoration, and all incidentals, in place complete.	$_____	$_____
13.	310	LF	1-1/4-inch PVC sewer force main installed by open trenching, inclusive of bypassing, electronic markers, fittings, backfilling, restoration, and all incidentals, in place complete.	$_____	$_____
14.	1	EA	Standard Sewer Manhole, 4 feet diameter, (7.00'-7.99' depth from top of cover to invert) lined, in place complete.	$_____	$_____
15.	1	EA	Standard Sewer Manhole (4.00'-4.99' depth from top of cover to invert) lined, in place complete.	$_____	$_____
16.	1	EA	Transition Sewer Manhole (6.00'-5.99' depth from top of cover to invert) lined, in place complete.	$_____	$_____
17.	1	EA	Reconstruct existing transition sewer manhole to gravity sewer manhole and line, in place complete.	$_____	$_____
18.	1	EA	Preloader 3 structure, (14.00'-14.99' depth from top of cover to bottom of preloader) lined, in place complete.	$_____	$_____
19.	1	EA	Comfort Station 6 Preloader structure with liner, (7.00'-7.99' depth from top of cover to bottom of preloader) lined, in place complete.	$_____	$_____
20.	1	EA	Valve Vault for Pump Station 3 (7.00'-7.99 depth from top of bottom of valve vault) lined, in place complete	$_____	$_____
21.	1	EA	316 SS Check Valve	$_____	$_____
22.	1	EA	316 SS Ball Valve	$_____	$_____
23.	3	EA	Double Ball Flexible Expansion Joint	$_____	$_____
24.	1	EA	Flexible Ball Joint	$_____	$_____

Item No.	Quantity	Unit	Description	Unit Price	Total
25.	260	SF	Concrete Pad 6" thick, inclusive of reinforcement, in place complete.	$_____	$_____
26.	2	CY	Concrete for reaction blocks inclusive of necessary structural struts, straps, rods, reinforcing steel and appurtenances, in place complete.	$_____	$_____
27.	80	LF	4'-High Chain Link Fence, including gates.	$_____	$_____
28.	4	EA	Removable pipe barrier	$_____	$_____
29.	6	EA	Special sign over toilet/urinal	$_____	$_____
			ELECTRICAL WORK		
30.	5	LF	Demolish Equipment Connection	$_____	$_____
31.	415	LF	Demolish Ducts	$_____	$_____
32.	30	LF	Demolish Conduits	$_____	$_____
33.	1	EA	Buck Boost Transformer	$_____	$_____
34.	3	EA	Junction Box, 8"SQ x 4"D, NEMA 4X 316SS	$_____	$_____
35.	4	EA	Junction Box, 18"SQ x 4"D, NEMA 4X 316SS	$_____	$_____
36.	60	LF	3/4"C, GRC	$_____	$_____
37.	120	LF	2"C, GRC	$_____	$_____
38.	180	LF	Conductors, #10 AGW, RHW	$_____	$_____
39.	180	LF	Conductors, #1 AGW, RHW	$_____	$_____
40.	1	EA	Disconnect Switch, 3P100A, NEMA 4X, 316SS, Fusible	$_____	$_____
41.	88	CY	Excavate	$_____	$_____
42.	32	CY	Concrete Encasement	$_____	$_____
43.	56	CY	Backfill and Compact	$_____	$_____
44.	750	LF	3/4"C, PVC SCH 40	$_____	$_____
45.	1,500	LF	2"C, PVC SCH 40	$_____	$_____
46.	2,250	LF	Conductors, #10 AGW, RHW	$_____	$_____
47.	2,250	LF	Conductors, #1 AGW, RHW	$_____	$_____
48.	6	EA	2'x4' Handhole	$_____	$_____

Item No.	Quantity	Unit	Description	Unit Price	Total
49.		LS	Miscellaneous and Testing		$_____
50.		LS	Project Sign, in place complete.		$_____
51.	Allowance		Field Office, shall be full compensation for furnishing materials, labor, tools, equipment, and incidentals necessary to construct the field office, in place complete, as required. Field Office		$_____
				Subtotal Base Bid (Items 1-51)	$_____
52.		LS	Mobilization and Demobilization (not to exceed 10% of the Subtotal Base Bid)		$_____
				Total Base Bid (Items 1-52)	$_____
			ADDITIVE NO. 1		
53.		LS	Sewer Bypass System and Temporary 4" Force Main		$_____
				Total Sum Additive No. 1 (Items 53)	$_____
			ADDITIVE NO. 2		
54.	6	EA	EA., Standard Portable Restroom for 14 days.	$_____	$_____
55.	3	EA	EA., Accessible Portable Restroom for 14 days.	$_____	$_____
				Total Sum Additive No. 2 (Items 54-55)	$_____

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. Bidders offering a Hawaii product ("HP") shall identify the HP in the table below.

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 no later than the deadline specified in the procurement notice and solicitation. The responsibility for certification and qualification shall rest upon the person requesting the preference. One form shall be completed and submitted for each product. Form SPO-38 is available at http://hawaii.gov/spo/

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
1.						
2.						
3.						
4.						
5.						
6.						

RECYCLED PRODUCTS PREFERENCE

This project allows a 10% price preference for recycled products in accordance with HRS 103D-1005. Please indicate your selection of 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	NONRECYCLED 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, that 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. "Registered 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 to 52) selected by the Board of Land and Natural Resources. Write the total of bid items 1 to 52 on page P-1.

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 resolicitation 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 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 ninety (90) days from 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 or 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 HIePRO bid due date and time, 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 and 00/100 ($200.00) for each and every calendar day in excess thereof prior to completion of Phase 1 of the contract by June 25, 2021 shall be withheld from payments due to the Contractor.

It is also understood and agreed that liquidated damages in the amount of Five Hundred and 00/100 ($500.00) for each and every calendar day in excess thereof prior to completion of the other phases 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 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 a 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 ON 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 (HRS), who will be engaged by the Bidder on this project to perform the required work indicated pursuant to Section 103D-302, HRS. 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 and providing the work of the required specialty contractor, 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.

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

JOINT CONTRACTORS OR SUBCONTRACTORS LIST FOR THE ADDITIVE(S):

Bidder agrees that for projects with additives(s), the Bidder, joint contractor or subcontractor listed in the completed "Joint Contractors or Subcontractors List for the Additives(s)" will perform work for the respective additives.

Additive 1

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. _____
E-Mail Address _____

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

SPECIAL PROVISIONS

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

Section 2 – Proposal Requirements and Conditions

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

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

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

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

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

A. Tax Clearance (HRS Chapter 237): Bidder shall obtain a tax clearance certificate from the Hawaii State Department of Taxation (DOTAX) and the Internal Revenue Service (IRS). The certificate is valid for six months from the most recently approved stamp date on the certificate; the certificate must be valid on the date received by the Department.

B. Department of Labor (DLIR) "Certificate of Compliance". (HRS Chapter 383 - Unemployment Insurance, Chapter 386 - Workers' Compensation, Chapter 392 - Temporary Disability Insurance, and 393 – Prepaid Health Care): Bidder shall obtain a certificate of compliance from the Hawaii State Department of Labor and Industrial relations (DLIR). The certificate is valid for six months from the date of issue; certificates must be valid on the date received by the Department.

C. Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG) "Certificate of Good Standing". Bidder shall obtain a certificate of good standing issued by the Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG). The certificate of good standing is valid for six months from the date of issue; certificates must be valid on the date received by the Department.

Hawaii Compliance Express. Alternately, instead of separately applying for these certificates at the various state agencies, bidder may choose to use the Hawaii Compliance Express (HCE), which allows businesses to register online through a simple wizard interface at http://vendors.ehawaii.gov to acquire a "Certificate of Vendor compliance" indicating that bidder's status is compliant with requirements of §103D-310(c), HRS, shall be accepted for contracting and final payment purposes.
Bidders that elect to use the new HCE services will be required to pay an annual fee of $15.00 to the Hawaii

Information Consortium, LLC (HIC). Bidders choosing not to participate in the HCE program will be required to provide the paper certificates as instructed in the previous paragraphs.

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

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

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

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

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

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

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

Section 3 – Award and Execution of Contract

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

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

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

3. **AMEND** Section 3.9, Notice to Proceed, by deleting "180 days" and replacing with "one (1) year" in the last paragraph.

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

"**3.10 PROTESTS**—Pursuant to Section 103D-701, Hawaii Revised Statutes, an actual or prospective

offeror who is aggrieved in connection with the solicitation or award may submit a protest. Any protest shall be submitting in writing to the Chairperson, Department of Land and Natural Resources, 1151 Punchbowl Street, Honolulu, Hawaii 96813, or designee as specified in the solicitation.

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

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

Section 5 – Control of Work

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

Section 6 – Substitution of Materials and Equipment

ADD the following to Section 6.3 Sub-paragraph b:

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

Section 7 – Prosecution and Progress

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

"d. Proof of Insurance Coverage

A Certificate of Insurance or other documentary evidence, to the satisfaction of the Engineer, that the Contractor has in place all insurance coverage required by the contract. The Certificate of Insurance shall contain wording which identifies the Project number and Project title for which the certificate of insurance is issued. Refer to the following for insurance requirements:

1. Insurance Requirements

(a) Obligation of Contractor - Contractor shall not commence any work until it obtains, at its own expense, all required herein insurance. Such insurance must have the approval of the Department as to limit, form and amount and must be maintained with a company authorized by laws of the State to issue such insurance in the State of Hawaii. Coverage by a "Non-Admitted" carrier is permissible provided the carrier has a AM Best's Rating of "A-VII" or better.

(b) All insurance described herein will be maintained by the Contractor for the full period of the contract and in no event will be terminated or otherwise allowed to lapse prior to written certification of final acceptance of the work by the Department.

(c) Certificate(s) of Insurance acceptable to the Department shall be filed with the Engineer prior to commencement of the work. Certificates shall identify if the insurance company is a "captive" insurance company or a "Non-Admitted" carrier to the State of Hawaii. The Best's Rating must be stated for the "Non-Admitted" carrier. Certificates shall contain a provision

that coverages afforded under the policies will not be canceled or changed until at least thirty (30) days written notice has been given to the Engineer by registered mail. The insurance policies shall name the State of Hawaii, its officers and employees as an additional insured and such coverage shall be noted on the certificate. Should any policy be canceled before final acceptance of the work by the Department, and the Contractor fails to immediately procure replacement insurance as specified, the Department, in addition to all other remedies it may have for such breach, reserves the right to procure such insurance and deduct the cost thereof from any money due to the Contractor.

(d) Nothing contained in these insurance requirements is to be construed as limiting the extent of Contractor's responsibility for payment of damages resulting from its operations under this contract, including the Contractor's obligation to pay liquidated damages, nor shall it affect the Contractor's separate and independent duty to defend, indemnify and hold the Department harmless pursuant to other provisions of this contract. In no instance will the Department's exercise of an option to occupy and use completed portions of the work relieve the Contractor of its obligation to maintain the required insurance until the date of final acceptance of the work.

(e) All insurance described herein shall be primary and cover the insured for all work to be performed under the contract, all work performed incidental thereto or directly or indirectly connected therewith, including traffic detour work or other work performed outside the work area, and all change order work.

(f) The Contractor shall, from time to time, furnish the Engineer, when requested, satisfactory proof of coverage of each type of insurance required or a copy of the actual policies covering the work. Failure to comply with the Engineer's request may result in suspension of the work, and shall be sufficient grounds to withhold future payments due the Contractor and to terminate the contract for Contractor's default.

(g) If the Contractor is self-insured, it shall furnish, upon the request and the satisfaction of the Engineer, any documentation to demonstrate the ability to self-insure itself. The Engineer, from time to time, can conduct an audit to determine the ability of the Contractor to be self-insured. Failure to comply with the Engineer's request will be considered a material breach of the contract, and at the discretion of the Engineer, may be sufficient grounds to terminate the contract, suspend any work or withhold future payments.

(h) It is the responsibility of the Contractor to notify the Department of any changes to its insurance policies or if the Contractor receives a notice of cancellation of any of its insurance policies. The Contractor will immediately provide written notice to the Department should the insurance policies evidenced on its Certificate of Insurance form be cancelled, limited in scope, or not renewed upon expiration.

2. Types of Insurance - The Contractor shall purchase and maintain insurance described below which shall provide coverage against claims arising out of the Contractor's operations under the contract, whether such operations be by the Contractor itself or by the subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.

(a) Worker's Compensation. The Contractor and all subcontractors shall obtain worker's compensation insurance for all persons whom they employ or may employ in carrying out the work under this contact. This insurance shall be in strict conformity with the

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

(b) Commercial General Liability. The Contractor shall obtain General Liability insurance with a limit of not less than $1,000,000 per occurrence and $2,000,000 aggregate. The insurance policy shall contain the following clauses: 1) "The State of Hawaii is added as an additional insured as respects to operations performed for the State of Hawaii."; and 2) "It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contributed with, insurance provided by this policy." The required limit of insurance may be provided by a single policy or with a combination of primary and excess polices."

(c) Comprehensive Automobile Liability. The Contractor shall obtain Auto Liability insurance covering all owned, non-owned and hired autos with a combined single Limit of not less than $1,000,000 per accident for bodily injury and property damage. The insurance policy shall contain the following clauses: 1) "The State of Hawaii is added as an additional insured as respects to operations performed for the State of Hawaii."; and 2) "It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contributed with, insurance provided by this policy." The required limit of insurance may be provided by a single policy or with a combination of primary and excess polices.

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

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

The Contractor shall either:

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

ii. Insure the activities of its subcontractors in its own policy.

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

(d) Builder's Risk Insurance. Unless included in the Specifications of this project, the Contractor shall not be required to provide builder's risk insurance. If required as noted in the Specifications, builder's risk insurance shall be provided during the progress of work and until final acceptance by the Department upon completion of the contract. It shall be "All Risk" (including but not limited to earthquake, windstorm and flood damage) completed value insurance coverage on all completed work and work in progress to the full replacement value thereof. Such insurance shall include the Department as additional name insured. The insurance policy shall contain the following clauses: 1) "The State of Hawaii is added as an additional insured as respects to operations performed for the State of Hawaii."; and 2) "It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contributed with, insurance provided by this policy." The required limit of insurance may be provided by a single policy or with a combination of primary and excess polices.

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

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

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

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

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

The Contractor shall defend, indemnify and hold harmless the State and its Departments and Agencies and their officers, representatives, employees or agents from all suits, actions or claims of any character brought

on account of any claims or amounts arising or recovered under the Worker's Compensation Laws or any other law, by-law, ordinance, order or decree.

Section 8 – Measurement and Payment

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

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

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

d. A Certification from the Contractor affirming that the Contractor has, as applicable, remained in compliance with all laws as required by Section 103D-310, HRS, and Section 3-122-112, HAR. A contractor making a false affirmation shall be suspended and may be debarred pursuant to section 103D-702, HRS.

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

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

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

DETAILED SPECIFICATIONS

TABLE OF CONTENTS

DIVISION 1 – GENERAL REQUIREMENTS

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 DESCRIPTION OF WORK

Work consists of furnishing and paying for all labor, tools, equipment and materials necessary for the installation, in place complete, of a pre-loader structure and grinder pump at Comfort Station 6, a pre-loader structure and submersible pump station at Pump Station 3, approximately 2,800 linear foot total of 1-1/4 inch, 4 inch, 6 inch, and 8 inch gravity sewer line and sewer force main, all in accordance to plans and specifications.

1.3 GENERAL

A. 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.

B. Notices: The Contractor shall notify the Engineer at least three (3) working days before starting any work.

C. Permits and Regulations: The Contractor shall obtain and pay for all permits and licenses, give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. All costs shall be considered incidental to the various items in the bid proposal.

D. Existing Utilities

The Contractor shall be responsible for the protection of existing surface and subsurface utilities and poles within and abutting the project site, trench excavations, borrow sites, and other work areas. Any utility that the Contractor encounters during the progress of the work, such as telephone poles, electric poles, water lines, sewer lines, electric lines, and drainage pipes, whether or not shown on the plans, shall not be disturbed or damaged unless otherwise instructed in the plans and specifications. The Contractor shall notify the Engineer and the affected utility company immediately of any damaged or disturbed utility.

In the event utilities which are not shown on the plans and specifications, not located and exposed on the job as it progressed or not pointed out to the Contractor in the field are damaged or disturbed by the Contractor, the Contractor shall not be held liable but shall notify the Engineer and the affected utility company.

I. Standard Specifications

1. The work embraced herein shall be done in accordance with:

a. "DLNR INTERIM GENERAL CONDITIONS" October 1994

b. "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION• County of Honolulu, 1986

c. "WASTEWATER SYSTEM DESIGN STANDARDS" City and County of Honolulu, July 2017

2. The terms used hereinafter are as follows:

a. "GENERAL CONDITIONS" shall refer to the "DLNR INTERIM GENERAL CONDITIONS, October 1994"

b. "STANDARD SPECIFICATIONS" shall refer to the "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" of the State of Hawaii, 1986.

3. These DETAILED SPECIFICATIONS supplement and modify the STANDARD SPECIFICATIONS.

J. Conditions at Site

1. EXISTING CONDITIONS: Every person bidding upon the work is expected to visit the site and examine the conditions of same and satisfy himself as to the character and amount of work to be performed as indicated on the plans and called for by these specifications. No additional payment will be granted because of the lack of knowledge of such conditions.

2. WATER AND ELECTRICITY: The Contractor shall make all necessary arrangement and connections for temporary use of water and electricity for construction and shall pay all expenses.

K. Toilet Accommodations: The Contractor shall be responsible for providing and maintaining his own toilet facilities for his use.

L. 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, 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.

M. 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.

N. Clean Up Premises: The Contractor shall throughout the duration of the project keep all streets, sidewalks and driveways free from all debris produced from the project. The

Contractor shall keep the project and surrounding area neat and free from dust nuisance. 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.

O. Completion of Work: Upon completion of the work, the Contractor shall remove all equipment, signs and unused materials provided for the work and shall restore the project site to a neat and clean condition

P. 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.

Q. 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.

R. 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.

S. 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.

U. Coordination with Concurrent Projects

1. Contractor shall coordinate work with contractor of concurrent project “Sand Island State Recreational Area Sewer System Improvements Phase 1: Sewer Line A Replacement.”

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

      3) The Contractor shall submit the as-built drawings 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.

      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
AEIC	Association of Edison Illuminating Companies 51 East 42nd Street New York, NY 10017
AFBMA	Anti-Friction Bearing Manufacturer's Association 60 East 42nd Street New York, NY 10017
AGA	American Gas Association 8501 East Pleasant Valley Road Cleveland, OH 44131
AGMA	American Gear Manufacturer's Association 1330 Massachusetts Avenue, N.W. Washington, D.C.
AISC	American Institute of Steel Construction 101 Park Avenue New York, NY 10017
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, D.C. 20036
AITC	American Institute of Timber Construction 333 West Hampden Avenue Englewood, CO 80110

Abbreviation	Company
AMCA	Air Moving and Conditioning Association, Inc. 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute, Inc. 1430 Broadway New York, NY 10018
APA	American Plywood Association 1119 A Street Tacoma, WA 98401
API	American Petroleum Institute 1801 K Street N.W. Washington, DC 20006
ARI	Air-Conditioning and Refrigeration Institute 1814 North Fort Myer Drive Arlington, VA 22209
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017
ASCII	American Standard Code for Information Interchange United States of America Standards Institute 1430 Broadway New York, NY 10018
ASE Code	American Standard Safety Code for Elevators, Dumbwaiter and Escalators American National Standards Institute 1430 Broadway New York, NY 10018
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers United Engineering Center 345 East 47th Street New York, NY 10017
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103

Abbreviation	Company
AWPA	American Wood Preservers Association 1625 Eye Street Washington, DC 20006
AWS	American Welding Society 2501 N.W. 7th Street Miami, FL 33125
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
CBM	Certified Ballast Manufacturers 2120 Keith Building Cleveland, OH 44115
CMAA	Crane Manufacturers Association of America, Inc. (Formerly called: Overhead Electrical Crane Institute - OECI) 1326 Freeport Road Pittsburgh, PA 15238
CRSI	Concrete Reinforcing Steel Institute 180 North La Salle Street Chicago, IL 60601
CSA	Canadian Standards Association 178 Rexdale Boulevard Rexdale, Ontario, M9W IR3, Canada
DEMA	Diesel Engine Manufacturer's Association 122 East 42nd Street New York, NY 10017
DIS	Division of Industrial Safety California Department of Industrial Relations 2422 Arden Way Sacramento, CA 95825
EEI	Edison Electric Institute 90 Park Avenue New York, NY 10016
EIA	Electronic Industries Association 2001 Eye Street N.W. Washington, DC 20006

Abbreviation	Company
EJMA	Expansion Joint Manufacturer's Association 331 Madison Avenue New York, NY 10017
ESO	Electrical Safety Orders, California Administrative Code, Title 8, Chap. 4, Subarticle 5 Office of Procurement, Publications Section P.O. Box 20191 8141 Elder Creek Road Sacramento, CA 95820
FEDSPEC	Federal Specifications General Services Administration Specification and Consumer Information Distribution Branch Washington Navy Yard, Bldg. 197 Washington, DC 20407
FEDSTDS	Federal Standards (see FEDSPECS)
FM	Factory Mutual Research 1151 Boston-Providence Turnpike Norwood, MA 02062
HEI	Heat Exchange Institute 122 East 42nd Street New York, NY 10017
HI	Hydraulic Institute 1230 Keith Building Cleveland, OH 44115
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

Abbreviation	Company
IES	Illuminating Engineering Society C/O United Engineering Center 345 East 47th Street New York, NY 10017
ISA	Instrument Society of America 400 Stanwix Street Pittsburgh, PA 15222
JIC	Joint Industrial Council 7901 Westpark Drive McLean, VA 22101
MILSPEC	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Street, N.E. Vienna, VA 22180
NAAMM	National Association of Architectural Metal Manufacturers 100 South Marion Street Oak Park, IL 60302
NACE	National Association of Corrosion Engineers P.O. Box 986 Katy, TX 77450
NEC	National Electric Code National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
NEMA	National Electrical Manufacturer's Association 155 East 44th Street New York, NY 10017
NESC	National Electric Safety Code American National Standards Institute 1430 Broadway New York, NY 10018
NFPA	National Forest Products Association (Formerly called: National Lumber Manufacturer's Association) 1619 Massachusetts Avenue, N.W. Washington, DC 20036

Abbreviation	Company
OSHA	Occupational Safety and Health Act U.S. Department of Labor San Francisco Regional Office 450 Golden Gate Avenue, Box 36017 San Francisco, CA 94102
PPIC	The Plumbing & Piping Industry Council, Inc. Suite 402 510 Shatto Place Los Angeles, CA 90020
SAE	Society of Automotive Engineers 2 Pennsylvania Street New York, NY 10001
SAMA	Scientific Apparatus Makers Association One Thomas Circle Washington, DC 20005
SBCC	Southern Building Code Congress 1116 Brown-Marx Building Birmingham, AL 35203
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc. 8224 Old Courthouse Road Tysons Corner Vienna, VA 22180
SSPWC	Standard Specifications for Public Works Construction Building News, Inc. 3055 Overland Avenue Los Angeles, CA 90034
TEMA	Tubular Exchanger Manufacturer's Association 331 Madison Avenue New York, NY 10017
UBC	Uniform Building Code Published by ICBO
UL	Underwriters Laboratories Inc. 207 East Ohio Street Chicago, IL 60611
UMC	Uniform Mechanical Code Published by ICBO
UPC	Uniform Plumbing Code Published by IAPMO

Abbreviation	Company
USBR	Bureau of Reclamation U.S. Department of Interior Engineering and Research Center Denver Federal Center, Building 67 Denver, CO 80225
WWPA	Western Wood Products Association (Formerly called: West Coast Lumberman's Association - WCLA) Yeon Building Portland, CA 97204

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01100

ARCHAEOLOGICAL PROTECTION

PART 1 - GENERAL

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION METHOD: Representatives of the State will from time to time examine and monitor 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.

The Contractor shall coordinate with the Division of State Parks all construction work that involve ground disturbance, as a Division of State Parks Archaeologist shall be on site to monitor during ground disturbance work.

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 or deductive work required by the additive bid item(s), as only the principal features of such additional or deductive work are listed.

C. Should anyone or all of the additive bid items become a part of the contract, the cost of all additional or deductive 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.

1. 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.

1. 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: Sewer Bypass System and Temporary 4” Force Main

B. Additive Bid Item 2: Standard Portable Restroom for 14 days

C. Additive Bid Item 3: Accessible Portable Restroom for 14 days

END OF SECTION

SECTION 01300 – SUBMITTALS

PART 1 - GENERAL

Submittals shall be furnished to the Engineer at least thirty (30) days prior to construction unless otherwise specified on the drawings or in the specification sections.

1.1 SUBMITTALS

A. Shop drawings shall be required for:

1. Section 01581 – Project Sign
2. Any others as called for in the plans, specifications or by the Engineer.

B. Other required submittals shall include:

1. Section 01500 – Wastewater Spill Mitigation Plan
2. Section 02220 – Excavation, Trenching, and Backfilling
3. Section 02231 – Subbase Course
4. Section 02232 – Aggregate Base Course
5. Section 02732 – Sewer Line and Manhole Cleaning
6. Section 02736 – Sewer Manhole Rehabilitation
7. Section 03300 – Cast-in-Place Concrete
8. Section 11000 – Package Wastewater Pump Station
9. Manufacturer's Data.
10. Certificates of Warranty.
11. Training, Repair, Operations and Maintenance Manual
12. 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 01400 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Quality control and control of installation.

B. Tolerances.

C. References.

D. Testing and inspection services.

E. Manufacturers' field services.

F. Examination.

G. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.5 TESTING AND INSPECTION SERVICES

A. Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing.

1. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time specialist and responsible officer.

2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.

B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Architect/Engineer.

1. Laboratory: Authorized to operate in State of Hawaii.

2. Laboratory Staff: Maintain full time specialist on staff to review services.

3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.

C. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Architect/Engineer or Owner.

D. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect/Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

H. Agency Responsibilities:

1. Test samples of mixes submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests required by Architect/Engineer.
7. Attend preconstruction meetings and progress meetings.

I. Agency Reports: After each test, promptly submit two copies of report to Architect/Engineer and to Contractor. When requested by Architect/Engineer, provide interpretation of test results. Include the following:

1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

J. Limits On Testing Authority:

1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Agency or laboratory may not approve or accept any portion of the Work.

3. Agency or laboratory may not assume duties of Contractor.

4. Agency or laboratory has no authority to stop the Work.

1.6 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

SECTION 01410 – PERMITS AND LICENSES

PART 1 - GENERAL

1.1 SUMMARY

The Contractor shall consult with all appropriate governmental agencies to determine the applicable permits, charges and fees required for the Project. Unless otherwise specified in the Contract, two (2) copies of all permits required for the Project shall be submitted to the Engineer.

Permits, charges, and fees required for the Project may include, but not be limited to, the following:

A. Trenching Permit

B. Fire Hydrant Usage Permit

C. Community Noise Control Permit

D. Dumping Charges

E. Permit to Discharge Effluent into the City and County Separate Storm Sewer System

F. Permit to Discharge Effluent into State Drainage System

G. Chapter 55 Water Pollution Control, Hawaii Administrative Rules, Title 11, State Department of Health, permits for discharges of storm water runoff associated with construction.

H. Noise Variance

I. Industrial Wastewater Discharge Permit for Temporary Discharges into the City's Sewer System

Time required to obtain all permits and fees associated with Items A thru J above shall be included in the work order completion period.

Items G and I above have been obtained by the State. The Contractor shall be responsible to submit any additional information required to complete the permit. The Contractor shall also be responsible if resubmittal for a new permit is necessary.

END OF SECTION

SECTION 01500 – MAINTAINING THE EXISTING WASTEWATER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

The existing wastewater system shall be maintained in full operation at all times. When the existing wastewater system are affected by the Contractor's performance of the Contract, the Contractor shall provide adequate provisions to ensure that sewage flow through the existing system and facilities is maintained without spillage.

1.2 RELATED SECTIONS:

Section 01410	Permits and Licenses
Section 01567	Pollution Control

1.3 SUBMITTALS

Within 30 calendar days after the Notice to Proceed date, the Contractor shall submit a Wastewater Spill Mitigation Plan for approval to the Engineer and the State Department of Health (DOH). The Wastewater Spill Mitigation Plan shall detail the procedures and provisions that the Contractor will implement to ensure uninterrupted sewage flow throughout the Project and, should a spill occur, regulatory agencies' requirements are satisfied. Any revisions to the plan requested by the above agencies prior to approval shall be the responsibility of the Contractor. No construction activities involving the existing wastewater system will be allowed until the Contractor's Wastewater Spill Mitigation Plan has been approved.

The Contractor's Wastewater Spill Mitigation Plan, at minimum, shall include:

1. The Contractor's sewage diversion and bypass pumping plan which has been approved by the Engineer before any diversion of sewage flows has started.

2. Specific details of all work which will affect the existing sewer system.

3. A project schedule indicating when work affecting the existing sewer system will occur.

4. Spill prevention, mitigation, containment, treatment, and disposal provisions and procedures to be implemented whenever the existing wastewater facilities are affected.

5. Reporting requirements which conform with the current edition of Department of Health (DOH) Wastewater Branch's (telephone no. 586-4294) "Protocol for Sewage Spills" and which include immediate coordination with DOH and Division of Environmental Quality of the City Department of Environmental Services (EQ) (telephone no. 768-3279) through the Engineer. A January 2002 edition of the "Protocol for Sewage Spills" has been attached on pages 01500-3 through 01500-6 for information only. The Contractor shall obtain a current official copy of the "Protocol for Sewage Spills" from DOH.

6. Acknowledgement of the requirements of Section 01410,"Permits and Licenses".

7. Identification of potential liabilities involved with working with the wastewater system, sewage spills, reporting requirements should spills occur, and monitoring requirements of pollutant discharges into receiving waters.

1.4 GENERAL REQUIREMENTS

The Contractor shall be liable for any fines and damages relating to sewage spills or the failure to maintain normal sewage flows in the existing wastewater system. The Contractor shall be responsible for coordination of his work with the Engineer to ensure that his intended work procedures will be compatible with the design and operation of the existing wastewater system and the new wastewater improvements being constructed under this contract.

The Contractor shall be responsible for any damages to the existing wastewater system caused by his construction activities. This includes, but is not limited to, existing sewer lines, manholes, and other improvements.

The Contractor shall be responsible for all costs to return everything back to its original condition or better. This includes, but is not limited to, restoring or replacing all materials, equipment, property, or improvements damaged or disturbed as a result of the Contractor's activities.

Protocol for Sewage Spills (Revised January 2002) follows on pages 01500-3 to 01500-6

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

PROTOCOL FOR SEWAGE SPILLS
(Revised **January 2002**)

Spills to Surface Waters

1. The County or Federal agency shall immediately notify the Chief of the Clean Water Branch (586-4309) on all spills into State Waters.

   If a spill occurs on the neighbor islands, the County or Federal agency shall immediately notify the Environmental Health Program (EHP) chief or their representatives:

   Kauai District Health Office (DHO) (241-3323);
   Maui DHO (984-8234, 984-8200); or
   Hawaii DHO (974-6006)

   During non-working hours contact the:

   Call the State Hospital Operator (24 hrs.) at 247-2191. The next working day notify the Clean Water Branch and the respective district EHP chief with a follow-up call.

2. As part of the requirement, the County or Federal agency shall immediately send out a press release for spills over a thousand gallons and for lesser spills if they present a substantial threat to public health. The press release shall describe the location of the spill, the amount of sewage released, what caused the spill, and what is being done to rectify the situation. Also, include a contact person and telephone number (including an after-hours/weekend contact). Fax or telephone the press releases to the following:

   * Associated Press (for radio dissemination) (Phone No. 536-5510)
   * Major statewide and island newspapers
   * Major television news stations
   * Department of Health (Fax No. 586-4444)

   For neighbor island spills also include your respective island EHP chiefs: Kauai

   DHO (Fax No. 241-3566)
   Maui DHO (Fax No. 984-8222)
   Hawaii DHO (Fax No. 974-6000)

3. Sewage that is spilled into near shore waters shall be disinfected prior to being discharged if sufficient disinfection contact time is available. Best judgment should be used in determining the amount of chlorine added to the discharge if chlorine is used as a disinfectant.

4. The County or Federal agency shall immediately post "Warning Signs" in the areas likely to be impacted by the spill and where public access is possible.

5. The DOH shall also assure that sufficient number and location of the "Warning Signs" have been posted. Authorization to remove the signs will also come from the DOH.

6. The County or Federal agency shall conduct bacteria (enterococci and either clostridium perfringens or fecal coliform) sampling of spills greater than 100 gallons, or when public health may be threatened in the area in the receiving water affected by the discharge as soon as possible. The results shall be submitted to the DOH immediately. Monitoring shall continue until notification to stop is received from the DOH.

7. The DOH shall be informed of the sampling stations and may modify the number of stations and site selection.

8. The DOH may require additional bacteria monitoring by the County or Federal agency to supplement their existing monitoring program, as may be necessary or appropriate. The DOH may also require the County or Federal agency to post additional "Warning Signs" as needed and may assist in removal of the signs.

9. The County or Federal agency shall submit a written report of the details of the spill within five (5) calendar days of the incident to the Director of Health. The report shall include the cause of the incident, clean-up efforts, and remedial actions to prevent future incidents, a summary of the sampling data, a map of the sampling locations and public notification procedures if applicable.

Spills Not Reaching Surface Waters

Spills within the Confines of a Wastewater Facility (where public access is restricted):

1. Immediate reporting of minor spills (less than 1,000 gallons **but greater than 50 gallons**) within the confines or fence line of a wastewater facility is not required but should be recorded by operating personnel. Spill records are to be tabulated and kept onsite for review by DOH personnel.

2. Major (greater than 1,000 gallons) or chronic (**occurring more than twice within a 12 month period**) spills within the confines or fence line of a wastewater facility shall be immediately reported to the Chief of the Wastewater Branch (586-4294). The County or Federal agency shall submit a written report of the details of the spill within five (5) calendar days of the incident to the Director of Health. The report shall include the cause of the incident, clean-up efforts, and remedial actions to prevent future incidents.

Spills Outside of the Confines of a Wastewater Facility:

1. The County or Federal agency shall immediately notify the Chief of the Wastewater Branch (586-4294) of all spills greater than a thousand gallons that have not entered State Waters.

   If a spill that is greater than a thousand gallons occurs on the neighbor islands, the County or Federal agency shall immediately notify the Environmental Health Program chiefs or their representatives:

   Kauai DHO (241-3323);
   Maui DHO (984-8234, 984-8200); or
   Hawaii DHO (974-6006).

   During non-working hours contact the:

   Call the State Hospital Operator (24 hrs.) at 247-2191. The next working day notify the Wastewater Branch or on the neighbor islands, the respective district EHP chief with a follow-up call.

Spills Outside of the Confines of a Wastewater Facility (continued):

2. As part of the requirement, the County or Federal agency shall immediately send out a press release for spills over a thousand gallons and for lesser spills if they present a substantial threat to public health. The press release shall describe the location of the spill, the amount of sewage released, what caused the spill, and what is being done to rectify the situation. Also, include a contact person and telephone number (including an afterhours/weekend contact). Fax or telephone the press releases to the following:

    * Associated Press (for radio dissemination) (Phone No. 536-5510)
    * Major statewide and island newspapers
    * Major television news stations
    * Department of Health (Fax No. 586-4444)

    For neighbor island spills also include your respective island DHOs:

Kauai DHO	(Fax No. 241-3566)
Maui DHO	(Fax No. 984-8200)
Hawaii DHO	(Fax No. 974-6006)

3. Sewage that is spilled shall be disinfected prior to being discharged if sufficient disinfection contact time is available.

4. The County or Federal agency shall submit a written report of the details of spills greater than a thousand gallons within five (5) calendar days of the incident to the Director of Health. The report shall include the cause of the incident, clean-up efforts, remedial actions to prevent future incidents, and public notification procedures if applicable.

5. The County or Federal agency shall immediately post "Warning Signs" in the vicinity of the discharge area where public access is possible. All spill sites shall be cleared of all debris and standing wastewater, and disinfected. Areas containing standing wastewater which cannot be removed shall be limited to public access by having the area roped off or limited by other means.

6. For spills less than a thousand gallons immediate reporting is not required. A tabulated summary of spills less than a thousand gallons shall be submitted quarterly to DOH.

7. Reporting of leaks or breaks in pipelines discovered during inflow/infiltration repair work is not required. These situations are considered exfiltration.

Contractor shall notify Construction Manager of all spills. Construction Manager will inform the appropriate parties/agencies.

END OF SECTION

SECTION 01505 – MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

This section covers the requirements for mobilization and demobilization.

1.2 MOBILIZATION

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

1.3 DEMOBILIZATION

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GUIDELINES

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

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

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

END OF SECTION

SECTION 01530

BARRICADES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

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

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber: Lumber for rails, frames and braces shall be dry, sound, undamaged, well seasoned, and free from any defect which may impair their strength and durability.

B. Hardware: Nails shall be galvanized wire nails. As many and as large a size as is practicable shall be used.

C. Paints: Paints shall be exterior enamel paint of the best grade or first line as made by approved manufacturers.

D. Sheet Reflecting Material: Sheet reflecting material shall conform to the applicable requirements of Subsection 712.20(C) of the "Standard Specifications for Road and Bridge Construction".

E. Alternate Designs: Alternate barricade designs such as plastic molded barricades may be used subject to the Engineer's approval. The Contractor shall submit shop drawings or catalog cuts for approval.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

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

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

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

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

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

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

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

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

B. Painting: Wooden rails, frames and braces shall be given a prime coat and 2 finish coats of new white exterior enamel paint. Rail faces to be reflectorized may be left unpainted unless otherwise specified or directed.

C. Reflectorization: Reflectorization of barricade rails shall be done in a first class, workmanlike manner and the attachment of reflective sheeting shall be as shown on the plans, specified herein, or as directed and approved by the Engineer.

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

Wooden rails shall be reflectorized with one of the following:

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

2. a hardened aluminum backed reflective sheeting as specified in Subsection 712.20(C)(5) of the "Standard Specifications for Road and Bridge Construction."

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

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

1. Orange and white stripes shall be used in the following conditions:

    a. Construction work.

    b Detours.

    c. Maintenance work.

2. Red and white stripes shall be used in the following conditions:

    a. On roadways with no outlet (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 01560 – CONFINED SPACE ENTRY

PART 1 – GENERAL

1.1 For entry by State personnel, including its inspectors and representatives, into a permit required confined space as defined in 29 CFR Part 1910.146(b), the Contractor shall be responsible for providing:

A. All safety equipment required by the confined space regulations applicable to all parties other than construction industry, to include, but not limited to, the following:

(1) Full body harnesses for up to two(2) personnel.
(2) Lifeline and associated clips.
(3) Ingress/egress and fall protection equipment.
(4) Two-way radios (walkie-talkies) if out of line-of-sight.
(5) Emergency (escape) respirator (10 minuteduration).
(6) Cellular telephone to call for emergency assistance.
(7) Continuous gas monitoring instrument (calibrated) to measure oxygen content, and concentrations of hydrogen sulfide, carbon monoxide and flammable gases (capable of monitoring at a distance at least 20 feet away).
(8) Personal multi-gas detector to be carriedby inspector.
(9) Signed permit to enter confined space area.

B. Continuous forced air ventilation adequate to provide safe entry conditions.

C. One attendant/rescue personnel topside (two, if conditions warrant it) for each entrant into a confined space.

All safety equipment shall comply with the standards of the Occupational Safety and Health Administration (OSHA) and all applicable Federal, State, and City laws and regulations relating to safety.

1.2 SAFETY AND EXPERIENCE

The Contractor shall have a documented, in-place safety program which meets or exceeds all Federal and State OSHA regulations, with special emphasis on hazard-free work in confined spaces and sewage environment.

Additionally, the Contractor shall submit documentation of confined space training certification for all personnel performing confined space entry at preconstruction conference.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01567 – POLLUTION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

Furnish all labor, material and equipment and perform all work required for the prevention of environmental pollution during and as the result of construction operations under this contract.

This Section contains general specifications pertaining to the prevention of environmental pollution to be maintained until completion of the contract and shall become a part of the work of all other Sections as applicable. The requirements of this Section take precedence over conflicting or contradictory provisions of other Sections.

1.2 DEFINITIONS

A. For the purpose of this specification, Environmental Pollution is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely affect human/animal health or welfare.

2. Unfavorably alter ecological balances important to human/animal life.

3. Affect other species of importance to man.

4. Degrade the utility of the environment for its normal daily function, for aesthetic, and for recreational purposes.

B. The control of environmental pollution requires consideration of air, water, and land, and involves noise control, solid waste management, and management of other pollutants.

1.3 RELATED SECTIONS

Section 01500	Maintaining the Existing Wastewater System
Section 01560	Confined Space Entry
Section 02270	Temporary Soil Erosion Control

1.4 GENERAL REQUIREMENTS

A. Comply with all applicable Federal and State laws, including the latest Hawaii Public Health regulations, local laws and regulations concerning pollution control and abatement.

B. Compliance with the provisions of this Article by its subcontractors will be the responsibility of the Contractor.

C. Prior to commencement of the work, the Contractor shall meet with the Director or his authorized representative to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

D. The Contractor shall become familiar with the latest requirements of the National Pollutant Discharge Elimination System (NPDES) Permit and all other necessary permits to discharge water to State receiving waters, into storm drainage system and into sanitary sewer system prior to bidding on this project. The Contractor will apply for appropriate NPDES permits required by the State Department of Health (DOH). The Contractor shall prepare and submit a written site-specific construction BMP Plan to DOH thirty (30) calendar days prior to constructions.

E. Notification: The Engineer will notify the Contractor in writing of any non- compliance with the foregoing provisions and the action to be taken. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose of notification. After receipt of such notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it was later determined that the Contractor was in compliance.

F. Sub-Contractor: Compliance with the provisions of this Section by subcontractors will be the responsibility of the Contractor.

1.5 SUBMITTALS

The Contractor shall submit the following in accordance with provisions as herein specified:

A. Water Pollution, Dust, and Erosion Control Meeting. Submit Site Specific BMP to Engineer. Schedule a water pollution, dust, and erosion control meeting with Engineer after site specific BMP is accepted in writing by Engineer. Meeting shall be scheduled 14 days before start of construction work. Discuss sequence of work, plans and proposals for water pollution, dust, and erosion control.

B. Water Pollution, Dust, and Erosion Control Submittals:
Submit the following:

1. Written site specific BMP describing activities to minimize water pollution and soil erosion into State waters, drainage or sewer systems. BMP shall include the following:

    a. An identification of potential pollutants and their sources.
    b. List of all materials and heavy equipment to be used during construction.
    c. Descriptions of the methods and devices used to minimize the discharge of pollutants into state waters, drainage or sewer systems.
    d. Details of the procedures used for maintenance and subsequent removal of any erosion or siltation control devices.
    e. Methods of removing and disposing hazardous wastes encountered or generated during construction.
    f. Spill control.
    g. Methods of storing and handling of oils, paints and other products used for the project.
    h. Material storage and handling areas, and other storage areas.

i. Fueling and maintenance of vehicles and other equipment.
j. Tracking of sediments offsite from project entries and exits.
k. Litter management.
l. Toilet facilities.
m. Other factors that may cause water pollution, dust and erosion control.

2. Provide plans indicating location of water pollution, dust and erosion control devices; provide plans and details of BMP's to be installed or utilized; show areas of soil disturbance, indicate areas where vegetative practices are to be implemented, and areas used for the storage of soil or waste. Indicate intended drainage patterns on plans. Include separate drawings for each phase of construction that alters drainage patterns. Indicate approximate date when device will be installed and removed.

3. Construction schedule.

4. Names of specific individual(s) designated responsible for water pollution, dust, and erosion controls on the project site. Include home and business telephone numbers, fax numbers, and e-mail addresses.

Date and sign BMP. Keep accepted copy on site throughout duration of the project. Revisions to the BMP shall be included with original BMP. Modify contract documents to conform to revisions. Include actual date of installation and removal of BMP. Obtain written acceptance by Engineer before revising BMP.

Follow guidelines in the "Construction Best Management Practices Field Manual" dated January 2008, in developing, installing, and maintaining BMPs for all projects. Follow Honolulu's City and County "Rules for Soil Erosion Standards and Guidelines" for all projects on Oahu.

1.6 WASTEWATER DISCHARGES/SPILLS

A. The Contractor shall be liable for any treatment of discharges that is required before disposal and for any fines, clean-up costs and damages which may occur through the violation of any federal, state or local law which may be applicable.

B. The Contractor shall be liable for all clean-up costs, fines and damages resulting from wastewater spills related to any construction activities. The Contractor shall not store chemicals, materials or equipment at the work site unless specifically authorized by the Engineer.

C. All sewage spills shall be cleaned up immediately. Every effort must be made to prevent spills from entering the storm drainage system. After the majority of the sewage from the spill has been removed, the contaminated area(s) shall be disinfected with Triton (manufactured by Zep Inc.) or an approved equal.

D. Within 30 calendar days after the Notice to Proceed date, the Contractor shall prepare a Wastewater Spill Mitigation Plan as specified in SECTION 01500, "Maintaining the Existing Wastewater System". This plan shall be approved by the Engineer, prior to commencing construction.

E. The Contractor shall be responsible for any damages to the existing wastewater system and facilities caused by his construction activities. This includes, but is not limited to, existing sewer lines, manholes, treatment processes, and other improvements. The Contractor shall be responsible for all costs to return all sewer facilities and property back to its original working conditions. This includes, but is not limited to, restoring or replacing all materials, equipment, property, or improvements damaged or disturbed as a result of the Contractor's activities.

1.7 ODOR

The Contractor shall ventilate all sewer manholes and pipelines where man entry is required in accordance with Section 01560, "Confined Space Entry". Otherwise, any open sewer manholes or openings in the sewer pipe shall be sealed at all times to minimize dispersal of sewer pipe odor above ground. In cases where an opening cannot be sealed because of concerns for worker safety, the opening shall be vented and filtered before release into the atmosphere.

1.8 RUBBISH DISPOSAL

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

B. 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.

C. Disposal of any materials including tanks, wastes, effluent, trash, garbage, oil, grease, chemicals, in areas adjacent to public waters is prohibited. If any waste material is dumped in unauthorized areas, the Contractor shall remove the material and restore area to the condition of the adjacent undisturbed area.

D. 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.

E. 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.

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

G. 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.

H. Construction debris should be disposed of daily.

1.9 DUST

A. 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.

B. 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.

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

1.10 NOISE

A. 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.

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

C. Work shall be allowed on weekdays typically between the hours of 7:30 a.m. to 4:30 p.m. and on Saturdays, Sundays, and legal State Holidays, between the hours of 9:00 a.m. to 10:00 p.m., provided all regulatory requirements are met. The use of certain demolition and construction equipment (such as pile drivers, hydraulic hammers, jackhammers, etc.) shall be limited to 9:00 a.m. to 5:30 p.m., Monday through Friday. Contractor shall coordinate and obtain approval from the State to accommodate the park’s camp users.

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

1.11 EROSION

A. Surface drainage from trenches, cuts or fills within the construction site, whether or not completed, and from demolition, abatement and construction waste disposal areas, shall, if turbidity producing materials are present, be held in suitable collection areas or shall be bermed to control erosion and runoff. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of exposed bare soil and waste areas shall be kept to a minimum. Fills and waste areas shall be constructed by selective placement to eliminate silts or clays on the surface that will erode and contaminate adjacent waters.

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

B. Whenever trucks or vehicles leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being carried onto the pavement. Trucks hauling fine material shall be covered in compliance with PUC regulations. Wastewater shall not be discharged into existing waterways, or drainage systems such as gutters and catch basins unless treated to comply with State Department of Health water pollution regulations.

1.12 WATER POLLUTION CONSTRUCTION REQUIREMENTS

A. Do not begin work until submittals detailed in Section 01300 Subsection 1.1, "Submittals", are completed and accepted in writing by Engineer.

B. Install, maintain, monitor, repair and replace site-specific BMP measures, such as for water pollution, dust and erosion control.

C. Address all comments received from Engineer. Modify and resubmit plans and construction schedules to correct conditions that develop during construction which were unforeseen during the design and pre-construction stages.

D. Coordinate temporary control provisions with permanent control features throughout the construction and post-construction period.

E. Do not expose or disturbed surface area of earth material (including clearing and grubbing) until BMP measures are installed and accepted in writing by the Engineer. BMP measures shall be in place and operational at the end of workday.

F. Clean up and remove any pollutant that can be attributed to Contractor.

G. Install or modify BMP measures due to change in Contractor's means and methods, or for omitted condition that should have been allowed for in the accepted site specific BMP or a BMP that replaces an accepted site specific BMP that is not satisfactorily performing.

H. Properly maintain all BMP features. Inspect, remove debris collected, prepare a written report, and make necessary repairs to BMP measures at the following intervals:

1. Weekly during dry periods.

2. Within 24 hours of any rainfall of 0.5 inch or greater which occurs in a 24-hour period.

3. Daily during periods of prolonged rainfall.

4. When existing erosion control measures are damaged or not operating properly as required by site specific BMP.

5. Temporary removal of construction BMPs that may affect drainage or cause a potential flooding hazard in the event of a weather advisory warning.

I. Remove, destroy, replace or relocate any BMP that must be removed, destroyed, replaced or relocated due to potential or actual flooding, or potential danger or damage to project or public.

J. When there are conflicts between these requirements and laws, rules, or regulations of other Federal or State local agencies, the more restrictive laws, rules, or regulations shall apply.

K. Non-Compliance: The Engineer will notify the Contractor of any non-compliance with the foregoing provisions and the action to be taken. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No extension of time or payment for excess costs or damages shall be made for the time lost due to such stop action.

L. The Contractor's designated representative shall address any BMP concerns brought up by Engineer within 24 hours of notification, including weekends and holidays. Failure to satisfactorily address these concerns, Engineer's own labor forces to provide necessary corrective measures. Engineer will charge Contractor such incurred costs plus any associated project Engineering costs. Engineer will make appropriate deductions from Contractor's monthly progress estimate. Failure to apply BMP measures shall result in either or both the establishment and increase in the amount of retainage due to unsatisfactory progress or withholding of monthly progress payment. Continued failure to apply BMP measures may result in one or more of the following: assessment of liquidated damages, suspension, or cancellation of Contract with Contractor being fully responsible for all additional costs incurred by State.

1.13 OTHERS

A. 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.

B. Wastewater shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basins unless treated to comply with the State Department of Health water pollution regulations.

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

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

G. Water used in washing, abatement, demolition or construction and other waste waters shall not be allowed to enter public waters.

H. 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.

I. 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.

J. Maintenance of Pollution Control Facilities During Construction: During the life of this contract, the Contractor shall maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out, or until the material concerned has become stabilized to the extent that pollutants are no longer being created.

1.14 DEWATERING

Construction dewatering effluent shall not be discharged, in any way, into the ocean or into drainage systems or drainage ways that ultimately empty into state waters. Dewatering, when required, shall be done by back-trenching (pit-to-pit discharge).

1.15 SUSPENSION OF WORK

A. 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.

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

C. The Engineer may also suspend any operations which he feels are creating pollution problems although they may not be in violation of the above-mentioned requirements. In this instance, the work shall be done 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

1.1 GENERAL REQUIREMENTS

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

1.2 SUBMITTAL

The contractor shall provide the Engineer with six (6) shop drawings of the project sign for review and approval by the Engineer at least thirty (30) days prior to ordering the sign.

1.3 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.

1.4 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.

1.5 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

2.1 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

3.1 GENERAL

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

SW

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.

3.2 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

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Product delivery requirements.

C. Product storage and handling requirements.

D. Product options.

E. Product substitution procedures.

F. Equipment electrical characteristics and components.

1.2 PRODUCTS

A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.

C. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Provide off-site storage and protection when site does not permit on-site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.

B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that Bidder:

1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
2. Will provide same warranty for Substitution as for specified product.
3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.

E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

PART 2 - PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

B. Cord and Plug: Furnish minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01660 - INSTALLATION, TESTING AND TRAINING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies the installation, testing and training for all mechanical, electrical and instrumentation systems and the complete project, functioning as a completed facility.

1.02 QUALITY ASSURANCE

A. GENERAL

1. Supplier's/manufacturer's Qualifications: Competent and experienced technical personnel shall represent the manufacturers of all equipment and systems as may be necessary to resolve assembly or installation problems at the worksite which are attributable to, or associated with, the equipment furnished.

2. Where manufacturer's functional testing services are called for in the Specifications, or when technical assistance is necessary to resolve performance problems that may become apparent during the performance test, the manufacturer's representative shall provide such assistance as necessary to demonstrate the specified performance. Where training is called for in the Specifications, the manufacturer's or supplier's representative shall provide training for the State's personnel as specified herein.

3. Where the number of days for services is stated in the Specifications, this shall be considered as the minimum number of days.

1.03 SUBMITTALS

A. Test reports and master log:

Submit report after the completion of the operational testing. Report shall include the following minimum information and as specified in the individual equipment specifications.

1. Date and Time
2. Equipment tested
3. Service conditions - fluid service or application
4. Performance including but not limited to the following:

    a. Flow
    b. Pressure
    c. Level
    d. Temperature
    e. Vibrations
    f. Setpoints
    g. Quantities or volume
    h. Weight
    i. Speed
    j. Torque

k. Concentrations
l. Time
m. Frequency
n. Average
o. Voltage
p. Resistance
q. Amperage

PART 2 - MATERIALS (NOT USED)

PART 3 - EXECUTION

3.01 INSTALLATION

A. GENERAL

1. All mechanical, electrical, and instrumentation equipment provided under this contract shall be installed in conformity with the details shown and specified and with the manufacturer's requirements and recommendations.

2. All equipment and apparatus used in testing shall be installed by specialists properly skilled in the trades and professions required to assure first-class workmanship. Where required by detailed specifications, the Contractor shall cause the installation of specific equipment testing items to be accomplished under the supervision of factory-trained installation specialists furnished by the equipment manufacturers.

3.02 MANUFACTURER'S STARTUP AND TRAINING SERVICES

A. GENERAL

1. Where specified for specific pieces of equipment, the Contractor shall make available, during the installed test phase, experienced factory-trained representatives of the manufacturers of all the various pieces of equipment, to train the State's personnel in the operation and maintenance thereof. The time required for this training shall be as specified in the specifications for the equipment items.

B. MANUFACTURER REPRESENTATIVE'S QUALIFICATIONS AND SERVICES

1. The specialist shall have at least **five consecutive years** of operational and maintenance experience with the specific equipment.

2. The manufacturer's services shall be provided for each item of equipment as specified in identified in Exhibit 01660-1 and as specified in individual specification sections. In the event of a conflict between the requirements, the individual equipment specifications will overrule the requirements of this specification section. Additional services shall be provided, where specifically required in individual specification sections.

3. All classroom training sessions shall be videotaped by the Contractor.

4. Training of the State's operators, where specified, may be scheduled prior to or during the installed test unless otherwise specified. These representatives shall follow the outline presented here:

   a. Verify that applicable catalog, parts lists, drawings, O&M manuals, etc. are provided. Make arrangements to supply those that are required by specification and are missing.

   b. Check out the installation of the specific equipment items.

   c. Thoroughly explain the theory of operation (mechanical, electrical and instrumentation).

   d. Demonstrate normal operation of the unit and show that all parts of the specifications are met.

   e. Provide related instrumentation repair and calibration.

   f. Answer questions.

   g. Safety

      i) Point out safety references.
      ii) Discuss proper precautions around equipment.

   h. Operation

      i) Identify applicable reference literature and provide a listing of at least three recommended articles or publications.

      ii) Explain all modes of operation (including emergency).

      iii) Explain and demonstrate normal and abnormal readings as is practical.

      iv) Demonstrate operation duties and instruct them on proper use of the equipment.

      v) Provide standard operating procedures (SOP).

      vi) Explain and demonstrate equipment troubleshooting process.

   i. Preventive Maintenance

      i) Provide list of recommended preventive maintenance (PM) duties including:

         (1) Reference material.

(2) Daily, weekly, monthly, quarterly, semi-annual and annual tasks.

ii) Demonstrate correct procedures for performing PM work.

iii) Demonstrate the indicators of equipment problems and equipment troubleshooting procedures.

iv) Provide standard maintenance procedures (SMP) for equipment.

j. Corrective Maintenance

i) Discuss possible problems in a classroom or at the equipment and provide troubleshooting techniques.

ii) Discuss how repairs are made and point out special problems.

iii) Open up equipment and demonstrate operation and maintenance procedures, where practical.

k. Parts

i) Demonstrate use of parts list and ordering procedures.

ii) Verify that all recommended spare parts on hand. Make recommendations for other optional parts.

l. Local Representatives

i) Provide information on where to order parts with name, address, and telephone number of closest representative.

ii) Provide service problem information:

(1) Who to call.
(2) How to get emergency help.

5. Classroom equipment training for operations personnel will include:

a. Using slides and blueprints, discuss the equipment's specific location in the plant.

b. Purpose and plant related function of the equipment.

c. A working knowledge of the operating theory of the equipment.

d. Startup, shutdown, normal operation, and emergency operating procedures, including a discussion on system integration and electrical interlocks, if any.

e. Identify and discuss safety items and procedures.

f. Routine preventive maintenance, including specific details on lubrication and maintenance of corrosion protection of the equipment and ancillary components.

g. Operator detection, without test instruments, of specific equipment trouble symptoms.

h. Required equipment exercise procedures.

i. Routine disassembly and assembly of equipment if applicable (as judged by the State on a case by case basis) for purposes such as operator inspection of equipment.

6. Hands-on equipment training for operations personnel will include:

a. Identifying location of equipment and its function on plant wide as well as process control function.

b. Identifying piping, flow options, and impacts on process control function.

c. Identifying valves and process control function.

d. Identifying instrumentation:

(1) Location of primary element

(2) Location of instrument readout

(3) Discuss purpose, basic operation, and information interpretation

e. Discuss, demonstrate, and perform standard operating procedures and round checks.

f. Discuss and perform the preventative maintenance activities.

g. Discuss and perform start-up and shut down procedures.

h. Perform the required equipment exercise procedures.

i. Perform routine disassembly and assembly of equipment.

j. Identify and review safety items and perform safety procedures, if feasible.

7. Classroom equipment training for the maintenance and repair personnel will include:

a. Theory of operation

b. Description and function of equipment

c. Start-up and shut down procedures

d. Normal and major repair procedures

e. Equipment inspection and troubleshooting procedures including the use of applicable test instruments and the "pass" and "no pass" test instrument readings

f. Routine and long-term calibration procedures

g. Safety procedures

h. Preventive maintenance such as lubrication; normal maintenance such as belt, seal and bearing replacement; and up to major repairs such as replacement of major equipment part(s) with the use of special tools, bridge cranes, welding jigs, etc.

i. Removal, installation, alignment procedures, and tolerance adjustments

j. Review equipment operations, maintenance, and repair manuals, including equipment O&M manual and factory shop manuals

8. Hands-on equipment training for maintenance and repair personnel shall include:

a. Locate and identify equipment components

b. Review the equipment function and theory of operation

c. Review normal repair procedures

d. Perform start-up and shut-down procedures

e. Review and perform the safety procedures

f. Perform State approved practice maintenance and repair job(s), including mechanical and electrical adjustments and calibration and troubleshooting equipment problems

g. Review and use equipment manufacturer's manuals in the hands-on training

9. The Contractor will provide any consumable materials required for the hands-on equipment training.

C. TRAINING CLASSROOM INFORMATION:

1. During each class, **ten copies** of the training manuals and handouts shall be provided to facilitate training of all required State's Operators. One complete set of originals (not copies) of the lesson plans, training manuals, training handouts, training aids and materials shall become the property of the State and shall be suitably bound for proper organization and easy reproduction.

2. Training manuals and/or handouts shall include (a) student notes such that student note taking is minimized to allow for the student to concentrate on the instruction; (b) legible copies of the visual aids to allow the student to annotate his/her notes directly on the copy of the visual aid as it is being discussed; and (c) equipment standard operating procedures and equipment standard maintenance routines.

3. Individual equipment standard operating procedures (SOP) and equipment standard maintenance routines (SMR) will both be jointly developed by the Contractor and the Manufacturer and field tested during the equipment mechanical and electrical testing phase and during the acceptance testing phase of this project.

4. Resources for training aids and training handouts will include and be available and readily accessible to the O&M personnel during the classes:

   a. Drawings and photographs of equipment.

   b. Equipment O&M manual information.

   c. Equipment manufacturer's information, such as factory shop manuals, factory fabrication drawings, and circuit diagrams

   d. Erection and/or installation drawings and procedures

   e. Generic printed matter references and off-the-shelf audio/visual training materials that relate to the equipment, including generic instructional videotapes such as from NUS Corporation of Rockville, Maryland.

D. INSTRUCTION AND TRAINING DURATION:

1. Services for instruction and training shall be provided for:

EXHIBIT 01660-1		
Equipment	Operations Personnel Training Days	Maintenance & Repair Personnel Days
Wastewater pump	1.0	1.0
Gate and Operator	0.5	0.5
Instrumentation	1.0	1.0

2. A training day is defined as at least 5 hours student-instructor contact time per day for classroom training and at least 4 hours 30 minutes student-instructor contact time per day for hands-on training. A training day occurs Tuesday through Thursday, not including holidays, and between the hours of 7:00 a.m. and 3:00 p.m. For planning and estimating purposes, the following time schedules and any combinations thereof are suggested in Exhibit 01660-2.

E. The instructor shall be present and available during both classroom training periods and study periods. During the study periods, the instructor shall be available to answer questions on previous training or questions on the ongoing training whereby some students are uncomfortable in asking questions during the delivery of classroom training.

F. Contractor shall be responsible to coordinate training with the operational staff.

3.03 TESTING

A. GENERAL

1. All equipment and partially complete or fully completed portions of the work included in this contract shall be tested and inspected to prove compliance with the contract requirements. For the purpose of this section, equipment shall mean any mechanical, electrical, instrumentation, or other device with one or more moving parts or devices requiring an electrical, pneumatic or hydraulic connection. Installed leakage tests and other piping tests shall be as specified in Divisions 2 and 15. Installed tests for electrical devices and systems shall be in accordance with Division 16. Installed tests for instrumentation devices and systems shall be in accordance with Divisions 13 and 16.

2. Testing equipment, gages, meters, recorders, and monitors shall be provided by the Contractor as required by the State to supplement or augment the instrumentation system, provided under this contract, to properly demonstrate that all equipment fully satisfies the requirements of this project manual. All devices employed for the purpose of measuring the performance of the facility's equipment and systems shall be specifically selected to be consistent with the variables to be monitored. All instruments shall be recently calibrated and the Contractor shall be prepared at all times to demonstrate, through recalibration, the accuracy of all instruments employed for testing purposes. Calibration procedures shall be in accordance with applicable standards of ASTM, ISA, and IEEE.

3. During the plant operational testing period, all equipment and systems in operation shall be operated to the greatest extent practicable, at conditions which represent the full range of operating parameters as defined by this contract document.

4. Tests and inspection shall include:

a. The factory tests and delivery inspections.

b. The initial testing and inspections.

c. The operational testing of completed sections of the plant using wastewater, where practical.

5. Testing procedures shall be designed to duplicate, as nearly as possible, all conditions of operation and shall be carefully selected to ensure that the equipment is not damaged. The Contractor shall produce checkout, alignment, adjustment and calibration signoff forms for each item of equipment to be used in the field by the Contractor and the State jointly to ensure that each item of electrical, mechanical and instrumentation equipment has been properly installed and tested. The Contractor is advised that failure to observe these precautions may place the acceptability of the subject equipment in question.

6. Tests and inspections, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry. The Contractor shall see that scheduling and performance of all tests are coordinated with involved subcontractors and suppliers.

7. A master test log book shall be maintained by the Contractor which shall cover all tests including piping, equipment, electrical, and instrumentation.

8. If under test, any portion of the work should fail to fulfill the contract requirements and is adjusted, altered, renewed or replaced, tests on that portion when so adjusted, altered, removed or replaced, together with all other portions of the work as are affected thereby, shall be repeated within reasonable time and in accordance with the specified conditions.

9. Once simulated operation has been completed, all machines shall be rechecked for proper alignment, realigned, if necessary, and doweled in place. All equipment shall be checked for loose connections, unusual movement or other indications of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the State. All machines or devices which exhibit unusual or unacceptable operating characteristics shall be disassembled and inspected. They shall then be repaired or removed from the site and replaced.

10. Test results shall be within the tolerances set forth in the detailed specification sections of this contract document. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice.

B. FACTORY TESTS AND DELIVERY INSPECTIONS

1. Test of items at the place of manufacture during and/or on completion of manufacture, comprising hydraulic pressure tests, electric and instrumentation subsystems tests, performance and operating tests and inspections in accordance with the relevant standards of the industry and more particularly as details in individual clauses of these specifications require in order to satisfy the State that the items tested and inspected comply with the requirements of this contract.

C. INITIAL TESTING AND INSPECTIONS

1. All equipment shall be tested by the Contractor before the commencement of Operators training or before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the work.

2. Pre-operation Checkout: The installed tests and inspection procedures shall incorporate all requirements of these specifications and shall proceed in a logical, step-wise sequence to ensure that all equipment has been properly serviced, aligned, connected, calibrated and adjusted prior to operation. Pre-operation checkout procedures shall include, but not necessarily be limited to:

   a. Coating system testing as specified in Divisions 9.

   b. Piping system pressure testing and cleaning as specified in Divisions 2 and 15.

   c. Electrical system testing as specified in Divisions 13 and 16.

   d. Instrumentation system testing as specified in Divisions 13 and 16.

   e. Alignment of equipment.

   f. Pre-operation lubrication.

3. Installed Test: Once all affected equipment has been subjected to the required preoperational checkout procedures and has not found deficiencies in that portion of the work, individual systems may be started and operated under simulated operating conditions by closed-loop recirculation or other approved methods to determine as nearly as possible whether the equipment and systems meet the requirements of these specifications.

   a. The intended process fluid or a compatible substitute (supplied by the Contractor) shall be employed for the testing of all liquid systems. Domestic potable, plant water or non-potable water may be utilized at the expense of the Contractor in lieu of wastewater for the installed tests.

   b. The equipment shall be operated for a sufficient period of time to determine machine operating characteristics, including temperatures and vibration; to observe performance characteristics; and to permit initial adjustment of operating controls.

D. OPERATIONAL TESTING

1. After completion of all installed testing that all equipment complies with the requirements of the specifications, the Contractor shall fill all process units and process systems with the actual service fluid.

a. Upon completion of the filling operations, the Contractor shall introduce flow through the completed portion of the facility for a period of not less than **7 consecutive days,** during which all systems shall be operated as a complete facility. Should the operational testing period be halted for any reason related to problems with the facilities constructed or the equipment furnished under this contract, or the Contractor's temporary testing systems, the operational testing program shall be repeated until the specified continuous period has been accomplished without interruption. All process units shall be brought to full operating conditions, including temperature, pressure and flow. The portion of facility being tested should be able to isolate from the rest of the plant in the event that repair is required.

b. The Contractor shall supply operational manpower for 24-hours-per-day for the duration of the operational testing.

c. The Contractor shall prepare all material (training, repairs, operations, maintenance, etc.) in a manual and submit to the State, 3 copies, one electronic PDF.

d. Unless otherwise specified, operational testing shall verify the performance of all equipment as specified in the Qualify Assurance paragraphs of each equipment specifications in Division 11, 13, 14, 15, and 16

END OF SECTION

DIVISION 2 – SITE WORK

SECTION 02050 – DEMOLITION AND REMOVAL

PART 1 - GENERAL

1.1 WORK SPECIFIED

A. Accomplish all demolition, removal, and related work indicated on or required by the drawings, and as specified herein.

B. Work shall include, but is not limited to removal of existing fencing, vegetation, and berms.

1.2 GENERAL REQUIREMENTS

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

B. Obvious conditions which exist on the site shall be accepted as part of the work, even though they may not be clearly indicated on the drawings and/or described herein or may vary therefrom.

C. All debris of any kind accumulated from the work of this section shall be disposed of off the site.

D. Burning of any debris on-site will not be permitted.

E. Permits, Notice, Etc.

1. The Contractor shall procure and pay for all necessary permits of certificate that may be required in connection with this work.

2. The Contract shall serve proper notice and consult with the Engineer regarding any temporary disconnections of electrical or other utility lines in the area which may interfere with the removal work, and all such lines where necessary shall be properly disconnected before commencing with the work.

F. Protection: Throughout the work, protection shall be provided for all roads, walks, property, etc., scheduled to remain. Safe working conditions shall be maintained at all times for all personnel, and temporary lights and barricades shall be provided and maintained.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DEMOLITION AND REMOVAL

A. Cutting: All concrete, when required, shall be cut with a carborundum saw prior to removal, with water applied to control dusting.

B. All work shall be executed in an orderly and careful manner, with due consideration for all items to remain, and the Contractor shall be strictly responsible for any damage thereto.

C. Water facilities shall be available and in operating condition at all times. All dust shall be suppressed by a fog spray or other approved method.

D. Demolish and remove existing fencing, vegetation, and berms, as indicated.

3.2 DUST CONTROL

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, a hazardous condition such as flooding or pollution.

3.3 CONTRACT ZONE LIMIT

The Contract Zone Limit shall be the limit of grading or work outside the Zone Limits necessary to complete the project shall be included.

3.4 BARRICADE

Erect temporary barricade as required and/or as shown on the plans, to prevent people from entering into the project area to the extent as approved by the Engineer. Such barricade shall not be less than 6'-0" in height. The extent of barricade may be adjusted as necessary with the approval of the Engineer. This work shall be accomplished at no extra cost to the Owner.

3.5 CLEAN-UP

Debris and rubbish shall be removed from the site daily. Debris and rubbish shall not be allowed to accumulate in the building or on site. Debris shall be removed and transported in a manner that will prevent spillage on streets or adjacent areas.

END OF SECTION

SECTION 02110 - CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Furnish all labor, materials, equipment and tools necessary to accomplish all clearing and grubbing work as indicated on the drawings and as specified herein.

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

C. Obvious conditions of the site existing on the date of the bid opening shall be accepted as part of the work, even though they may not be clearly indicated on the drawings and/or described herein or may vary therefrom.

D. All debris of any kind accumulated from clearing or grubbing shall be disposed of on site, and the whole area left clean. The Contractor shall be required to make all necessary arrangements related to the proposed place of disposal with the State.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SEQUENCE OF WORK: All sequence of work shall be subject to the approval of the State.

3.2 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, plants, grass, walks, pavements, utility boxes, etc. Any damages will be repaired or replaced by the Contractor to the satisfaction of the State.

3.3 PERMITS: The Contractor shall apply for and obtain the necessary permits prior to the commencement of work. The Contractor shall pay for all fees required.

3.4 BARRICADE: Erect temporary barricade to prevent people and animals from entering the project area, to the extent as approved by the Engineer. Such barricades shall not be less than 5'-0" in height. The extent of barricades may be adjusted as necessary with the approval of the Engineer. This work shall be accomplished at no extra cost to the State. Barricades shall be removed upon completion of work, and job site premises left clean.

3.5 MAINTAINING TRAFFIC

A. The Contractor shall conduct operations with minimum interference to parking lots, driveways, sidewalks, etc.

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

3.6 CONSTRUCTION LINES, LEVELS AND GRADES

A. The Contractor shall verify all lines, levels and elevations indicated on the drawings before any clearing, excavation or construction begin. Any discrepancy shall be immediately brought to the attention of the State and any change shall be made in accordance with his instruction. The Contractor shall not be entitled to extra payment if he fails to report the discrepancies before proceeding with any work whether within the area affected or not.

B. All lines and grades shall be established by a Surveyor or Civil Engineer licensed in the State of Hawaii.

3.7 CLEARING AND GRUBBING

A. The Contractor shall clear off and remove from the entire area within the area to be graded, all rubbish, grass and weeds, stumps, large roots, buried logs, garbage and other unsuitable material. Where soft wet soils are encountered, light equipment should be used.

B. The Contractor shall grub the ground surface within the area to be graded of all grass and weeds to 2 inches below present grades. Grub out tree root structures.

C. Any stumps and roots larger than 3 inches in diameter shall be removed to a depth not less than 18 inches below the original grade level. Fill voids with select fill to maintain indicated grade.

D. No excavation or filling shall be undertaken until area has been cleared and grubbed.

E. Perform all clearing and grubbing in accordance with Section 10, Standard Specifications for Public Works Construction, September 1986, and Rules Relating to Soil Erosion Standards and Guidelines, April 1999, of The Department of Planning and Permitting, City and County of Honolulu,

3.8 CONTRACT ZONE LIMITS: The Contract Zone Limits shown on the drawings indicate only in general the limits of the work involved. The Contractor, however, is required to perform any and all necessary and incidental work which may fall outside of these demarcation lines. The Contractor is also expected to confine all of his construction activities within the Contract Zone Limits and not spread his equipment and materials indiscriminately about the area.

3.9 VERIFICATION OF EXISTING GRADES: Verify existing grades, inverts, and improvements before any clearing and grubbing work is done. Immediately bring to the attention of the Engineer any discrepancy, and make any changes in accordance with his instructions. Starting of clearing and grubbing operations will be construed to mean that the Contractor agrees that the existing grades, inverts, and improvements are essentially correct as indicated. No extra compensation will be allowed if existing grades, inverts, and improvements are in error after verification thereof or if he fails to report the discrepancies before proceeding with any work.

3.10 CLEAN UP: Clean up and remove all debris accumulated from construction operations from time to time, when and as directed by the State. Upon completion of the construction work and before final acceptance of work, remove all surplus materials, equipment, etc., and leave entire job site clean and neat.

END OF SECTION

SECTION 02200 –TRENCH, EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Furnish all materials, labor and equipment required to accomplish all trenching, excavation and backfilling for utilities as indicated on the drawings and specified herein.

B. During excavation, if any archaeological significant items, such as artifacts, shell, bone, or charcoal deposits are found, stop work and notify the Engineer. The Owner shall pay for any investigation.

C. Permits, Notice, Etc.:

1. The Contractor shall procure and pay for all necessary permits or certificates that may be required in connection with this work.

2. The Contractor shall serve proper notices and consult with the Engineer regarding any temporary disconnections of electrical or other utility lines in the area which may interfere with the removal work, and all such lines where necessary shall be properly disconnected before commencing with the work.

D. The Contractor shall be solely responsible for the means, techniques, procedures and sequences for dewatering, shoring, bracing, and supporting the excavation.

E. Protection: Throughout the work, safe working conditions maintained at all times for all personnel along the excavation. Contractor shall also provide park users adequate protection, approved by the Owner, around work areas.

F. Contractor shall obtain geotechnical engineer licensed in Hawaii to provide geotechnical services during construction for inspection and monitoring of shoring installation, excavation and trenching monitoring, and trench back fill placement and compaction in compliance with the intent of the project.

1.2 REFERENCE SPECIFICATIONS

Except as modified herein, all excavation, trenching and backfilling shall conform to the following sections of the Standard Specifications for Public Works Construction dated September 1986:

Section 11 ..... Trench Excavation and Backfill
Section 12 ..... Roadway Excavation
Section 13 ..... Structure Excavation and Backfill
Section 15 ..... Crushed Rock
Section 16 ..... Borrow
Section 17 ..... Embankment
Section 38 ..... Restoring Pavements and Other Improvements

1.3 SUBMITTALS

A. Product Data: Imported materials

1.4 APPLICABLE PUBLICATIONS

The following 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. Copies of the soil reports and addendums are available for review at the Engineer's office.

1. "Geotechnical Engineering Exploration, Sand Island Recreational Area Sewer System Improvements, Honolulu, Oahu, Hawaii" dated January 28, 2019, by Geolabs, Inc.

2. American Society for Testing and Materials (ASTM) Publications

   D1557-78 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457mm) Drop

1.5 QUALITY ASSURANCE

A monitoring program should be developed and implemented by the contractor to detect ground movement and/or subsidence adjacent to the excavations, which may result in damage to nearby structures and pavements. Contractor shall retain a qualified geotechnical engineer to design and evaluate the shoring system used. Costs for shoring system shall be incidental to the various items in the proposal.

1.6 DEGREE OF COMPACTION

Degree of compaction is a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, Method D, abbreviated hereinafter as a percent of laboratory maximum density.

1.7 OPTIMUM MOISTURE

Optimum moisture is the water content (percentage by weight) corresponding to the maximum dry density.

PART 2 - PRODUCTS

2.1 PIPE TRENCH AND STRUCTURE BACKFILL MATERIALS

A. For concrete and/or asphalt concrete walkways and pavement areas, materials shall be in accordance with the following section of the Standard Specifications, as revised, except as amended on the drawings and/or in the specifications herewith.

Restoring Pavements and Other Improvements Section 38

B. Trench Backfill material shall be in accordance with the following section of the Standard Specifications, as revised except as amended on the drawings and/or in the specifications herewith.

Trench Excavation and Backfill Section 11

C. Backfill material should consist of non-expansive granular materials generally less than 3 inches in maximum dimension with sufficient fines to prevent occurrence of voids when compacted.

1. Approved excavated on-site soils:

Must be free of vegetation, deleterious materials, and clay lumps and rock fragments greater than 3 inches in maximum dimension.

2. Imported select granular fill material:

a. Consist of non-expansive select granular material, such as crushed coral or basaltic gravel.
b. Well-graded from coarse to fine with no particles larger than 3 inches in largest dimension and should contain between 10 and 30 percent particles passing the No. 200 sieve.
c. Have laboratory California Bearing Ratio (CBR) value of 20 or more
d. Maximum swell of 1 % or less when tested in accordance with ASTM D1883.
e. Tested for conformance with above recommendations prior to delivery to the project site for the intended use.

D. Granular pipe bedding material and over-excavation backfill material shall consist of 3B Fine gravel (ASTM C33, No. 67 gradation).

E. Non-woven filter fabric shall be Mirafi 180N or approved equal.

F. Geogrid stabilization shall be TriAx TX160 Geogrid or approved equal.

PART 3 - EXECUTION

3.1 STANDARD SPECIFICATIONS: This work shall be done in accordance with the following specification sections.

The following section of the Standard Specifications, as revised, shall apply except as amended on the drawings and/or in the specifications herewith.

Trench Excavation and Backfill	Section 11
Structure Excavation and Backfill	Section 13

3.2 EXCAVATION SUPPORT AND GROUNDWATER CONTROL

The Contractor is responsible to design and provide adequate support to all open excavations. Provide full perimeter water tight excavation support, shoring, bracing, ground improvement grout seals, etc. and install as necessary to protect workmen, banks, adjacent paving, structures, and utilities. Remove shoring and bracing as excavations are backfilled, in a manner to prevent caving. Include provisions in the excavation support plan that will accomplish the following:

A. All open excavations shall be well braced to minimize movement of walls or sides of excavations and to prevent damage to adjacent existing utilities and nearby facilities and structures.

B. When open excavations are adjacent to or under existing surface and subsurface utilities, poles, and improvements, the Contractor shall be responsible for properly bracing the excavation and stabilizing the existing ground to render it safe and secure from possible slides, excessive groundwater inflows, cave-ins, and settlement. The Contractor shall also be responsible for properly supporting existing surface and subsurface utilities, poles, and improvements with beams, struts, or appropriate ground improvements as required to control groundwater inflows and ensure that no movement or damages occur.

C. Settlement of the existing ground may occur as a result of the vibrations generated during the installation of the sheet pile shoring. Special attention should be given by the contractor during the sheet pile installation process to reduce the potential for appreciable ground settlement.

D. Dewatering of excavations will be necessary where the existing groundwater level is above the bottom of the proposed excavation. Open excavations below groundwater level shall use a full-perimeter watertight excavation support system with sump pumps to collect water that percolates up into the base of the excavation.

Dewatering for construction is the responsibility of the contractor. The selection of equipment and methods of dewatering should be left up to the contractor. The dewatering operations should be coordinated with the shoring support such that the stability of the excavations is not jeopardized.

The dewatering method shall follow these basic criteria:

1. Result in the least disturbance or damage to existing buildings, roads, and the environment

2. Maintain the stability of, and also provide safe and dry working conditions in the excavation.
3. Sufficiently flexible to allow modifications to accommodate various ground conditions.

Dewatering and lowering of the groundwater level outside of the open excavation is not permitted. Construction dewatering effluent shall not be discharged, in any way, into the ocean or into drainage systems or drainage ways that ultimately empty into state waters. Dewatering, when required, shall be done by back-trenching (pit-to-pit discharge).

3.3 EXCAVATION

Excavation shall be performed to the lines and grades indicated. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a minimum distance from the banks of the trench equal to the depth of the excavation. Excavated material not required or not satisfactory for backfill shall be removed from the site. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein shall be removed to maintain the stability of the bottom and sides of the excavation. Unauthorized over-excavation shall be backfilled in accordance with paragraph BACKFILLING AND COMPACTION at no additional cost to the Owner.

A. Trench Excavation

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed and as specified in Section 11, "Trench Excavation and Backfill" of the Standard Specification. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor.

1. Bottom Preparation: The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe.

2. Removal of Unstable Material: Where unstable material (loose compressible lagoonal depsoits) is encountered in the bottom of the trench, such material shall be removed to a minimum depth of 2 feet below the bottom of the bedding layer (about 2.5 feet below the pipe elevation).

3. Stockpiles: Excavated soils should not be stockpiled closer than a horizontal distance equal to the depth of the excavation measured from the outside edge of the excavation. Excavated soils shall also be stockpiled at least 15 feet away from existing underground utilities.

B. Excavation for Appurtenances

Excavation for manholes or similar structures shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Structures shall bear on a 6 inch thick bedding layer of No. 3B final gravel (ASTM C33, No.67 gradation). Extent of bedding layer shall extend 2 feet beyond edge of structure base in all directions.

Where unstable material is encountered beneath the structure, such material shall be over-excavated a minimum of 2 feet below the bottom of the bedding layer, and 2-feet beyond the edge of structure base in all direction. The over-excavation shall be backfilled with a stabilization layer as specified above in the removal of unstable material for trench excavation.

When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.4 PLACEMENT AND COMPACTION OF BACKFILL

Backfill and compaction shall be done in accordance with the Standard Specifications, except as amended herewith.

A. Over-excavation

The over-excavation shall be backfilled to the proper grade with a stabilization layer consisting of the following:

1. Non-woven filter fabric (Mirafi 180N or equivalent) placed into the over-excavated trench subgrade followed by a layer of geogrid (TriAx TX160 or equivalent).

2. Approximately 12 inches of free-draining material, such as No. 3B fine gravel (ASTM C33, No. 67 gradation), followed by an additional layer of geogrid (TriAx TX160 or equivalent).

3. Approximately 12 inches of free-draining material, such as No. 3B fine gravel (ASTM C33, No. 67 gradation) and wrapped with the non-woven filter fabric.

The filter fabric shall be pulled taut and be relatively free of wrinkles prior to placement of the free-draining fill. A minimum overlap of 2 feet shall be provided between the ends of each roll of the filter fabric placed along the pipe alignment under relatively dry conditions.

When placement of filter fabric in wet conditions is necessary, the 2 feet overlap shall be sewn together. Criteria for sewing seams together shall be as recommended by the manufacturer.

B. Trench

Initial backfill in trenches shall be free-draining granular material, such as No. 3B fine gravel (ASTM C33, No. 67 gradation). From 6 inches below the pipe to 12 inches above pipe crown or 12 inches above the groundwater level, whichever is higher. Free-draining backfill materials shall be wrapped with non-woven filter fabric. Compaction by water ponding or jetting shall not be allowed.

Trench shoring shall be removed to the level above the top of the stabilization layer and pipe bedding before the gravity sewer lines are placed. Additional pipe bedding material shall be placed to achieve design pipe invert elevations.

Upper portion of backfill shall be placed in layers 8 inches loose thickness mechanically compacted to at least 90 percent relative compaction. Within vehicular pavement areas the top 3 feet below the finished pavement grade should be compacted to a minimum of 95 percent relative compaction.

Equipment used for backfill compaction around and above the pipe shall be limited to 4 tons or less in static weight.

C. Below-Grade Structures

Bottom of the below-grade structure shall bear on a 6 inch thick bedding layer of free-draining granular material, such as No. 3B fine gravel (ASTM C33, No. 67 gradation). Initial backfill up to 12 inches above the groundwater level shall also be free-draining granular material.

Soil backfill above the free-draining material shall be placed in layers 8 inches loose thickness mechanically compacted to at least 90 percent relative compaction. Within vehicular pavement areas the top 3 feet below the finished pavement grade should be compacted to a minimum of 95 percent relative compaction.

END OF SECTION

SECTION 02270 – TEMPORARY SOIL EROSION CONTROL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS: Furnish all labor, materials, services, equipment and related items necessary to implement the temporary erosion control measures as shown on the drawings, as required by these specifications and as ordered by the Engineer during the life of the contract to control water pollution though the use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains, and other erosion devices of methods.

A. Temporary erosion and siltation control measures as described herein shall be applied to any erodible material within this project, including local material sources and work areas.

B. The Contractor shall be responsible for providing the necessary erosion control measures which are shown on the plans or which may be ordered by the Engineer. All grading operations shall be performed in conformance with the applicable provisions of the "Water Pollution Control and Water Quality Standards" contained in the "Public Health Regulations," Owner Department of Health.

C. The Contractor shall be responsible for removing all silt and debris resulting from his work and deposited in drainage facilities, roadways, neighboring lands, and other areas.

1.2 RELATED WORK IN OTHER SECTIONS

Pollution Control	Section 01567
Trenching, Excavation and Backfilling	Section 02200

PART 2 - PRODUCTS

2.1 MATERIALS

A. Mulches: To be bagasse, hay, stray, fiber mats, netting, wood cellulose, bark, wood chips, or other suitable material acceptable to the Engineer and shall be reasonably clean and free of noxious weeds and deleterious materials.

B. Grass: To be a quick growing species (such as rye grass, Italian rye grass, or cereal grasses) suitable to the area and which provides temporary cover that does not later compete with the permanent cover.

C. Fertilizer and Soil Conditioners: To be a standard commercial grade acceptable to the Engineer.

D. Compost Filter Sock: Refer to construction plans for construction requirements

PART 3 - EXECUTION

3.1 TEMPORARY EROSION CONTROL INSTALLATION

A. The Engineer has the authority to limit the surface area exposed by clearing and grubbing and to limit the surface area exposed by excavation, borrow and fill operations. The Engineer may also direct the Contractor to provide immediate, permanent, or temporary pollution control measures to prevent contamination of streams, lakes, ponds, drainage channels and pipes, roads, neighboring lands, and other areas.

Except for specified measures which may be shown on the plans the Contractor shall determine the appropriate erosion control measures to use. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, and slope drains, and the use of temporary mulches, mats, and grassing, or the construction and use of other control devices or methods as necessary to control erosion.

B. The Contractor shall incorporate all erosion control measures shown in the plans. The plans may be modified as necessary to adjust to conditions that develop during construction.

C. The Contractor shall limit the surface area exposed by grubbing, stripping of topsoil, and grading to that which is necessary for him to perform the next operation and which is within his capability and progress in keeping the finish grading, mulching, grassing, and other such pollution control measures current.

The grubbing of the vegetative root mat and stumps and the stripping of topsoil shall be confined within the limits of grading which can be actively and continuously prosecuted within 15 calendar days. The area to be graded shall be limited to the minimum area necessary to accommodate the Contractor's equipment and work force and shall not at any time exceed 15 acres without prior approval of the Engineer.

Any area remaining bared or cleared for more than 10 calendar days and which is not within the limits of active construction shall be immediately hydro-mulch seeded or remedied as directed by the Engineer at the Contractor's expense without cost to the State. All areas where finish grading has been completed shall be grassed within 3 calendar days after the completion of grading for that area.

The maintenance of these grassed areas shall include the following:

a. Grass germination in all areas specified with 80% coverage required by the end of the maintenance period. Any area of one foot square or more in which grass has failed to grow after 30 days of maintenance shall be re-grassed.

b. All germinated areas shall be healthy and living at the end of maintenance period.

c. Weeds shall not exceed an area greater than 10 percent in any grass area.

d. All depressions and erosion fills shall be filled to proper grade and area re-grassed as required.

e. Contractor shall provide temporary irrigation to maintain all grassed areas until the landscape maintenance period have ended or until Engineer have accepted the work.

Acceptance of the ground cover planting after the maintenance period shall be contingent upon an 80 percent coverage.

D. The Contractor shall, at the end of each work operation in any one day, shape the earthwork in such a manner as to control and direct the runoff to minimize the erosion of soils. He shall construct earth berms along the top edges of embankments or along the property line with adjacent properties, streams and water channels, to intercept any runoff. Temporary slope drains shall be provided to carry runoff from the top of cuts and fills. Temporary facilities for controlled discharges shall be provided for runoff impounded, directed, or controlled by project activities or by any erosion control measure employed.

E. Construction of berms, cofferdams, or other such construction in or near the vicinity of streams, ponds, waterways, or other bodies of water shall be approved materials.

F. The temporary erosion and siltation control measures outlined in these specifications are minimum requirements and shall not preclude the provision of any additional measures which the Contractor may deem necessary. Damages caused by the erosion of soils and the pollution of downstream areas shall be the responsibility of the Contractor and all costs for repairing, correcting, replacing, and cleaning damaged or polluted facilities shall be borne by the Contractor.

END OF SECTION

SECTION 02282 – SOIL TREATMENT FOR VEGETATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

This work shall consist of spraying weed killer on the prepared pavement subgrade prior to the installation of the base course and where called for on plans.

1.2 SUBMITTALS

A. Before installation, submit to the Engineer, affidavits from the manufacturers or suppliers of the aggregate base course proposed to be furnished and installed under this section certifying that such materials delivered to the project conform to the requirements of these specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. Weed Killer shall be "Casoron 4G", "Norosac 4G", or an approved equal for under asphalt application on new or rebuilt pavement, and shall be "Hyvar X", "Roundup" or approved equal for application to existing weeds for resurfacing jobs.

PART 3 - EXECUTION

3.1 APPLICATION

A. The under asphalt weed killer shall be mixed and uniformly spread using calibrated application equipment at the maximum rates permitted for “under asphalt” use and in strict accordance with the manufacturer’s label. Base course material shall be installed as soon as possible after applying the weed killer to preclude loss of germination inhibiting action.

B. Nut grass shall be retreated two (2) days after initial application and again if growth still exists.

C. The Contractor shall notify the Engineer 24 hours before application of weed killer.

END OF SECTION

SECTION 02444 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish materials, labor and equipment necessary to install all chain link fences and gates to the limits shown and as detailed on the plan and as specified herein.

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. Chain Link Fence Fabric shall be 2-inch mesh unless otherwise shown or specified, be galvanized and conform to ASTM A392, Class 1. The hot-dipped galvanized fabric shall contain not less than 1.2 ounces per sq. ft. of uncoated wire surface as determined by stripping test ASTM A90 and under the PREECE Test (ASTM A239), shall withstand 6 or more 1-minute dips before reaching the end point. All fabric shall be free from barbs, icicles or other hazardous projections resulting from galvanizing. The top and bottom of the fence fabric shall be knuckle finished. Aluminum clad fabric shall be an acceptable alternate to the hot-dipped galvanized fabric provided it is of the same gauge as the latter.

C. Tie Wire shall be 12-gauge (9 gauge for gates) soft annealed galvanized steel wire.

D. Tension Bar shall be 1/4" thick by 3/4" wide mild steel bar for attachment of a fabric to a terminal post.

E. Stretcher Band shall be formed from steel bands at least 1/8" thick by 3/4" wide.

F. Tension Band shall be formed from steel bands at least 12 gauge thick by 3/4" wide.

G. Tension Rod shall be a 3/8" diameter mild steel rod threaded at one end and hooked 180 degrees at the other.

H. Fittings:

1. Post Cap and Eye Top shall be of one-piece cast iron construction and shall attach securely onto their respective posts.

2. Coupling for top rails shall be outside sleeve type, at least 6 inches long and crimped at center.

3. Rail Ends shall be snug, one-piece fittings for top and brace rails with holes to receive 5/16" bolts for securing to rail end bands.

4. Double Rail End shall be similar to rail and except for an additional 1/2" hole to receive the hooked end of a tension rod.

I. Composition and Finish of Metal Parts: All metal parts and fittings, including tracks, gate hardware and frames, shall be of steel, malleable iron or wrought iron and shall be galvanized by the hot-dip process, after fabrication, in conformance with ASTM A153. The coating on all parts shall be continuous and smooth; that is, free from barbs, icicles or other projections. Bolts may be cadmium-plated in conformance with ASTM A165 instead.

J. Gate Hardware:

1. Hinges shall be heavy duty offset type permitting 180-degree swing using double clamping method of attachment and manufactured or forged malleable iron. All hinges shall be of appropriate size and capacity for the particular gate being supported and/or operated.

2. Unless otherwise shown or specified, padlocking provisions for walk gate shall be a fork latch assembly, and that for a drive gate shall be an industrial drop rod guide and latch assembly.

3. Padlock shall be 5-pin cylinder type with brass case and a 5/16" dia. hardened steel shackle. Padlocks shall be keyed differently but masterkeyed to the fence system. Two (2) masterkeys shall be provided.

K. Posts, Rails and Braces shall be of either standard weight, hot-dipped galvanized, welded and seamless steel pipes conforming to ASTM A120.

L. Tension Wire shall be of 7-gauge coiled spring or 6-gauge plain galvanized wire.

M. Concrete for post footings shall be Class 2500 as specified in Section CAST-IN-PLACE CONCRETE.

PART 3 - EXECUTION

3.1 INSTALLATION AND WORKMANSHIP

A. General

1. Metal fencing and gates shall be erected in strict conformance with the plans and these specifications. The gates and hardware shall provide intended freedom of operation. Posts shall be plumb and in line. Welding shall be done in accordance with latest AWS standards. However, no splicing of posts, rails or braces shall be accepted. Where changes in line occur with an angle of deflection of 30 degrees or more, the change point will be considered a corner and a corner post shall be installed thereat. End, corner, and gate posts for fences with 5-foot and wider fabric shall be braced to the nearest line post with horizontal braces and tension rods. The horizontal braces shall be spaced midway between top rail and ground and securely fastened to posts as shown on plans. Where fencing is placed along a curve with radius of 50 feet, or less, horizontal braces (and tension rods) shall be installed between all posts in like manner. Pull posts, at maximum intervals of 300 feet, shall be braced and trusses in both directions as specified above.

2. Field Touch-Ups: Field welds shall be cleaned of flux and spatter and all damaged galvanizing removed, all hazardous projections ground off, properly prepared, and then heavily coated with self-curing inorganic zinc coating. Manufactured coatings shall be applied in strict accordance with manufacturer's printed specifications. Damage to existing painted surfaces shall be touched up.

B. Fence Posts, except as otherwise indicated or specified, shall be spaced not more than 10 feet apart. In curved fence sections having a radius of 50 feet or less, the posts shall be spaced not more than 6 feet apart. Line posts shall be set so that top of the eye tops shall be at the same height as the fence fabric.

C. Top Rails shall pass through and bear firmly on base of eye tops, form a continuous brace from end to end of each stretch of fence, and be securely fastened to terminal posts with rail ends and brace bands. Couplings for the top rails shall be installed at intervals of 24 feet maximum.

D. Chain Link Fabric shall be fastened on the side of the posts as designated and shall be mounted on the posts so that the bottom of the fabric will be no more above the finished grade than 2 inches. High points of the ground shall be excavated as necessary. The fabric shall be stretched taut and securely fastened to the posts. Ends of wire ties shall be bent back so as not to be a hazard. Between posts the top edge of the fabric shall be fastened to the top rail and the lower edge to the tension wire with tie wire of size and at spacing as called for on the plans. Tension wire shall be stretched tight and shall be installed in a straight line between posts. Tension bars extending the full height of the fence and tension bar bands shall be used for fastening fabric to end, corner, pull and gate posts. Bolted tension bar bands shall be placed at top and bottom of tension bars

and spaced at 12-inch intervals. Fastenings to line posts shall be made with tie wire of size and at spacing as called for on the plans.

E. Gates shall be of size specified in plans. The corners of gate frames shall be fastened together and reinforced with malleable iron fittings or by welding as approved. Welds shall all be ground smooth. Where sizes permit, frames shall be galvanized after fabrication, otherwise all welds shall be finished as specified for touching up abrasions and field welds. All drive gate frames for fences 4 feet and higher and walk gate frames for 6-foot high fences shall be cross-trussed with tension rods welded to frame at hooked end. Fabric specified for the fence shall be attached to the sides of the gate frame with full-height tension bars and tension bar bands at top, bottom and 12 inches ∀o.c. along tension bars with 9-gauge tie wires shall be placed along the top and bottom of the gate at corners and 6 inches ∀o.c. in between. The gates shall be hung by at least two hinges. For the drive gates, latches of the crop rod type shall be provided and shall be of the full gate height, arranged to engage the gate catch. For walk gates, a forked latch may be provided. Catch for the drop rod shall be galvanized pipe and set in concrete. Gate hold-backs shall be positioned to secure and support the free end of the gate in full open position and/or as shall be accessible from both sides of the gates.

F. Tack-weld the chain link fabric to the fence posts and top rails. Tack-weld to fence posts at mid-height. Tack-weld to top rails at 5-foot intervals.

3.2 FINAL CLEAN-UP

A. All exposed metal surfaces shall be clean and free of cement. All surplus earth resulting from metal fencing work that is not used in the grading work shall be cleaned up and disposed of off-site. All debris resulting from work of this section shall be removed from the site.

END OF SECTION

SECTION 02730 – SEWER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

Furnish all labor, materials, equipment, and tools to construct the exterior sewer system as indicated on the drawings and herein specified.

1.2 REFERENCES

A. Department of Public Works, County of Kauai, City and County of Honolulu, County of Maui, County of Hawaii of the State of Hawaii

1. "Standard Specifications for Public Works Construction," September 1984, Departments of Public Works, City and County of Honolulu, hereinafter referred to as the "Standard Specifications"

2. "Standard Specifications for Public Works Construction," September 1986, Departments of Public Works, City and County of Honolulu, hereinafter referred to as the "Standard Specifications"

3. "Wastewater System Design Standards," July 2017, Department of Environmental Services, City and County of Honolulu, hereinafter referred to as the "Wastewater Standards"

B. ASTM A74 – Cast Iron Soil Pipe and Fitting

C. ASTM C564 – Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

D. ASTM D 1785 – (1999) Rigid Poly (Vinyl Chloride) PVC) Plastic Pipe, Schedules 40, 80 and 120

E. ASTM D2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

F. ASTM D 2464 – Poly(Vinyl Chloride) (PVC) Plastic Pipe Threaded Fittings, Schedule 80

G. ASTM D 2467 – Poly(Vinyl Chloride) (PVC) Plastic Pipe Socket Fittings, Schedule 80

H. ASTM D3212 – Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Seals.

I. ASTM D3350 – Standard Specification for Polyethylene Plastic Pipe and Fitting Materials

J. ASTM F477 – Elastomeric Seals (Gaskets for Joining Plastic Pipe).

K. ASTM F714, Standard Specification for Polyethylene (PE) Plastic Pipe (SOR-PR) Based on Outside Diameter.

L. ASTM F794 – Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

M. ASTM F1055, Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

N. AWWA C901 – Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. Through 3 In., for Water Service

O. AWWA C906 – AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 63 In., for Water Distribution and Transmission

P. IAPM0 – Uniform Plumbing Code (UPC)

1.3 SUBMITTALS

A. Product Data: Describe pipe and pipe accessories, including joints, fittings, and couplings.

B. Submit manufacturer's standard drawings or catalog cuts.

C. Test and Inspection Reports: For tests and instructions performed.

D. Manufacturer's Installation Instructions: Indicate special procedures and installation instructions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements for pipeline materials, joints and fittings, including factory-applied linings.

1. Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in tests in that publication to be mandatory or otherwise. Production control tests shall have been performed at the intervals or frequency specified in the referenced publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

F. As-Builts:

1. Accurately record actual locations of pipe runs, connections, cleanouts, and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 MATERIAL HANDLING

Deliver, store, and handle products with adequate protection against damage. Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris. Carry do not drag, pipe to trench

PART 2 – PRODUCTS

2.1 MATERIALS

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

B. Materials for exterior sewer system shall be constructed in accordance with the following publications. The Standard Specifications for Public Works Construction, dated September 1986, and Standard Details for Public Works, dated September 1984, as revised, except as amended in the plans and/or specifications and the Wastewater System Design 2017 Standards.

1. PVC Sewer Pipe and Appurtenances (4" and greater)..... Section 21

2. Connection to Existing Sewer and Connecting Cesspool in Direct Line of Sewer ..... Section 22

3. Sewer Manholes..... Section 23

C. PVC, Plastic Gravity pipe, in conformance with ASTM D 3034, SDR 35, or ASTM F 949 with ends suitable for elastomeric gaskets joints. Joints shall conform to ASTM 3212. Gaskets shall conform to ASTM F 477.

D. PVC Plastic Pressure piping, coupling and fittings, shall be in conformance to ASTM D 1784, Class 1245B.

1. Screw-Joint: Pipes 4 inches and less shall conform to dimensional requirements of SATM D1785 Schedule 80, with joints meeting requirements of 150 psi working pressure, 200 psi hydrostatic test pressure, unless otherwise shown or specified. Pipe couplings when used, shall be tested as required by ASTM 2464. For pipe less than 4-inch in diameter, fittings for threaded to conform to the requirements of ASME B1.20.1 for use with Schedule 80 pipe and fittings, fitting for solvent cement jointing shall conform to ASTM D2466 or ASTM D2467, and fitting for elastomeric-gasket joint pipe shall be iron conforming to AWWA C110 or AWWA C111.

2. Pipes 4 inches through 12 inches in diameter shall conform to AWWA C900. Pipe shall be plain end or gasket bell end, Pressure Class 150 (SDR18), with cast-iron-pipe-equivalent OD. Fittings for pipes 4 inches through 8 inches shall be PVC conforming to AWWA C907. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with the PVC plastic pressure pipe specified in this paragraph.

3. Pipes with water service shall be labeled “Water” and shall be blue in color. Pipes for wastewater service shall be labeled “Sewer” and be light gray in color.

4. Joints for pipe shall be pish-on joints as specified in ASTM D 3139. Joints between pipe and fittings shall be push-on joints as specified in ASTM D 3139 or shall be compression-type joints/mechanical-joints as respectively specified in ASTM D 3139 and AWWA C111/A21.11. Each joint connection shall be provided with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gasket for push-on joints for pipe shall conform to ASTM F 477. Gaskets for push-on joints and compression-type joints/mechanical-joints for joint connections between pipe and fittings shall be as specified in AWWA C111/A21.11.

5. Buried PVC piping conveying chemical (ferric chloride or polymer, hypochloride) shall double contain and shall slope towards the chemical tank’s secondary containment.

E. HIGH DENSITY POLYETHYLENE (HDPE) PIPE

The pipe shall be extruded from a polyethylene compound and shall conform to the following requirements:

1. Pipe should be rated for pressure service in water and sewage in accordance with ASTM D3350 and AWWA C901/906. Pipe should be SDR 11, PE4710.

2. The polyethylene compound shall be suitably protected against degradation by ultraviolet light.

3. The maximum allowable hoop stress shall be 800 psi at 23.4 degrees F.

4. The pipe manufacturer shall be listed with the Plastic Pipe Institute as meeting the recipe and mixing requirements of the resin manufacturer for the resin used to manufacture the pipe in this project.

5. Pipe sizes shall conform to ASTM F714.

6. The pipe shall conform to the following schedule:

NOMINAL PIPE SIZE	
1-1/4 -inch	SDR 11
4-inch	SDR11
6-inch	SDR 11

7. All piping system components shall be the products of one manufacturer.

8. ELECTROFUSION FITTINGS: Electrofusion Fittings shall be PE4710 HDPE, Cell Classification 445574C as determined by ASTM D3350 and be the same base resin as the pipe. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055.

9. GASKETS

Gaskets for plain faced flanges shall be the full faced type. Thickness shall be l/16-inch for pipe 10 inches and less in diameter and 1/8-inch for pipe 12-inches and larger in diameter. Unless otherwise specified, gaskets for raised face flanges shall match the raised face and shall be l/16-inch thick for pipes 3-1/2 inches and less in diameter and 1/8-inch thick for pipe 4 inches and larger.

10. VALVES

Discharge piping shall be of PVC. The check valves shall be (Flygt-HDL Type-5087 ball-type, cast iron ANSI Class 125 flanged or engineer approved equal). The shut-off valves shall be ¼-turn eccentric plug-type, cast iron ANSI Class 125 flanged, with 100% port area (6” model has an 88% port opening) and shall be suitable for the intended purpose.

11. VALVE BOXES

Valve boxes shall be coated cast iron or concrete, except that concrete boxes may be installed only in locations not subjected to vehicular traffic. Cast-iron boxes shall be extension type with slide-type adjustment and with flared base. The minimum thickness of metal shall be 3/16 inch. Concrete boxes shall be the standard product of a manufacturer of concrete equipment. The word "Sewer" shall be cast in the cover. The box length shall adapt, without full extension, to the dept of cover required over the pipe at the valve location. All valve box dimensions shall be furnished and installed in accordance with the Standard Specifications.

H. FLEXIBLE EXPANSION JOINT

1. Flexible expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material requirements of ASTM A536 and ANSI/AWWA C153/A21.53.

2. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating shall meet ANSI/NSF-61.

3. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.

4. Appropriately sized polyethylene sleeves, meeting ANSI/AWWA C105/A21.5, shall be included for direct buried applications.

5. All flexible expansion joints shall be FLEX-TEND as manufactured by EBAA Iron, INC or approved equal.

I. FLEXIBLE BALL JOINT

1. Flexible ball joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53. Flexible ball joints shall be pressure tested against its own restraint to 350 PSI for 3" through 24 inch. MEGALUG or approved equal shall be provided with each mechanical joint connection. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the application requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating shall meet ANSI/NSF-61. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bond epoxy conforming with the applicable requirements of ANSI16/A21.16. Appropriately sized polyethylene sleeves, meeting ANSI/AWWA C105/A21.5, shall be included for direct buried applications. All flexible ball joints shall be FLEX-900 as manufactured by EBAA Iron, Inc. or approved equal.

J. PIPING IDENIFICATION

For piping identification see Section 02780 Electronic Markers.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS FOR INSTALLTION OF PIPELINES

A. Earthwork: Perform earthwork operations in accordance with Section 02200, “Trench, Excavation, and Backfill”.

B. Pipe Laying and Jointing: Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Lay non-pressure pipe with the ball ends in the upgrade direction. Adjust spigots in bells to give a uniform space all around. Blocking or wedging between bells spigots will not be permitted. Replace by one of the proper dimensions, pipe or fittings that do not allow sufficient space for installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards not more than 25 feet apart in trenchless for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batterboards for the same purpose.

C. Connections to Existing Lines: Obtain approval from the Engineer before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

3.2 PREPARATION:

A. Be responsible for precisely laying out sanitary sewage system. Locations shown on drawings of various existing utility lines were determined on basis of best information available; however, no assurance can be given that actual locations will be precisely as shown on drawings.

B. Exercise due care and caution necessary to avoid damage to and impairment in use of existing utility lines. Repair and restore immediately damages inflicted on existing lines as directed by the Engineer at no cost to the State.

3.3 INSTALLATION:

A. Install sanitary sewage system as per applicable Standard Specifications, Standard Details and as noted on drawings.

B. Installation of PVC Plastic Gravity Piping: Install pipe and fittings in accordance with paragraph entitled “General Requirements for Installation of Pipelines” of this section and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

C. Installation of PVC Plastic Pressure Pipe and Fittings: Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of ASTM D 2774, ASTM D 2855, and UBPPA UNI-B-3 for laying of pipe, joining PVX pipe to fittings and accessories, and setting hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation."

a. Joints: Make push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint ends having factory-made bevel; for push-on joint connections to fittings, cut spigot end of pipe off square and re-bevel pipe end to approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of UBPPA UNI-B-3 for laying the pipe and the recommendations in AWWA M23, Chapter 7, "Installation," for pipe joint assembly. Assemble push-on joints for connection to fittings in accordance with requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners specified for this type joint and assemble in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111/A21.11 Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel.

b. Pipe anchorage: Provide concrete thrust blocks (reaction backing) for pipe anchorage. Size and position thrust blocks as indicated. Use concrete conforming to ASTM C 94 having a minimum compressive strength of 2,000 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 ½ parts sand, and 5 parts gravel, having the same minimum compressive strength.

c. Jointing: Make solvent-cemented joints for PVC plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with ASTM D 2855. Make solvent-cemented joints for ABS plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with the recommendations of the pipe manufacturer, as approved. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

d. Plastic Pipe Connections to Appurtenances: Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.

D. Installation of Polyethylene (PE) Plastic Piping: PE pipes shall be installed in accordance with ASTM 2774.

2. Polyethylene flanges must be at the ambient temperature of the surrounding soil at the time they are bolted tight to prevent relaxation of the flange bolts and loosening of the joint due to thermal contraction of the polyethylene. Flange bolts must be retightened at least once 24 hours after initial flange bolt tightening.

3. All polyethylene pipe must be at the temperature of the surrounding soil at the time it is backfilled and compacted.

4. Butt-Fusion Joining:

A. Sections of HDPE pipe shall be joined into continuous lengths on the job site above ground.

B. Pipes shall be joined to one another by means of thermal butt-fusion. Polyethylene pipe lengths to be joined by thermal butt-fusion shall be of the same type, grade and class of polyethylene compound and supplied from the same raw material supplier.

C. Joining method shall be the butt joint heat fusion method and shall be performed in accordance with the pipe manufacturer's recommendations.

D. Butt fusion equipment used on the joining procedures shall be capable of meeting all conditions recommended by the pipe manufacturer, including but not limited to, temperature requirements, alignment, and interfacial fusion pressure.

E. Pipe and fitting joints shall be heat fused by a qualified fusion technician; trained by an approved manufacturer's representative, in accordance with manufacturer's recommended fusion procedures. Joints shall be manufactured using a McElroy Datalogger or equivalent approval to record fusion pressure and temperature. A graphic representation of the temperature and pressure data for all fusion joints made shall be maintained as part of the quality control. The joint shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

F. Each person making butt joints shall demonstrate proficiency by making trial joints and destructively testing the trial fusion by bent strap testing or ultra-sonic testing. Trial joints shall be allowed to cool completely before testing, and shall not fail at the joint. During construction, the first fusion of the day shall be a trial fusion which shall be allowed to cool, and destructively bent strap tested or ultra- sonically tested. If the fusion fails, additional trial fusion shall be made and tested until successful fusion are made, then that procedure shall be used for the balance of the day's construction provided the procedure is within the limitations recommended by the manufacturer.

G. Bead Removal: The internal and external beads resulting from the butt-fusion process shall be completely removed before installation.

4. Electrofusion Fittings:

A. Install electrofusion fittings per manufacturer's recommendations.

E. Cleanouts: Construct cleanouts of heavy-duty cast-iron housing and cast iron plug. See drawings for details.

F. The Contractor shall be responsible for precisely laying out the sewer line shown on the contract drawings. The location shown on the contract drawings of the various existing utility lines which the new lines are to cross over or under or connect to where determined on the basis of the best information available, however, no assurance can be provided that the actual locations will be precisely as shown on the contract drawings.

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

H. Connect to existing sewer per Section 22 - Connection to Existing Sewer and Connecting Cesspool in Direct Line of Sewer of the Standard Specifications.

I. Concrete Jacket shall be installed per Section 43 – Concrete Blocks, Cradles and Jackets of the Standard Specifications, and Standard Details.

J. Piping Identification: For piping identification refer to Section 02780 Electronic Markers.

3.4 FIELD QUALITY CONTROL:

A. Testing shall comply with all applicable jurisdictional building codes, statutes, standards, regulations and laws.

B. Field Tests and Inspections: The Engineer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications. Do not bury or conceal piping until it has been inspected, tested, and approved. Where pipe passes through building structure, pipe joints shall not be concealed, but shall be located where they may be readily inspected and building structure shall not be weakened.

C. Hydrostatic Testing And Leakage Testing For Pressure Piping

1. Hydrostatic and leakage testing for piping systems that contain mechanical jointing as well as fused PVC jointing shall comply with AWWA D1785.

2. All hydrotesting water, chlorinated and unchlorinated, shall be disposed to the existing sewer system in accordance with the Industrial Wastewater Discharge (IWD) Permit Requirements.

3. Unless agreed to or otherwise designated by the Engineer, for a simultaneous hydrostatic and leakage test following installation, a pressure equal to 150% of working pressure at point of test, but not less than 125% of normal working pressure at highest elevation shall be applied. The duration of the pressure test shall be for two (2) hours.

4. If hydrostatic testing and leakage testing are performed at separate times, follow procedures as outlined in AWWA C605.

5. In preparation for pressure testing the following parameters must be followed:

   a. All air must be vented from the pipeline prior to pressurization. This may be accomplished with the use of the air relief valves or corporation stop valves, vent piping in the testing hardware or end caps, or any other method which adequately allows air to escape the pipeline at all high points. Venting may also be accomplished by 'flushing' the pipeline in accordance with the parameters and procedures as described in AWWA C605.

   b. The pipeline must be fully restrained prior to pressurization. This includes complete installation of all mechanical restraints per the restraint manufacturer's guidelines, whether permanent or temporary to the final installation. This also includes the installation and curing of any and all required concrete thrust blocking. All appurtenances included in the pressure test, including valves, blow-offs, and air-relief valves shall be checked for proper installation and restraint prior to the beginning of the test.

   c. Temporary pipeline alignments that are being tested, such as those that are partially installed in their permanent location shall be configured to minimize the amount of potentially trapped air in the pipeline.

3.5 BACKFILLING:

A. Backfilling is not permitted until lines have been tested and approved by the Engineer.

B. Backfilling shall be as specified under Section 02200 – Trenching, Excavation and Backfill.

3.6 FIELD QUALITY CONTROL:

A. Conduct field tests required by Standard Specifications in presence of the Engineer.

B. Provide leakage test for sewer pipes and appurtenances in accordance with the requirements of the Standard Specifications.

3.7 PROTECTION OF FINISHED WORK: Protect pipe from damage or displacement until backfill operation is in progress.

END OF SECTION

SECTION 02731 – SEWER FLOW CONTROL

PART I - GENERAL

1.1 DESCRIPTION

The Contractor shall furnish all labor, tools, materials and equipment necessary, including traffic control plans and work necessary to control sewer line flows to sewer lines undergoing replacement or rehabilitation. The Contractor shall use one or more of the following flow control methods unless otherwise allowed by the Engineer:

A. Plugging and Blocking: Sewer line plugs shall be inserted into the line at an upstream manhole location. The plug shall be designed so that a portion of the sewage flow can be released as may be required. During the work, flows shall be controlled and shall be either completely shut off or, as allowed by the Engineer, reduced sufficiently to ensure proper performance of Contract work.

B. Pumping and Bypassing: Pumping equipment, piping, and any other appurtenant equipment and tools shall be furnished and placed by the Contractor to bypass all gravity sewer lines where work is being performed. Standby pumps of equal size shall be on-site during pumping operations all pumps must be capable of pumping the highest of all Existing Design Peak Flows (Q_R), which accounts for existing population, daily peak flow, dry weather I/I and wet weather I/I.

Where additional temporary bypass piping is required, the bypass piping shall be buried in paved vehicular traffic areas, if required by the Engineer. Safe passage of pedestrian and vehicular traffic must be ensured through and around all bypassing equipment and materials. In areas not subject to vehicular traffic, temporary bypass piping may be laid on the ground surface as approved by the Engineer, but shall be pinned firmly in place to prevent movement and/or breakage during usage. All temporary bypass piping joints and connections shall be positively sealed with no leaks occurring. When the sewage bypass system is in operation, the Contractor shall ensure that the system is continuously manned, operated, monitored and maintained by skilled personnel specifically trained and experienced in all aspects of such systems. Standby pumps shall be checked, maintained, and started up periodically to ascertain their operational status.

Where sewer flow controls and bypassing are used, precautions shall be taken to ensure that water levels do not create backups nor cause damage or flooding to any properties. Any such damage, claims or fines due to the Contractor's operations shall be repaired, cleaned or compensated at the sole expense of the Contractor. The Contractor shall reference Section 01500, "Maintaining the Existing Wastewater System".

C. Hauling of Wastewater: Provisions shall be made by the Contractor to haul wastewater from the manhole(s) in the event of an emergency or wet weather flow event. All costs associated with wastewater hauling as a result of any emergency or wet weather flow shall be paid for by the Contractor at no extra cost to the State.

1.2 CONTRACTOR REQUIREMENTS

The pumping and bypassing contractor/subcontractor shall have successfully performed a minimum of two projects requiring pumping and bypassing of sewer line of 6-inch or larger diameter and/or average daily flows larger than 1 million gallons per day (mgd). The Contractor shall submit documentation of his meeting this minimum requirement within 15 calendar days of the Notice to Proceed date. The documentation shall include name of project, name and address of owner, owner contact person and phone number, description of constraints, significant environmental concerns, and letters of confirmation and project completion from owner.

1.3 SAFETY

Sanitary sewers convey sanitary sewage and certain substances which may be considered hazardous. These substances may include hydrogen sulfide, a natural gaseous byproduct of sanitary sewage. The Contractor shall exercise extreme caution and comply with all applicable Federal, State, and City regulations and all applicable OSHA requirements when performing the required sewer work or when in the vicinity of any hazardous substances.

1.4 SUBMITTALS

At least fifteen (15) calendar days prior to the planned start of actual construction activities, the Contractor shall prepare and submit for approval to the Engineer a proposed sewer bypass plan. The Contractor's proposed bypass plan shall include, but not be limited to, a sewer system map showing all sewer inverts, the anticipated sewage water level and rim elevations at manholes (record drawing information may be used, however, the Contractor shall adjust the elevations to reflect a common survey datum) in the areas affected by any diversion, anticipated peak sewage flows, and locations of plugs, pumps, piping, and monitoring sites for each stage of construction.

The Contractor shall submit a contingency plan that outlines the actions to be taken in the event that any sewage spills should occur. The Contractor's bypass plan shall be approved by the Engineer before any diversion of sewage flows will be allowed.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

The Contractor shall adhere to the following requirements when performing any work to plug, pump or bypass sewage flows:

A. The Contractor shall continuously monitor the sewage water level elevations in cleanouts or manholes upstream and downstream of the Project area and at any discharge manhole where flow is being diverted or pumped to. The Contractor shall obtain approval from the Engineer of all monitoring locations prior to commencing the bypassing or diversion of any sewage flows.

B. A trial diversion shall be performed one day before beginning rehabilitation work unless otherwise directed by the Engineer. Trial diversion shall continue for two (2) consecutive hours in the presence of the Engineer. Pumping equipment and piping shall be leak tested with potable water prior to pumping sewage.

C. In the event of an emergency, the Contractor shall be capable of immediately removing all plugs, diversion plates, bypass pumps, bypass piping, or any portions of diversion and bypass pumping equipment and materials as may be required.

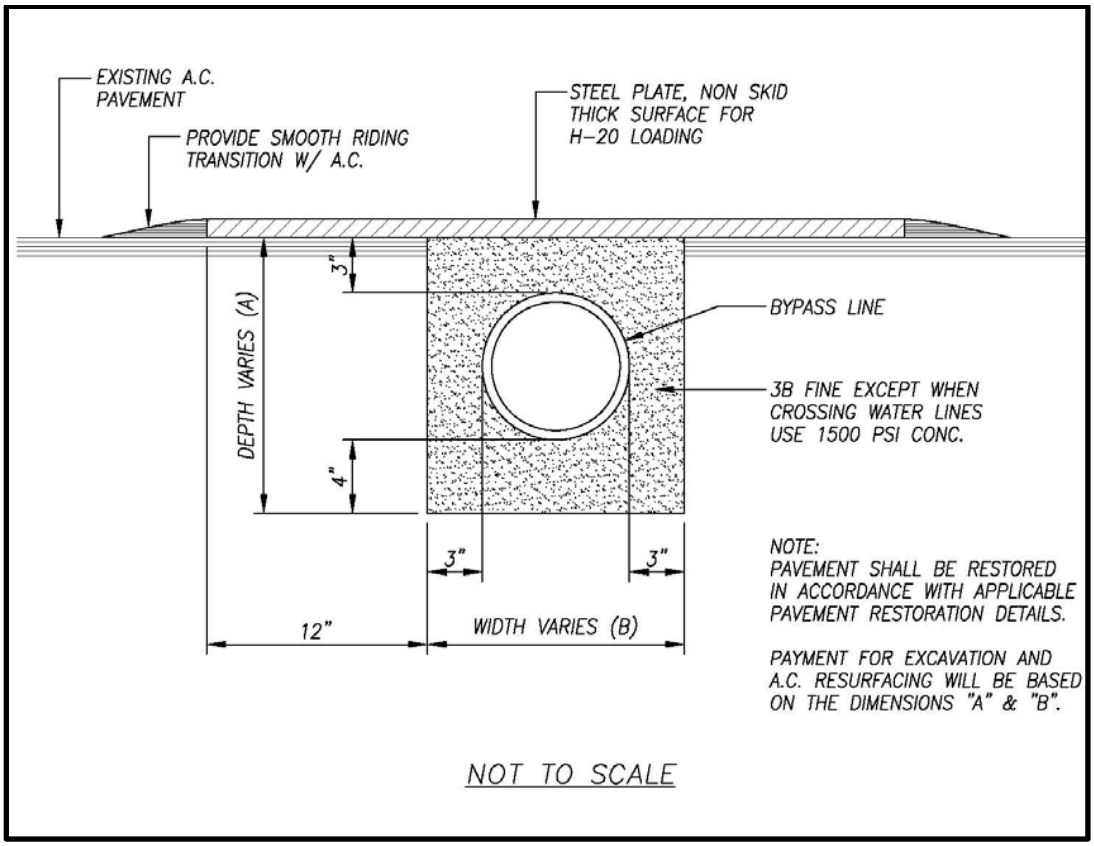
D. Pumping equipment and piping shall be checked for leaks by the Contractor at all times. Leak detection shall be performed any time the bypass pumping system is disassembled, reassembled or modified. No leaks in the diversion piping shall be permitted. Any fines resulting from sewage spills due to the Contractor's work shall be the total responsibility of the Contractor.

E. Where sewer flow controls are used, precautions shall be taken to ensure that sewer water levels do not create backups, damages, or flooding of public or private properties. Damages caused by the Contractor's operations shall be repaired and cleaned by the Contractor at no cost to the Owner. The Contractor shall also be responsible for the settlement of all claims for damages resulting from his work or actions.

F. Sewage flowing by gravity shall not be allowed to flow higher than the top of the crown of the flowing sewer pipe at any manhole as a result of construction or diversion activities. No diversion shall be implemented or left in place once the sewage level reaches aforementioned limits.

G. The Contractor shall be responsible for monitoring for high sewage flow conditions and for temporarily suspending their sewage flow control activities if conditions warrant it. The Contractor shall also temporarily suspend their sewage flow control activities if so directed by the Engineer. On-going Project work that requires sewage flow control shall be suspended until the conditions and the Engineer allow for the resumption of the sewage flow control activities.

I. Following the completion and acceptance of each section of sewer line replacement or rehabilitation work, the Contractor shall remove all diversion and bypass pumping equipment and piping and the area shall be restored to its original or better condition. The Engineer will evaluate the restoration work in accordance with the preconstruction site survey photographs, videotapes, and report of the project site provided by the Contractor



Temporary Bypass Line Detail

END OF SECTION

SECTION 02732 - SEWER LINE AND MANHOLE CLEANING

PART 1 - GENERAL

1.1 GENERAL

The term "clean" as used in these specifications shall be defined as the removal of materials to render the sewer manhole sufficiently prepped for rehabilitation or as directed by the Engineer. The work covered by this Section shall consist of furnishing all labor, materials, equipment, and supervision to perform all work necessary to clean the designated sewer manholes.

All work will be performed by experienced personnel using equipment and materials which meet the requirements hereinafter specified. The Contractor shall obtain all necessary permits required for the proper disposal of debris and other materials resulting from the cleaning work.

1.2 SAFETY AND EXPERIENCE

The Contractor shall have a documented, in place safety and health program which meets or, exceeds all Federal and State OSHA regulations, with special emphasis on hazard free work in confined spaces and sewage environment.

1.3 SUBMITTAL

A. Work Procedure: Submit for review a description of the procedures to be followed and equipment necessary to accomplish the work. Submittal shall be made fifteen (15) calendar days prior to initiating the work.

B. Records: Maintain printed records of all cleaning performed, including manhole ID, diameter, depth, pipe invert(s), manhole type, cleaning method(s) used, special remarks and observations, and other pertinent data. These records shall be available to the Engineer for inspection during the performance of work and shall become the property of the State after completion of the Project.

1.4 EQUIPMENT

All designated manholes to be rehabilitated shall be cleaned using vacuum and/or high velocity sewer cleaning equipment as specified herein, and the selection of equipment to be used shall be based on the condition of the pipe sections at the time the work commences. The equipment, and the methods selected for cleaning shall be capable of removing all dirt, sand, grease, rocks, air pockets, debris, sludge, roots, and other deleterious materials from the sewer manhole.

Satisfactory precautions shall be taken to protect the sewer manhole from damage that might be inflicted by the use of the cleaning equipment.

All solid or semisolid materials resulting from the cleaning operations shall be removed from the Project area and properly disposed of by the Contractor. An appropriate disposal site shall be arranged for by the Contractor and approved by the Engineer. All permits required for the proper transportation and disposal of the materials shall be the sole responsibility of the Contractor.

A. Vacuum Removal/Cleaning Equipment: This equipment shall be truck mounted for ease of operation, and designed to use air movement for cleaning and vacuuming of materials in the sewer pipe and manholes.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

A. Cleaning shall commence at the upstream pipe section and proceed downstream.

B. Materials resulting from the cleaning operations shall be trapped and removed from the downstream access point of the pipe section being cleaned. No materials shall be allowed to continue through the upstream access point into an adjacent pipe section at any time. The Contractor shall be responsible for properly disposing of all materials removed. Under no circumstances shall sewage or solids be dumped onto streets, or into streams, ditches, catch basins, storm drains, or the ocean. A vacuum truck shall be used to remove heavy accumulations of material.

C. The Contractor shall be responsible for properly disposing all materials removed. All materials resulting from cleaning operations shall be removed and conveyed by the Contractor in an environmentally safe manner in accordance with Federal, State, and local laws and regulations to a suitable waste disposal site approved by the Engineer. Under no circumstances shall sewage or solids be dumped onto street, or into streams, ditches, catch basins, storm drains or the ocean.

D. Where hydraulically propelled cleaning tools are utilized, precautions shall be taken to ensure that the water pressure created does not cause damage or flooding to public or private property.

E. To attain the required degree of sewer manhole cleaning, sewer flow controls as specified in SECTION 02731 "Sewer Flow Control" shall be provided.

F. No open manholes shall be left unattended during the Contractor's operations.

J. The Contractor is responsible for maintaining sewer service at all times during work.

K. The Contractor shall be responsible for locating hidden or buried manholes.

L. Damage to private property, gravity sewer lines and appurtenances caused by the Contractor's work shall be repaired by the Contractor at no additional cost to the State.

END SECTION

SECTION 02780 – ELECTRONIC MARKERS

PART 1 - GENERAL

1.1 DESCRIPTION

This item of work shall include the furnishing of all labor, materials, tools and equipment necessary for the installation and testing of electronic markers for "locating" purposes.

Electronic markers shall be installed over all sewer lines including gravity and force main, concrete jackets, mains under concrete pavement.

PART 2 – PRODUCTS

Electronic markers shall be the "Omni Marker", manufactured by Tempo, or approved equal.

Application	Color	Frequency	Model Number	UPC Number
Sanitary Sewer	Green	121.6 kHz	Model 162	60767

PART 3 – EXECUTION

3.1 CONSTRUCTION REQUIREMENTS:

A. Placement

Electronic markers shall be hand placed in the trench, centered over the pipe and covered with sufficient base course material to prevent shifting prior to backfilling of the trench. Installation shall be at a minimum depth of two (2) feet and a maximum depth of three (3) feet from finish grade.

B. Location

Installation of electronic markers shall be in accordance with the following:

1. One marker at all changes in horizontal alignment.

    a. Tees with branches 4-inches and larger
    b. Bends
    c. Deflection couplings
    d. Deflections at joints

2. One marker 10 feet prior to and one marker 10 feet after a change in horizontal alignment unless markers are required within the 10 foot distance.

3. On straight runs, markers shall be placed at a maximum distance of 40 feet.

4. One marker at the end of all mains.

5. Markers at the beginning and end of all concrete jackets.

6. Markers at the beginning and end of all sections of mains under concrete pavement.

7. One marker at the connection of the new main to the existing main.

8. Markers shall not be placed at crossings with electrical duct lines, gas lines or telephone duct lines. Install markers at a minimum clearance of 5 feet from these utility crossings.

C. Testing

Contractor shall test the electronic markers prior to installation to verify proper operation. The Engineer shall verify the number and locations of placed electronic markers prior to final paving.

END OF SECTION

SECTION 02900 - PLANTING GRASS

PART 1 - GENERAL

1.1 SUMMARY

Furnish all materials, labor and equipment required to accomplish the planting of grass as indicated on the drawings and specified herein.

1.2 STANDARD SPECIFICATIONS

The following specifications shall be made a part of this section:

“Standard Specifications for Public Works Construction," September 1986, Departments of Public Works County of Kauai, City and County of Honolulu, County of Maui, County of Hawaii of the State of Hawaii, hereinafter referred to as the "Standard Specifications."

PART 2 - PRODUCTS

2.1 MATERIALS

Materials for planting grass shall be in accordance with the following sections of the Standard Specifications as revised, except as amended on the drawings and/or in the specifications herewith:

Planting Trees, Shrubs, Ground Cover and Grass	Section 51

PART 3 - EXECUTION

3.1 LOCATION

Grass shall be installed on all soil surfaces exposed from trenching operations.

3.2 PLANTING

The Contractor shall have the option of planting grass by seeding, sprigging or hydromulching. Grass shall be planted in accordance with the sections of the Standard Specifications noted hereinbefore.

END OF SECTION

DIVISION 3 – CONCRETE

SECTION 03300- MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Sections:

1. Division 31 Section "Concrete Paving" for concrete pavement and walks.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Action Submittal:

1. Design Mixtures: For each concrete mixture.

1.3 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Comply with the following sections of ACI 301, unless modified by requirements in the Contract Documents:

1. "General Requirements."
2. "Formwork and Formwork Accessories."
3. "Reinforcement and Reinforcement Supports."
4. "Concrete Mixtures."
5. "Handling, Placing, and Constructing."

C. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.01 FORMWORK

A. Furnish formwork and formwork accessories according to ACI 301.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

2.03 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, Type I/II.

B. Normal-Weight Aggregate: ASTM C 33, graded, 1-1/2 inch nominal maximum aggregate size.

C. Water: ASTM C 94/C 94M.

2.04 ADMIXTURES

A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

2.05 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.06 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.07 CONCRETE MIXTURE

A. Comply with ACI 301 requirements for concrete mixtures.

B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
4. Slump Limit: 5 inches, plus or minus 1 inch.

2.08 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.

3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 – EXECUTION

3.01 FORMWORK

A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.03 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.04 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Locate and install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

3.05 CONCRETE PLACEMENT

A. Comply with ACI 301 for placing concrete.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

C. Consolidate concrete with mechanical vibrating equipment.

3.06 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding 1/2 inch.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.07 FINISHING UNFORMED SURFACES

A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.

1. Do not further disturb surfaces before starting finishing operations.

3.08 REPAIRS

A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION

DIVISION 11 - EQUIPMENT

SECTION 11100 – COMFORT STATION 6 WASTEWATER PUMP STATION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes package wastewater pump station (WWPS) indicated on Drawings and related.

1. Package WWPS shall be a complete factory-built and tested wet well/dry well grinder pump station such as Environmental One Corporation (E/ONE) model DH152 duplex grinder pump station or approved equal, complete with all appurtenances

2. Coordinate work for plumbing and electrical connection related to the package WWPS.

1.2 SUBMITTALS

A. Product Data: For package WWPS as indicated on the Drawings. Include manufacturer's model number and accessories.

B. Package WWPS documentation for proof of compliance with Uniform Plumbing Code.

C. Shop drawings detailing package WWPS equipment, including dimensions and materials.

D. Installer and Manufacturer Statement of Qualifications

E. Start-up authorization form

1.5 QUALITY ASSURANCE

A. Installer Qualifications: WWPS shall be installed by a contractor with a State of Hawaii plumbing license, has completed at least 10 installations similar in design and extent to that indicated for this Project, and has been in operation for at least 10 years. Electrical work shall be conducted by an electrician with a State of Hawaii license.

B. Manufacturer Qualifications: The equipment furnished hereunder shall be the product of a company experienced in the design and manufacture of grinder pumps specifically designed for use in low pressure systems.

All manufacturers proposing equipment for this project shall have at least 10 years of experience in the design and manufacture of units of identical size(s) and performance to the specified units.

All manufacturers proposing equipment for this project must also have not less than 250 successful installations of low pressure sewer systems utilizing grinder pumps of like type to the grinder pumps specified herein.

1.7 PROJECT CONDITIONS

Field Measurements: Verify equipment and connecting pipe dimensions and elevations by field measurements before installation.

1.9 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the State of other rights the State may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Warranty Period: 2 years from Owners acceptance. Any manufacturing defects found during the warranty period will be reported by the Owner to the Contractor and will be corrected at no cost to the Owner.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Package E/ONE DH 152 Duplex Grinder Pump Station, or approved equal, shall include:
   a. 150 gallon capacity tank
   b. Two grinder pumps, each with the following assembled in the basin
      i. Stainless steel discharge assembly/shut-off valve
      ii. anti-siphon valve/check valve
      iii. 1-horsepower, 1,725 rpm, high torque, capacitor start, thermally protected, 120/240V, 60 Hz, 1-phase motor
   c. NEMA 6P electrical quick disconnect
   d. pump removal system
   e. Duplex Protect and Panel with Sentry Advisor, Gen Receptacle and Auto Transfer Relay:
   f. Curb stop assembly kit, box, and 45” core wrench
   g. Concrete anchor (ballast)
   h. Controls

Component type grinder pump systems that require field assembly will not be acceptable due to the potential problems that can occur during field assembly

B. Duplex Protect and Panel with Sentry Advisor, Gen Receptacle and Auto Transfer Relay:

C. Curb stop assembly kit, box, and 45” core wrench

D. Concrete anchor (ballast),

2.2 PUMPS

The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil nominal dry thickness, wet applied. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

2.3 GRINDER

The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects," such as paper, wood, plastic, glass, wipes, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter stainless steel discharge piping.

2.4 TANK

The tank shall be a wet well/dry well design made of high density polyethylene, with a grade selected to provide the necessary environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. The corrugations of the outside wall are to be a minimum amplitude of 1-1/2" to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be 0.250" thick (minimum). All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.

The dry well access way shall be an integral extension of the wet well assembly and shall include a lockable cover assembly providing low profile mounting and watertight capability. The cover shall be high density polyethylene, green in color, with a load rating of 150 lbs per square foot. The access way design and construction shall enable field adjustment of the station height in increments of 3" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.

The station shall have all necessary penetrations molded in and factory sealed. To ensure a leak free installation no field penetrations will be acceptable.

All discharge piping shall be constructed of 304 stainless steel. The discharge shall terminate outside the access way bulkhead with a stainless steel, 1-1/4" Female NPT fitting. The discharge piping shall include a stainless steel ball valve rated for 235 psi WOG; PVC ball valves or brass ball/gate will not be accepted. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

The access way shall include a single NEMA 6P Electrical Quick Disconnect (EQD) for all power and control functions, factory installed with access way penetrations warranted by the manufacturer to be watertight. The EQD will be supplied with 32', 25' of useable Electrical

Supply Cable (ESC) outside the station, to connect to the alarm panel. The ESC shall be installed in the basin by the manufacturer. Field assembly of the ESC into the basin is not acceptable because of potential workmanship issues. The EQD shall require no tools for connecting, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. A junction box shall not be permitted in the access way due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required. The access way shall also include an integral 2-inch vent to prevent sewage gases from accumulating in the tank.

2.5 CHECK VALVE

The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the stainless steel discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back-pressure. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable

2.6 ANTI-SIPHON VALVE

The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the stainless steel discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

2.7 CONTROLS

All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. The wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. The level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. All fasteners throughout the assembly shall be 300 Series stainless steel.

2.8 STAINLESS STEEL CURB STOP/CHECK VALVE ASSEMBLY

The curb stop shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi.

The stainless steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4” passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure.

Curb Boxes – Curb boxes shall be constructed of ABS, conforming to ASTM-D 1788. Lid top casting shall be cast iron, conforming to ASTM A-48 Class 25, providing magnetic detectability, and be painted black. All components shall be inherently corrosion-resistant to ensure durability in the ground. Curb boxes shall provide height adjustment downward (shorter) from their nominal height.

Factory Test – The stainless steel, combination curb stop/check valve component shall be 100 percent hydrostatically tested to 150 psi in the factory.

Installation – Assemble the compression fittings according to the fitting manufacturer's recommendations.

2.9 ALARM PANEL

ALARM PANEL: Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 10.5" W x 14" H x 7" D, or 12.5" W x 16" H x 7.5" D if certain options are included.

The alarm panel shall contain one 15-amp, double-pole circuit breaker for the pump core's power circuit and one 15-amp, single-pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high level alarm capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:

1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.

2. The audible alarm may be silenced by means of the externally mounted, push-to-silence button.

3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the "off" setting of the alarm pressure switch.

The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

DUPLEX PROTECT PLUS:

Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel.

The panel shall contain one 15-amp single pole circuit breaker for the alarm circuit and one 15-amp double pole circuit breaker per core for the power circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The visual alarm lamp shall be inside a red, lens at least 3.75" L x 2.25" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

The high-level alarm system shall operate as follows:

1. The panel will go into alarm mode if either pump's alarm switch closes. During the initial alarm mode both pumps will run and the alarm light and buzzer will be delayed for a period of time based on user settings (default is 3-1/2 minutes). If the station is still in high-level alarm after the delay, the light and buzzer will be activated.

2. The audible alarm may be silenced by means of the externally mounted push-to-silence button.

3. The visual alarm remains illuminated until the sewage level in the wet well drops below the "off" setting of the alarm switch for both pumps.

The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

Contains the following features:

- Alarm Activated Dry Contacts – Normally open relay contact closes upon alarm activation.

- Alarm Activated Contacts for Remote Indoor Alarm Module – Will work with or without power to the alarm panel and is designed to work with E/One's Remote Sentry.

- Includes Inner Door Dead Front

- Separate LED's for each condition

Provides protection from the following operating conditions:

- Low Voltage (Brownout) Protection – A lockout cycle will prevent the motor from operating and will illuminate the Trouble LED if:

    - the incoming AC Mains voltage drops below a predetermined minimum, typically 12% of nameplate (211 volts for a 240 volt system) for 2 to 3 seconds, regardless of whether the motor is running

    - The lockout cycle will end if the incoming AC Mains voltage returns to a predetermined value, typically 10% of nameplate (216 volts for a 240 volt system).

  The system continues to retest the voltage every second indefinitely. If the lockout cycle has been initiated and the voltage comes back above the predetermined starting voltage, the system will function normally. The Trouble LED remains illuminated during a Brownout condition and a corresponding Brownout message will be displayed on the LCD screen. The LED will turn off when the Brownout condition ends and the LCD message remains latched until the panel is reset. The audible and visual alarm will not be activated unless there is a high wastewater level in the tank.

- Run Dry Protection – A 20-minute lockout cycle will prevent the motor from operating and will illuminate the Trouble LED when the wastewater level in the tank is below the pump inlet shroud. A corresponding Run Dry message will be displayed on the LCD screen. The condition is rechecked every 20 minutes and the LCD message remains latched. If the condition is satisfied, the pump is allowed to cycle normally and the Trouble LED will go out, but the LCD message remains latched. The LCD message will remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until the panel is reset or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle will be activated.

- High System Pressure Protection – A 20-minute lockout cycle will prevent the motor from operating and will illuminate the Trouble LED when the pressure in the discharge line is atypically high (closed valve or abnormal line plug). A corresponding Overpressure message will be displayed on the LCD screen. The condition is rechecked every 20 minutes. If the condition is satisfied, the pump is allowed to cycle normally and the Trouble LED will turn off, but the LCD message remains latched. The LCD message will remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely and the audible and visual alarm will be activated. The LCD message and alarms will remain latched until the condition is removed and the panel is reset.

GENERATOR RECEPTACLE AND AUTO TRANSFER: The alarm panel shall include a 20 amp, 250 VAC generator receptacle with a spring-loaded, gasketed cover suitably mounted to provide access for connection of an external generator while maintaining a NEMA 4X rating. An automatic transfer switch shall be provided, which automatically switches from AC power to generator power. Power shall be provided to the alarm panel through the generator receptacle whenever power is present at the receptacle, allowing the audible and visual alarms to function normally in generator mode. When power is no longer applied to the generator receptacle, the panel is automatically switched back to the AC Mains power.

SERVICE EQUIPMENT/MAIN SERVICE DISCONNECT BREAKER – A separate, internal breaker that is rated and approved for use as "service equipment" and acts as a main service disconnect of the grinder pump station shall be provided.

The entire alarm panel, as manufactured shall be listed by Underwriters Laboratories, Inc.

2.10 SERVICEABILITY

The grinder pump core, including level sensor assembly, shall have two lifting hooks complete with lift-out harness connected to its top housing to facilitate easy core removal when necessary. The level sensor assembly must be easily removed from the pump assembly for service or replacement. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect the internal electrical pins while the EQD is unplugged. A pump push-to-run feature will be provided for field trouble shooting. The push-to-run feature must operate the pump even if the level sensor assembly has been removed from the pump assembly. All motor control components shall be mounted on a readily SA replaceable bracket for ease of field service.

2.11 OSHA CONFINED SPACE

All maintenance tasks for the grinder pump station must be possible without entry into the grinder pump station (as per **OSHA 1910.146**, permit-required confined spaces). *"Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space."*

2.12 SAFETY

The grinder pump shall be free from electrical and fire hazards. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station shall be listed by Underwriters Laboratories, Inc. to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable.

The grinder pump shall meet accepted standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump shall bear the seal of NSF International. Third-party testing to NSF standard is not acceptable.

PART 3 – EXECUTION

3.1 FACTORY TEST

Each grinder pump shall be submerged and operated for 1.5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit's dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include: integral level control performance, continuity to ground and acoustic tests of the rotating components.

3.2 CERTIFIED SERVICE PROGRAM

CERTIFIED SERVICE PROGRAM: The grinder pump manufacturer shall provide a program implemented by the manufacturer's personnel as described in this specification to certify the service company as an authorized serviced center. As evidence of this, the manufacturer shall provide, when requested, sufficient evidence that they have maintained their own service department for a minimum of 15 years and currently employ a minimum of five employees specifically in the service department.

As part of this program, the manufacturer shall evaluate the service technicians as well as the service organization annually. The service company will be authorized by the Manufacturer to make independent warranty judgments. The areas covered by the program shall include, as a minimum:

1. Pump Population Information — The service company will maintain a detailed database for the grinder pumps in the territory that tracks serial numbers by address.

2. Inventory Management — The service company must maintain an appropriate level of inventory (pumps, tanks, panels, service parts, etc.) including regular inventory review and proper inventory labeling. Service technicians will also maintain appropriate parts inventory and spare core(s) on service vehicles.

3. Service Personnel Certification — Service technicians will maintain their level-specific certification annually. The certifications are given in field troubleshooting, repair, and training.

4. Service Documentation and Records — Start up sheets, service call records, and customer feedback will be recorded and available by the service company.

5. Shop Organization — The service company will keep its service shop organized and pumps will be tagged with site information at all times. The shop will have all required equipment, a test tank, and cleaning tools necessary to service pumps properly.

3.3 DELIVERY

All grinder pump units will be delivered to the job site 100 percent completely assembled, including testing, ready for installation. Field installation of the pump in tanks under 96 inches is not allowed. Field installation of the level sensor into the tank is not allowed. Grinder pump stations will be individually mounted on wooden pallets.

3.4 INSTALLATION

Earth excavation and backfill are specified under SECTION 02200 “Trench, Excavation and Backfill”, but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.

The Contractor shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.

The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the Engineer.

Remove packing material. User instructions MUST be given to the Owner. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4" inlet grommet (4.50" OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.

Installation shall be accomplished so that 1 inch to 4 inches of access way, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.

A 6" inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.

A concrete anti-flotation collar, as detailed on the drawings, and sized according to the manufacturer’s instructions, shall be required and shall be pre-cast to the grinder pump or poured in place. Each grinder pump station with its pre-cast anti-flotation collar shall have a minimum of three lifting eyes for loading and unloading purposes.

If the concrete is poured in place, the unit shall be leveled, and filled with water, to the bottom of the inlet, to help prevent the unit from shifting while the concrete is being poured. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured.

The Contractor will provide and install a 4-foot piece of 4-inch SCH 40 PVC pipe with water tight cap, to stub-out the inlet for the property owners’ installation contractor, as depicted on the contract drawings.

E/One requires that an E/One Uni-Lateral assembly (E/One part number NB0184PXX or NC0193GXX) or E/One Redundant Check Valve (E/One part number PC0051GXX) be installed in the pipe lateral outside the home between the pump discharge and the street main on all installations.

The electrical enclosure shall be furnished, installed and wired to the grinder pump station by the Contractor. An alarm device is required on every installation, there shall be NO EXCEPTIONS. It will be the responsibility of the Contractor to coordinate with the Owner to determine the optimum location for the Alarm Panel.

The Contractor shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 32 feet, 25 feet of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a factory installed EQD half to connect to the mating EQD half on the core.

3.5 START-UP AND FIELD TESTING

The Manufacturer shall provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the Owner's personnel in the operation and maintenance of the equipment before the stations are accepted by the Owner.

All equipment and materials necessary to perform testing shall be the responsibility of the Installing Contractor. This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technician(s) arrival on site.

Upon completion of the installation, the authorized factory technician(s) will perform the following test on each station:

1. Make certain the discharge shut-off valve in the station is fully open.

2. Turn ON the alarm power circuit and verify the alarm is functioning properly.

3. Turn ON the pump power circuit. Initiate the pump operation to verify automatic "on/off" controls are operative. The pump should immediately turn ON.

4. Consult the Manufacturer's Service Manual for detailed start-up procedures.

Upon completion of the start-up and testing, the Manufacturer shall submit to the Engineer the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

PART 4 – OPERATION AND MAINTENANCE

A. The Contractor HEMANUALS
B. Package WWPS shall be installed as recommended by the manufacturer.

END OF SECTION

SECTION 11101 – SUBERMISBLE NON-CLOG WASTEWATER PUMPS AND EQUIPMENT AT PUMP STATION 3

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes furnishing and installing two submersible non-clog wastewater pumps indicated on the Drawings and related.

1. Coordinate work for plumbing and electrical connection related to the WWPS.

1.2 SUBMITTALS

A. Product Data: For submersible non-clog as indicated on the Drawings include manufacturer's model number and accessories.

B. Shop drawings detailing equipment, including dimensions and materials.

C. Installer and Manufacturer Statement of Qualifications

D. Start-up authorization form

1.5 QUALITY ASSURANCE

A. Design and Operating Requirements: Pumps shall perform as described in the drawings.

B. Installer Qualifications: WWPS shall be installed by a contractor with a State of Hawaii plumbing license, has completed at least 10 installations similar in design and extent to that indicated for this Project, and has been in operation for at least 10 years. Electrical work shall be conducted by an electrician with a State of Hawaii license.

C. Manufacturer Qualifications: The equipment furnished hereunder shall be the product of a company experienced in the design and manufacture of non-clog submersible pumps.

Manufacturer's Experience: All manufacturers proposing equipment for this project shall have at least 10 years of experience in the design and manufacture of units of identical size(s) and performance to the specified units. Pumps of each type shall be the standard product of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory service for at least 5 years prior to bidding.

1.7 PROJECT CONDITIONS

Field Measurements: Verify equipment and connecting pipe dimensions and elevations by field measurements before installation.

1.9 WARRANTY

A. General Warranty: For the period defined, Xylem Water Solutions USA, Inc. offers a commercial warranty to the original End Purchaser against defects in workmanship and material on Flygt Products.

B. Warranty Period: From months 1 to 18 from the date of shipment or date of valid Start-Up, the warranty coverage is 100%. From months 19 to 39 from the date of shipment or date of valid Start-Up, the warranty coverage is 50%. From months 40 to 60 from the date of shipment or date of valid Start-Up, the warranty coverage is 25%.

PART 2 – PRODUCTS

2.1 MATERIALS

A. 2 submersible non-clog wastewater pumps. Each pump shall be equipped with an 11 HP submersible electric motor connected for operation on 230 volts, 3 phase, 60 hertz, wire service, with 50 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and have P-MSHA Approval.

B. Guide Rails: Stainless steel guide rails and guide bar brackets for pumps shall be the same manufacturer as submersible pumps provided.

C. Access Hatch: Access hatch shall include 316SS nuts and bolts.

D. Duplex Control Panel, 316 SS NEMA 4X, with cell modem and auto dialer.

2.2 PUMPS

A. Pumps shall be a NP 3127 SH 3 Xylem Flygt non-clog submersible pump, or Engineer approved equal.

B. General Pump Construction: Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be AISI type 316 stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or optional Viton rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

2.3 CABLE ENTRY SEAL

A. The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the interior from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

2.4 MOTOR

A. The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 40°C (104°F) and capable of no less than 30 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches set to open at 125°C (260°F) shall be embedded in the stator end coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber containing the terminal board, shall be hermetically sealed from the motor by an elastomer compression seal. Connection between the cable conductors and stator leads shall be made with threaded compression type binding posts permanently affixed to a terminal board. The motor and the pump shall be produced by the same manufacturer.

The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40°C (104°F) ambient and with a temperature rise not to exceed 80°C. A performance chart shall be provided upon request showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.

The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

2.5 BEARINGS

A. The pump shaft shall rotate on two bearings. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single deep groove ball bearing. The lower bearing shall be a two row angular contact bearing to compensate for axial thrust and radial forces. Single row lower bearings are not acceptable. The minimum L_{10} bearing life shall be 50,000 hours at any usable portion of the pump curve.

2.6 MECHANICAL SEALS

A. Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, corrosion and abrasion resistant tungsten-carbide ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, corrosion and abrasion resistant tungsten-carbide seal ring.

Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor depend on direction of rotation for sealing. The position of both mechanical seals shall depend on the shaft. Mounting of the lower mechanical seal on the impeller hub will not be acceptable. For special applications, other seal face materials shall be available.

The following seal types shall not be considered acceptable or equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces. No system requiring a pressure differential to offset pressure and to effect sealing shall be used.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate dry without damage while pumping under load.

Where a seal cavity is present in the seal chamber, the area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.

Seal lubricant shall be non-hazardous.

2.7 PUMP SHAFT

A. Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be stainless steel – ASTM A479 S43100-T.

B. If a shaft material of lower quality than stainless steel – ASTM A479 S43100-T is used, a shaft sleeve of stainless steel – ASTM A479 S43100-T is used to protect the shaft material. However, shaft sleeves only protect the shaft around the lower mechanical seal. No protection is provided in the oil housing and above. Therefore, the use of stainless steel sleeves will not be considered equal to stainless steel shafts.

2.8 IMPELLER (ADAPTIVE)

A. The impeller shall be of Hard-Iron™ (ASTM A-532 (Alloy III A) 25% chrome cast iron), dynamically balanced, semi-open, multi-vane, back-swept, non-clog design. The impeller vane leading edges shall be mechanically self-cleaned upon each rotation as they pass across a spiral groove located on a replaceable insert ring.

B. The impeller shall have vanes hardened to Rc 45 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in waste water. The screw shape of the impeller inlet shall provide an inducing effect for the handling of sludge and rag-laden wastewater. The impeller shall be capable of momentarily moving axially upwards a distance of 15mm/0.6-in. to allow larger debris to pass through and immediately return to normal operating position.

2.9 VOLUTE / SUCTION COVER

A. The pump volute shall be a single piece grey cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall be cast of Hard-Iron™ (ASTM A-532 (Alloy III A) 25% chrome cast iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

2.10 PROTECTION

A. All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. The thermal switches shall open at 125°C (260°F), stop the motor and activate an alarm.

B. A leakage sensor shall be available as an option to detect water in the stator chamber. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will stop the motor and send an alarm both local and/or remote. USE OF VOLTAGE SENSITIVE SOLID STATE SENSORS AND TRIP TEMPERATURE ABOVE 125°C (260°F) SHALL NOT BE ALLOWED.

C. The thermal switches and FLS shall be connected to a Mini CAS (Control and Status) monitoring unit. The Mini CAS shall be designed to be mounted in any control panel.

2.11 LIFTING SYSTEM

A. Provide a lifting device equal to the Flygt “Grip Eye” system. This system, which shall be capable of lifting the pump and motor, shall consist of a stainless steel cable connected to a stainless steel chain attached to the pump. The lifting device shall be constructed of wrought alloy steel.

2.12 GUIDE RAILS

A. Guide rails shall be attached to the automatic discharge connection at their lower end and to an upper bar bracket at their upper end. Intermediate guide rail bar supports shall be provided as required to insure a rigid installation. The guide rail bars shall not support any of the pump weight.

2.13 LEVEL FLOAT SWITCHES

A. The float switches shall consist of a mechanically activated SPDT micro switch encased in a polypropylene float. Mercury activated switches shall not be allowed. The interrupting capacity of the switch shall be 250VAC 10A resistive load, 250VAC 3A inductive load, or 30VDC 5A. The plastic components shall be screwed or welded together. Plastic casings joined by adhesives shall not be allowed. The cable shall consist of 3 conductors in a PVC sheath. The float switch shall operate in media temperatures of 0 to +60 degrees C, and in media densities of 0.65 to 1.5 g/cm3. The float switch shall be ENM-10 by Xylem Flygt, or Engineer approved equal.

2.14 LEVEL TRANSMITTER

A. The level transmitter shall be a MJK Model 3400 Hydrostatic Level Transmitter, or Engineer approved equal.

B. All materials shall be supplied by one manufacturer to ensure consistent fit and system-wide functioning.

C. Furnishing, installing, and calibrating level measuring equipment including, but not limited to, pressure-type water level transmitter, mounting hardware, signal wiring at locations shown on the drawings, labor, equipment, materials, supervision and incidentals necessary for a complete and properly functioning level measurement system, shall be in accordance with Section 11102 “Submersible Water Level Measuring and Transmitting System”.

2.15 PUMP CONTROL PANEL

A. The level transmitter shall be MJK Model 704 System Package 1, or Engineer approved equal.

B. All materials shall be supplied by one manufacturer to ensure consistent fit and system-wide functioning.

C. Furnishing, installing, and calibrating water level measuring and pump control equipment including, but not limited to, ultrasonic-type level sensor, pump controller, mounting hardware, signal wiring at locations shown on the drawings, labor, equipment, materials supervision and incidentals necessary for a complete and properly functioning level measurement and pump control system, shall be in accordance with Section 11103 "Water Level Pump Control System".

PART 3 – EXECUTION

3.1 INSTALLATION

A. Each pump shall be aligned, connected, and installed in accordance with manufacturer's recommendations.

B. After completion of installation each pumping unit shall be field tested to demonstrate compliance with the performance requirements as specified in accordance to Section 01660, "Installation, Testing and Commissioning".

PART 4 – OPERATION AND MAINTENANCE

A. Operation and maintenance shall be in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 11102 - SUBMERSIBLE WATER LEVEL MEASURING AND TRANSMITTING SYSTEM

PART 1 – GENERAL

1.00 SCOPE OF WORK

1.01 DESCRIPTION:

A. The work in this section consists of furnishing, installing, and calibrating level measuring equipment including, but not limited to, pressure-type water level transmitter, mounting hardware, signal wiring at locations shown on the drawings, labor, equipment, materials, supervision and incidentals necessary for a complete and properly functioning level measurement system.

1.02 SYSTEM DESCRIPTION

A. Sensors, signal processors, hardware and wiring to produce local sensing and transmitting a linear signal proportional to the water level.

1.03 SUBMITTALS

A. Product Data:

1. Catalog cut sheets or product data sheets

2. O&M manual with product wiring diagrams and dimensional drawings for the products

1.04 QUALITY ASSURANCE

A. System Responsibility:

1. Components, installation and start-up are to be supplied by a single supplier.

2. Supplier shall be responsible for system function.

PART 2 – PRODUCTS

2.01 SUBMERSIBLE LEVEL TRANSMITTER

A. Manufacturers: The level transmitter shall be MJK Model 3400 Hydrostatic Level Transmitter, or Engineer approved equal.

B. System Description:

1. The level transmitter shall measure level from 0 to 12 inch through 0 to 1000 feet as specified at the time of ordering.

2. The level transmitter shall be capable of being custom scaled in the field using a PC with a USB port, USB adaptor kit and software, without the need for programming skills or test jigs.

3. The level transmitter shall have equal to or better than ±0.1% full scale accuracy, less than 0.015%/ºF drift, direct air pressure compensation, temperature compensation, and less than 0.1% drift during the first year of operation.

4. The level transmitter shall produce a linear 4-20mA signal proportional to the measured level, and capable of transmission over a maximum 600-ohm loop resistance. The signal shall be transmitted as indicated on the drawings.

5. The level transmitter shall have a ceramic diaphragm in an iron rod reinforced NEMA 6P PSS (Ryton) housing.

6. The level transmitter shall have an oil resistant Polyurethane jacketed, 2X AWG-20 wire and 5 x30AWG shielded cable, with a 2000 lb. pull strength, and with internal and external dust and water barriers on the breather tube.

7. The level transmitter shall have CE approvals EN50081-1 and EN50082-1.

8. The level transmitter shall be UL certified and approved for use in Class 1 Division 1 Groups A-D hazardous atmospheres.

9. The level transmitter shall have an operating temperature range from 14 to 158ºF.

10. The level transmitter shall be 10-29VDC loop powered from the flow converter.

C. Materials:

1. All materials shall be supplied by one manufacturer to ensure consistent fit and system-wide functioning.

2. Provide:

   a. Hydrostatic level transmitter with required measurement range.

   b. Hydrostatic level transmitter manufacturer’s recommended cable mounting.

   c. All necessary wires and hardware necessary for installation and operation.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16000 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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

1.02 DESCRIPTION OF WORK

This Section includes specifications for interior and exterior electrical work.

1.03 GENERAL REQUIREMENTS

A. Electrical Work: Provide all articles, materials, equipment operators, systems and services specified herein and on the Drawings and as normally required by accepted industry standard practices, including all labor taxes, fees, insurance, warranties and incidentals required to complete all electrical work.

B. In general, the following work is included:

1. Demolish existing electrical connections and equipment as indicated on the drawings.

2. Provide, complete and in place, electrical system as indicated in the Drawings and specified herein. Provide, complete and in place, exterior and interior electrical system.

3. Provide saw cutting (where required), excavation, shoring, bracing, suitable backfill material, concrete encasement, backfilling, compacting, ac patching (where required) and concrete patching (where required) for complete duct system installation.

4. Coordinate work with HECO, the Owner, and the State electrical inspectors.

C. Furnish required submittals and samples.

D. Coordinate work with other trades to avoid omissions and overlapping of responsibilities.

E. Apply for, obtain and pay for all State fees, permits, licenses, utility fees, assessments and inspections required for this work.

F. Pay for all temporary construction and testing power.

G. Before bidding, visit project site, carefully review each section of the Specifications and all Drawings of this Contract. Verify details, report any error, conflicts or omissions to the Engineer at least 10 calendar days before submission of bids for interpretation or clarification. If errors or omissions are not reported, Contractor shall provide necessary work at no additional cost to the Engineer to properly complete intent of Specifications and Drawings. By submitting a proposal of the work included in this contract, the Contractor shall be deemed to have made such examination and to be familiar with and accept all conditions of the job site.

1.04 INTENT OF SPECIFICATIONS AND DRAWINGS

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

B. Specifications and Drawings complement each other and what is specified, scheduled or mentioned on one shall be binding as if called for by both.

C. Discrepancies and Interpretations:

1. Should the Contractor find any discrepancies in or omissions from any of the documents or be in doubt as to their meaning, he shall advise the Engineer who will issue any necessary clarification within a time period which does not disrupt the progress of the work.

2. All interpretation and supplemental instructions will be in the form of a written addendum to the Contract Documents.

3. Should any discrepancies arise from the failure of the Contractor to notify the Engineer, the higher quality or larger quantity of item shall prevail. Engineer shall make the final interpretation and judgment.

4. In the event of a discrepancy between small scale drawings and large scale details, or between Drawings and Specifications, of which is in violation of any regulations, ordinances, laws or codes, the discrepancy, if known by the Contractor, shall be immediately brought to the attention of the Engineer for a decision before proceeding with the particular work involved. Work carried out disregarding these

instructions will be subject to removal and replacement at the Contractor's expense.

1.05 DEFINITIONS

A. Provide: "Furnish and install, test and deliver to the Engineer in operating and ready to use condition."

B. Wiring: "Provide all raceways, junction boxes, conductors, devices, protection equipment, installation of motor controllers (furnished by others) when required, etc., including testing for a complete, operative and ready to use electrical system."

C. Equal: "Material, equipment or system, including all necessary labor, modifications and accessories satisfying the requirements of the contract documents, the design intent, and to provide features or have operating characteristics equal or better than that specified."

D. Complete: "Furnish installation that is operative, tested, and ready to use and which satisfies the intent of the contract documents, including all necessary accessories and modifications."

E. Contractor: "General Contractor responsible for all work shall assign work to Sub-Contractors. Except where noted, work of this section shall be assigned to the Electrical Sub-Contractor."

F. HECO: Hawaiian Electric Company

1.06 QUALITY ASSURANCE

A. Government and Utility Requirements: Comply with all requirements of the Owner, State, Disability and Communication Access Board (DCAB), and respective utility company rules and regulations.

B. Specifications are accompanied by architectural, civil, mechanical, landscape, and audio-visual plans of the buildings, site, and diagrammatical electrical plans showing locations of luminaries, standards, outlets, feeder runs, devices and other electrical equipment. Locations are approximate and before installation, Contractor shall study adjacent construction details and make installation in the most logical manner. Prior to installation and at the direction of the Engineer, relocate any device, equipment, feeder, or circuit within 10'-0" of the location presently shown without added cost to the Engineer.

C. Prior to start of the rough-in work, verify all dimensions and equipment sizes with the approved shop drawings including equipment furnished by

others. Circuits and raceway routes are diagrammatic and may be altered in any logical manner. However, all changes from the contract documents shall be subject to review and acceptance of the Engineer and indicated on the "As-built" Drawings.

D. Feeders and branch circuits for equipment furnished by others were sized for the anticipated equipment. Verify electrical requirements of all equipment furnished by others prior to rough in and prior to ordering of the electrical distribution equipment. Re-size affected feeders and branch circuits at no additional cost to the Engineer.

E. Materials and Equipment: Materials and equipment shall conform to requirements of applicable technical specification sections, publications specified therein and shall be as shown on the drawings. Materials and equipment shall be new and shall be the product of manufacturers regularly engaged in the manufacture of such products.

All items shall essentially duplicate materials and equipment which have been in satisfactory use at least 2 years prior to bid opening and shall be supported by a service organization that is located reasonably close to the site of installation.

F. Substitution:

1. Where items are specified by manufacturer's name or catalog number, substitutions require written permission by the Engineer prior to bidding. Brand names, manufacturer's names and catalog numbers indicate the standard of design and quality required. List of substitute materials together with qualifying data shall be submitted for review in accordance with the GENERAL PROVISIONS. Failure to submit substitute material for review in a timely manner shall mean that materials, as specified, will be provided. Substitute materials submitted and rejected shall not be resubmitted in any modified form.

2. Samples of proposed substitute items may be required and shall be submitted by the Contractor at his expense as soon as practicable after they are requested.

3. Burden of proof of equality of proposed substitutions will be the responsibility of the Contractor. Submittals shall be sufficiently detailed to permit evaluation of the proposed items. Inadequacy of submittals shall be sufficient cause to reject a proposed substitution.

4. All prospective bidders must submit descriptive information on proposed material for acceptance where an item is detailed but no manufacturer is named.

5. Costs to review any contractor submitted value engineering change proposals shall be paid by the Contractor.

G. Prevention of Corrosion: All metallic materials shall be protected against corrosion. Exposed metallic parts of equipment, apparatus, devices, mounting hardware, and fasteners that are provided in damp, wet, or corrosive areas shall be constructed from 316 or 316L stainless steel. All such parts as boxes, bodies, fittings, guards and miscellaneous parts shall be constructed of 316 or 316L stainless steel. The Contractor shall not join dissimilar metals that will result in deterioration due to galvanic corrosion.

1.07 DEPARTURES

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

EXAMPLE:

Item	Manufacturer and Catalog Number Specified	Substitute Manufacturer and Catalog Number
Cable	John Doe - No. 3200	King - No. 2200

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

1.08 SUBMITTALS

A. Submit in accordance with SECTION 01300 - SUBMITTALS. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. Incomplete submittals and those without summary sheets will be returned without review.

A.

B. List of Materials and Equipment: These lists shall include manufacturer's names and material or equipment identification such as styles, types, or catalog numbers to permit ready and complete identification. Original catalog cuts or brochures shall be provided. Scanned or photocopied submittals will be rejected without review.

C. Product Data: Shall be sufficiently comprehensive and detailed to permit evaluations, otherwise the item may be rejected, and shall include, as applicable, the following:

1. Original catalog cuts or brochures shall be provided. Scanned or photocopied submittals will be rejected without review.

2. Each submittal shall contain an itemized list of each item being submitted. Each item shall be identified with the complete manufacturer's ordering number including all options.

3. Dimension outlines of all enclosures.

4. Dimension drawings of components such as switchboard, motor control center, panelboards, transformers, enclosed circuit breakers, safety disconnect switches, inverters, and generators.

5. Scaled drawings showing the layouts and arrangement of equipment in all electrical rooms, telecom rooms, and generator rooms.

6. Operating and electrical characteristics including interrupting ratings and impedances.

D. Certificate of Compliance: Where required by the section specifying the equipment, the Contractor shall submit 6 copies of certificates of compliance in accordance with the requirements of SECTION 01300 - SUBMITTALS. The certificates shall include but not be limited to factory test reports.

E. Installation, Operation and Maintenance Data: 6 copies of installation, operation and maintenance data shall be submitted for equipment specified to require such data. The data shall be in the form of manuals and shall

indicate instructions for operating, maintaining, repairing, recommended inspection points, periods for inspection, and all related spare parts in a practical, complete and comprehensive manner. The information shall be arranged in a logical, orderly sequence, including a general description of the equipment and significant technical characteristics.

Test, adjustment and calibration information shall be furnished and identified to specific equipment. The installation, operation and maintenance data shall be in accordance with SECTION 01300 - SUBMITTALS.

F. Acceptance Requirements: Acceptance for material and equipment will be based on manufacturer's published data. Where materials or equipment are specified to be constructed and tested, or both, in accordance with the standards of the

National Electrical Manufacturers Association (NEMA) or the American National Standards Institute (ANSI), the Contractor shall submit proof that the items furnished under this section of the specifications conform to such requirements. A certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard by a company listed as a member company of NEMA for the section whose standards cover the item under construction, will be acceptable as sufficient evidence that the item conforms to the requirements of the National Electrical Manufacturers Association. A manufacturer's statement indicating complete compliance of each item with the applicable NEMA, ANSI or other commercial standard specified shall be submitted and will be acceptable proof of compliance. Conformance with the agency requirements does not relieve the item from complying with any other requirements of the specifications.

G. Nameplates:

1. General: In addition to standard manufacturer's nameplate, permanent corrosion resistant nameplates shall be provided for each enclosed circuit breaker, safety switch, panelboard, lighting contactor, inverter, telecom junction box, and other major pieces of equipment. Nameplates shall designate the function of the equipment for which they are used. The designation shall be submitted for review and acceptance with the shop drawings.

2. Material and Lettering: 1/16-inch thick, laminated plastic, black-white-black. Nameplate lettering shall be 1/4-inch high upper-case.

3. Fastening: Nameplates shall be fastened stainless steel (316) screws.

4. Hand lettering or stick-on embossed marking tape is not acceptable.

5. Provide laminated tape labeling for all new receptacles on coverplates. Identify associated panel name and circuit number.

H. Labels:

1. Provide labels as required by the latest version of the National Electrical Code adopted by the State.

2. The labels shall be designed according to the following standards:

a. UL969 – Standard for Marking and Labeling Systems.

b. ANSI Z535.4 – Product Safety Signs and Labels.

c. NFPA 70 (National Electric Code) – Article 110.16.

d. NFPA 70E – Section 130.

3. Labels shall be provided for, but not limited to:

a. Available fault currents at switchboards and panelboards per 2014 NEC 110.24(A).

b. Arc Flash warning labels shall be provided per 2014 NEC 110.16 and 2015 NFPA-70E 130.5. The contractor shall attain all information required for the calculations, perform the calculations, and provide the labels at no additional cost.

c. Source and location of feeder serving switchboards and panelboards per NEC 408.4(B).

d. Method utilized for conductor identification per 2014 NEC 210.5(C).

4. Label materials shall be provided similar to nameplates except that labels for wires, conductors, and cables shall be of the printed tape type.

I. Factory Tests and Inspection:

1. The equipment furnished shall be inspected mechanically and electrically, and all manufacturers' routine factory tests shall be performed to verify conformance with the specified requirements. The

test equipment and test methods shall conform to the requirements of standards specified. The contract price shall include cost of performing all tests.

2. The Contractor shall furnish, at time of equipment delivery, 6 certified copies of all test results.

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

K. Shop Drawings: Layout shop drawings required. Prepare and submit the following coordinated layout shop drawings:

1. All electrical rooms with electrical equipment along with lighting and mechanical equipment and dimensions.

2. Underground ducts, handholes, manholes in relation to structural footings, wet utility lines including but not limited to sewer, storm drain, domestic water, fire, water, etc.

3. Areas requiring deviation from design documents. Such deviations shall be clearly identified.

1.09 CODES, REGULATIONS AND STANDARD SPECIFICATIONS

A. Work shall conform to the Hawaii Revised Statutes, the Ordinances of the State; the International Conference of Building Officials (ICBO) International Building Code (IBC); and the latest edition of National Electrical Code (NEC).

B. Applicable rules, standards and specifications of following associations shall apply to materials, workmanship, and procedures:

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

1.10 WARRANTY

Defective materials and workmanship shall be removed and replaced at no cost to the Owner. For period of one year after date of final acceptance of work by the Owner, materials and workmanship developing defects and malfunctions shall be repaired and/or replaced, to conform with intent of the specification and drawings, at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

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

PART 3 - EXECUTION

3.01 MATERIALS AND EQUIPMENT PROVIDED BY THE CONTRACTOR

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

3.02 PROTECTION DURING STORAGE

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

3.03 PROTECTION OF WORK IN PROGRESS

All electrical materials and equipment shall be completely protected during installation. Equipment shall be securely protected against physical or chemical damage. In areas exposed to weather, materials unused at the end of each day's

work shall be protected by weatherproofed installations. All unprotected conduits shall be sealed to prevent water and foreign debris from entering conduits. Damage to materials and equipment due to Contractor's neglect shall be repaired or replaced by and at the expense of the Contractor.

3.04 PROGRESS OF WORK AND COORDINATION

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

3.05 RULES

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

3.06 COORDINATION

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

3.07 WORKMANSHIP

A. All materials and equipment shall be installed in accordance with printed recommendations of the manufacturer and shall conform to the requirements of the contract drawings. The installation shall be accomplished by workers skilled in this type of work. For actual fabrication, installation and testing of the Electrical work, use only thoroughly trained and experienced workmen completely familiar with items to be installed and with manufacturers' recommended methods of installation. In acceptance or rejection of installed work no allowance will be made for lack of skill on part of workmen.

B. Inspection: Skill and competency of workmanship shall be subject to the approval of the Engineer. The contractor shall open all electrical equipment, cabinets, junction boxes, and devices as required by the Engineer or inspector for inspection. All equipment shall be de-energized prior to inspection unless voltage and current measurements are required. The

Contractor shall be responsible for all electrical and arc flash safety at the project site.

3.08 FIELD TESTS

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

B. Insulation Tests: The insulation of all conductors shall be tested with a megger insulation tester. Submit results of tests to the Engineer.

C. Operating Tests: The equipment and systems shall be demonstrated to operate in accordance with the requirements of the technical sections in which the equipment or systems are specified.

D. Test all 600 volt class conductors to verify that no short circuits or accidental grounds exist. Make tests using an instrument which applies a voltage of approximately 500 volts to provide a direct reading in resistance, and measure the insulation resistance from phase to phase and phase to neutral. All test results shall be recorded and submitted to the Engineer.

E. Wherever test or inspection reveals faulty materials or installation, Contractor shall take corrective action, at his own expense, repairing or replacing materials or installation as directed. The materials or installation shall then be retested.

END OF SECTION

SECTION 16050 – BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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

1.02 REFERENCE

A. The transformers and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of ANSI, NEMA and UL.

B. Transformers shall meet the requirements of the most current version of federal law 10 CFR Part 431 "Energy Efficiency Program for Certain Commercial and Industrial Equipment".

1.03 DESCRIPTION OF WORK

Provide power for submersible pumps for relocated Pump Station 3 for the Sand Island Recreational Area Sewer Improvements Phase 2.

1.04 SUBMITTALS

A. Submit in accordance with SECTION 01300 - SUBMITTALS. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. Incomplete submittals and those without summary sheets will be returned without review.

B. Shop Drawings: Submit complete shop drawings and manufacturer's literature for Engineer's review before any work is fabricated. Submit manufacturer's literature for the following:

1. Conductors.
2. Raceways.
3. Large Junction Boxes.
4. Device Coverplates.
5. Equipment Disconnect and Fused Switch.
6. Dry-type Buckboost Transformer.
7. Padlocks.
8. Enclosed Circuit Breaker.

C. Intent of Shop Drawing and Catalog Cut Review:

1. Shop drawing and catalog cut submittals processed by the Engineer are not Change Orders. The purpose of the submittals by the Contractor is to demonstrate to the Engineer that he understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.

2. If deviations, discrepancies or conflicts between shop drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed.

3. Prequalification: Where materials or products specified herein are designated by manufacturer's name, any request to substitute materials or products other than those specified shall be approved by the Engineer as specified in the GENERAL PROVISIONS. Burden of proof of equality of proposed substitutions will be the responsibility of the Contractor.

4. Shop drawings and catalogue cuts for substitute materials shall clearly specify compliance with and/or deviation from specified material. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; and "achieve the same end use and results as materials formulated in accordance with the referenced publications". Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance. Review of shop drawings and catalogue cuts shall not release Contractor from complying with intent of drawings and specifications.

1.05 GUARANTEE AND CERTIFICATE

Any item of material, apparatus, equipment furnished and installed, or construction by the Contractor showing defects in design, construction, quality or workmanship within one year from the date of final acceptance by the Owner shall be replaced by such new material, apparatus or parts as may be found necessary to make such defective portion of the complete system conform to the true intent and meaning of the specification and/or the drawings. Exceptions shall be fluorescent, high intensity discharge and incandescent lamps which shall be guaranteed for one half the manufacturer's listed life time. Such repairs or replacement shall be made by the Contractor or his surety, free of all expense to the Owner.

1.06 GENERAL REQUIREMENTS

The Contractor shall furnish all labor, materials (except as hereinafter noted), tools, equipment and appliances required to provide and install all electrical work, complete, as indicated on the drawings and/or as herein specified. The drawings note various sizes of equipment as determined for basis of design; the electrical work, however, shall be installed to comply with the equipment furnished by the

successful supplier. The work shall include but not necessarily be limited to, the following:

1. Provide complete general use electrical system for this project.

2. Before bidding on this work, carefully examine each of the drawings and the site. By submitting a proposal of the work included in this Contract, the Contractor shall be deemed to have made such examination and to be familiar with and accept all conditions of the job site.

3. Prior to ordering equipment, the Contractor shall examine the plans to verify the amount of space allocated for the electrical equipment and to determine if the material proposed will fit within the allotted space. It shall be the Contractor's responsibility to provide equipment that will fit within the allotted space.

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

5. Make detailed arrangements and pay for all work by utility companies (HECO) pertaining to contract.

1.06 COORDINATION WITH UTILITY COMPANIES AND OTHER TRADES

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

PART 2 – PRODUCTS

2.01 MATERIALS

A. All materials shall be new, except as specifically noted, and shall bear the label of Underwriters Laboratories (UL) whenever standards have been established and label service is normally and regularly furnished by the agency.

B. Raceways:

1. Galvanized rigid steel (GRS), electrical metallic tubing (EMT), 3/4 inch minimum diameter. Metallic tubing and conduits shall be zinc-coated and conduits shall be hot-dip galvanized.

2. Non-Metallic Conduit shall be high impact polyvinyl chloride (PVC), Schedule 40. Tensile strength 6000 psi minimum and compressing strength shall be 9000 psi minimum

3. Flexible Conduit: Zinc-coated inside and outside, fully interlocked; for wet or moist areas - liquid-tight with factory fittings.

C. Conductors and Cables: Conductors shall be copper, No. 12 AWG minimum; No. 10 AWG and smaller, solid; No. 8 AWG and larger, stranded. Conductors shall be type THHN/THWN for interior use and RHW-USE for exterior use. All high voltage work shall be performed by qualified electricians certified to work on high voltage systems.

D. Outlet and Small Junction Boxes: In all conditions and for all cases, outlet and junction boxes shall be increased in size to conform with NEC Article 314 fill requirements. Boxes shall be cast iron or ferrous alloy, prime painted and enamel finished, with threaded hubs for conduit connection. For exterior locations, junction boxes shall have a continuous hinge and lockable hasp.

E. Large Junction Boxes: For dry interior locations, the box shall be fabricated from NEC gauge galvanized steel with matching screw-on type cover, field punched knockouts. For exterior, wet and basement locations, the box shall be NEMA 4X type 316 stainless steel. All screws shall be stainless steel type 316. In all conditions and for all cases, outlet and junction boxes shall be increased in size to conform with NEC Article 314 fill requirements. For exterior locations, junction boxes shall have a continuous hinge and lockable hasp.

F. Device and Cover Plates:

1. Plates for interior flush construction shall be type 302 stainless steel, dull finish with suitable hole for device unless otherwise indicated.

2. Plates for exposed, damp, or wet installations shall be weatherproof with lockable U.V. stabilized covers. Covers shall permit plugs to be connected without compromising the integrity of the protective nature of the cover.

G. Equipment Disconnect and Fused Switch: Heavy-duty, horse-power rated when used as motor disconnect, lever-operated contacts, spring-loaded. NEMA enclosure type 1 for interior locations and NEMA 4X stainless steel for exterior locations. Fused disconnect switches shall, in addition, have NEC standard fuse rejection type holders when used with current limiting fuses. Eaton, Square D, General Electric, Siemens or approved equal.

H. Nameplates: Laminated nameplates shall be provided for panelboards and circuit breaker enclosures. Nameplate shall be 1/8 inch thick melamine plastic, black and white center core. Size of nameplate shall be one inch by 2-1/2 inch minimum. Lettering shall be 1/4 inch high block lettering. Equipment designations shall be as indicated on the drawings.

I. Ground Rod: Rod shall be of copper clad steel conforming to UL 250 not less than 3/4-inch in diameter by 10 feet in length. Sectional type driven fully into the earth.

J. Hardware, Supports, Backing, Etc.: All hardware, supports, backing and other accessories necessary to install electrical equipment shall be provided. Wood materials shall be "wolmanized" treated against termites, iron or steel materials shall be galvanized for corrosion protection, and non-ferrous materials shall be brass or bronze.

K. Padlocks: Laminated steel 2" wide body with hardened boron alloy 3/8 " diameter shackle, 5-pin, rekeyable cylinder, Masterlock 25LF series or approved equal. All padlocks shall be keyed alike.

L. Dry-Type Buckboost Transformer:

1. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

2. The manufacturer shall be a participant in the UL Data Acceptance Program (DAP) under the Client Test Data Program (CTDP) certification to ensure UL test methodologies and record traceability complies with the requirements of ISO 17025.

3. Transformer must bear the UL Energy Efficiency Verification Mark to confirm that the unit meets the requirements of 10 CFR Part 431.

4. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years.

5. Transformer shall be EATON V28M23T3016 or approved equal.

M. Enclosed (Individual) Circuit Breakers: Shall consist of molded plastic case circuit breaker with toggle operated mechanism and thermal magnetic overload trips. Interchangeable trip shall be provided when available. Toggle positions "On" and "Off", engraved or embossed on body. Provide NEMA 1 enclosure for interior locations and NEMA 4X stainless steel (316) enclosure for exterior, damp, wet or corrosive locations. Integrated means shall be provided to lock the breaker in "Off" position. Provide auxiliary contacts for elevator circuit breakers, confirm signal output voltage with elevator battery back up supplier.

PART 3 - EXECUTION

3.01 GENERAL

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

B. Qualification of Installers:

1. For actual fabrication, installation and testing of the work of this section, use only thoroughly trained and experienced workmen completely familiar with items required and with manufacturers' recommended methods of installation. In acceptance or rejection of installed work, no allowance will be made for lack of skill on part of workmen.

2. Workmanship shall meet the approval of the Engineer who shall be afforded every opportunity to determine skill and competency. Concealed work shall be reopened at random during formal inspection by the Engineer at his request.

C. Construction Methods: Construction shall conform to construction practices as recommended by the American Electricians Handbook by Croft (latest edition), Edison Electric Institute, National Electrical Code, National Electrical Safety Code and applicable instructions of manufacturers of equipment and material supplied for this project.

D. Provide structural bracing for equipment permanently attached to the building. Structural bracing shall resist the effects of earthquake motions in accordance with ASCE 7 per IBC 2006, Section 1613.

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

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

G. Discrepancies and Interpretations:

1. Should the Contractor find any discrepancies in or omissions from any of the documents or be in doubt as to their meaning, he shall advise the

Engineer who will issue any necessary clarification within a time period which does not disrupt the progress of the work.

2. All interpretation and supplemental instructions will be in the form of a written addenda to the Contract Documents.

3. Should any discrepancy arise from the failure of the Contractor to notify the Engineer, the higher quality or larger quantity of item shall prevail. Engineer shall make the final interpretation and judgment.

4. In the event of a discrepancy between small scale drawings and large scale details, or between drawings and specification, on which is in violation of any regulations, ordinances, laws or codes, the discrepancy, if known by the Contractor, shall be immediately brought to the attention of the Engineer for a decision before proceeding with the particular work involved. Work carried out disregarding these instructions will be subject to removal and replacement at the Contractor's expense.

H. Symbols: The standard electrical symbols together with the special symbols, notes and instructions shown on the drawings indicate the work required and are all to be included as a part of this specification.

I. Coordination: This specification is accompanied by floor plans of the affected buildings, elevations, and site plans indicating locations of all boxes, electrical connections, service runs, and other electrical apparatus. These locations are approximate and, before installing, the Contractor shall study the adjacent architectural details and actually make the installation in the most logical manner. The circuit routing is typical only and may be varied in any logical manner.

3.02 INSTALLATION

A. Grounding:

1. All metallic enclosures, raceways, and electrical equipment shall be grounded according to requirements of NEC Article 250. Final connection to equipment, raceways and other metallic parts directly exposed to ungrounded electric conductors shall be No. 12 AWG minimum, copper, NEC type TW, green insulation. Use approved bonding terminal at panels.

2. All grounding wire runs within building shall be routed together with circuit conductors.

3. Bond and ground all feeder conduit to panelboard enclosures.

B. Wiring System:

1. Below grade or in slab, use Schedule 40 PVC. Provide separate ground wire and rise out of ground with PVC. Transition GRS, or EMT conduit as required within 6 inch of finished grade or floor.

2. GRS shall be used where run is exposed in exterior locations and interior locations within 6 feet of the floor level. GRS shall be used in all exposed locations in the existing basement areas.

3. EMT may be used in concrete walls, above suspended ceilings and where run is exposed in interior locations higher than 6 feet above the floor level.

4. Flexible conduit shall be used for connecting dry-type transformers, motors and other equipment subject to vibration or movement.

5. Conduit shall be cut square and inner edges reamed. Butt together evenly in couplings.

6. Bends and offsets shall be made with hickey or conduit bending machine. Do not use vise or pipe tee. Bends shall be made so that interior cross-sectional areas will not be reduced. Radius of curve of inner edge of field bend shall not be less than 10 times internal diameter of conduit.

7. Use of running threads and set screw couplings will not be permitted. Where conduit cannot be joined by standard threaded couplings, approved watertight conduit union or compression couplings shall be used.

8. Cap conduit, during construction, with plastic or galvanized pipe caps to prevent entrance of dirt or moisture. All conduits shall be swabbed out and dried before wires or cables are pulled in.

9. Conduit shall be mounted clear of other piping, valves or mechanical equipment.

10. Fish wires, cords strings, chains or the like shall not be placed or inserted into the conduit system during installation. Insulating bushings and 2 locknuts shall be installed on the end of every run of conduit at sheet metal enclosures and boxes.

11. Securely fasten conduit to junction boxes and to structure support. Project adequate number of conduit threads through box for bushings. Anchorage for 1-1/2 inch and smaller conduit shall be made with 2-hole galvanized conduit straps or clamps. 2 inch and larger conduits shall be anchored with galvanized wrought iron one-hole clamps or equal fittings.

12. Exposed conduit shall be parallel with, or at right angles to, structural or architectural elements, and securely fastened in place with 2-hole galvanized pipe straps with screws, or with approved beam clamps, or approved single or gang pipe hangers spaced not more than 5 feet apart, as conditions required. Vertical runs shall be supported at intervals not exceeding 5 feet approved clamp hangers.

13. Pullwire shall be installed in empty conduit. Pullwire shall be No. 12 AWG type TW insulated wire or nylon pull line. Pullwires shall be tagged at conduit terminations to identify conduit use (i.e. power, telephone, data, etc.).

C. Conductors:

1. Mechanical means for pulling shall be torque-limiting type and not used for No. 2 AWG and smaller wires.

2. Pulling tension shall not exceed wire manufacturer's recommendations.

3. Where necessary, powdered soapstone may be used as a lubricant for drawing wires through conduit. No other means of lubricating will be allowed.

4. Form neatly in enclosures for minimum of crossovers. Tag all feeders.

D. Splicing of Wire and Cable:

1. Wires shall be formed neatly in enclosures and boxes.

2. Splices made according to NEC Article 110.

3. Splices shall be reinsulated. Remove all sharp points that can pierce tape. Use Minnesota Mining and Manufacturing Co. "Scotch" No. 33 tape, or equal. Splices in boxes for exterior locations shall be water-tight.

E. Receptacles: Openings around electrical penetrations into or through fire-resistant-rated walls, partitions, floors, and ceilings shall be fire-stopped using UL approved methods to maintain fire rating per NEC 300.21.

F. Finishing:

1. All cutting that may be required for complete installation of the electrical work shall be carefully performed, and all patching shall be finished in first-class condition by the Contractor.

2. Close unused knockouts in boxes or enclosures with metal cap.

3. Wipe clean all exposed raceways and boxes with rag and solvent. Unfinished raceways and boxes shall be prime- painted and finished to blend into background.

G. Miscellaneous Details:

1. Cut, drill and patch as required to install electrical system. Repair any surface damaged or marred by notching, drilling or any other process necessary for installation of electrical work. Cutting, repairs and refinishing subject to the approval of the Engineer. Need for remedial work determined by the Engineer as attributable to poor coordination

and workmanship shall be cause for reconstruction to the satisfaction of the Owner.

2. Attachment of electrical equipment to wood by non-ferrous wood screws. Attachment to concrete by expansion anchors. Powder-charge-driven studs and anchors permitted only with prior approval.

3. Complete all panel circuit directories, using typewriter. Verify "room" and "use" designations before typing.

4. Prime and paint all exposed conduits, hangers, and fasteners.

5. All grounding wire within building run in rigid steel conduit, and where practicable, routed together with circuit conductors.

6. Furnish necessary test equipment and make all tests necessary to check for unspecified grounding, shorts and wrong connections. Correct faulty conditions, if any.

7. Tag all empty conduits in switchboard, panelboards, cabinets, at backboards, etc and identify destination.

8. Provide arc flash warning labels on all electrical equipment as required by 2014 NEC Article 110.16 and 2015 NFPA-70E 130.5. The contractor shall attain all information required for the calculations, perform the calculations, and provide the labels at no additional cost.

9. Anchor all free-standing floor mounted electrical equipment, apparatus, and transformers. Provide additional bracing per the seismic conditions at the site.

3.03 TESTING AND INSPECTION

A. If the Engineer (or their representative) discovers any errors, the Contractor, at his own expense, shall go over all similar portions of the entire job, taking the necessary or directed remedial action.

B. Interior installations 600 volts and less shall be tested for insulation resistance after all wiring is completed and ready for connection to fixtures and equipment. Using a 500V megger, measure and record the insulation resistance from phase to phase and phase to neutral. The above tests shall be witnessed by the Engineer and the records turned over to him for proper disposition. The Contractor shall notify the Engineer when this test is to be performed.

1. High Voltage Cables: After installation, and before placing in service, perform a DC High Potential Test on all cables rated above 600 volts. All precautions and limits as specified in the applicable standards shall be adhered to. Current sensing circuits in test equipment shall measure only the leakage current associated with the cable under test,

and shall not include internal leakage current of the test equipment. Test procedures shall be as follows and the results for each cable test shall be recorded.

2. Record temperature and relative humidity. Do not perform tests unless weather is clear and relative humidity is below 7 percent.

3. Each conductor shall be individually tested with all other conductors grounded. All shields shall be grounded.

4. Terminations shall be properly corona suppressed by guard ring, field reduction sphere, or other suitable methods.

5. Perform megger and continuity test prior to high-pot.

6. A DC high potential shall be applied in at least 5 equal increments until maximum test voltage is reached. DC leakage current shall be recorded at each step after a constant stabilization time consistent with system charging current decay. 100 percent voltage shall be reached in a maximum of 60 seconds.

7. A graphic plot shall be made of leakage current (X axis) versus voltage (Y axis) at each increment.

8. The test conductor shall be raised to a maximum test voltage and held for a total of 15 minutes. Readings of leakage current (Y axis) versus time (X axis) shall be recorded and plotted.

9. The conductor test potential shall be reduced to zero and grounds applied for at least 10 minutes.

10. The DC test voltage shall be 23kV.

C. The Contractor shall re-tape splices which have been bared for inspection. The Contractor shall test all portions of the electrical system furnished by him for proper operation and freedom from accidental grounds. All tests shall be subject to the approval of the Engineer.

D. Wherever test or inspection reveals faulty equipment or installation, the Contractor shall take corrective action, at his own expense, repairing or replacing equipment or installation as directed.

END OF SECTION

SECTION 16301 – UNDERGROUND ELECTRICAL WORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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

1.02 DESCRIPTION OF WORK

A. In general, provide complete underground electrical systems within project boundaries.

B. Provide all material, labor, tools and equipment to construct all items as indicated on the drawings and as specified herein, including but not limited to the following:

1. Complete underground distribution system including trenches, concrete ducts, and handholes.

2. Saw-cut and patch existing concrete sidewalks to match existing. Repaint any painted patterns (hop-scotch, etc.) which may be damaged. Match existing patterns and colors.

3. Remove and replace tables, benches, trees, bushes and landscaping as necessary for trenching work. Maintain plants at temporary location on site and re-plant as soon ductline work is completed. Re-locate tables, benches, trees, and bushes within 50 feet at no additional cost to the Owner.

4. Pass test mandrel through all ducts and conduits 2 inches or larger, and make corrections as directed by inspectors or Engineer. Mandrel test requirements shall be as specified in the latest edition of Hawaiian Telcom's mandrel testing requirements. Corrections made shall be at no additional cost to the Owner.

5. Provide polypropylene pullstring in all empty ducts and conduits, unless indicated otherwise.

6. Immediately report and pay for damages to existing equipment and facilities.

C. Obtain and pay for electrical permits, arrange for periodic inspection by local authorities and deliver certificate of final inspection to Engineer.

D. Contractor shall check and test the installation for completeness and functional operation as described by the drawings and specified herein. Final test shall be in the presence of Engineer. Contractor shall arrange and pay for all testing costs.

E. Should intermediate or final inspections of the duct system reveal crushed, damaged or impassable ducts, the Contractor shall repair those sections of duct system, including repairs to paved surfaces, concrete structures, and landscaping, at no additional cost to the Owner.

F. Related Work Specified Elsewhere: SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS.

1.03 SCHEDULING OF WORK

Schedule all trenching with the Owner and the Engineer. Obtain approvals for all trenching work.

1.04 COORDINATION WITH THE UTILITIES AND OTHER TRADES

During pricing and construction, Contractor shall coordinate his work with the other trades to avoid omissions and overlapping of responsibilities. Obtain and review the standards and specifications of the local utility companies.

1.05 DRAWINGS

A. Before installation, verify all dimensions, conditions and sizes of equipment at job site.

B. Verify details, report all conflicts and omissions to Engineer.

C. Work shall be in accordance with the drawings and specifications. Exceptions, changes and deviations from the work intended may be made only with the approval of Engineer. Submissions for approval shall consist of drawings, written explanation and reason for request; 6 copies. Changes and additions shall be recorded daily on copy of contract specifications and drawings, which shall be maintained at job site.

1.06 SUBMITTALS

A. Submit in accordance with SECTION 01300 - SUBMITTAL. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. Incomplete submittals and those without summary sheets will be returned without review.

B. Shop Drawings and Manufacturer's Literature: Submit complete shop drawings and manufacturer's literature for the Engineer's review before any work is ordered or fabricated. Partial or incomplete submittals will be returned without review. Submit manufacturer's literature for the following:

1. Handholes (including covers).

2. Conduits and Fittings.

3. Nameplates

C. Guarantee and Certificate: As specified in SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS.

1.07 PREVENTION OF CORROSION

All metallic materials shall be protected against corrosion. Exposed metallic parts of outdoor apparatus shall be given a rust-inhibiting treatment and standard finish by the manufacturer. All such parts as boxes, bodies, fittings, guards and miscellaneous parts made of ferrous metals, but not of stainless steel (type 316 or 316L), shall be zinc-coated in accordance with ASTM A153. The Contractor shall not join dissimilar metals directly to each other that will result in deterioration due to galvanic corrosion.

1.08 INSPECTION

Skill and competency of workmanship shall be subject to the approval of Engineer. Notification for inspection shall be given the respective or agencies a minimum of 3 working days (72 hours) in advance of work.

1.09 CODES, REGULATIONS AND STANDARD SPECIFICATIONS

A. Work shall conform to latest adopted edition of National Electrical Code.

B. Applicable rules, standards and specifications of following associations shall apply to materials and workmanship:

1. American National Standards Institute (ANSI)

2. Electronic Industries Association (EIA)

3. National Board of Fire Underwriters (NBFU)

4. National Electrical Manufacturer's Association (NEMA)

5. National Fire Protection Association (NFPA)

6. Underwriters' Laboratories, Inc. (UL)

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall be new, except as specifically noted, and shall bear the label of Underwriter's Laboratories whenever standards have been established and label service is normally and regularly furnished by the agency.

B. Contractor shall afford every opportunity for the Engineer to ascertain skill and competency of labor. Concealed work shall be reopened at random as directed during formal inspections by the Engineer or Electrical Inspector.

C. Ducts:

1. All conduits shall be concrete encased, 3000 psi minimum, 3 inches minimum thickness.

2. All concrete encased conduits shall be round bore, PVC Schedule 40 or accepted equivalent.

3. Conduit and Duct Accessories: Couplings, spacers, plugs, and accessories shall be as recommended by the manufacturer of conduits and ducts and shall be of the same schedule as the ducts to which they are connected.

D. Wires and Cables: Listed for use in underground installations, size and type as indicated on Drawings and is other specification sections.

E. Wire Mesh: Welded steel wire fabric for reinforcing concrete, galvanized, conforming to ASTM Specification A185.

F. Backfill Material: As specified in Drawings.

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

H. Hardware, Supports, Backing, Etc.: All hardware, supports, backing and other accessories necessary to install electrical equipment shall be provided. Wood materials shall be treated against termites, iron or steel materials shall be galvanized for corrosion protection and non-ferrous materials shall be brass or bronze.

PART 3 - EXECUTION

3.01 GENERAL

As specified in SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS.

3.02 INSTALLATION

A. Trench Excavation:

1. Tone all excavation locations prior to digging. Visually inspect areas round trenching locations for visible signs of underground utilities. Hand excavate near known or suspected locations of existing underground pipes and utilities.

2. Dimensions and locations of trenches for handholes and ductlines shall be as indicated on drawings. Trench width and depths shall be sufficient to accommodate proper installation of conduit banks.

3. Should material at bottom of trench for direct buried conduits not be equal to backfill material Type B, the trench shall be excavated an additional 3 inches to permit backfilling with Type B backfill.
4. Where a trench is excavated on slope, sides are to be vertical, and depth measured at lowest side. All measurements are to be based on final grades.

5. Bottom of trenches to be flat and smooth.

6. Trenches shall be widened at equipment pads and handhole sites to permit proper entry of conduits.

7. All excavations for handholes in excess of the required depths shall be filled with concrete or crushed lava rock.

8. Sheathing and bracing as required shall be provided to support sides of excavations from cave-ins.

9. Provide drainage and pumps to keep trenches dry.

10. Unused excavated material shall be removed off site and disposed of.

B. Backfill:

1. Provide a plastic electrical warning tape in the backfill 12 inches above the ductline.

2. Tamp and replant landscaping.

C. Installation of Conduit and Duct Bank:

1. Bottom of trenches for all systems shall be clean, smooth and well graded prior to installation of conduits.

2. Saw cut, ream and taper conduits with manufacturers' approved tool.

3. Couplings and bells shall be tight to prevent entry of dirt or concrete into ducts and conduits.

4. Provide spacers to maintain proper separation between ducts.

5. Changes of direction shall not exceed 4 degrees per length of conduit or duct. Radii and turns shall be made with appropriate duct bends and sweeps. Minimum radius bend for all systems shall be 15 feet - 0 inches. Angled couplings are not permitted. If factory made bends are to be provided, the contractor shall demonstrate their suitability to the Engineer and inspectors by pulling the respective mandrel completely through the bend prior to installation.

6. Terminate conduits in end-bells where duct lines enter handholes. Separators shall be of precast concrete, high impact polystyrene, steel, or any combination of these. Stagger the joints of the conduits by rows and layers so as to provide a duct line having the maximum strength.

7. Duct lines shall have a continuous slope downward toward handholes and away from buildings with a pitch of not less than 3 inches in 100 feet.

8. Ducts shall be clean and free from debris and rubbish.

9. After each day's work, provide temporary conduit plugs at the end of conduit banks to prevent entry of dirt, rubbish, debris, or concrete.

10. Pass smooth bullet-shaped, blunt tip wooden test mandrel through the entire length of each duct or conduit to test for burrs and obstructions. Unless indicated otherwise, mandrel shall have diameter of ½ inch less than inside diameter of dirt. If burrs or obstructions are encountered, that section of ductline shall be replaced at no additional cost to the Owner.

11. Unless indicated otherwise, install polypropylene pullstring in each conduit after testing. Pullstrings shall have a minimum 200 pound tinsel strength.

12. Apply thin coat of sealing compound on ducts and conduits at couplings and bells.

13. Securely anchor duct banks prior to pouring concrete encasement to prevent ducts from floating.

14. When pouring concrete, prevent heavy masses of concrete from falling directly on ducts. If unavoidable, protect ducts with planks.

15. Direct flow of concrete down sides of duct bank to bottom, allowing concrete to rise between ducts, filling all open spaces uniformly.

16. To insure against voids in concrete, work a long, flat splicing bar or spatula liberally and carefully up and down the vertical rows of ducts.

17. Cure concrete for a minimum of 72 hours before permitting traffic and/or backfilling.

18. Provide duct seal on all conduit ends within handholes and where conduits first daylight within buildings (at backboards, inside switchboards, panelboards, cabinets, panels, junction boxes, etc.).

19. A 4-inch wide warning tape, foil backed, bright orange colored with a black imprinted message similar to "WARNING! STOP DIGGING. ELECTRICAL LINES" shall be placed 12 inches below finish grade over the entire length of ductline installation.

D. Concrete and Brick Work:

1. Concrete, ready mixed according to ASTM C94.

2. Convey concrete from mixer to forms rapidly to prevent segregation. Free drop shall be limited to 5 feet, unless authorized by inspector.

3. Placing:

a. Clean and remove all debris from inside forms and trenches before placing concrete.

b. Place concrete only on clean damp surfaces, free from water.

c. Place concrete in forms, in horizontal layers not exceeding 18-inch thickness.

d. Place concrete to avoid segregation of materials and displacement of ducts, inserts and reinforcing.

e. Vibrate structural concrete thoroughly during and immediately after placing to insure dense watertight concrete.

4. Forming:

a. Forms shall be of good sound lumber with sufficient strength and conforming to shapes and dimensions indicated on drawings.

b. Forms shall be treated with non-staining form oil immediately before each use.

5. Patching: Patch all voids, pour joints and holes before concrete is thoroughly dry. Use mortar of same proportions as original concrete.

6. Curing: Curing of concrete shall be accomplished by impervious membrane method with liquid membrane compound. Apply 2 or more coats to obtain a total of one gallon for each 150 square feet of concrete surface.

7. Concrete Brick and Hollow Concrete Block Work:

   a. Concrete brick and hollow block shall be laid in full bed of mortar, both horizontally and vertically.

   b. Mortar shall be one part cement and 3 parts sand, thoroughly mixed and used when fresh. Re-tamping will not be allowed.

   c. Setting bed shall be of depth required to bring top of blocks flush with finish line.

E. Handhole Installation:

1. Boxes shall be installed approximately where shown. The exact location of each handhole shall be determined after careful consideration has been given to the location of other utilities, grades and pavement. Handholes shall be of the type noted on the Drawings and shall be constructed in accordance with the applicable details as indicated. A machine-finished seat shall be provided to ensure a perfect joint between frame and cover. Covers shall be machined to prevent rocking within frames. In paved areas, the tops of handhole covers shall be flush with the finished surface of the paving. In unpaved areas, the top of handhole covers shall be approximately 2 inches above the finished grade.

2. Precast Handhole Installation: Commercial precast assembly shall be set on 6 inches of level, 90 percent compacted crushed rock fill, 3/4-inch to one-inch size, extending 12 inches beyond the handhole on each side. Granular fill shall be compacted by a minimum of 4 passes with a plate type vibrator.

F. Structural Steel and Miscellaneous Metal Work:

1. Structural steel work including bolts, nuts, anchors, pulling-in irons, etc. shall be galvanized by hot-dipped process after fabrication into largest practical sections.

2. Reinforcing Steel:

a. Clean reinforcing steel of mill or rust scale and form to dimensions indicated.

b. Install reinforcing steel in proper locations and secure in place to prevent movement during concrete placing or vibrating.

G. Underground Utilities: Underground utilities indicated on plans are approximate in location. It is not the intention of plans to imply that all existing utilities are drawn and located. It shall be the responsibility of Contractor to coordinate locations of existing utilities prior to doing any excavation work. Any damage to existing and new utilities shall be repaired by Contractor at no cost to the Owner.

H. Cleaning and Repairing:

1. During the progress of work, all rubbish, waste lumber, displaced materials, etc. shall be removed as soon as possible and upon completion of the work, Contractor shall remove from the Owner's property and from all public and private property, at his own expense, all temporary structures, rubbish and waste material resulting from his operations.

2. The Contractor shall restore all removed or damaged pavement, gutters, curbs, sidewalks, sign posts, walkway paintings, trees and landscape damaged by his operations to as near their original condition or better.

I. Testing and Inspection:

1. If the Owner (or its representative) discovers any errors, the Contractor, at his own expense, shall go over all similar portions of the entire job, taking the necessary or directed remedial action.

The Contractor shall re-tape splices which have been bared for inspection. The Contractor shall test all portions of the electrical system furnished by him for proper operation and freedom from

accidental grounds. All tests shall be subject to the approval of the Engineer.

2. Wherever test or inspection reveals faulty equipment or installation, the Contractor shall take corrective action, at his own expense, repairing or replacing equipment or installation as directed.

3. Ground-Resistance Measurements: Ground-resistance measurements for each ground rod shall be made and certified by the Contractor. Upon completion of the project, Contractor shall submit in writing to the Engineer the measured ground resistance of each ground rod and grounding system, as well as the resistance and soil conditions at the time the measurements were made.

END OF SECTION