STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS

Land Development Division

Date: 05/05/2020

ADDENDUM NO. 1
TO
INVITATION FOR BIDS
IFB-20-HHL-025

KAU WATER SYSTEM IMPROVEMENTS – PHASE 1

Notice to All Prospective Offerors

This addendum is hereby made a part of the contract documents for Kau Water System Improvements – Phase 1, IFB-20-HHL-025, and it shall amend the said contract documents as detailed within this Addendum document.

APPROVED:

Stewart Matsunaga, Acting Administrator
Land Development Division
Department of Hawaiian Home Lands

Please execute and immediately return the receipt below to the Department of Hawaiian Home Lands via e-mail to: **Ms. Sara Okuda, at sara.t.okuda@hawaii.gov.**

Receipt of Addendum No.1 for Kau Water System Improvements – Phase 1, Invitation for Bids No.: IFB-20-HHL-025, is hereby acknowledged.

Signature: _____ _____
Print Name: Title

_____ _____
Name of Firm/Company Date

ADDENDUM NO. 1
May 5, 2020

TO

PLANS, BID FORM, SPECIFICATIONS, CONTRACT AND BOND

FOR
Kau Water System Improvements – Phase 1

Kamaoa, Kau, Island of Hawaii

IFB No.: IFB-20-HHL-025

Item No. 1 Pre-bid Conference Minutes

A Pre-bid Conference was held remotely through GoToMeeting, on April 29, 2020. The minutes from the meeting and the attendance sheet are attached.

Item No. 2 – Standard Qualification Questionnaire for Offerors (SPO Form-21)

Correcting 1.2 IFB Notice to Bidders/Invitation for Bid, page 2 of 2, 2nd paragraph, to read as follows: A properly executed and notarized STANDARD QUALIFICATION QUESTIONNAIRE FOR OFFERORS, SPO Form-21 ("Questionnaire") is required and shall be uploaded with offer to HIePRO by 2:00 p.m., May 14, 2020. The Questionnaire is available for download from the State Procurement Office website: http://spo.hawaii.gov/wp-content/uploads/2013/12/spo-021.pdf Revised Section 1.2 Attached.

Correcting 2.1 Instructions for Bid Submittal, page 14 of 14, 1st item under Items required with Bid, to read as follows: SPO Form 21 (Standard Qualification Questionnaire), uploaded with offer to HIePRO by 2:00 p.m., May 14, 2020. Revised Section 2.1 Attached.

Kau Water System Improvements – Phase 1
Kamaoa, Kau, Island of Hawaii

Minutes for Pre-bid Conference
10:00 a.m., Wednesday, April 29, 2020

IFB No.: IFB-20-HHL-025

The Pre-bid Conference was held remotely through GoToMeeting. Meeting commenced at 10:00 AM. See Attachment 1, a list of persons in attendance.

Michael Bungcayao (G70) read through the Pre-bid Conference Agenda which included Introductions, Purpose, Scope of Work, Procurement Reminders, Completion Schedule and Liquidated Damages, Questions/Answers issued by Addenda, Deadlines, and Site Visit via pictures/video. The Meeting was then open to Questions and Answers. Written answers to questions provided via Addenda; any verbal responses to questions by DHHL and its Consultant shall not be binding. See Attachment 2 for Pre-bid Conference Agenda.

Questions and Answers:

- Will DHHL make the Preliminary Geotechnical Engineering Report available to Contractors? There are a lot of "ash" soils at the site?
    - Final Geotechnical Report titled "Geotechnical Engineering Exploration, DHHL Kau Water System Improvements, South Point, Island of Hawaii" is attached.

- Is there a construction water source near the site?
    - Contractor is responsible for obtaining construction water, and costs shall be incidental to the project construction.

- What is DHHL's budget?
    - DHHL will release Control Amount at Bid Opening.

Kau Water System Improvements – Phase 1
Kamaoa, Kau, Island of Hawaii

Minutes for Pre-bid Conference
10:00 a.m., Wednesday, April 29, 2020

IFB No.: IFB-20-HHL-025

Attachment 1: Attendees

Name	**Company**
Sara Okuda	DHHL LDD
Jeffrey Fujimoto	DHHL LDD
Stewart Matsunaga	DHHL LDD
Michael Bungcayao	G70
David Olson	XTRLs
Lizi Olson	Glover
Scot Yoshimura	Isemoto
Jim Foss	Goodfellow Bros
Antonio Hernandez	DN Tanks, Inc.
Tanner Bennett	DN Tanks, Inc.
Kaleo Nawahine	TCG

Kau Water System Improvements – Phase 1
Kamaoa, Kau, Island of Hawaii
IFB-20-HHL-025

Pre-bid Conference
10:00 a.m., Wednesday, April 29, 2020
Video Conference
https://global.gotomeeting.com/join/220193141

1. Introductions
    - Sara Okuda, Engineer – DHHL Land Development Division
    - Jeffrey Fujimoto, Engineer – DHHL Land Development Division
    - Michael Bungcayao, Project Manager – G70, Design Consultant

2. Purpose of Pre-Bid Conference
    - To provide potential bidders with a project overview.
    - To review procurement requirements.
    - To allow potential bidders to ask questions and obtain clarification on the bid documents.
    - A written summary of this pre-bid conference will be issued as an Addendum.

3. Scope of Work
    - This project consists of improvements to the Department of Water Supply Public Water System and DHHL property, including installation of a new 100,000-gallon water reservoir, and new water spigot to provide water to DHHL Lessees.
    - Plans in this IFB are Pre-Final Plans, pending signatures of approval.
    - Plans in this IFB are based on preliminary geotechnical recommendations, dated 3/28/2020. The Final Geotechnical Report is scheduled to be completed 5/8/2020. Archaeological Inventory Survey (AIS) completion is pending approval/meeting with State Historic Preservation Division.

4. Procurement Reminders
    - This project is not tax exempt. Your bid proposal must be inclusive of General Excise Tax.
    - This project is subject to §103.55 of the Hawaii Revised Statutes (HRS) for Wages, hours, and working conditions of employees of contractors performing services.
    - After offer is due and prior to award of the contract, the DHHL shall verify compliance with Sections 103D-310 and 103D-328 HRS via Hawaii Compliance Express (HCE) for the bidder and all subcontractors. Therefore, bidders and all subcontractors are encouraged to register with

HCE. Instructions for registration are at the HCE website: http://vendors.ehawaii.gov. Failure by the bidder and/or any subcontractor to rectify a non-compliant status on HCE within ten business days of notification will be considered as sufficient for the disqualification of the bidder and rejection of its proposal.

- Standard Qualification Questionnaire (SPO Form 21) – to be submitted with bid. Addendum will be issued to correct IFB Notice to Bidders.
- Water Tank Qualification Form – to be submitted with bid.
- Notice to Proceed – to be issued after completion of Final Geotechnical Report and AIS.

5. Completion Schedule and Liquidated Damages
   - Time of Performance: Three hundred sixty-five (365) calendar days after the Notice to Proceed is issued.
   - Liquidated damages: $1,000.00 per day.

6. Questions/Answers issued by Addenda
   - Requests for clarifications and any questions after this meeting shall be submitted on HIePRO.
   - All questions shall be in writing and received by 2:00 pm, April 30, 2020.
   - The answers to those questions will be answered via Addenda, as soon as possible, no later than May 6, 2020.

7. Deadlines
   - See attached Submittals and Deadlines Table.

8. Site Visit pictures/video

9. Questions and Answers

Kau Water System Improvements – Phase 1
Kamaoa, Kau, Island of Hawaii
IFB-20-HHL-025

Submittals and Deadlines Table

SUBMITTAL	DEADLINE
Questions to: • Uploaded to HIePRO	2:00 pm, April 30, 2020
Notice of Intention to Bid: • sara.t.okuda@hawaii.gov	2:00 pm, May 4, 2020
Final Addendum (if needed)	May 6, 2020
SPO Form 21 (Standard Qualification Questionnaire): • Uploaded to HIePRO with Bid	2:00 pm, May 14, 2020
Water Tank Qualification Form: • Uploaded to HIePRO with Bid	2:00 pm, May 14, 2020
Bid Submittal • Uploaded to HIePRO	2:00 pm, May 14, 2020
Award of contract will be made to the lowest responsible and responsive bid, approximately two weeks following bid opening and after certification of the bid tabulation.	

GEOTECHNICAL ENGINEERING EXPLORATION

DHHL KAU WATER SYSTEM IMPROVEMENTS

SOUTH POINT, ISLAND OF HAWAII

W.O. 8024-00 MAY 1, 2020

Prepared for

G70

GEOLABS, INC.
Geotechnical Engineering and Drilling Services

GEOTECHNICAL ENGINEERING EXPLORATION

DHHL KAU WATER SYSTEM IMPROVEMENTS

SOUTH POINT, ISLAND OF HAWAII

W.O. 8024-00 MAY 1, 2020

Prepared for

G70

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

4-30-22

SIGNATURE EXPIRATION DATE
OF THE LICENSE

GEOLABS, INC.
Geotechnical Engineering and Drilling Services
94-429 Koaki Street, Suite 200, Waipahu, HI 96797

Hawaii • California

GEOLABS, INC.
Geotechnical Engineering and Drilling Services

May 1, 2020
W.O. 8024-00

Mr. Paul Matsuda
G70
111 South King Street, Suite 170
Honolulu, HI 96813

Dear **Mr. Matsuda:**

Geolabs, Inc. is pleased to submit our report entitled "Geotechnical Engineering Exploration, DHHL Kau Water System Improvements, South Point, Island of Hawaii," prepared for the design of the project.

Our work was performed in general accordance with the scope of services outlined in our fee proposal dated July 16, 2019.

Please note that the soil and rock samples recovered during our field exploration (remaining after testing) will be stored for a period of two months from the date of this report. The samples will be discarded after that date unless arrangements are made for a longer sample storage period. Please contact our office for alternative sample storage requirements, if appropriate.

Detailed discussion and specific design recommendations are contained in the body of this report. If there is any point that is not clear, please contact our office.

Very truly yours,

GEOLABS, INC.

Gerald Y. Seki, P.E.
Vice President

GS:lf

94-429 Koaki Street, Suite 200, Waipahu, Hawaii 96797
Phone: (808) 841-5064 • Facsimile: (808) 847-1749 • E-mail: hawaii@geolabs.net

Hawaii • California

GEOTECHNICAL ENGINEERING EXPLORATION

DHHL KAU WATER SYSTEM IMPROVEMENTS

SOUTH POINT, ISLAND OF HAWAII

W.O. 8024-00 MAY 1, 2020

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DHHL KAU WATER SYSTEM IMPROVEMENTS

SOUTH POINT, ISLAND OF HAWAII

W.O. 8024-00 MAY 1, 2020

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Our field exploration generally encountered a volcanic ash surface layer, about 1 to 3.5 feet thick, underlain by a clinker deposit to about 4.5 to 6.5 feet deep. The clinker deposit was underlain by a basalt rock formation extending to the maximum depth explored of 30 feet below the existing ground surface. The volcanic ash layer consisted of stiff to hard sandy silt. The clinker deposit was composed of dense to very dense sandy gravel. The basalt rock formation was medium hard to hard. Numerous voids were encountered at various depths in the basalt rock formation. We did not encounter groundwater in the drilled borings at the time of our field exploration.

Our field exploration indicated that volcanic ash, clinker and basalt rock formation may be encountered at or near the foundation subgrade level. To improve the foundation bearing performance and to provide more uniform support for the tank structure, we recommend over-excavating the subsurface materials below the bottom of the tank floor and foundation a minimum of 2 feet below the perimeter ring footing bottom elevation level. The over-excavation should be extended until the underlying clinker or basalt rock formation is encountered. The over-excavation should be replaced with compacted structural fill materials. The over-excavation for the compacted structural fill should extend beyond the outside edges of the perimeter ring footing a minimum of 2 feet.

For the design of foundations bearing on the 2-foot thick structural fill placed over the in-situ clinker deposit or basalt rock formation, we recommend using an allowable bearing pressure of up to 4,000 pounds per square foot (psf). For the design of the tank floor slab, a modulus of subgrade reaction of 200 pounds per square inch per inch of deflection (pci) may be used for the compacted structural fill materials.

Cavities and/or voids are commonly present in the basalt rock formation underlying the project site. In the three borings drilled below the tank site, voids were encountered in the basalt rock formation. To reduce the potential for loss of foundation support resulting from the collapse of cavities and/or voids below foundations supported on the basalt rock formation, we recommend implementing a program of cavity probing and grouting for the foundations of the new water tank structure during construction.

The text of this report should be referred to for detailed discussions and specific geotechnical recommendations.

END OF SUMMARY OF FINDINGS AND RECOMMENDATIONS

SECTION 1. GENERAL

This report presents the results of our geotechnical engineering exploration performed for the *DHHL Kau Water System Improvements* project in South Point on the Island of Hawaii. The project location and general vicinity are shown on the Project Location Map, Plate 1.

This report summarizes the findings and geotechnical recommendations resulting from our field exploration, laboratory testing, and engineering analyses for the project. The findings and recommendations presented herein are subject to the limitations noted at the end of this report.

1.1 Project Considerations

The project site is located west of South Point Road in the South Point area on the Island of Hawaii. We understand that the project includes the following items:

1. 100,000-Gallon water tank
2. Concrete equipment pad
3. Concrete utility vault
4. Gravel pad around the new tank
5. Gravel driveway
6. Asphaltic concrete pavement driveway
7. Earthwork
8. Waterline trenches

We anticipate that site grading may consist of cuts and fills up to about 5 feet in height to achieve the design finish grades.

1.2 Purpose and Scope

The purpose of our exploration was to obtain information on the subsurface conditions to develop an idealized soil/rock data set to formulate geotechnical engineering recommendations for the water system improvements project. The work was performed in general accordance with our fee proposal dated July 16, 2019. The scope of work for this exploration included the following tasks and work efforts:

1. Boring stakeout and utility clearance by our engineer.

2. Mobilization and demobilization of a truck-mounted drill rig on the Island of Hawaii, a water truck, and two operators from Honolulu to the project site and back.

3. Drilling and sampling of seven boreholes extending to depths of about 5 to 30 feet below the existing ground surface. In addition, bulk samples were obtained for California Bearing Ratio (CBR) testing for pavement design purposes.

4. Coordination of the field exploration and logging of the borings by our field engineer/geologist.

5. Laboratory testing of selected samples obtained during the field exploration as an aid in classifying the materials and evaluating their engineering properties.

6. Analysis of the field and laboratory data to formulate geotechnical recommendations for the design of foundations, site grading, pavements, and utility trenches.

7. Preparation of this report summarizing our work on the project and presenting the findings and geotechnical recommendations.

8. Coordination of our overall work on the project by our senior engineer.

9. Quality assurance of our work and client/design team consultation by our principal engineer.

10. Miscellaneous work efforts, such as drafting, word processing, and clerical support.

Detailed descriptions of our field exploration methodology and the Logs of Borings are presented in Appendix A. Results of the laboratory tests performed on selected soil samples are presented in Appendix B. Photographs of the core samples are presented in Appendix C.

END OF GENERAL

SECTION 2. SITE CHARACTERIZATION

2.1 Regional Geology

The Island of Hawaii is the largest in the Hawaiian Archipelago and covers an area of approximately 4,030 square miles. The island was formed by the activity of the following five shield volcanoes: Kohala (long extinct), Mauna Kea (activity during recent geologic time), Hualalai (last erupted in 1801 – 1803), and Mauna Loa and Kilauea (both still active). The project site is situated on the south flank of the Mauna Loa Shield Volcano.

The volume of Mauna Loa, extending from the ocean floor, is estimated to be on the order of about 10,000 cubic miles making it possibly the largest volcanic mountain on earth. Furthermore, it is estimated from current lava production that Mauna Loa may have been forming for the past 1 to 2 million years. Mauna Loa is actually composed of two separate shield volcanoes: Mauna Loa and Ninole. The latter having been covered by Mauna Loa lavas, left only a few localized surface expressions visible at present. The Mauna Loa shield has been built by volcanic eruptions along two principal rift zones that extend southwestward and east-northeastward from the summit caldera.

The majority of the surface rock exposures at Mauna Loa consist of lavas and volcanic deposits belonging to the Kau Volcanic Series (Pleistocene and Holocene age) and the older Kahuku Volcanic Series (Pleistocene age). In addition, a regional ash deposit, identified as Pahala Ash (Pleistocene age), forms a soil mantle overlying and interbedded within the rocks of the Kau Volcanic Series. The ash deposits typically occur as kipukas (isolated deposits) with some significant accumulations ranging up to about 30 feet in thickness.

Pahala Ash is a low plasticity silt derived from the weathering of ash, cinder, and Pele's Hair. It generally has low shear strength, and when the moisture content is high enough, it becomes thixotropic, i.e. it loses strength when remolded. Therefore, the typical Pahala Ash may be potentially liquefiable during seismic events. However, it should be noted that the volcanic ash soils encountered at the project site appear to be different from the typical "Pahala Ash" in that the moisture content of the sandy silts encountered at the site possess lower moisture contents (no greater than 30 percent).

Beneath the surface ash layer, rocks of the Kau Volcanic Series may be anticipated within about 100 feet below the existing ground surface. The Kau Volcanic Series essentially consists of tholeiitic basalt. The occurrence of embedded lava tubes in the formation is common.

2.2 Existing Site Conditions

The project site is located adjacent to South Point Road on the Island of Hawaii. The project site is currently undeveloped and covered with tall grass.

The project site generally slopes down towards the south with existing ground surface elevations from about +878 to +867 feet Mean Sea Level (MSL).

2.3 Subsurface Conditions

We explored the subsurface conditions at the project site by drilling and sampling seven borings, designated as Boring Nos. 1 through 7, extending to depths ranging from about 5 to 30 feet below the existing ground surface. In addition, three bulk samples of the near-surface soils, designated as Bulk-1 through 3, were obtained to evaluate the characteristics of the near-surface soils. The approximate boring locations are shown on the Site Plan, Plate 2.

The borings generally encountered a volcanic ash surface layer, about 1 to 3.5 feet thick, underlain by clinker deposit extending to about 4.5 to 6.5 feet deep. The clinker deposit was underlain by a basalt rock formation extending to the maximum depth explored of 30 feet below the existing ground surface.

The volcanic ash layer consisted of stiff to hard sandy silt. The clinker deposit was composed of dense to very dense sandy gravel. The basalt rock formation was medium hard to hard. Numerous voids were encountered at various depths in the basalt rock formation.

We did not encounter groundwater in the drilled borings at the time of our field exploration. However, it should be noted that the groundwater levels are subject to change due to rainfall, time of year, seasonal precipitation, surface water runoff and other factors.

2.4 Seismic Design Considerations

Based on the International Building Code (2006 Edition), the project site may be subject to seismic activity and seismic design considerations will need to be addressed. The following subsections provide discussions on the seismicity, soil profile type for seismic design, and the potential for liquefaction at the project site.

2.4.1 Earthquakes and Seismicity

In general, earthquakes that occur throughout the world are caused solely by shifts in the tectonic plates. In contrast, earthquake activity in Hawaii is linked primarily to volcanic activity. Therefore, earthquake activity in Hawaii generally occurs before or during volcanic eruptions. In addition, earthquakes may result from the underground movement of magma that comes close to the surface but does not erupt. The Island of Hawaii experiences thousands of earthquakes each year, but most of the earthquakes are so small that they can only be detected by instruments. However, some of the earthquakes are strong enough to be felt, and a few cause minor to moderate damage.

In general, earthquakes (associated with volcanic activity) are most common on the Island of Hawaii. Earthquakes that are directly associated with the movement of magma are concentrated beneath the active Kilauea and Mauna Loa Volcanoes on the Island of Hawaii. Because the majority of the earthquakes in Hawaii (over 90 percent) are related to volcanic activity, the risk of seismic activity and degree of ground shaking diminishes with increased distance from the Island of Hawaii. The Island of Hawaii has experienced numerous earthquakes greater than Magnitude 6 (M6+); however, earthquakes are not confined only to the Island of Hawaii.

2.4.2 Soil Profile Type for Seismic Design

Based on the subsurface materials encountered in the drilled borings, we believe that the project site may be classified from a seismic analysis standpoint as being a “Very Dense Soil and Soft Rock” site corresponding to a Site Class C soil profile type based on the International Building Code (Table No. 1613.5.2), 2006 Edition.

Based on Site Class C, the following seismic design parameters were estimated and may be used for seismic analysis of the project.

SEISMIC DESIGN PARAMETERS	
Parameter	**Value**
Peak Bedrock Acceleration, PBA (Site Class B)	1.405g
MCE Spectral Response Acceleration, S_S	2.635g
MCE Spectral Response Acceleration, S_1	1.205g
Site Class	"C"
Site Coefficient, F_a	1.000
Site Coefficient, F_v	1.300
Design Spectral Response Acceleration, S_{DS}	1.756g
Design Spectral Response Acceleration, S_{D1}	1.045g
Design Peak Ground Acceleration, PGA (Site Class C)	0.702g

2.4.3 Liquefaction Potential

Based on the International Building Code, 2006 Edition, the project site may be subjected to seismic activity, and the potential for soil liquefaction at the project site will need to be evaluated.

Soil liquefaction is a condition where saturated cohesionless soils located near the ground surface undergo a substantial loss of strength due to the build-up of excess pore water pressures resulting from cyclic stress applications induced by earthquakes. In this process, when the loose saturated sand deposit is subjected to vibration (such as during an earthquake), the soil tends to densify and decrease in volume causing an increase in pore water pressure. If drainage is unable to occur rapidly enough to dissipate the build-up of pore water pressure, the effective stress (internal strength) of the soil is reduced. Under sustained vibrations, the pore water pressure build-up could equal the overburden pressure, essentially reducing the soil shear strength to zero and causing it to behave as a viscous fluid. During liquefaction, the soil acquires a mobility sufficient to permit both horizontal and vertical movements, and if not confined, will result in significant deformations.

Soils most susceptible to liquefaction are loose, uniformly graded, fine-grained sands and loose silts with little cohesion. The major factors affecting the liquefaction characteristics of a soil deposit are as follows:

FACTORS	LIQUEFACTION SUSCEPTIBILITY
Grain Size Distribution	Fine and uniform sands and silts are more susceptible to liquefaction than coarse or well-graded sands.
Initial Relative Density	Loose sands and silts are most susceptible to liquefaction. Liquefaction potential is inversely proportional to relative density.
Magnitude and Duration of Vibration	Liquefaction potential is directly proportional to the magnitude and duration of the earthquake.

In general, the subsurface information obtained from the borings drilled indicate that the project site is underlain by stiff to hard sandy silts and dense to very dense sandy gravel overlying basalt rock formation at relatively shallow depths. Based on the subsurface conditions encountered in our field exploration, the geology in the area, and our engineering analyses, the potential for soil liquefaction at the project site is non-existent due to the presence of basalt rock formation and the absence of loose granular soils and groundwater table within the depths explored. Therefore, the potential for liquefaction is not a design consideration at this project site.

END OF SITE CHARACTERIZATION

SECTION 3. DISCUSSION AND RECOMMENDATIONS

Based on our field exploration, the project site is generally underlain by a volcanic ash surface layer underlain by clinker deposit and basalt rock formation extending to the maximum depth explored of 30 feet below the existing ground surface. Groundwater was not encountered in the drilled borings at the time of our field exploration.

Based on the borings, we believe that the new tank may be supported on a shallow foundation system. Over-excavation of the volcanic ash surface material below the tank foundation is recommended. In addition, the implementation of a probing and grouting program is recommended. Detailed discussions and recommendations for these items and other geotechnical aspects of the project are presented in the following sections.

3.1 Tank Foundation

Based on the subsurface conditions encountered at the project site, we believe that a shallow foundation consisting of a perimeter ring footing poured monolithically with the tank floor slab may be used for support of the proposed new water tank.

Our field exploration indicated that volcanic ash, clinker and basalt rock formation may be encountered at or near the foundation subgrade level. To improve the foundation bearing performance and to provide more uniform support for the tank structure, we recommend over-excavating the subsurface materials below the bottom of the tank floor and foundation a minimum of 2 feet below the perimeter ring footing bottom elevation level. The over-excavation should be extended until the underlying clinker or basalt rock formation is encountered. The over-excavation should be replaced with compacted structural fill materials. The over-excavation for the compacted structural fill should extend beyond the outside edges of the perimeter ring footing a minimum of 2 feet. The tank floor slab may be placed directly on the compacted structural fill materials.

The structural fill materials should consist of imported, non-expansive, select granular materials compacted to a minimum of 95 percent relative compaction. Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same soil established in accordance with ASTM D1557.

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

For the design of foundations bearing on the 2-foot thick structural fill placed over the clinker or basalt rock formation, we recommend using an allowable bearing pressure of up to 4,000 pounds per square foot (psf). This bearing value is for dead-plus-live loads and may be increased by one-third (⅓) for transient loads, such as those caused by wind or seismic forces. For the design of the tank floor slab, a modulus of subgrade reaction of 200 pounds per square inch per inch of deflection (pci) may be used for the compacted structural fill materials.

Lateral loads acting on the structure may be resisted by friction developed between the bottom of the foundation and the bearing soil and by passive earth pressure acting against the near-vertical faces of the foundation system. A coefficient of friction of 0.45 may be used for foundations bearing on the 2-foot thick structural fill materials. Resistance due to passive earth pressure may be estimated using an equivalent fluid pressure of 300 pounds per square foot per foot of depth (pcf). This assumes that the soils around footings are well-compacted. The passive pressure should be reduced for foundations located on slopes. Unless covered by pavements or slabs, the passive resistance in the upper 12 inches of soil should be neglected.

In general, the bottom of footings should be embedded a minimum of 24 inches below the lowest adjacent finish grades. Bottom of footings constructed near tops of slopes or on sloping ground should be embedded deep enough to provide a minimum horizontal set-back distance of 8 feet measured from the outside edge of the footings to the slope face.

Foundations located next to utility trenches or easements should be embedded below a 45-degree imaginary plane extending upward from the bottom edge of the utility trench or as deep as the inverts of the utility lines. This requirement is necessary to avoid surcharging adjacent below-grade structures with additional structural loads and to reduce the potential for foundation settlement.

If the foundations are designed and constructed in accordance with the recommendations presented herein, the total settlement of foundations is estimated to be on the order of about 1-inch with differential settlements less than about 1/2-inch.

We recommend that a Geolabs representative observe footing excavations prior to placement of reinforcing steel or concrete to confirm the foundation bearing conditions and the required embedment depths.

3.2 Foundation Probing

Cavities and/or voids are commonly present in the basalt rock formation underlying the project site. In the three borings drilled below the tank site, voids were encountered in the basalt rock formation. To reduce the potential for loss of foundation support resulting from the collapse of cavities and/or voids below foundations supported on the basalt rock formation, we recommend implementing a program of cavity probing and grouting for the foundations of the new water tank structure during construction.

We recommend drilling probe holes at 10-foot on centers for the continuous strip footings. In addition, probe holes should be drilled at each isolated spread footing (or column) location and tank floor slab (one probe hole per 50 square feet of footing and/or slab area). The probe holes should be at least 3 inches in diameter and should extend to a depth of at least 10 feet below the planned bottom of the foundation. Geolabs should review the proposed probing hole layout to evaluate whether the above requirements are met.

If cavities and/or voids are encountered or suspected during the probing operation, additional probe holes should be drilled at closer spacing to aid in delineating the vertical and lateral extent of the cavity and/or void. The probe holes and cavities discovered should be backfilled with sand-cement grout injected (pumped) at low to moderate pressures. We recommend utilizing a low strength sand-cement grout with a slump range of 6 to 9 inches for the grouting operations. In lieu of the sand-cement grout, fluid lean concrete, such as controlled low strength material (flowable fill), also may be used for the grouting operations.

A Geolabs representative should monitor the probing and grouting operations to observe the presence of cavities and/or voids in the subsurface and to allow for additional recommendations to be made if excess grout take and/or changed conditions are observed.

3.3 Retaining Structures

We understand that retaining walls may be required for the concrete utility vault and washout line headwall structures. In general, retaining structures should be designed to resist the lateral earth pressures due to the adjacent soils and surcharge effects. Based on the stiff to hard sandy silts and dense to very dense sandy gravels encountered, the foundation designs for the retaining walls should be based on the recommended parameters presented in the following subsections.

3.3.1 Retaining Wall Foundations

In general, we believe retaining wall foundations may be designed in accordance with the recommendations and parameters presented in the "Tank Foundation" section herein. The minimum 2 feet of over-excavation may be omitted provided the footings are bearing on the underlying clinker or basalt rock formation. In addition, retaining wall foundations should be at least 18 inches wide and should be embedded a minimum of 24 inches below the lowest adjacent finished grades. For sloping ground conditions, the footing should extend deeper to obtain a minimum 6-foot setback distance measured horizontally from the outside edge of the footing to the face of the slope. Wall footings oriented parallel to the direction of the slope should be constructed in stepped footings.

3.3.2 Lateral Earth Pressures

Retaining structures should be designed to resist lateral earth pressures due to the adjacent soils and surcharge effects caused by loads adjacent to the walls. The recommended lateral earth pressures for the design of the retaining structures, expressed in equivalent fluid pressures of pounds per square foot per foot of depth (pcf), are presented in the following table.

LATERAL EARTH PRESSURES FOR DESIGN OF RETAINING STRUCTURES			
Backfill Condition	**Earth Pressure Component**	**Active** (pcf)	**At-Rest** (pcf)
Level Backfill	Horizontal	40	60
	Vertical	None	None
Maximum 2H:1V Sloping Backfill	Horizontal	58	76
	Vertical	28	38

The values provided in the table above assume that select granular fill materials will be used to backfill behind the retaining structures. The backfill behind the retaining structures should be compacted to between 90 and 95 percent relative compaction per ASTM D1557. Over-compaction of the retaining structure backfill should be avoided.

In general, an active condition may be used only for gravity walls or walls that are free to deflect by as much as 0.5 percent of the structure height. If the tops of structures are not free to deflect beyond this degree or are restrained, the structures should be designed for the at-rest condition. These lateral earth pressures do not include hydrostatic pressures that might be caused by groundwater trapped behind the walls.

Footings adjacent to existing retaining walls should be embedded deep enough to avoid surcharging the retaining wall foundations. Foundations next to utility trenches or easements should be embedded below a 45-degree imaginary plane extending upward from the bottom edge of the utility trench or the footings should be embedded to a depth as deep as the inverts of the utility lines. This requirement is necessary to avoid surcharging adjacent below-grade structures with additional structural loads and to reduce the potential for appreciable foundation settlement.

Surcharge stresses due to areal surcharges, line loads, and point loads within a horizontal distance equal to the depth of the structure should be considered in the design. For uniform surcharge stresses imposed on the loaded side of the structure,

a rectangular distribution with a uniform pressure equal to 33 percent of the vertical surcharge pressure acting over the entire height of the wall, which is free to deflect (cantilever), may be used in the design. For walls that are restrained, a rectangular distribution equal to 50 percent of the vertical surcharge pressure acting over the entire height of the structure may be used for design. Additional analyses during design may be needed to evaluate the surcharge effects of point loads and line loads.

3.3.3 Dynamic Lateral Earth Pressure

Dynamic lateral earth forces due to seismic loading (peak bedrock a_{max}=1.405g) for retaining structures may be estimated by using $14.2H^2$ pounds per linear foot of wall length for level backfill conditions, where H is the height of the wall in feet. The resultant force should be assumed to act through the mid-height of the wall. It should be noted that the forces due to dynamic lateral earth pressures presented above are in addition to the static lateral earth pressures. An appropriately reduced factor of safety may be used when dynamic lateral earth forces are accounted for in the design of the retaining structures.

3.3.4 Drainage

The retaining walls should be well-drained to reduce the potential for build-up of hydrostatic pressures. A typical drainage system would consist of a 12-inch wide zone of permeable material, such as No. 3 Fine gravel (ASTM C33, No. 67 gradation), placed directly around a perforated pipe (perforations facing down) at the base of the wall discharging to an appropriate outlet or weepholes. As an alternative, a prefabricated drainage product, such as MiraDrain or EnkaDrain, may be used instead of the drainage material. The prefabricated drainage product also should be hydraulically connected to a perforated pipe at the base of the wall.

Unless covered by concrete slabs or pavements, the upper 12 inches of backfill should consist of relatively impervious material to reduce the potential for water infiltration behind the walls. In addition, the backfill below the drainage outlet (or weepholes) should consist of the relatively impervious material to reduce the potential for water infiltration into the footing subgrade. The relatively impervious material should be compacted to no less than 90 percent relative compaction.

3.4 Slabs-on-Grade

We envision that concrete slabs-on-grade will be utilized for the concrete equipment pad. Based on our field exploration, the on-site near-surface volcanic ash soils have a low to moderate expansion potential. Therefore, we recommend placing a minimum 12-inch thick layer of non-expansive select granular fill material (capping fill) below the slabs to reduce moisture changes in the slab subgrade soils. The capping fill should be compacted to a minimum of 90 percent relative compaction.

Select granular fill should consist of non-expansive granular material such as coralline and/or basaltic materials. The material should be well-graded from coarse to fine with particles no larger than 3 inches in its largest dimension. The material should also contain between 10 and 30 percent fines (particles passing the No. 200 sieve). Select granular fill should have a laboratory CBR value of 20 or more and should have a maximum swell of 1 percent or less when tested in accordance with ASTM D1883.

Prior to placing the non-expansive select granular fill, we recommend scarifying the subgrade soils to a depth of about 8 inches, moisture-conditioning the soils to at least 2 percent above the optimum moisture content and compacting to a minimum of 90 percent relative compaction. The underlying subgrade soils and select granular fill should be wetted and kept moist until the final placement of slab concrete. Where shrinkage cracks are observed after compaction of the subgrade, we recommend preparing the soils again as recommended. Saturation and subsequent yielding of the exposed subgrade due to inclement weather and poor drainage may require over-excavation of the soft areas and replacement with engineered fill.

Exterior concrete flatwork required for the project should be supported on a minimum 12 inches of non-expansive select granular fill. The select granular fill should be compacted to at least 90 percent relative compaction. Control joints should be provided at intervals equal to the width of the sidewalks with expansion joints at right-angle intersections. The thickened edges of slabs adjacent to unpaved areas should be embedded at least 12 inches below the lowest adjacent grade.

It should be emphasized that the areas adjacent to the slab edges should be backfilled tightly against the edges of the slabs with relatively impervious soils. These areas should also be graded to divert water away from the slabs and to reduce the potential for water ponding around the slabs.

3.5 Site Grading

We anticipate that site grading work for the proposed new water tank project will consist of cuts and fills up to about 5 feet in height to achieve the design grades. Items of grading are addressed in the following subsections.

(1) Site Preparation
(2) Fill and Backfill Materials
(3) Fill Placement and Compaction Requirements
(4) Cut and Fill Slopes

A Geolabs representative should monitor site grading operations to observe whether undesirable materials are encountered during excavation and to confirm whether the exposed soil/rock conditions are similar to those encountered in our exploration.

3.5.1 Site Preparation

At the on-set of earthwork, areas within the contract grading limits should be thoroughly cleared and grubbed. Vegetation, debris, deleterious material, and other unsuitable materials should be removed and disposed of properly off-site. Soft and yielding areas encountered during clearing and grubbing below areas designated to receive fill should be over-excavated to expose firm natural material and the resulting excavation should be backfilled with well-compacted engineered fill. The excavated soft and/or organic soils should be properly disposed of off-site or used in landscaping areas, if appropriate.

After clearing and grubbing, the areas within the proposed tank structure should be over-excavated to provide the minimum 2-foot thick compacted reinforced structural fill layer for more uniform support. Prior to placement of the structural fill material, the bottom of the over-excavation should be proof-rolled with a minimum 10-ton (static weight) vibratory drum roller for a minimum of eight passes to detect the

presence of near-surface soft and/or loose zones. The proof-rolling operations should be conducted under the observation of a Geolabs representative.

3.5.2 Fill and Backfill Materials

General fill materials required to raise the existing ground surface to the proposed finished subgrades (outside the tank structure) may consist of on-site or imported select fill materials. General fill material should consist of materials with particle size of 3 inches or less in maximum dimension. The material should have a laboratory CBR value of 12 or higher and a swell potential of less than 1 percent when tested in accordance with ASTM D1883.

Structural fill required under the tank structure should consist of non-expansive select granular material, such as crushed coral or basalt. The material should be well-graded from coarse to fine with particles no larger than 3 inches in largest dimension and should contain between 10 and 30 percent particles passing the No. 200 sieve. The material should have a CBR value of 20 or higher, and a swell potential of 1 percent or less when tested in accordance with ASTM D1883.

Aggregate base course and select borrow required for the project should consist of crushed basalt aggregates and should conform to the County of Hawaii, Department of Public Works, "Standard Specifications for Public Works Construction," dated September 1986. Imported fill materials should be tested for conformance with these recommendations prior to delivery to the project site for the intended use.

3.5.3 Fill Placement and Compaction Requirements

Compaction should be accomplished by sheepsfoot rollers, vibratory rollers, or other types of acceptable compaction equipment. Water tamping, jetting, or ponding should not be allowed to compact the on-site silty soils. General fill materials should be moisture-conditioned to at least 2 percent above the optimum moisture content, placed in level lifts not exceeding 8 inches in loose thickness, and compacted to a minimum of 90 percent relative compaction. Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density

as determined by ASTM D1557. Optimum moisture is the water content (percentage by dry weight) corresponding to the maximum dry density.

Structural fills required under the tank structure should be placed in level lifts not exceeding 8 inches in loose thickness, moisture-conditioned to above the optimum-moisture content and compacted to a minimum of 95 percent relative compaction. Aggregate base course material should be moisture-conditioned to above the optimum moisture content, placed in level lifts not exceeding 8 inches in loose thickness, and compacted to a minimum of 95 percent relative compaction.

3.5.4 Cut and Fill Slopes

Permanent cut and fill slopes may be designed with a slope inclination of two horizontal to one vertical (2H:1V) or flatter. Fills placed on slopes steeper than 5H:1V should be keyed and benched into the existing slope to provide stability of the new fill against sliding. The filling operations should start at the lowest point and continue up in level horizontal compacted layers in accordance with the above fill placement recommendations. Fill slopes should be constructed by overfilling and cutting back to the design slope ratio to obtain a well-compacted slope face. In addition, slope planting should be provided as soon as possible to reduce the potential for erosion of the finished slopes.

3.6 Pavement Design

We understand that a gravel driveway and perimeter service road are planned at the new water tank. In addition, we understand that a new asphaltic driveway will be installed.

In general, we anticipate post construction vehicle loading for the new pavements to consist primarily of utility vehicles and maintenance trucks with light usage. Based on our laboratory testing, the on-site volcanic ash soils have a CBR value of 5.9 or greater and swell potential of greater than 1 percent. Based on the above test results and the anticipated light traffic, we recommend using the following preliminary pavement sections for the project:

Asphaltic Concrete Driveway

2.0-Inch Asphaltic Concrete
6.0-Inch Aggregate Base Course (95 Percent Relative Compaction)
10.0-Inch Aggregate Select Borrow Course (95 Percent Relative Compaction)
18.0-Inch Total Pavement Thickness over Moist Compacted Subgrade

Gravel Road and Driveway

8.0-Inch ¾-inch Aggregate Base Course (95 Percent Relative Compaction)
8.0-Inch Total Roadway Thickness on a layer of Reinforcing Geogrid
(such as Tensar TriAx Grid TX5 or equivalent) over
Filter Fabric (Mirafi 180N or equivalent) on
Compacted Existing Subgrade

It should be noted that periodic maintenance will be required for the gravel road and driveway due to raveling of the gravel surface after rain events. Maintenance may include recompacting the gravel surface or placement and compacting of additional gravel.

The subgrade soils should be proof-rolled with a minimum 10-ton (static weight) vibratory drum roller for a minimum of eight passes. Soft/loose subgrade soils should be removed and replaced with compacted select granular fill materials.

Where shrinkage cracks are observed after preparation of the subgrade, we recommend thoroughly moistening and recompacting the soil to close the cracks. Saturation and subsequent yielding of the exposed subgrade due to inclement weather and poor drainage may require over-excavation of the soft areas and replacement with well-compacted engineered fill.

The aggregate base course and select borrow course should consist of crushed basalt aggregates compacted to no less than 95 percent relative compaction. California Bearing Ratio (CBR) and field density tests should be performed on the actual subgrade soils encountered during construction to confirm the adequacy of the above section. The recommended section considers only light traffic conditions and assumes that good drainage will be provided adjacent to paved areas.

Paved areas should be sloped and drainage gradients maintained to carry surface water off the site. Surface water ponding should not be allowed on the site during or after

construction. Where concrete curbs are used to isolate landscaping in or adjacent to the pavement areas, we recommend extending the curbs a minimum of 2 inches into the subgrade soil below the base course layer to reduce the potential for migration of landscape water into the pavement section. Alternatively, a subdrain system could be constructed to collect excessive water from landscaping irrigation. For long-term performance, we recommend constructing a subdrain system adjacent to the paved/landscaped areas.

3.7 Utility Trenches

We anticipate that underground utility lines will be installed for this project. In general, good construction practices should be utilized for the installation and backfilling of the trenches for the new utilities. The contractor should determine the method and equipment to be used for trench excavation, subject to practical limits and safety considerations. In addition, the excavations should comply with the applicable federal, state, and local safety requirements. The contractor should be responsible for trench shoring design and installation.

In general, we recommend providing granular bedding consisting of 6 inches of open-graded gravel (ASTM C33, No. 67 gradation) under the pipes for uniform support. Free-draining granular materials, such as No. 3B Fine gravel (ASTM C33, No. 67 gradation), should also be used for the initial trench backfill up to about 12 inches above the pipes to provide adequate support around the pipes. It is critical to use this free-draining material to reduce the potential for the formation of voids below the haunches of pipes and to provide adequate support for the sides of the pipes. Improper trench backfill could result in backfill settlement and pipe damage.

The upper portion of the trench backfill from the level 12 inches above the pipes to the top of the subgrade or finished grade may consist of compacted on-site soils (with a maximum particle size of 6 inches) or select granular fill material. The backfill should be placed in maximum 8-inch level loose lifts and mechanically compacted to no less than 90 percent relative compaction to reduce the potential for appreciable future ground subsidence. Where trenches are below pavement areas, the upper 3 feet of the trench

backfill below the pavement finished grade should be compacted to a minimum of 95 percent relative compaction.

3.8 Drainage

Finished grades outside the water tank should be sloped to shed water away from the slabs and foundations and to reduce the potential for ponding around the structures. This drainage requirement is essential for the proper performance of the above foundation recommendations because ponded water could cause subsurface soil saturation and subsequent heaving or loss of strength. The foundation excavations should be properly backfilled against the walls or slab edges immediately after setting of the concrete to reduce the potential for excessive water infiltration into the subsurface. Drainage swales should be provided as soon as possible and should be maintained to drain surface water runoff away from the slabs and foundations.

3.9 Design Review

Preliminary and final drawings and specifications for the project should be forwarded to Geolabs for review and written comments prior to bid solicitation for construction. This review is necessary to evaluate the conformance of the plans and specifications with the intent of the foundation and earthwork recommendations provided herein. If this review is not made, Geolabs cannot be responsible for misinterpretation of our recommendations.

3.10 Post-Design Services/Services During Construction

Geolabs should be retained to provide geotechnical engineering services during construction. The critical items of construction monitoring that require "Special Inspections" include the following:

- Observation of probing and grouting program
- Observation of cavity excavation and backfill
- Observation of subgrade preparation
- Observation of fill and backfill placement

A Geolabs representative also should monitor other aspects of earthwork construction to observe compliance with the design concepts, specifications, or recommendations and to expedite suggestions for design changes that may be required

in the event that subsurface conditions differ from those anticipated at the time this report was prepared. Geolabs should be accorded the opportunity to provide geotechnical engineering services during construction to confirm our assumptions in providing the recommendations presented herein.

If the actual exposed subsurface conditions encountered during construction differ from those assumed or considered herein, Geolabs should be contacted to review and/or revise the geotechnical recommendations presented herein.

END OF DISCUSSION AND RECOMMENDATIONS

SECTION 4. LIMITATIONS

The analyses and recommendations submitted herein are based in part upon information obtained from the field borings and bulk samples. Variations of the subsurface conditions between and beyond the field borings and bulk samples may occur, and the nature and extent of these variations may not become evident until construction is underway. If variations then appear evident, it will be necessary to re-evaluate the recommendations presented herein.

The field boring and bulk sample locations indicated herein are approximate, having been estimated by taping from visible features shown on the Phase 1 Improvements Plan received from G70 on December 12, 2019. Elevations of the borings were estimated from contours shown on the same plan. The field boring locations and elevations should be considered accurate only to the degree implied by the methods used.

The stratification breaks shown on the graphic representations of the borings depict the approximate boundaries between soil types and, as such, may denote a gradual transition. Water level data from the borings were measured at the times shown on the graphic representations and/or presented in the text of this report. These data have been reviewed and interpretations made in the formulation of this report. It should be noted that the groundwater levels are subject to change due to tidal fluctuation, rainfall, seasonal precipitation, surface water runoff, and other factors.

This report has been prepared for the exclusive use of G70 and their project consultants for specific application to the *DHHL Kau Water System Improvements* project in accordance with generally accepted geotechnical engineering principles and practices. No warranty is expressed or implied.

This report has been prepared solely for the purpose of assisting the design engineers in the design of the proposed project. Therefore, this report may not contain sufficient data, or the proper information, to serve as a basis for detailed construction cost estimates.

The owner/client should be aware that unanticipated soil conditions are commonly encountered. Unforeseen subsurface conditions, such as perched groundwater, soft deposits, hard layers or cavities, may occur in localized areas and may require additional probing or corrections in the field (which may result in construction delays) to attain a properly constructed project. Therefore, a sufficient contingency fund is recommended to accommodate these possible extra costs.

This geotechnical engineering exploration conducted at the project site was not intended to investigate the potential presence of hazardous materials existing at the project site. It should be noted that the equipment, techniques, and personnel used to conduct a geo-environmental exploration differ substantially from those applied in geotechnical engineering.

END OF LIMITATIONS

CLOSURE

The following plates and appendices are attached and complete this report:

-ΩΩΩΩΩΩΩΩΩ-

Respectfully submitted,

GEOLABS, INC.

By _____
Gerald Y. Seki, P.E.
Vice President

GS:lf

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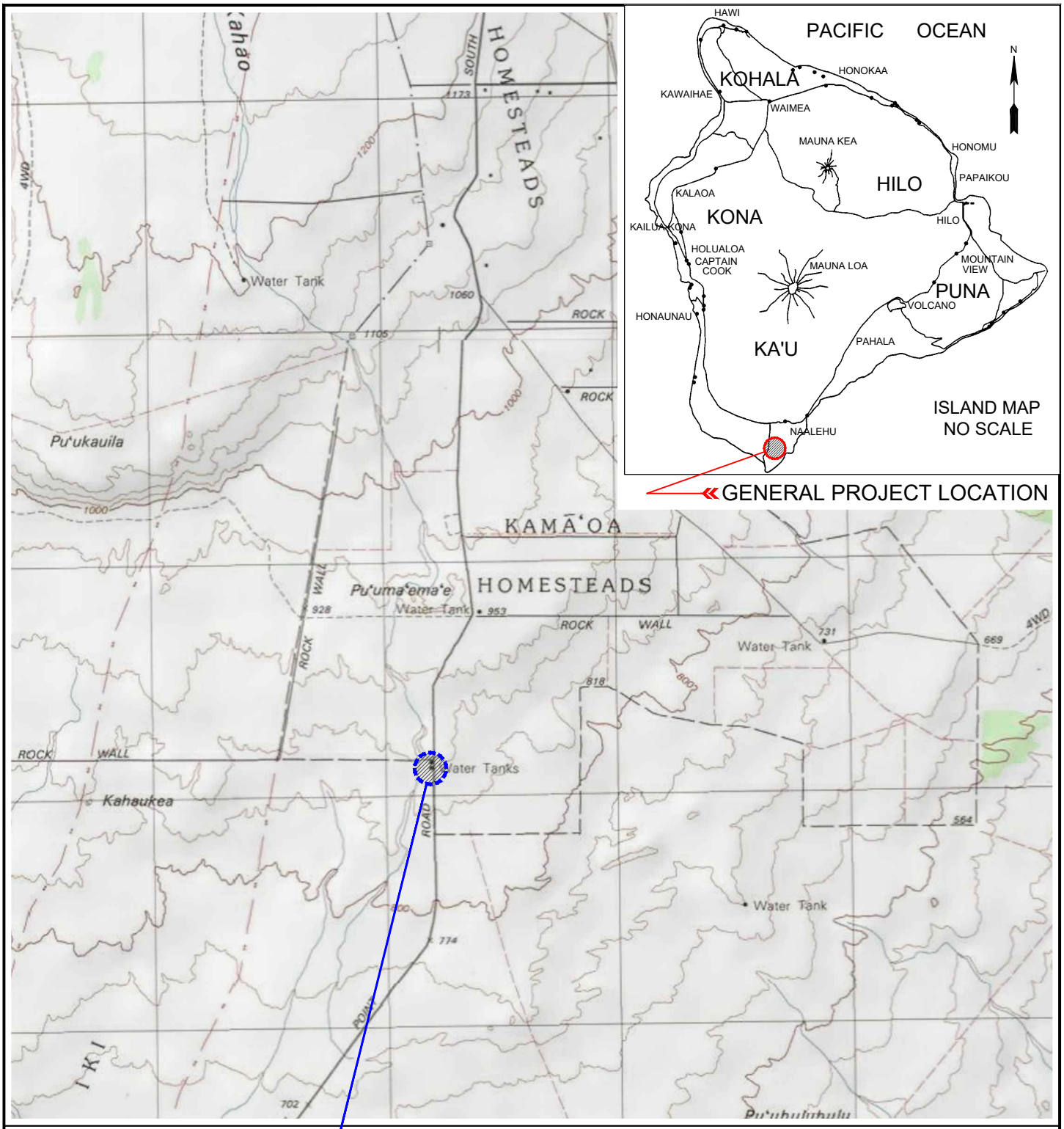
PLATES



PROJECT LOCATION MAP

DHHL KAU WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

2000 1000 0 2000 FT.

GRAPHIC SCALE

N

REFERENCE: MAP CREATED WITH TOPO!® ©2010 NATIONAL GEOGRAPHIC; ©2007 TELE ATLAS, REL. 1/2007.

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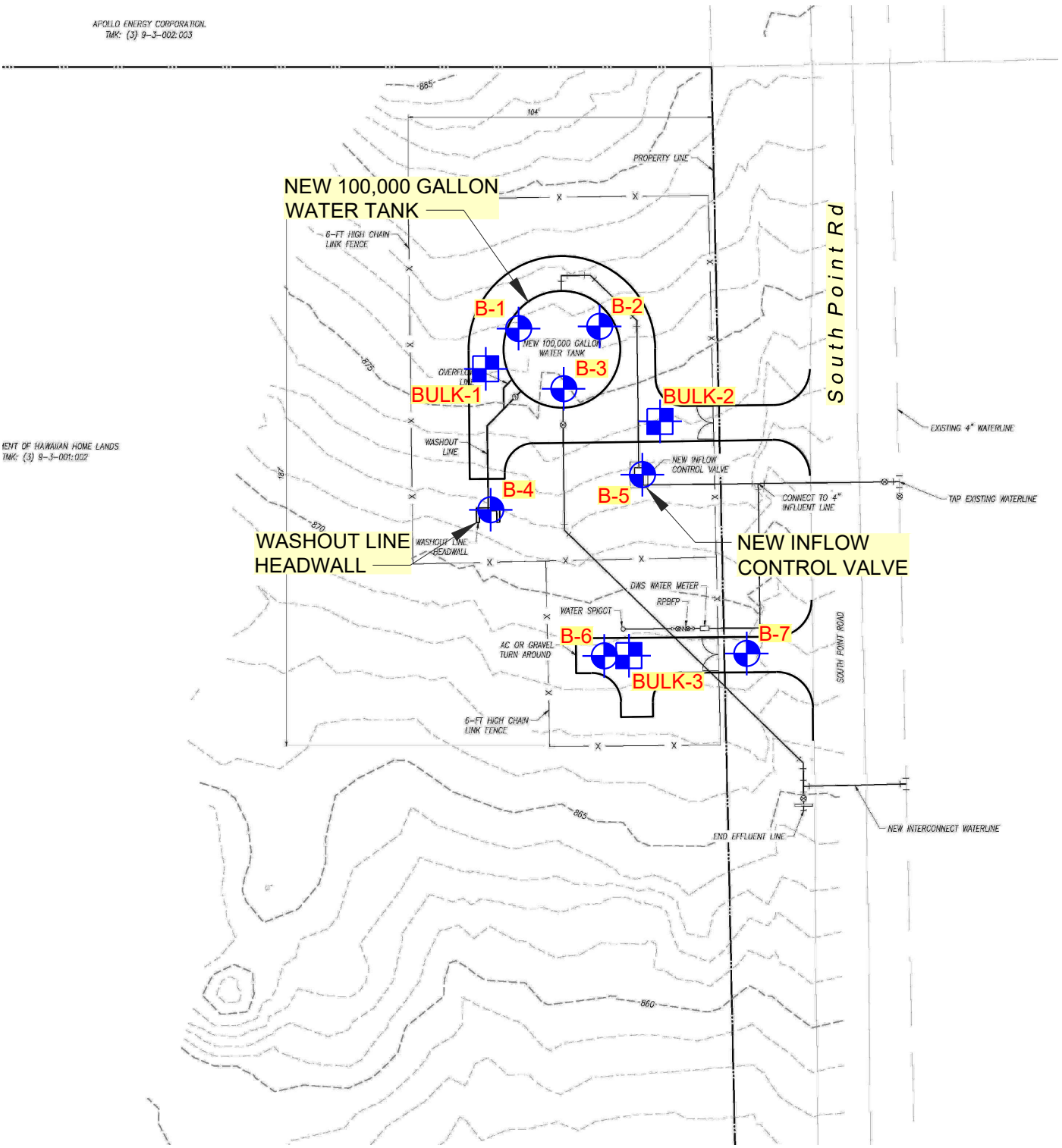
DATE	DRAWN BY	PLATE
MARCH 2020	ASP	1
SCALE	W.O.	
1" = 2,000'	8024-00	



LEGEND:

APPROXIMATE BORING LOCATION

APPROXIMATE BULK SAMPLE LOCATION

0 10 20 30 40 50 100 150 FT.

GRAPHIC SCALE

N

REFERENCE: PHASE 1 IMPROVEMENTS PLAN RECEIVED FROM G70 ON DECEMBER 12, 2019.

SITE PLAN

DHHL KAU WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

GEOLABS, INC.
Geotechnical Engineering

DATE	DRAWN BY	PLATE
MARCH 2020	ASP	2
SCALE	W.O.	
1" = 50'	8024-00	

APPENDIX A

APPENDIX A

Field Exploration

We explored the subsurface conditions at the project site by drilling and sampling seven borings, designated as Boring Nos. 1 through 7, extending to depths of about 5 to 30 feet below the existing ground surface. In addition, three bulk samples of the near-surface soils, designated as Bulk-1 through Bulk-3, were obtained to evaluate the pavement support characteristics of the near-surface soils. The approximate boring and bulk sample locations are shown on the Site Plan, Plate 2. The borings were drilled using a truck-mounted drill rig equipped with continuous flight augers and HQ coring.

Our geologist classified the materials encountered in the borings by visual and textural examination in the field in general accordance with ASTM D2488, Standard Practice for Description and Identification of Soils, and monitored the drilling operations on a near-continuous (full-time) basis. These classifications were further reviewed visually and by testing in the laboratory. Soils were classified in general accordance with ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), as shown on the Soil Log Legend, Plate A-0.1. Deviations made to the soil classification in accordance with ASTM D2487 are described on the Soil Classification Log Key, Plate A-0.2. Rock samples were described in general accordance with the Rock Description System, as shown on the Rock Log Legend, Plate A-0.3. Graphic representations of the materials encountered are presented on the Logs of Borings, Plates A-1 through A-7.

Relatively “undisturbed” soil samples were obtained in general accordance with ASTM D3550, Ring-Lined Barrel Sampling of Soils, by driving a 3-inch OD Modified California sampler with a 140-pound hammer falling 30 inches. In addition, some samples were obtained from the drilled borings in general accordance with ASTM D1586, Penetration Test and Split-Barrel Sampling of Soils, by driving a 2-inch OD standard penetration sampler using the same hammer and drop. The blow counts needed to drive the sampler the second and third 6 inches of an 18-inch drive are shown as the “Penetration Resistance” on the Logs of Borings at the appropriate sample depths. The penetration resistance shown on the logs of borings indicates the number of blows required for the specific sampler type used. The blow counts may need to be factored to obtain the Standard Penetration Test (SPT) blow counts.

Core samples of the rock materials encountered at the project site were obtained by using diamond core drilling techniques in general accordance with ASTM D2113, Diamond Core Drilling for Site Investigation. Core drilling is a rotary drilling method that uses a hollow bit to cut into the rock formation. The rock material left in the hollow core of the bit is mechanically recovered for examination and description. Rock cores were described in general accordance with the Rock Description System, as shown on the Rock Log Legend, Plate A-0.3. The Rock Description System is based on the publication “Suggested Methods for the Quantitative Description of Discontinuities in Rock Masses” by the International Society for Rock Mechanics (March 1977). “Suggested Methods for

the Quantitative Description of Discontinuities in Rock Masses" by the International Society for Rock Mechanics (March 1977).

Recovery (REC) is used as a subjective guide to the interpretation of the relative quality of rock masses. Recovery is defined as the actual length of material recovered from a coring attempt versus the length of the core attempt. For example, if 3.7 feet of material is recovered from a 5.0-foot core run, the recovery would be 74 percent and would be shown on the Logs of Borings as REC = 74%.

The Rock Quality Designation (RQD) is also a subjective guide to the relative quality of rock masses. RQD is defined as the percentage of the core run in rock that is sound material in excess of 4 inches in length without discontinuities, discounting drilling induced fractures or breaks. If 2.5 feet of sound material is recovered from a 5.0-foot core run in rock, the RQD would be 50 percent and would be shown on the Logs of Borings as RQD = 50%. Generally, the following is used to describe the relative quality of the rock, based on the "Practical Handbook of Physical Properties of Rocks and Minerals."

Rock Quality	**RQD** (%)
Very Poor	0 – 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 – 100

The rippability of a rock mass is a function of the relative hardness of the rock, its relative quality, brittleness, and fissile characteristics. A dense basalt with a high RQD value would be very difficult to rip and would probably require more arduous methods of excavation.

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Soil Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS — MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	GRAVELS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS — LESS THAN 5% FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES — MORE THAN 12% FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS — 50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	CLEAN SANDS — LESS THAN 5% FINES	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES — MORE THAN 12% FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS — 50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS — LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS — LIQUID LIMIT 50 OR MORE		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND

- (2-INCH) O.D. STANDARD PENETRATION TEST
- (3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE
- SHELBY TUBE SAMPLE
- GRAB SAMPLE
- CORE SAMPLE
- WATER LEVEL OBSERVED IN BORING AT TIME OF DRILLING
- WATER LEVEL OBSERVED IN BORING AFTER DRILLING
- WATER LEVEL OBSERVED IN BORING OVERNIGHT

LL	LIQUID LIMIT (NP=NON-PLASTIC)
PI	PLASTICITY INDEX (NP=NON-PLASTIC)
TV	TORVANE SHEAR (tsf)
UC	UNCONFINED COMPRESSION OR UNIAXIAL COMPRESSIVE STRENGTH
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)

Plate

A-0.1

GEOLABS, INC.

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Soil Classification Log Key

(with deviations from ASTM D2488)

GEOLABS, INC. CLASSIFICATION*

GRANULAR SOIL (- #200 <50%)

- **PRIMARY** constituents are composed of the largest percent of the soil mass. Primary constituents are capitalized and bold (i.e., **GRAVEL, SAND**)
- **SECONDARY** constituents are composed of a percentage less than the primary constituent. If the soil mass consists of 12 percent or more fines content, a cohesive constituent is used (**SILTY** or **CLAYEY**); otherwise, a granular constituent is used (**GRAVELLY** or **SANDY**) provided that the secondary constituent consists of 20 percent or more of the soil mass. Secondary constituents are capitalized and bold (i.e., **SANDY** GRAVEL, **CLAYEY** SAND) and precede the primary constituent.
- **accessory descriptions** compose of the following:
  with some: >12%
  with a little: 5 - 12%
  with traces of: <5%
  accessory descriptions are lower cased and follow the Primary and Secondary Constituents
  (i.e., SILTY GRAVEL **with a little sand**)

COHESIVE SOIL (- #200 ≥ 50%)

- **PRIMARY** constituents are based on plasticity. Primary constituents are capitalized and bold (i.e., **CLAY, SILT**)
- **SECONDARY** constituents are composed of a percentage less than the primary constituent, but more than 20 percent of the soil mass. Secondary constituents are capitalized and bold (i.e., **SANDY** CLAY, **SILTY** CLAY, **CLAYEY** SILT) and precede the primary constituent.
- **accessory descriptions** compose of the following:
  with some: >12%
  with a little: 5 - 12%
  with traces of: <5%
  accessory descriptions are lower cased and follow the Primary and Secondary Constituents
  (i.e., SILTY CLAY **with some sand**)

EXAMPLE: Soil Containing 60% Gravel, 25% Sand, 15% Fines. Described as: **SILTY GRAVEL** with some sand

RELATIVE DENSITY / CONSISTENCY

Granular Soils			Cohesive Soils			
N-Value (Blows/Foot)		Relative Density	N-Value (Blows/Foot)		PP Readings (tsf)	Consistency
SPT	MCS		SPT	MCS		
0 - 4	0 - 7	Very Loose	0 - 2	0 - 4		Very Soft
4 - 10	7 - 18	Loose	2 - 4	4 - 7	< 0.5	Soft
10 - 30	18 - 55	Medium Dense	4 - 8	7 - 15	0.5 - 1.0	Medium Stiff
30 - 50	55 - 91	Dense	8 - 15	15 - 27	1.0 - 2.0	Stiff
> 50	> 91	Very Dense	15 - 30	27 - 55	2.0 - 4.0	Very Stiff
			> 30	> 55	> 4.0	Hard

MOISTURE CONTENT DEFINITIONS

Dry: Absence of moisture, dry to the touch

Moist: Damp but no visible water

Wet: Visible free water

ABBREVIATIONS

WOH: Weight of Hammer

WOR: Weight of Drill Rods

SPT: Standard Penetration Test Split-Spoon Sampler

MCS: Modified California Sampler

PP: Pocket Penetrometer

GRAIN SIZE DEFINITION

Description	Sieve Number and / or Size
Boulders	> 12 inches (305-mm)
Cobbles	3 to 12 inches (75-mm to 305-mm)
Gravel	3-inch to #4 (75-mm to 4.75-mm)
Coarse Gravel	3-inch to 3/4-inch (75-mm to 19-mm)
Fine Gravel	3/4-inch to #4 (19-mm to 4.75-mm)
Sand	#4 to #200 (4.75-mm to 0.075-mm)
Coarse Sand	#4 to #10 (4.75-mm to 2-mm)
Medium Sand	#10 to #40 (2-mm to 0.425-mm)
Fine Sand	#40 to #200 (0.425-mm to 0.075-mm)

Soil descriptions are based on ASTM D2488-09a, Visual-Manual Procedure, with the above modifications by Geolabs, Inc. to the Unified Soil Classification System (USCS).

Plate

A-0.2

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Rock Log Legend

ROCK DESCRIPTIONS

	**BASALT**		**CONGLOMERATE**
	**BOULDERS**		**LIMESTONE**
	**BRECCIA**		**SANDSTONE**
	**CLINKER**		**SILTSTONE**
	**COBBLES**		**TUFF**
	**CORAL**		**VOID/CAVITY**

ROCK DESCRIPTION SYSTEM

ROCK FRACTURE CHARACTERISTICS

The following terms describe general fracture spacing of a rock:

Massive: Greater than 24 inches apart

Slightly Fractured: 12 to 24 inches apart

Moderately Fractured: 6 to 12 inches apart

Closely Fractured: 3 to 6 inches apart

Severely Fractured: Less than 3 inches apart

DEGREE OF WEATHERING

The following terms describe the chemical weathering of a rock:

Unweathered: Rock shows no sign of discoloration or loss of strength.

Slightly Weathered: Slight discoloration inwards from open fractures.

Moderately Weathered: Discoloration throughout and noticeably weakened though not able to break by hand.

Highly Weathered: Most minerals decomposed with some corestones present in residual soil mass. Can be broken by hand.

Extremely Weathered: Saprolite. Mineral residue completely decomposed to soil but fabric and structure preserved.

HARDNESS

The following terms describe the resistance of a rock to indentation or scratching:

Very Hard: Specimen breaks with difficulty after several "pinging" hammer blows.
Example: Dense, fine grain volcanic rock

Hard: Specimen breaks with some difficulty after several hammer blows.
Example: Vesicular, vugular, coarse-grained rock

Medium Hard: Specimen can be broked by one hammer blow. Cannot be scraped by knife. SPT may penetrate by ~25 blows per inch with bounce.
Example: Porous rock such as clinker, cinder, and coral reef

Soft: Can be indented by one hammer blow. Can be scraped or peeled by knife. SPT can penetrate by ~100 blows per foot.
Example: Weathered rock, chalk-like coral reef

Very Soft: Crumbles under hammer blow. Can be peeled and carved by knife. Can be indented by finger pressure.
Example: Saprolite

Plate

A-0.3

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DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Log of Boring

1

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS

Approximate Ground Surface Elevation (feet): 877 *

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	USCS	Description
LL=37 PI=12	20	59			48		ML	Orangish brown **SANDY SILT** with a little gravel, very stiff, moist (volcanic ash)
Direct Shear	3				73			
			97	0	15/0" Ref.		GP	Brownish gray **SANDY GRAVEL (BASALTIC)**, dense to very dense, moist (clinker)
			67	0				Gray **BASALT**, severely to closely fractured, slightly weathered (basalt formation)
			72	0				**VOID** @ 13.5'-15.25'
			80	10				**VOID** @ 18.5'-19.5'
			72	10				
			100	37				
								Boring terminated at 30 feet

* Elevations estimated from Phase 1 Improvements Plan received from G70 on December 12, 2019.

Date Started:	March 3, 2020	Water Level: ▽	Not Encountered 03/03/2020 1352 HRS	Plate
Date Completed:	March 3, 2020			
Logged By:	B. Aiu	Drill Rig:	MOBILE B-53.2	
Total Depth:	30 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring	A - 1
Work Order:	8024-00	Driving Energy:	140 lb. wt., 30 in. drop	

BORING_LOG 8024-00.GPJ GEOLABS.GDT 4/28/20

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DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Log of Boring

2

Approximate Ground Surface Elevation (feet): 876.5 *

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
					25/1"					ML	Orangish brown **SANDY SILT** with a little gravel, stiff, moist (volcanic ash)
					25/1"					GP	Brownish gray **SANDY GRAVEL (BASALTIC)**, very dense, moist (clinker)
UC			87	30	10/0" Ref.		5				Gray **BASALT**, closely to moderately fractured, slightly weathered (basalt formation)
UC			77	33							**VOID** @ 8'-9'
			80	20			10				
							15				**VOID** @ 14.5'-15.5'
UC			100	32							
			60	15			20				
							25				**VOID** @ 23.5'-25.5'
			87	53			30				Boring terminated at 30 feet
							35				

Date Started:	March 4, 2020	Water Level: ▼ Not Encountered 03/04/2020 1139 HRS	Plate
Date Completed:	March 4, 2020		
Logged By:	B. Aiu	Drill Rig: MOBILE B-53.2	
Total Depth:	30 feet	Drilling Method: 4" Solid-Stem Auger & HQ Coring	A - 2
Work Order:	8024-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 8024-00.GPJ GEOLABS.GDT 4/28/20

GEOLABS, INC.

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DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Log of Boring

3

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS
	30	56			45/2"					ML
					25/1"					GP
UC			63	17	10/0" Ref.		5			
UC			97	53						
UC			90	52			10			
			100	42			15			
			67	23			20			
			100	90			25			
							30			
							35			

Approximate Ground Surface Elevation (feet): 875 *

Description

Orangish brown **SANDY SILT** with a little gravel, hard, moist (volcanic ash)

Brownish gray **SANDY GRAVEL (BASALTIC)**, very dense, moist (clinker)

Gray **BASALT**, severely to closely fractured, slightly weathered (basalt formation)

grades to moderately fractured

VOID @ 24'-25.5'

Boring terminated at 30 feet

Date Started:	March 3, 2020	Water Level: ▼	Not Encountered 03/03/2020 1526 HRS	Plate
Date Completed:	March 3, 2020			
Logged By:	B. Aiu	Drill Rig:	MOBILE B-53.2	
Total Depth:	30 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring	A - 3
Work Order:	8024-00	Driving Energy:	140 lb. wt., 30 in. drop	

BORING_LOG 8024-00.GPJ GEOLABS.GDT 4/28/20

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DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Log of Boring

4

Laboratory			Field				Depth (feet)	Sample	Graphic	USCS	Approximate Ground Surface Elevation (feet): 872 *
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)					**Description**
	10	61			107					ML	Orangish brown **SANDY SILT** with a little gravel, hard, moist (volcanic ash)
	6				15/0" Ref.					GP	Brownish gray **SANDY GRAVEL (BASALTIC)**, very dense, moist (clinker)
					15/0" Ref.		5				Gray **BASALT**, highly weathered (basalt formation) **VOID** @ 7'-8'
					25/1"		10				Boring terminated at 10.08 feet
							15				
							20				
							25				
							30				
							35				

Date Started:	March 2, 2020	Water Level: ▼ Not Encountered 03/02/2020 1338 HRS	Plate
Date Completed:	March 2, 2020		
Logged By:	B. Aiu	Drill Rig: MOBILE B-53.2	
Total Depth:	10.08 feet	Drilling Method: 4" Solid-Stem Auger	A - 4
Work Order:	8024-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 8024-00.GPJ GEOLABS.GDT 4/28/20

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DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Log of Boring

5

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Approximate Ground Surface Elevation (feet): 873 * **Description**
	3	60			70					ML	Orangish brown **SANDY SILT** with a little gravel, hard, moist (volcanic ash)
	4				37/6" +15/0" Ref.					GP	Brownish gray **SANDY GRAVEL (BASALTIC)**, dense, moist (clinker)
					50/2"		5				Gray **BASALT**, highly weathered (basalt formation) **VOID** @ 7'-8'
					25/1"		10				Boring terminated at 10.08 feet
							15				
							20				
							25				
							30				
							35				

Date Started:	March 2, 2020	Water Level: ▼ Not Encountered 03/02/2020 1422 HRS	Plate
Date Completed:	March 2, 2020		
Logged By:	B. Aiu	Drill Rig: MOBILE B-53.2	A - 5
Total Depth:	10.08 feet	Drilling Method: 4" Solid-Stem Auger	
Work Order:	8024-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 8024-00.GPJ GEOLABS.GDT 4/28/20

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DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Log of Boring

6

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Approximate Ground Surface Elevation (feet): 869 * Description
	25	55			75/6" +25/1" 25/1"					ML	Orangish brown **SANDY SILT** with a little gravel, hard, moist (volcanic ash)
										GP	Brownish gray **SANDY GRAVEL (BASALTIC)**, very dense, moist (clinker)
					15/0" Ref.		5				Boring terminated at 5 feet
							10				
							15				
							20				
							25				
							30				
							35				

Date Started:	March 2, 2020	Water Level: ▼	Not Encountered 03/02/2020 1232 HRS	Plate
Date Completed:	March 2, 2020			
Logged By:	B. Aiu	Drill Rig:	MOBILE B-53.2	
Total Depth:	5 feet	Drilling Method:	4" Solid-Stem Auger	A - 6
Work Order:	8024-00	Driving Energy:	140 lb. wt., 30 in. drop	

BORING_LOG 8024-00.GPJ GEOLABS.GDT 4/28/20

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DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Log of Boring

7

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS
	23	50			82					ML
LL=NP PI=NP Sieve - #200 = 4.3%	6				63					GP
					15/0" Ref.		5			
							10			
							15			
							20			
							25			
							30			
							35			

Approximate Ground Surface Elevation (feet): 868.5 *

Description

Orangish brown **SANDY SILT** with a little gravel, hard, moist (volcanic ash)

Brownish gray **SANDY GRAVEL (BASALTIC)**, very dense, moist (clinker)

Boring terminated at 5 feet

Date Started:	March 2, 2020	Water Level: ▼ Not Encountered 03/02/2020 1210 HRS	Plate
Date Completed:	March 2, 2020		
Logged By:	B. Aiu	Drill Rig: MOBILE B-53.2	
Total Depth:	5 feet	Drilling Method: 4" Solid-Stem Auger	A - 7
Work Order:	8024-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 8024-00.GPJ GEOLABS.GDT 4/28/20

APPENDIX B

APPENDIX B

Laboratory Tests

Moisture Content (ASTM D2216) and Unit Weight (ASTM D2937) determinations were performed on selected samples as an aid in the classification and evaluation of soil properties. The test results are presented on the Logs of Borings at the appropriate sample depths.

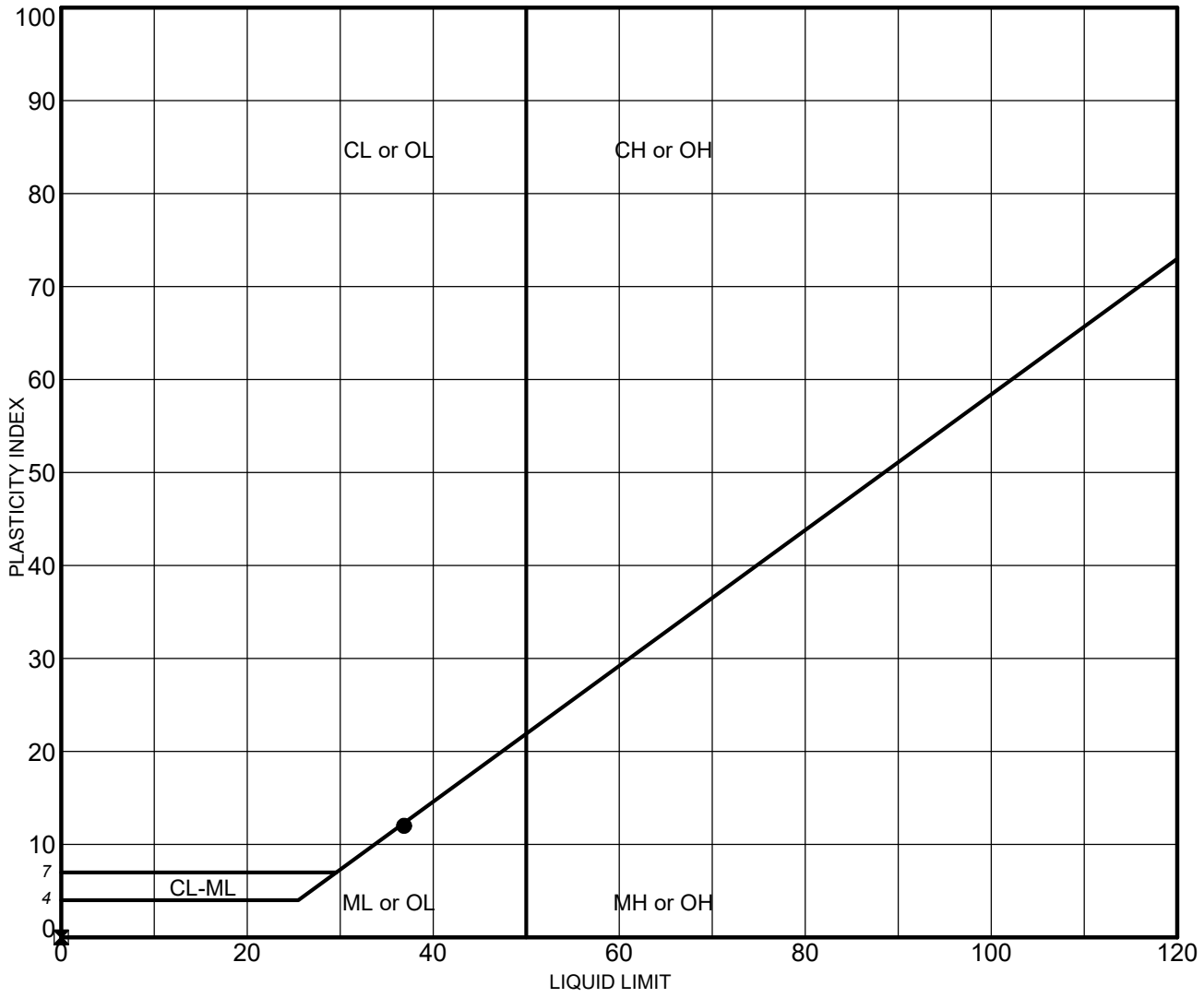
Two Atterberg Limits tests (ASTM D4318) were performed on selected soil samples to evaluate the liquid and plastic limits. The test results are summarized on the Logs of Borings at the appropriate sample depths. Graphic presentations of the test results are provided on Plate B-1.

One Sieve Analysis test (ASTM C117 & C136) was performed on a selected sample to evaluate the gradation characteristics of the soils and to aid in soil classification. Graphic presentation of the grain size distributions is provided on Plate B-2.

One Direct Shear test (ASTM D3080) was performed on a selected sample to evaluate the shear strength characteristics of the material tested. The test results are presented on Plate B-3.

Six Uniaxial Compressive Strength tests (ASTM D7012, Method C) were performed on basalt rock core samples to evaluate the uniaxial compressive strength of the underlying basalt rock formation. The test results are presented on Plate B-4.

Three laboratory California Bearing Ratio tests (ASTM D1883) were performed on bulk samples of the near-surface soils to evaluate the pavement support characteristics of the soils. The test results are presented on Plates B-5 through B-7.



	Sample	Depth (ft)	LL	PL	PI	Description
●	B-1	1.0-2.5	37	25	12	Orangish brown sandy silt (ML) with a little gravel
⊠	B-7	2.5-4.0	NP	NP	NP	Brownish gray sandy gravel (GP)

NP = NON-PLASTIC

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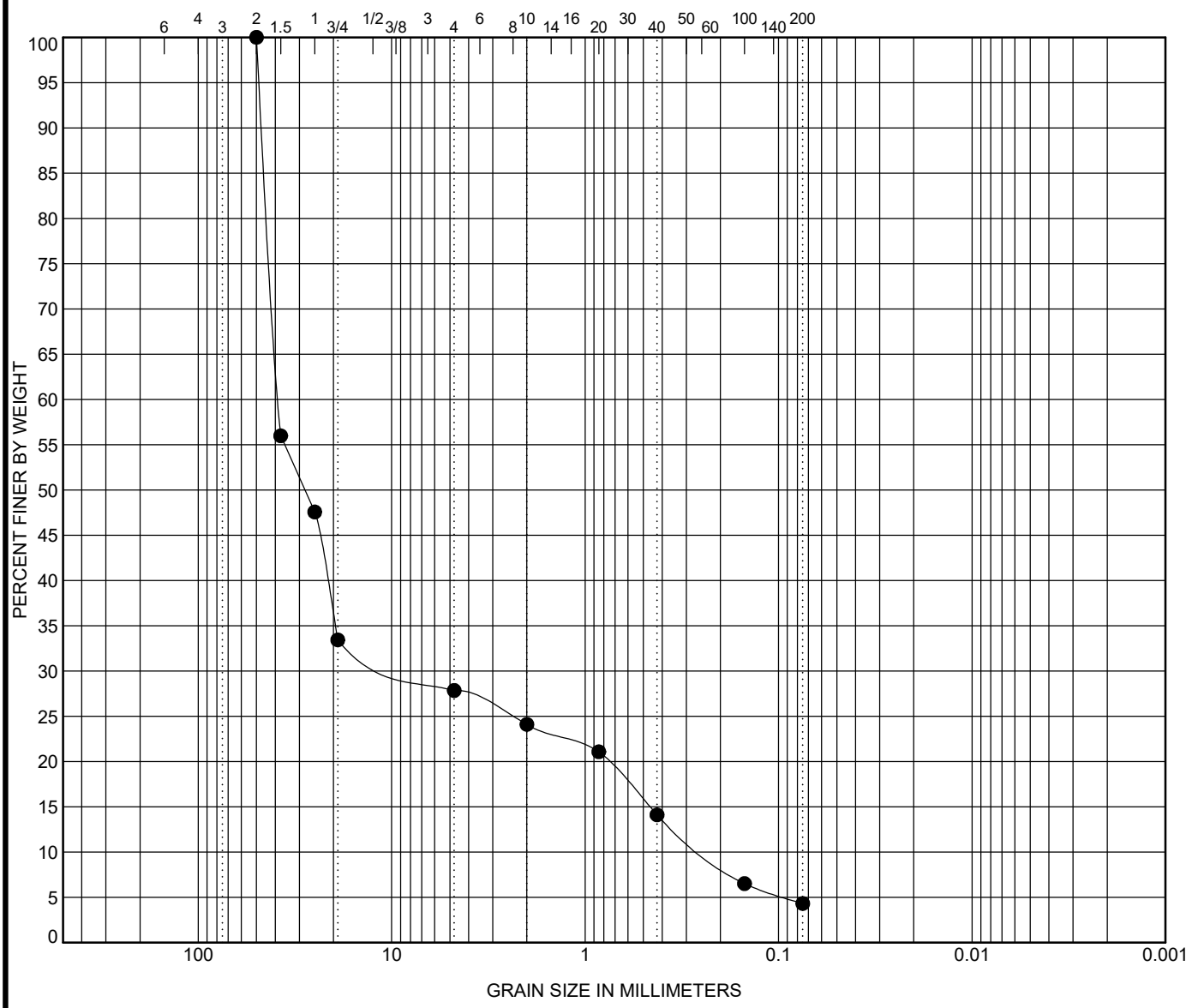
ATTERBERG LIMITS TEST RESULTS - ASTM D4318

DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Plate
B - 1

G ATTERBERG PI-100 LL-120 8024-00.GPJ GEOLABS.GDT 4/28/20



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	B-7	2.5-4.0	Brownish gray sandy gravel (GP)	NP	NP	NP	7.1	159.0

	Sample	Depth (ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Fine
●	B-7	2.5-4.0	50	38.498	8.11	0.242	72.2	23.5	4.3

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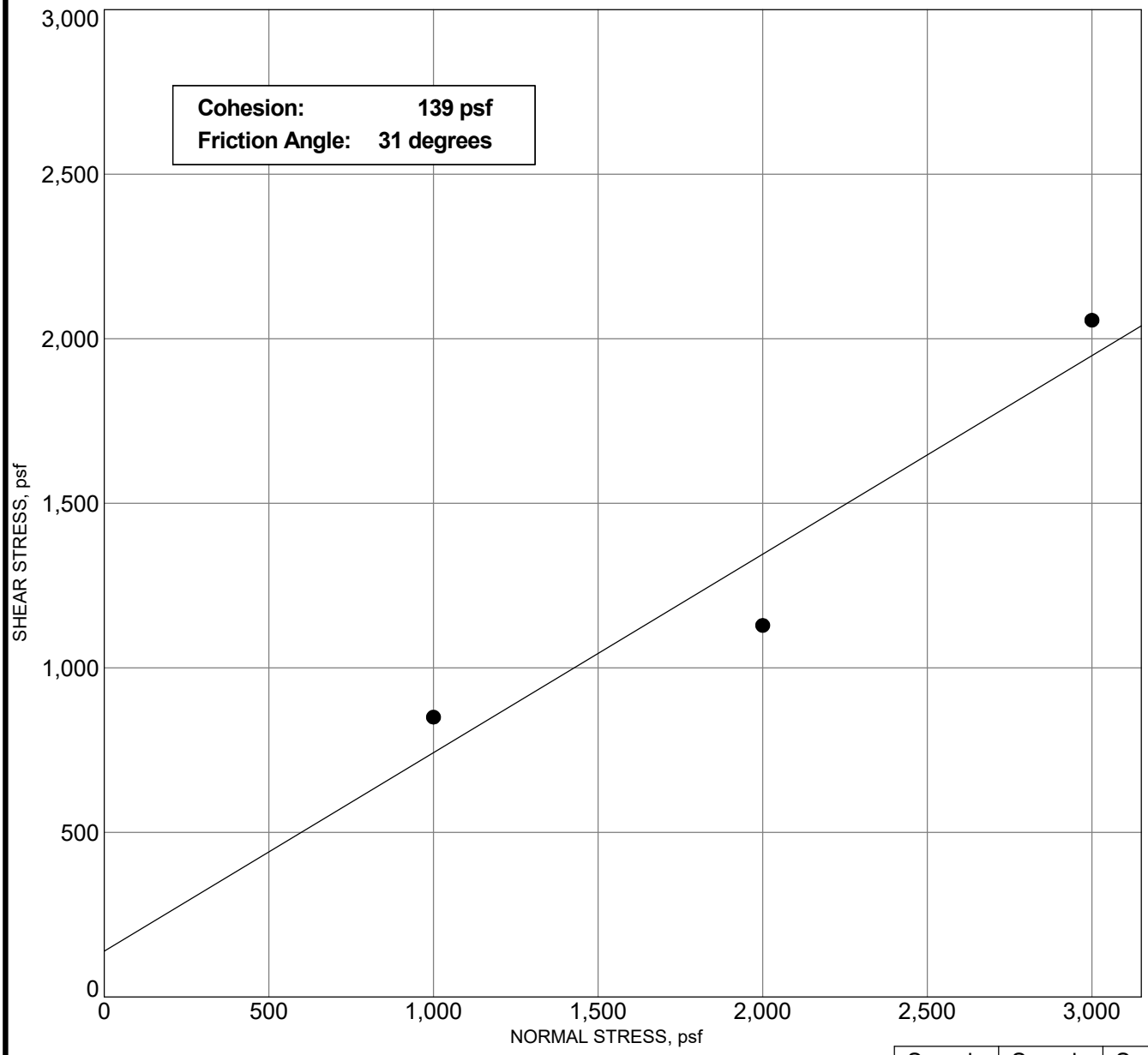
GRAIN SIZE DISTRIBUTION - ASTM C117 & C136

DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Plate
B - 2

G_GRAIN_SIZE_MOD_8024-00.GPJ GEOLABS.GDT 5/1/20



		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	49.6	61.3	60.2
	Dry Density, pcf	40.9	37.9	41.4
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	71.9	74.9	72.0
	Dry Density, pcf	40.0	38.3	42.7
	Height, inches	1.022	0.988	0.970
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0025	0.0023	0.0024
	Normal Stress, psf	**1000**	**2000**	**3000**
	Peak Shear Stress, psf	**850**	**1129**	**2056**
	Shear Displacement, inches	0.43	0.41	0.42

Sample: B-1
Depth: 1.0 - 2.5 feet
Description: Orangish brown sandy silt (ML) with a little gravel

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DIRECT SHEAR TEST - ASTM D3080

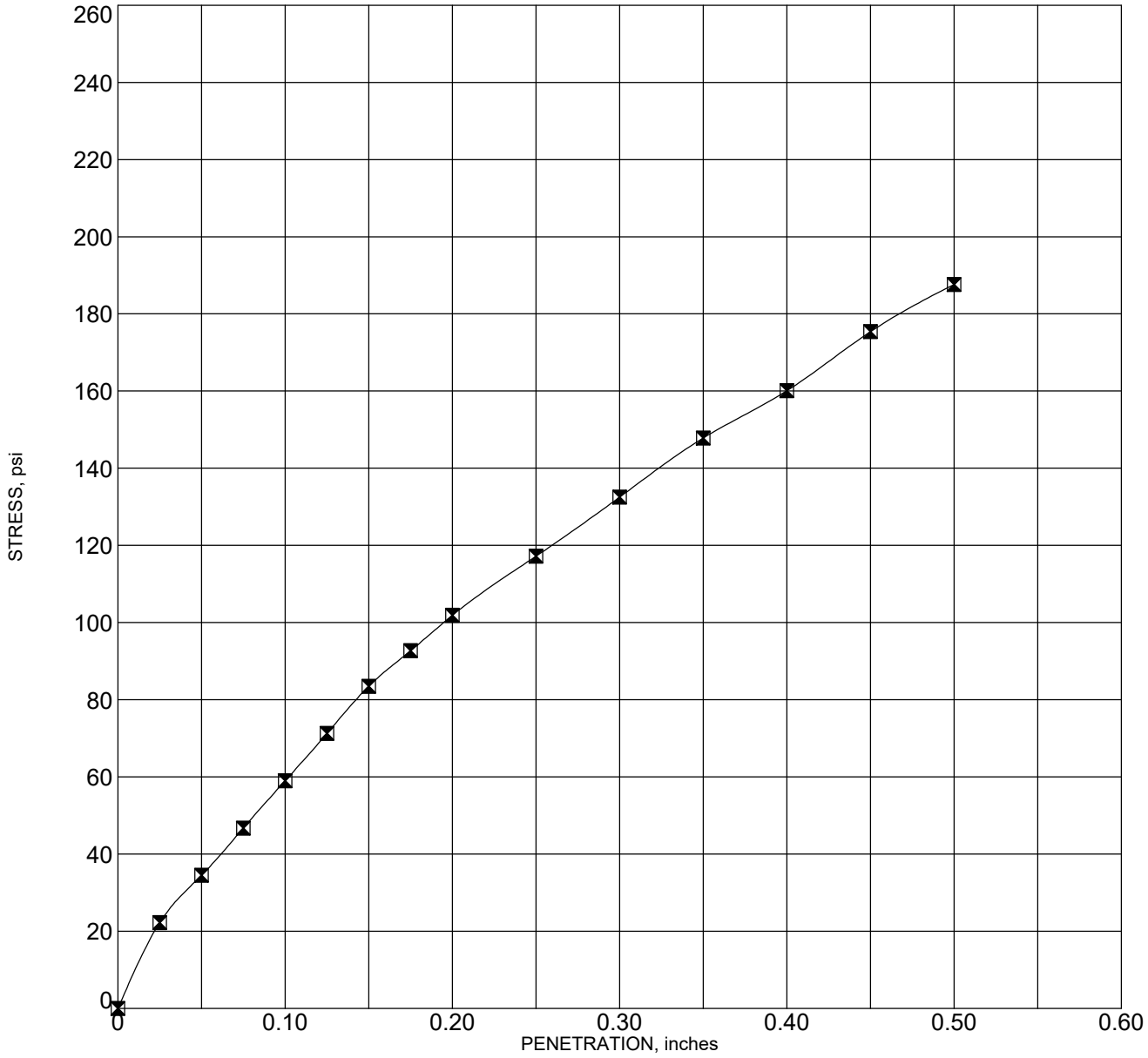
DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Plate
B - 3

G DIRECT SHEAR 8024-00.GPJ GEOLABS.GDT 4/28/20

Location	Depth	Length	Diameter	Length/ Diameter Ratio	Density	Load	Compressive Strength
	(feet)	(inches)	(inches)		(pcf)	(lbs)	(psi)
B-2	5.01 - 7.5	5.120	2.410	2.12	130.8	19,920	4,370
B-2	7.5 - 12.5	5.100	2.420	2.11	151.5	19,970	4,340
B-2	17.5 - 22.5	5.130	2.420	2.12	129.6	11,160	2,430
B-3	5.01 - 7.5	5.120	2.400	2.13	133.9	15,040	3,320
B-3	7.5 - 12.5	5.120	2.420	2.12	143.8	22,110	4,810
B-3	12.5 - 17.5	5.100	2.410	2.12	143.9	22,880	5,020

ASTM D7012 (METHOD C)



Corr. CBR @ 0.1"	5.9
Corr. CBR @ 0.2"	6.8
Swell (%)	1.51

Sample: Bulk-1
Depth: 0.0 - 1.0 feet
Description: Light brown silty clay with some ash and sand

Molding Dry Density (pcf)	75.3	Hammer Wt. (lbs)	10
Molding Moisture (%)	37.4	Hammer Drop (inches)	18
Days Soaked	4	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

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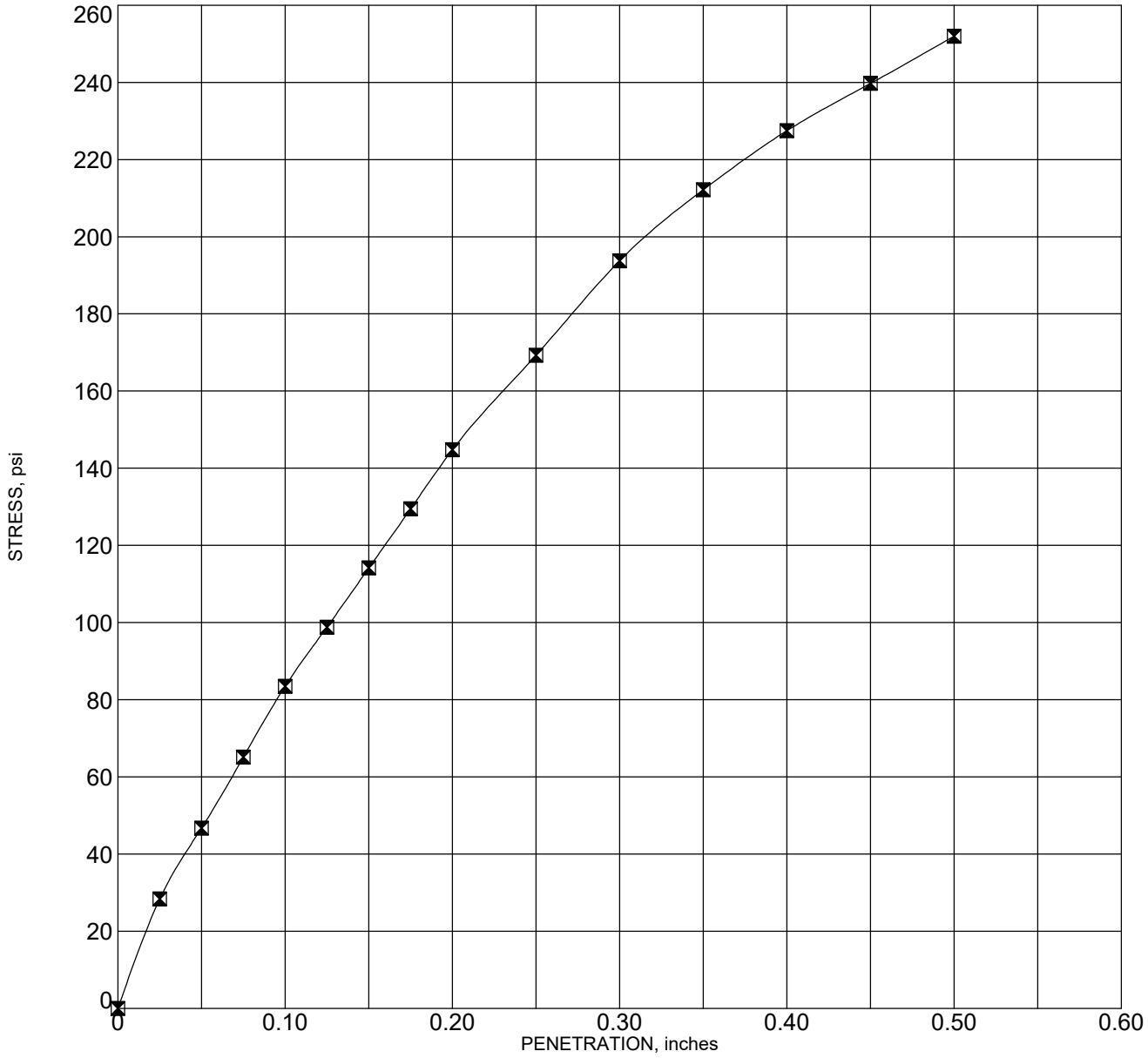
CALIFORNIA BEARING RATIO - ASTM D1883

DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Plate
B - 5

G_CBR_8024-00.GPJ GEOLABS.GDT 4/28/20



Corr. CBR @ 0.1"	8.4
Corr. CBR @ 0.2"	9.7
Swell (%)	1.03

Sample: Bulk-2
Depth: 0.0 - 1.0 feet
Description: Light brown silty clay with some ash and sand

Molding Dry Density (pcf)	78.5	Hammer Wt. (lbs)	10
Molding Moisture (%)	34.0	Hammer Drop (inches)	18
Days Soaked	4	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

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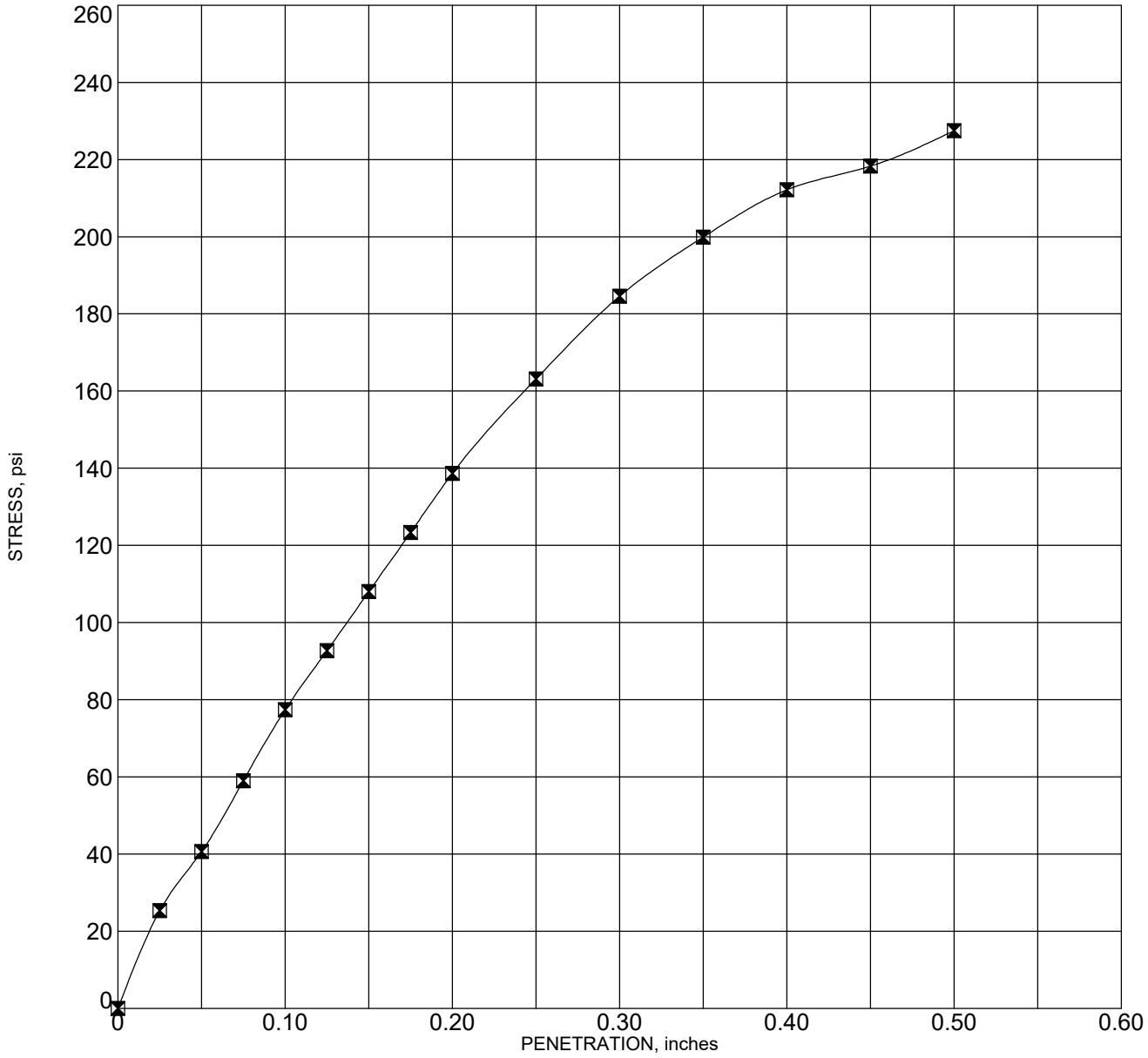
W.O. 8024-00

CALIFORNIA BEARING RATIO - ASTM D1883

DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Plate
B - 6

G_CBR_8024-00.GPJ GEOLABS.GDT 4/28/20



Corr. CBR @ 0.1"	7.7
Corr. CBR @ 0.2"	9.2
Swell (%)	1.13

Sample: Bulk-3
Depth: 0.0 - 1.0 feet
Description: Light brown silty clay with some ash and sand

Molding Dry Density (pcf)	81.7	Hammer Wt. (lbs)	10
Molding Moisture (%)	31.0	Hammer Drop (inches)	18
Days Soaked	4	No. of Blows	56
Aggregate	3/4 inch minus	No. of Layers	5

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W.O. 8024-00

CALIFORNIA BEARING RATIO - ASTM D1883

DHHL KA'U WATER SYSTEM IMPROVEMENTS
SOUTH POINT, ISLAND OF HAWAII

Plate
B - 7

G_CBR_8024-00.GPJ GEOLABS.GDT 4/28/20

APPENDIX C

B-1 5.0’ TO 30.0’

5.0’ **17.5’**

17.5’ **30.0’**

B-2 5.0' TO 30.0'

5.0' **17.5'**

17.5' **30.0'**

B-3 5.0’ TO 30.0’

5.0’ **12.5’** **22.5’**

12.5’ **30.0’**

NOTICE TO BIDDERS
INVITATION FOR BID
Department of Hawaiian Home Lands
Land Development Division
IFB NO.: IFB-20-HHL-025

BID OFFERS for IFB No.: IFB-20-HHL-025, KAU WATER SYSTEM IMPROVEMENTS – PHASE 1, Kamaoa, Kau, Island of Hawaii, State of Hawaii, shall be electronically submitted via HIePRO no later than **2:00 p.m., Hawaii Standard Time (H.S.T.) May 14, 2020**. The Bid Offer Form must be submitted, as an attachment, when submitting your offer via HIePRO. Bids received after the time fixed for opening or submitted anywhere other than as specified above will not be considered.

This project consists of furnishing all labor, materials, equipment, and supervision to satisfactorily complete the Kau Water Systems Improvements – Phase 1 package in Kamaoa, Kau, Hawaii.

To be eligible to submit a bid, the Bidder and/or his subcontractors shall possess all required valid State of Hawaii licenses and specialty licenses needed to perform the work for this project. A surety bid bond will be required for this Invitation for Bids (IFB).

This project is subject to Section 103D, Hawaii Revised Statutes, and to the payment of not less than the prevailing salaries and wages promulgated by the State of Hawaii, Department of Labor and Industrial Relations.

Bid documents may be examined at or obtained from The State of Hawaii eProcurement system (HIePRO):

https://hiepro.ehawaii.gov/sav-search.html

It is the responsibility of Interested Bidders to check the HIePRO website for any addenda issued by DHHL.

All prospective bidders/offerors are invited to attend a PRE-BID CONFERENCE to be held 10:00 AM, H.S.T., on April 29, 2020 through video conference. The video conference can be accessed through the web at https://global.gotomeeting.com/join/220193141. Subcontractors and union representatives are also invited to attend. The conference is to provide bidders/offerors with an opportunity to ask questions about the contractual requirements and technical aspects of the project. Images and video of the project site will be shared at the pre-bid conference. Attendance of the pre-bid conference is not a condition for submitting a bid, but strongly recommended. Persons needing special accommodations due to a disability may submit such requests to Sara Okuda, Project Manager, Land Development Division, via e-mail to sara.t.okuda@hawaii.gov.

A written NOTICE OF INTENTION TO BID is required and shall be received by the DHHL, Land Development Division, no later than **2:00 PM H.S.T., May 4, 2020.** Submittal of a NOTICE OF INTENTION TO BID shall be sent by e-mail to sara.t.okuda@hawaii.gov.

A properly executed and notarized STANDARD QUALIFICATION QUESTIONNAIRE FOR OFFERORS, SPO Form-21 ("Questionnaire") is required and shall be uploaded with offer to HIePRO by 2:00 p.m., May 14, 2020. The Questionnaire is available for download from the State Procurement Office website:

http://spo.hawaii.gov/wp-content/uploads/2013/12/spo-021.pdf

Bids shall comply with the requirements of the IFB. Bids that do not comply with the IFB may be subject to disqualification. DHHL reserves the right to amend the IFB by written addenda, to reject any and all bids, or to waive any defects in said bids where DHHL deems it is in the best interest of the State.

CAMPAIGN CONTRIBUTIONS BY STATE AND COUNTY CONTRACTORS PROHIBITED. If awarded a contract in response to this solicitation, offeror agrees to comply with HRS §11-355, which states that campaign contributions are prohibited from a State and county government contractor during the term of the contract if the contractor is paid with funds appropriated by the legislative body between the execution of the contract through the completion of the contract.

Questions regarding this project may be directed in writing to Sara Okuda, Project Manager, Land Development Division, DHHL via e-mail to sara.t.okuda@hawaii.gov.

Dated at Kapolei, Hawaii, this 22nd day of April 2020.

DEPARTMENT OF HAWAIIAN HOME LANDS

_____

William J. Aila, Jr., Chairman
Hawaiian Homes Commission

Posted on the internet at: https://hiepro.ehawaii.gov/sav-search.html

Instructions for Bid Submittal

General Instructions for Bid Submittal

The bid offer form must be completed and submitted to the Department of Hawaiian Home Lands ("DHHL" or "Department") by the required due date and time, and in the form prescribed by the DHHL. Electronic mail and facsimile transmissions shall not be accepted.

For your convenience, an "IFB Checklist for Bidders" is included in this section for your use.

No supplemental literature, brochures or other unsolicited information should be included in the bid packet.

A written response is required for each item unless indicated otherwise.

Bid documents and all certifications should be written legibly or typed and completed with black ink.

I. PROPOSAL REQUIREMENTS AND CONDITIONS

A. QUALIFICATION OF BIDDERS

Prospective Bidders must be capable of performing the work for which bids are invited, and must be capable of entering into a public contract of $25,000 (twenty-five thousand dollars) or more.

B. NOTICE OF INTENTION TO BID

1. In accordance with Section 103D-310, Hawaii Revised Statutes ("HRS"), and Section 3-122-108, Hawaii Administrative Rules ("HAR"), a written notice of intention to bid must be submitted to the Chairman of the Hawaiian Homes Commission ("Chairman"), who is the Department's chief procurement officer. The notice shall be e-mailed to the office as indicated in the Notice to Contractors.

2. The written notice must be received by the office indicated in the Notice to Contractors no later than 2:00 p.m. on the 10th calendar day prior to the day designated for opening bids. If the 10th calendar day prior to the day designated for opening bids is a Saturday, Sunday, or legal State holiday, then the written notice must be received by the Department no later than 2:00 p.m. on the last working day immediately prior to said Saturday, Sunday, or legal State holiday. The time indicated in the date and time field of the email as received by the Department shall be official.

3. It is the responsibility of the prospective Bidder to ensure that the written notice of intention to bid is received in time and the Department assumes no responsibility for failure of timely delivery caused by the prospective Bidder or by any method of conveyance chosen by the prospective Bidder.

4. If two (2) or more prospective Bidders desire to bid jointly as a joint venture on a single project, they must file an affidavit of joint venture with their notice of intention to bid. Such affidavit of joint venture will be valid only for the specific project for which it is filed. No further license is required when all parties to the joint venture possess current and appropriate contractor's licenses. Joint ventures are required to be licensed in accordance with Chapter 444 of the Hawaii Revised Statutes, as amended, and the rules and regulations of the Contractor's License Board when any party to the joint venture agreement does not hold a current or appropriate contractor's license. The joint venture must be registered with the office of the Director of Commerce and Consumer Affairs in accordance with Chapter 425, HRS, as amended.

5. No persons, firm or corporation may bid where (1) the person, firm, or corporation, or (2) a corporation owned substantially by the person, firm, or corporation, or (3) a substantial stockholder or an officer of the corporation, or (4) a partner or substantial investor in the firm is in arrears in any payment owed to the State of Hawaii or any of its political subdivisions or is in default of any obligation to the State of Hawaii or to all or to any of its political subdivisions, including default as a surety or failure to perform faithfully and diligently any previous contract with the Department.

6. Failure to submit the written notice of intention to bid by the designated deadline will disqualify a prospective Bidder as nonresponsive.

C. STANDARD QUALIFICATION QUESTIONNAIRE FOR OFFERORS

1. Bidders shall submit answers to questions contained in the STANDARD QUALIFICATION QUESTIONNAIRE FOR OFFERORS, SPO Form-021 ("Questionnaire"), properly executed and notarized, setting forth a complete statement of the experience of such Bidder and its organization in performing similar work and a statement of the equipment proposed to be used, together with adequate proof of the availability of such equipment, with Bid Offer Form. Original, wet signature, notarized copy shall be mailed in upon request. If the information in the Questionnaire proves satisfactory, the Bidder's proposal will be received. All information contained in the answers to the Questionnaire shall be kept confidential.

2. If upon review of the Questionnaire, or otherwise, the Bidder appears not fully qualified or able to perform the intended work, the Chairman shall, after affording the Bidder an opportunity to be heard and if still of the opinion that the Bidder is not fully qualified to perform the work, refuse to receive or to consider any bid offered by the prospective Bidder.

3. Failure to complete and submit the Questionnaire by the designated deadline will disqualify a prospective Bidder as nonresponsive.

D. PROPOSAL FORM

1. Prospective Bidders are being furnished with the proposal form giving the location, description, and the contract time of the work contemplated for which a lump sum bid price is asked or containing a schedule of items, together with estimated quantities of work to be performed and materials to be furnished, for which unit bid prices and/or lump sum bid prices are asked.

2. All papers bound with or attached to the proposal form shall be considered a part thereof and shall not be detached or altered when the proposal is submitted.

3. The drawings, specifications and other documents designated in the proposal form will also be considered a part thereof whether attached or not.

4. When quantities for individual items of work are listed in the proposal form for which respective unit prices are asked, said quantities are estimated or approximate and are to be used by the Department only for the purpose of comparing on a uniform basis bids offered for the work. The Department does not, expressly or by implication agree that the actual quantity of work will correspond therewith.

5. On unit price bids, payment will be made only for the actual number of units incorporated into the finished project at the unit price bid, subject to DHHL Construction General Conditions (CGC), Section 4.7, VARIATIONS IN ESTIMATED QUANTITIES.

6. The Bidder's proposal must be submitted on the proposal form furnished by the Department. The proposal must be prepared in full accordance with the instructions herein. The Bidder must state, both in words and numerals, the lump sum price or total sum bid at which the work contemplated is proposed to be done. These prices must be written in ink or typed. In case of a discrepancy between the prices written in words and those written in figures, the words shall govern over the figures. The Bidder shall sign the proposal in the spaces provided with ink.

7. If the proposal is made by an individual, the person's name and post office address must be shown in the space provided. If made by a partnership, the name and post office address of each member of the partnership must be shown and the proposal signed by all partners or evidence in the form of a partnership agreement must be submitted showing the authority of the partner to enter, on behalf of said partnership, into contract with the Department. If made by a corporation the proposal must show the name, title and business address of the president, secretary and treasurer and also evidence in the form of a corporate resolution must be submitted showing the authority of the particular corporate representative to enter on behalf of said corporation into contract with the Department. If made by a joint-venture the name and post office address of each member of the individual firm, partnership or corporation comprising the joint-venture must be shown with other pertinent information required of individuals, partnerships or corporations as the case may be. The proposal must be signed by all parties to the joint-venture or

evidence in the form of a Joint-Venture Agreement must be submitted showing the authority of the joint-venture's representative to enter on behalf of said joint-venture into contract with the Department.

8. Pursuant to the requirements of Section 103D-302, HRS, each Bidder shall include in its bid the name of each person or firm to be engaged by the Bidder on the project as joint contractor or subcontractor indicating also the nature and scope of work to be performed by such joint contractor and/or subcontractor and their respective contractor's license number. A joint contractor or subcontractor performing less than or equal to one percent of the total bid amount is not required to be listed in the proposal. The Bidder shall be solely responsible for verifying that their joint contractor or subcontractor has the proper license at the time of the submitted bid.

9. It is understood and agreed that the Contractor shall make no claim for anticipated profit, loss of profit or unabsorbed field, branch or home office overhead and impact losses due to the exercise of the Departments right to eliminate entire portions of the work or to increase or decrease any or all the quantities shown in the proposal form.

10. By submitting a bid on the proposal form, a Bidder accepts the language therein as its own.

E. BID SECURITY

1. Subject to the exceptions in Section 3-122-223(d), HAR, all lump sum bids of $50,000 (fifty thousand dollars) and higher, or lump sum base bids including alternates of $50,000 (fifty thousand dollars) and higher, that are not accompanied by bid security are non-responsive. Bid security shall be one of the following:

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

   b. Legal Tender; or

   c. Certificate of Deposit; credit union 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.

      (i) These instruments may be utilized only to a maximum of $100,000 (one hundred thousand dollars).

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

(iii) CAUTION - Bidders are cautioned that certificates of deposit or share certificates with an early withdrawal penalty must have a face value sufficient to cover the maximum penalty amount in addition to the proposal guaranty requirement. If the certificate is made out to two names, the certificate must be assigned unconditionally to the Chairman.

2. Unless otherwise stated, the bid security shall be in an amount equal to at least five percent (5%) of the lump sum bid or lump sum base bid including all additive alternates or in an amount required by the terms of the federal funding, where applicable.

3. If the Bidder is a corporation, evidence in the form of a corporate resolution, authorizing the corporate representative to execute the bond must be submitted with the proposal. (See sample in Appendix.) If the Bidder is a partnership, all partners must sign the bond or evidence in the form of a partnership agreement must be submitted showing the authority of the partner.

4. If the Bidder is a joint-venture, all parties to the joint-venture must sign the bond; provided, that one party to the joint-venture may sign on behalf of the joint-venture if evidence in the form of a joint-venture agreement or power of attorney, is submitted showing the authority of the signatory to sign the bond on behalf of the joint-venture.

5. In the case where the award will be made on a group or item basis, the amount of bid security shall be based on the total bid for all groups or items submitted.

6. Bidders are cautioned that surety bid bonds which place a limit in value to the difference between the bid amount and the next acceptable bid, such value not to exceed the purported amount of the bond, are not acceptable. Also, surety bid bonds which place a time limit on the right of the State to make claim other than allowed by statutes or the GENERAL CONDITIONS are not acceptable. Bidders are hereby notified that a surety bid bond containing such limitation(s) is not acceptable and a bid accompanied by such surety bid bond will be automatically rejected.

F. BIDDER'S RESPONSIBILITY FOR EXAMINATION OF CONTRACT DOCUMENTS, SITE OF WORK, ETC.

The Bidder shall carefully examine the project site and study all Contract Documents (as defined in the DHHL Construction General Conditions) and any documents or items referenced therein and contract and bond forms therefore. The submission of a bid shall be considered as a warranty that the Bidder has made such examination and is informed of the conditions to be encountered in performing the Work and of the requirements of the Contract Documents and any documents and items referenced therein, and contract and bonds.

G. ADDENDA AND BID CLARIFICATIONS

1. The terms and requirements of the bid documents (i.e. drawings, specifications and other bid and contract documents) cannot be changed prior to the bid opening except by a duly issued addendum.

2. The Department may alter, increase or decrease the scope of the work or the contract time, provisions and conditions by issuing a written addendum which sets forth such alterations, increase or decrease.

3. If a Bidder discovers what it considers to be a discrepancy, ambiguity, omission or doubt as to the meaning of drawings, specifications and any other bid or contract documents, the Bidder shall request in writing an interpretation from the Chairman.

4. If the Department agrees that a discrepancy, ambiguity, omission or doubt exists, it shall issue a written addendum to the bid documents to all prospective Bidders known to have received a solicitation eight (8) days before the bids are opened. The Department may extend the bid opening to allow at least eight (8) days from the notification date of the addendum. Upon notification by the Department, all Bidders/addressees shall be deemed to be on notice of the information therein whether or not the addendum is actually received. All addenda so issued shall become part of the contract documents.

5. No claim for additional compensation and/or time for performance will be allowed if the Contractor discovered, or in the exercise of reasonable care, should have discovered a discrepancy, ambiguity, omission or doubt for which an interpretation was not requested.

H. SUBSTITUTION OF MATERIALS AND EQUIPMENT BEFORE BID OPENING

1. Brand names of materials or equipment are specified or shown on the drawings to indicate a quality, style, appearance or performance and not to limit competition. The Bidder shall base its bid on one of the specified brand names unless alternate brands are qualified as equal or better in an addendum. Qualifications of such proposed alternate brands shall be submitted in writing and addressed to the Project Manager. The subject of the request must be clearly marked "SUBSTITUTION REQUEST". The request may be submitted through e-mail to DHHL Project Manager. The written request must be received by DHHL no later than fourteen (14) days before the bid opening date and time specified in the Notice to Bidders. The time indicated in the date and time field of the email as received by the Department shall be official.

2. Submit with written request, technical brochures, and a statement of variances.

3. A statement of variances must list all features of the proposed substitution which differ from the drawings, specifications and/or product(s) specified and must further certify that the substitution has no other variant features. The brochure and information submitted shall be clearly marked showing make, model, size, options, etc., and must include sufficient evidence to evaluate each feature listed as a variance. A request will be denied if submitted without sufficient evidence. If after

installing the substituted product, an unlisted variance is discovered, Contractor shall immediately replace the product with a specified product at no cost to the Department.

4. Any substitution request not complying with the above requirements will be denied. Substitution requests sent to other agencies and received by Project Manager after the deadline above will be denied.

5. An addendum shall be issued to inform all prospective Bidders of any accepted substitution.

I. DELIVERY OF PROPOSALS.

The entire proposal shall be submitted through HIePRO as indicated in the Notice to Bidders. Bids which do not comply with this requirement may not be considered. Proposals will be received up to the time fixed in the public notice for opening of bids and must be in the hands of the official by the time indicated. The time designated by the HIePRO system shall be official.

J. WITHDRAWAL OR REVISION OF PROPOSAL. Proposal may be modified, prior to the deadline to submit, through the HIePRO system.

K. PUBLIC OPENING OF PROPOSALS.

Proposals will be opened at the time indicated in the Notice to Bidders, and results shared through the HIePRO system. There will be no physical bid opening, as this bid is to be submitted electronically through the HIePRO system.

L. DISQUALIFICATION OF BIDDERS. Any one or more of the following causes will be considered as sufficient for the disqualification of a Bidder and the rejection of its proposal or proposals:

1. Non-compliance with Section I.A. QUALIFICATION OF BIDDERS;

2. Evidence of collusion among Bidders;

3. Lack of responsibility and cooperation as shown by past work such as failing to complete all of the requirements to close the project within a reasonable time or engaging in a pattern of unreasonable or frivolous claims for extra compensation;

4. Being in arrears on existing contracts with the State of Hawaii, or having defaulted on a previous contract with the State of Hawaii;

5. Lack of proper equipment and/or sufficient experience to perform the work contemplated, as revealed by the Standard Questionnaire and Financial Statement for Bidders;

6. No contractor's license or a contractor's license which does not cover type of work contemplated;

7. More than one proposal for the same work from an individual, firm, partnership, corporation or joint venture under the same or different name;

8. Delivery of bids after the deadline specified in the advertisement calling for bids;

9. Failure to pay, or satisfactorily settle, all bills overdue for labor and materials of former contracts in force at the time of issuance of proposal forms; and/or

10. Debarment or suspension pursuant to the provisions of Chapters 103D, 104 and 444, HRS, as amended.

M. PROTESTS

1. Protests shall be governed by Section 103D-701, HRS, and amended hereafter, and its implementing rules set forth in Title 3, Chapter 126, Subchapter 1, HAR, and as amended hereafter.

2. The Chairman is the Department's chief procurement officer to whom protests shall be addressed unless specified otherwise in the solicitation.

N. WRONGFUL REFUSAL TO ACCEPT A BID.

In the event the Chairman, for any reason, wrongfully refuses to accept what would otherwise be a responsive and responsible lowest bid, the exclusive remedy for such lowest Bidder shall be the recovery of the reasonable actual costs of preparing the bid. No other Bidder shall have any claim for damages.

II. AWARD AND EXECUTION OF CONTRACT

A. CONSIDERATION OF PROPOSALS; CANCELLATION.

After the proposals are opened, the figures will be extended and/or totaled in accordance with the bid prices of the acceptable proposals and the totals will be compared and the results of such comparison shall be made public. In the event of a tie bid, the low Bidder shall be determined in accordance with Section 3-122-34, HAR. In the comparison of bids, words written in the proposals will govern over figures and unit prices will govern over totals. Until the award of the contract, the Department may cancel the solicitation, reject any and all proposals in whole or part and may waive any defects or technicalities whenever such action is deemed to be in the best interest of the Department.

B. IRREGULAR PROPOSALS.

Proposals will be considered irregular and may be rejected for the following reasons:

1. If the proposal is unsigned.

2. If bid security is not in accordance with Section I.E. BID SECURITY.

3. If proposal is on a form other than that furnished by the Department; or if the form is altered or any part thereof detached.

4. If the proposal shows any non-compliance with applicable law, alteration of form, additions not called for, conditional bids, incomplete bids, non-initialed erasures, other defects, or if the prices are obviously unbalanced.

5. If the Bidder adds any provisions reserving the right to accept or reject an award.

6. If the Bidder adds any provisions reserving the right to enter into a contract pursuant to an award.

7. When a proposal is signed by an officer or officers of a corporation and a currently certified corporate resolution authorizing such signer(s) to submit such proposal is not submitted with the proposal or when the proposal is signed by an agent other than the officer or officers of a corporation or a member of a partnership and a power of attorney is not submitted with the proposal.

8. Where there is an incomplete or ambiguous listing of joint contractors and/or subcontractors the proposal may be rejected. All work which is not listed as being performed by joint contractors and/or subcontractors must be performed by the Bidder with its own employees. Additions to the list of joint contractors or subcontractors will not be allowed. Whenever there is a doubt as to the completeness of the list, the Bidder will be required to submit within five (5) working days, a written confirmation that the work in question will be performed with its own work force. Whenever there is more than one joint contractor and/or subcontractor listed for the same item of work, the Bidder will be required to either confirm in writing within five (5) working days that all joint contractors or subcontractors listed will actually be engaged on the project or obtain within five (5) working days written releases from those joint contractors and/or subcontractors who will not be engaged.

9. If in the opinion of the Chairman, the Bidder and/or its listed subcontractors do not have the contractor's licenses or combination of contractor's licenses necessary to complete all of the work.

C. CORRECTION OF BIDS AND WITHDRAWAL OF BIDS (HAR §3-122-31)

1. Corrections to bids after bid openings but prior to award may be made under the following conditions:

   (a) If the mistake is attributable to an arithmetical error, the Chairman shall so correct the mistake. In case of error in extension of bid price, the unit price shall govern.

   (b) If the mistake is a minor informality which shall not affect price, quantity, quality, delivery, or contractual conditions, the Bidder shall request correction by submitting proof of evidentiary value which demonstrates that a mistake was made. The Chairman shall prepare a written approval or denial in response to this request. Examples of such mistakes include:
   (1) Typographical errors;

(2) Transposition errors;
(3) Failure of a Bidder to sign the bid, but only if the unsigned bid is accompanied by other material indicating the Bidder's intent to be bound.

(c) For reasons not allowable under Subsections II.C.1.(a) and II.C.1.(b) when the Chairman determines that the correction or waiver of an obvious mistake is in the best interest of the Department or is warranted for the fair treatment of other Bidders.

2. Withdrawal of bids after bid opening but prior to award may be made when the bid contains a mistake attributable to an obvious error which affects price, quantity, quality, delivery, or contractual conditions, and the Bidder requests withdrawal by submitting proof of evidentiary value which demonstrates that a mistake was made. The Chairman shall prepare a written approval or denial in response to this request.

3. Correction or withdrawal of bids after award is not permissible except in response to a written withdrawal or correction request by the Contractor, and the Chairman makes a written determination that the Department's procurement practices and policies would not be materially affected by such correction or withdrawal.

D. AWARD OF CONTRACT

1. The award of contract, if it be awarded, will be made within one hundred twenty (120) consecutive calendar days after the opening of the proposals to the lowest responsible and responsive Bidder (including the alternate or alternates which may be selected by the Chairman in the case of alternate bids) whose proposal complies with all the requirements prescribed, but in no case will an award be made until all necessary investigations are made. The successful Bidder will be notified, by letter mailed to the address shown on the proposal, that its bid has been accepted and that it has been awarded the contract.

2. If the contract is not awarded within the one hundred twenty (120) days noted in Subsection II.D.1 above, 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. No contract will be awarded to any person or firm suspended or debarred under the provisions of Chapters 103D, 104 and Chapter 444, HRS, as amended.

4. The contract will be drawn on the forms furnished by the Chairman. The contract will not be binding on the Department until all required signatures have been affixed thereto and written certification that funds are available for the work has been made.

5. Prior to award of the contract, the Department shall verify compliance with Sections 103D-310 and 103D-328, HRS, via Hawaii Compliance Express ("HCE"). Firms who decline to participate in HCE shall submit paper certificates in a timely manner or risk determination that the bid is non-responsive.

E. CANCELLATION OF AWARD

The Department reserves the right to cancel the award of any contract at any time before the execution of said contract by all parties. The exclusive remedy to the awardee for such cancellation shall be payment of the reasonable bid preparation costs and the reimbursement of any direct expenses incurred as directed in the Notice of Award. Such cancellation will not incur any liability by the Department to any other Bidder.

F. SUBMITTAL OF BID SECURITY

Bid securities shall be scanned and uploaded with offer to HIePRO. The four (4) lowest Bidders shall mail in their bid security, following the opening and checking of the proposals. The retained bid securities of the four lowest Bidders will be returned within five (5) working days following the complete execution of the contract.

G. REQUIREMENT OF PERFORMANCE AND PAYMENT BONDS

1. Performance and Payment Bonds shall be required for contracts $50,000 (fifty thousand dollars) and higher. At the time of the execution of the contract, the successful Bidder shall file good and sufficient performance and payment bonds on the form furnished by the Department, each in an amount equal to one hundred percent (100%) of the amount of the contract price unless otherwise stated in the solicitation of bids. Acceptable performance and payment bonds shall be limited to the following:

   (a) Surety bonds underwritten by a company licensed to issue bonds in this State; or

   (b) A certificate of deposit; credit union 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 Department by a bank, a savings institution, or credit union insured by the Federal Deposit Insurance Corporation or the National Credit Union Administration.

      (1) These instruments may be utilized only a maximum of $100,000 (one hundred thousand dollars).

      (2) If the required security or bond amount totals over $100,000 (one hundred thousand dollars), more than one instrument not exceeding $100,000 (one hundred thousand dollars) each and issued by different financial institutions shall be acceptable.

2. If the Contractor fails to deliver the required performance and payment bonds, the Contractor's award shall be canceled, the Department shall have the remedies provided below under Section II.I FAILURE TO EXECUTE THE CONTRACT

and award of the contract shall be made to the next lowest responsible and responsive Bidder.

H. EXECUTION OF THE CONTRACT

1. The contract shall be signed by the successful Bidder and returned, together with satisfactory performance and payment bonds, within ten (10) calendar days after the Bidder is awarded the contract for execution or within such further time as the Chairman may allow. No proposal or contract shall be considered binding upon the Department until the contract has been fully and properly executed by all parties thereto. For projects funded with State Capital Improvement Project ("CIP") funds, the Chairman shall also endorse thereon its certificate, as required by Section 103D-309, HRS, that there is an available unexpended appropriation or balance of an appropriation over and above all outstanding contracts sufficient to cover the Department's amount required by such contract.

2. On any individual award totaling less than $25,000 (twenty-five thousand dollars), the Department reserves the right to execute the contract by the issuance of a Purchase Order. Issuance of a Purchase Order shall result in a binding contract between the parties without further action by the Department. The issuance of a Purchase Order shall not be deemed a waiver of the General Conditions, and Contract Document requirements.

I. FAILURE TO EXECUTE THE CONTRACT

1. Before the Award. If a low Bidder without legal justification withdraws its bid after the opening of bids but before the award of the contract, the Department shall be entitled to retain as damages the amount established as bid security, and may take all appropriate actions to recover the damages sum from the property or third-party obligations deposited as bid security.

2. After the Award. If the Bidder to which a contract is awarded shall fail or neglect to enter into the contract and to furnish satisfactory security within ten (10) calendar days after such award or within such further time as the Chairman may allow, the Department shall be entitled to recover from such Bidder its actual damages, including but not limited to the difference between the bid and the next lowest responsive bid, as well as personnel and administrative costs, consulting and legal fees and other expenses incurred in arranging a contract with the next low responsible and responsive Bidder or calling for new bids. The Department may apply all or part of the amount of the bid security to reduce its damages. If upon determination by the Department that the bid security exceeds the amount of its damages, it shall release or return the excess to the person who provided same.

3. Chairman's Options. Upon a withdrawal of the lowest responsive bid, or upon a refusal or failure of the lowest Bidder to execute the contract, the Chairman may thereupon award the contract to the next lowest responsible and responsive Bidder

or may call for new bids, whichever method the Chairman may deem to be in the best interests of the Department.

J. PRE-CONSTRUCTION CONFERENCE

A pre-construction conference will be conducted prior to the issuance of a Notice to Proceed.

IFB Checklist for Bidders
IFB-20- HHL-025
Kau Water System Improvements – Phase 1

Items required prior to Bid Opening:

☐ Notice of Intention to Bid, no later than 2:00 p.m., May 4, 2020.

Items required with Bid:

☐ SPO Form 21 (Standard Qualification Questionnaire), uploaded with offer to HIePRO by 2:00 p.m., May 14, 2020.

☐ Bid Offer Form (included with this IFB)

The total sum bid amount must be typed or clearly written in both numbers and words in the appropriate space on page 6 of the Bid Offer Form. Illegible writing on any portion of the Bid Offer Form, except for the signee's signature, may be grounds for considering a Bid "non-responsive".

☐ Corporate Resolution (Indicating who is authorized to sign bid documents and contracts)

☐ Bid Security (Surety companies executing bonds must appear on the U.S. Department of the Treasury's Listing of Certified Companies:
https://www.fiscal.treasury.gov/fsreports/ref/suretyBnd/c570_a-z.htm)

☐ Form 1 – Certification of Bidder's Participation in Approved Apprenticeship Program Under Act 17 (Apprenticeship Agreement Preference, if any).

☐ Tank Construction Qualification Form (included with this IFB)