APPENDIX A

APPENDIX A

Field Exploration

We explored the subsurface conditions at the project site by drilling and sampling16 borings, designated as Boring Nos. 1 through 16, extending to depths of about 10 to 122.5 feet below the existing ground surface. In addition, two borings, designated as Boring Nos. 101 and 101A, were drilled on the north side of the Gulick Avenue Overpass near the proposed footing location of the temporary pedestrian bridge. Five bulk samples of the near-surface soils, designated as Bulk-1 through Bulk-5, were obtained to evaluate the moisture-density relationship and pavement support characteristics of the near-surface soils. The approximate boring and bulk sample locations are shown on the Overall Site Plan, Plate 2, and the Site Plans, Plates 3.1 and 3.2. The borings were drilled using a truck-mounted drill rig equipped with continuous flight augers and coring tools.

Our geologists 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. Graphic representations of the materials encountered are presented on the Logs of Borings, Plates A-1 through A-18.

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.

Pocket penetrometer tests were performed on selected cohesive soil samples in the field. The pocket penetrometer test provides an indication of the unconfined compressive strength of the sample. Results of the pocket penetrometer tests are summarized on the Logs of Borings at the appropriate sample depths.

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).

Recovery (REC) may be used as a subjective guide to the interpretation of the relative quality of rock masses, where appropriate. 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 orings 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 any discontinuities, discounting any drilling, mechanical, and handling 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" by Robert S. Carmichael (1989).

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

The excavation characteristic of a rock mass is a function of the relative hardness of the rock, its relative quality, brittleness, and fissile characteristics. A dense rock formation with a high RQD value would be very difficult to excavate and probably would 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

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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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INTERSTATE ROUTE H-1 (EB) IMPROVEMENTS
OLA LANE OVERPASS TO
KALIHI STREET INTERCHANGE
HONOLULU, OAHU, 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
							0			
Sieve - #200 = 11.7%	6	126			84					GP-GM
	12				50/3"					GM
	14		100	31	15/0" Ref.		5			
					10/0" Ref.		10			
							15			
							20			
							25			
							30			
							35			

Approximate Ground Surface Elevation (feet): 43 *

Description

4-inch **ASPHALTIC CONCRETE**

Brownish gray **SANDY GRAVEL** with a little silt, very dense, moist (fill)

Brown and gray **SILTY GRAVEL (BASALTIC)** with a little cobbles (basaltic), very dense, moist (saprolite)

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

Boring terminated at 10 feet

* Elevations estimated from Topographic Survey Map transmitted by Jacobs on January 5, 2021.

Date Started:	October 19, 2020	Water Level: ▼	Not Encountered	Plate
Date Completed:	October 19, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	10 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 1
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

BORING_LOG 8049-00.GPJ GEOLABS.GDT 5/3/21

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INTERSTATE ROUTE H-1 (EB) IMPROVEMENTS
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HONOLULU, OAHU, HAWAII

Log of Boring

2

Approximate Ground Surface Elevation (feet): 48 *

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
	23	106			38					GP	4-inch **ASPHALTIC CONCRETE**
											Brownish gray **SANDY GRAVEL**, moist (fill)
	37				6					CL CH	Brown and gray **GRAVELLY CLAY** with some sand, very stiff, moist (fill)
LL=82 PI=51	35	92			26		5				Brownish gray with multi-color mottling **SILTY CLAY** with traces of gravel (basaltic), medium stiff, moist (saprolite)
											grades to stiff at 5 feet
	41				76		10				grades to hard
											Boring terminated at 11.5 feet
							15				
							20				
							25				
							30				
							35				

Date Started:	October 19, 2020	Water Level: ▼	Not Encountered	Plate
Date Completed:	October 19, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	11.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 2
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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Log of Boring

3

Approximate Ground Surface Elevation (feet): 51 *

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
										GP	4-inch **ASPHALTIC CONCRETE**
LL=48 PI=28	13	111			53					CL	Brownish gray **SANDY GRAVEL**, dense, moist (fill)
Direct Shear	28				59						Brown with multi-color mottling **SANDY CLAY** with traces of gravel (basaltic), very stiff, moist (saprolite)
TXUU S_u=2.6 ksf	27	94			119		5				grades to hard
UC= 25720 psi			94	63							Gray **BASALT**, closely to moderately fractured, slightly weathered, hard (basalt formation)
UC= 8720 psi			100	100			10				
			100	67			15				grades to severely to slightly fractured
UC= 17010 psi			95	78			20				grades to closely to slightly fractured
			100	100			25				grades to massive
UC= 8550 psi			100	75			30				
							35				

Date Started:	October 19, 2020	Water Level: ▼	Not Encountered	Plate
Date Completed:	October 20, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	41 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 3.1
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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HONOLULU, OAHU, 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

(Continued from previous plate)

Description

			97	90			40				

Boring terminated at 41 feet

45 50 55 60 65 70

Date Started:	October 19, 2020	Water Level: ▼	Not Encountered	Plate
Date Completed:	October 20, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	41 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 3.2
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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HONOLULU, OAHU, HAWAII

Log of Boring

4

Laboratory			Field								Approximate Ground Surface Elevation (feet): 56 *
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	26	87			55/6" +25/1"					GP	4-inch **ASPHALTIC CONCRETE**
										SM	Brownish gray **SANDY GRAVEL**, very dense, moist (fill)
Sieve - #200 = 32.8%	29				52/6" +50/3"						Brown and gray **SILTY SAND (BASALTIC)** with some gravel and a little cobbles (basaltic), very dense, moist (saprolite)
	17				50/3"		5				
	39				67		10				Boring terminated at 11.5 feet
							15				
							20				
							25				
							30				
							35				

Date Started:	October 20, 2020	Water Level: ▼	Not Encountered	Plate
Date Completed:	October 20, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	11.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 4
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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KALIHI STREET INTERCHANGE
HONOLULU, OAHU, HAWAII

Log of Boring

5

Approximate Ground Surface Elevation (feet): 56 *

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
										GP	4-inch **ASPHALTIC CONCRETE**
Direct Shear	21	93			23						Brownish gray **SANDY GRAVEL**, moist (fill)
LL=59 PI=38	21				29					CH	Brown **SILTY CLAY** with some gravel, stiff to very stiff, moist (fill)
	28		0 33		35/2"		5				grades with cobbles
										GM	Brown and gray **SILTY GRAVEL (BASALTIC)** with some sand (basaltic) and a little cobbles (basaltic), dense, moist (saprolite)
Sieve - #200 = 45.4%	36		100	0	40		10				
							15				Gray **BASALT**, severely to closely fractured, moderately weathered, hard (basalt formation)
UC= 6690 psi			97	78							grades to moderately fractured
UC= 10120 psi			97	97			20				grades to slightly fractured
			98	98			25				grades to massive
UC= 16060 psi			100	57			30				
							35				

Date Started:	October 20, 2020	Water Level: ▼	Not Encountered	Plate
Date Completed:	October 21, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	41 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 5.1
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

BORING_LOG 8049-00.GPJ GEOLABS.GDT 5/3/21

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INTERSTATE ROUTE H-1 (EB) IMPROVEMENTS
OLA LANE OVERPASS TO
KALIHI STREET INTERCHANGE
HONOLULU, OAHU, 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

(Continued from previous plate)

Description

			100	100			40				

Boring terminated at 41 feet

45 50 55 60 65 70

Date Started:	October 20, 2020	Water Level: ▼	Not Encountered	Plate
Date Completed:	October 21, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	41 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 5.2
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

BORING_LOG 8049-00.GPJ GEOLABS.GDT 5/3/21

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INTERSTATE ROUTE H-1 (EB) IMPROVEMENTS
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Log of Boring

6

Approximate Ground Surface Elevation (feet): 55.5 *

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
							0			GP	4-inch **ASPHALTIC CONCRETE**
Direct Shear	18	80			128					CH	Brownish gray **SANDY GRAVEL**, moist (fill)
LL=67 PI=42	18				22						Brown and gray **SILTY CLAY** with some gravel (basaltic) and a little cobbles (basaltic), hard to very stiff, moist (fill)
TXUU S_u=1.4 ksf	27	87			14		5				grades to medium stiff
	39				12		10			CH	Brown with multi-color mottling **SILTY CLAY** with a little sand and gravel (basaltic), stiff, moist (alluvium)
			100	0			15				Gray **BASALT**, severely fractured, unweathered, hard (basalt formation)
UC= 25440 psi			98	98							grades to massive
UC= 8400 psi			93	93			20				grades to slightly fractured
			100	62			25				grades to closely fractured
			100	100			30				grades to massive
							35				

Date Started:	October 21, 2020	Water Level: ▼ Not Observed	Plate
Date Completed:	October 26, 2020		
Logged By:	B. Aiu	Drill Rig: CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	A - 6.1
Total Depth:	122.5 feet	Drilling Method: 4" Solid-Stem Auger & PQ Coring	
Work Order:	8049-00 & 10(B)	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 8049-00.GPJ GEOLABS.GDT 5/3/21

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INTERSTATE ROUTE H-1 (EB) IMPROVEMENTS
OLA LANE OVERPASS TO
KALIHI STREET INTERCHANGE
HONOLULU, OAHU, 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

(Continued from previous plate)

Description

UC= 13450 psi			100	100							
			100	100			40				
							45				
UC= 11940 psi			100	100							
			100	100			50				
							55				
UC= 15070 psi			100	100							
			100	100			60				
							65				
			50	13						CH	Brown **SILTY CLAY** with some sand and a little gravel (basaltic), hard, moist (older alluvium)
							70				

Date Started:	October 21, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	October 26, 2020				
Logged By:	B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	A - 6.2
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

BORING_LOG 8049-00.GPJ GEOLABS.GDT 5/3/21

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INTERSTATE ROUTE H-1 (EB) IMPROVEMENTS
OLA LANE OVERPASS TO
KALIHI STREET INTERCHANGE
HONOLULU, OAHU, 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	(Continued from previous plate) Description
TXUU S_u=3.8 ksf	34	86	62		30/6" +50/3"	3.8	75			CH	
LL=69 PI=36	51		0		24						grades to very stiff
TXUU S_u=4.0 ksf	52	70	0		26	3.3	80			CH	Brown with multi-color mottling **SILTY CLAY** with some sand, stiff, moist (older alluvium)
	55		0		18		85				grades to very stiff
LL=107 PI=73 TXUU S_u=3.8 ksf	59	65	0		29	3.5	90				
	50		0		13		95				grades to stiff
Direct Shear	56	69	0		21	3.3	100				
							105				

Date Started:	October 21, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	October 26, 2020				
Logged By:	B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		A - 6.3
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
	59		0		18		110	CH	grades to very stiff
TXUU S_u=2.5 ksf	59	65	0		27	2.3	115		
	58		45		19		120		grades with a little sand
	52	74			31		125		Boring terminated at 122.5 feet
							130		
							135		
							140		

Date Started:	October 21, 2020	Water Level: ▼	Not Observed	Plate
Date Completed:	October 26, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 6.4
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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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): 41.5 * **Description**
	1				65						3-inch **ASPHALTIC CONCRETE**
	54				9					CH	**COBBLES (BASALTIC)**, dense, moist (fill) Yellowish brown **SILTY CLAY** with some sand, stiff, moist (fill)
UC= 16670 psi			100	70	12/0" Ref.		5				Gray **BASALT**, severely to moderately fractured, slightly weathered, very hard (basalt formation)
UC= 13600 psi			100	100			10				grades to closely to moderately fractured
UC= 10380 psi			100	100			15				grades to massive
			100	100			20				
UC= 10000 psi			100	100			25				
			100	100			30				
							35				

Date Started:	November 16, 2020	Water Level: ▼	Not Observed	Plate
Date Completed:	November 19, 2020			
Logged By:	M. Hassani / B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	A - 7.1
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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Laboratory			Field								
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	(Continued from previous plate) Description
UC= 9330 psi			100	100							
			100	100			40				
UC= 15400 psi			100	100			45				
			42	100			50				Reddish brown **BASALT**, moderately fractured, highly weathered, medium hard (basalt formation)
										CH	Brown **SILTY CLAY** with some sand (basaltic) and a little gravel (basaltic), very stiff, moist (older alluvium)
	35	91			49	>4.5	55				
			31								
	44				33		60				grades to hard
			10								
LL=72 PI=42 TXUU S_u=9.4 ksf	48	73			61/6" +25/1"	>4.5	65				
			13								
							70				

Date Started:	November 16, 2020	Water Level: ▼	Not Observed	Plate
Date Completed:	November 19, 2020			
Logged By:	M. Hassani / B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 7.2
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	(Continued from previous plate) Description
	53		10		16		75			CH	grades to very stiff
TXUU S_u=4.6 ksf	48	72	0		47		80				grades with some gravel
	49		98		17		85				
Direct Shear	53	73	71		26	2.0	90			SP-SC	grades to stiff Brown with dark brown **GRAVELLY SAND** with a little clay, medium dense, moist (older alluvium)
	56		21		24		95			MH	Brown **CLAYEY SILT** with traces of sand (coralline), stiff, moist (older alluvium)
TXUU S_u=1.4 ksf	52	71	12		23	1.8	100				
	56		86		15		105				grades to stiff to very stiff

Date Started:	November 16, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	November 19, 2020				
Logged By:	M. Hassani / B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	A - 7.3
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS
Direct Shear	57	71	71		14	1.5	110			MH
	52		0		10		115			
TXUU S_u=1.8 ksf	36	84	100		27	1.8	120			
	53				12		125			
							130			
							135			
							140			

(Continued from previous plate)

Description

grades to medium stiff

grades to stiff

Boring terminated at 122 feet

Date Started:	November 16, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	November 19, 2020				
Logged By:	M. Hassani / B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	A - 7.4
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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Approximate Ground Surface Elevation (feet): 55 *

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
											6-inch **ASPHALTIC CONCRETE**
Direct Shear	9	104			36					SM	Brownish gray **SILTY SAND** with some gravel, moist (fill)
LL=74 PI=52	19				18					CH	Brown **SILTY CLAY** with some sand and gravel, very stiff, moist (fill)
	15	80			24		5				grades with more gravel, stiff
			33								
										ML	Brown **SANDY SILT** with some gravel and cobbles, hard, moist (alluvium)
LL=30 PI=5	28				34		10				grades with some sand (coralline)
			45								
UC= 16520 psi			100	77	20/0" Ref.		15				Gray **BASALT**, moderately fractured, slightly weathered, very hard (basalt formation)
UC= 14360 psi			100	100			20				grades to massive, unweathered
UC= 18870 psi			100	100			25				
			100	100			30				
							35				

Date Started:	October 28, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	November 2, 2020				
Logged By:	B. Aiu / M. Hassani	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		A - 8.1
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	USCS	Description
UC= 15330 psi			100	100				
			100	100				
UC= 13420 psi			100	100				
			100	100				grades to slightly fractured
UC= 20380 psi			100	90				
			72	100			MH	Brown with dark gray mottling **CLAYEY SILT** with some sand and traces of gravel, very stiff, moist (older alluvium)
LL=58 PI=25	46		62		19			

40 45 50 55 60 65 70

Date Started:	October 28, 2020	Water Level: ▼	Not Observed
Date Completed:	November 2, 2020		
Logged By:	B. Aiu / M. Hassani	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop

Plate

A - 8.2

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	USCS	Description
TXUU S_u=3.3 ksf	52	71	86		40	2.0	MH	
	54		0		20			grades with no gravel and less sand
	51	73	13		71/6" +25/1"	>4.5	CL	Brown with multi-color mottling **SANDY CLAY** with some gravel (basaltic), hard, moist (older alluvium)
	55		19		10			grades to stiff locally
TXUU S_u=4.9 ksf	41	78	26		58	4.5		
	56		26		23			grades to very stiff
Direct Shear	57	69	14		28	4.5		

75 80 85 90 95 100 105

Date Started:	October 28, 2020	Water Level: ▼ Not Observed	
Date Completed:	November 2, 2020		
Logged By:	B. Aiu / M. Hassani	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop

Plate

A - 8.3

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
TXUU S_u=2.8 ksf	45	75	19		40	4.5		CL	
	50		19		16		110	CH	Brown with multi-color mottling **SILTY CLAY** with a little sand, very stiff, moist (older alluvium)
Direct Shear	52	73	24		26	3.5	115		grades to stiff
	50				15		120		grades to stiff to very stiff
									Boring terminated at 122 feet
							125		
							130		
							135		
							140		

Date Started:	October 28, 2020	Water Level: ▼	Not Observed	Plate
Date Completed:	November 2, 2020			
Logged By:	B. Aiu / M. Hassani	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 8.4
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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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
											Approximate Ground Surface Elevation (feet): 53 *
	23				57					SM	7-inch **ASPHALTIC CONCRETE**
										MH	Dark gray with light gray mottling **SILTY SAND** with some gravel, dense to very dense, moist (fill)
LL=62 PI=25	36	88			43	4.0	5				Orangish gray **CLAYEY SILT** with some sand and gravel, very stiff, moist (saprolite) grades with more gravel
					25/0" Ref.		10				Gray **BASALT**, moderately weathered, medium hard to hard (basalt formation) Boring terminated at 10 feet
							15				
							20				
							25				
							30				
							35				

Date Started:	October 26, 2020	Water Level: ▽	Not Encountered	Plate
Date Completed:	October 26, 2020			
Logged By:	M. Hassani	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	10 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 9
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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Approximate Ground Surface Elevation (feet): 52 *

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
	20	96			40/2"		0			SM	4-inch **ASPHALTIC CONCRETE**
					25/1"					ML	Gray **SILTY SAND (BASALTIC)** with some gravel (basaltic), moist (fill)
			100	25							Brown and gray **SANDY SILT** with some gravel (basaltic), hard, moist (fill)
											grades with some cobbles
							5				Gray **BASALT**, moderately fractured, slightly weathered, hard (basalt formation)
UC= 5860 psi			100	97							
							10				
			95	95							
							15				
UC= 4790 psi			100	100							grades to massive
							20				
			100	100							
							25				
UC= 19010 psi			100	100							
							30				
			100	100							
							35				

Date Started:	November 9, 2020	Water Level: ▼	Not Encountered	Plate
Date Completed:	November 9, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	41.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 10.1
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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

(Continued from previous plate)

Description

UC= 17140 psi			100	100			40				

Boring terminated at 41.5 feet

45 50 55 60 65 70

Date Started:	November 9, 2020	Water Level: ▼	Not Encountered		Plate
Date Completed:	November 9, 2020				
Logged By:	B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	A - 10.2
Total Depth:	41.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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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): 70 *

Description

Other Tests	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	USCS	Description
				GM	Grayish brown **SILTY GRAVEL (BASALTIC)** with some sand (basaltic), moist (fill)
	100	100	25/1"		Gray vesicular **BASALT**, slightly fractured, moderately weathered, hard (basalt formation)
UC= 6330 psi	97	88			
	97	58			grades to severely to slightly fractured
UC= 14340 psi	98	40			grades to severely fractured, medium hard
	100	0			
UC= 19350 psi	97	97			grades to slightly fractured, slightly weathered, hard
	93	83			

Depth (feet): 5, 10, 15, 20, 25, 30, 35

Date Started:	June 25, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	June 26, 2020				
Logged By:	B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		A - 11.1
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	USCS	Description
UC= 18880 psi			98	98				
			100	100				
UC= 16870 psi			97	80				
			100	90				
			47	0				grades to severely fractured, highly weathered, soft to medium hard
							CH	Reddish brown **SILTY CLAY** with some sand, hard, moist (older alluvium)
LL=55 PI=28 TXUU S_u=6.1 ksf	29	92	0		84	>4.5		
	48		0		33		CH	Brown with multi-color mottling **SILTY CLAY** with some sand, hard, moist (older alluvium)

40 45 50 55 60 65 70

Date Started:	June 25, 2020	Water Level: ▼ Not Observed	
Date Completed:	June 26, 2020		Plate
Logged By:	B. Aiu	Drill Rig: CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122 feet	Drilling Method: 4" Solid-Stem Auger & PQ Coring	A - 11.2
Work Order:	8049-00 & 10(B)	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 8049-00.GPJ GEOLABS.GDT 5/3/21

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INTERSTATE ROUTE H-1 (EB) IMPROVEMENTS
OLA LANE OVERPASS TO
KALIHI STREET INTERCHANGE
HONOLULU, OAHU, HAWAII

Log of Boring

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	USCS	Description
TXUU S_u=3.8 ksf	57	67	0		31	3.0	CH	grades to very stiff
	59		67		20			
LL=73 PI=41 Direct Shear	54	71	55		28	3.8		grades with fine gravel
	45		71		23			
TXUU S_u=4.3 ksf	50	73	0		34	2.5		
	49		60		25			
TXUU S_u=7.1 ksf - #200 = 98.1%	43	78	62		37		ML	Brown with multi-color mottling **SILT (BASALTIC)** with traces of sand, very stiff, moist (older alluvium)

75 80 85 90 95 100 105

Date Started:	June 25, 2020	Water Level: ▼ Not Observed	Plate
Date Completed:	June 26, 2020		
Logged By:	B. Aiu	Drill Rig: CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122 feet	Drilling Method: 4" Solid-Stem Auger & PQ Coring	A - 11.3
Work Order:	8049-00 & 10(B)	Driving Energy: 140 lb. wt., 30 in. drop	

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Log of Boring

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
	60				8			ML	grades to stiff locally
			71						
	52	70			31		110		
			71						
	47				39		115		grades to hard locally
			52						
Direct Shear	60	66			27		120		
									Boring terminated at 122 feet
							125		
							130		
							135		
							140		

Date Started:	June 25, 2020	Water Level: ▼	Not Observed	Plate
Date Completed:	June 26, 2020			
Logged By:	B. Aiu	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 11.4
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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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
											Approximate Ground Surface Elevation (feet): 51 *
											8-inch **ASPHALTIC CONCRETE**
										GW	Gray **SANDY GRAVEL (BASALTIC)**, moist (base course)
	18				7/6" +50/5"					SW	
										CH	Grayish brown **GRAVELLY SAND (BASALTIC)**, medium dense, moist (fill)
	7				25/1"		5				Brown with some gray **SILTY CLAY** with some cobbles (basaltic), hard, moist (fill)
UC= 17550 psi			83 100	0 38							Gray **COBBLES AND BOULDERS (BASALTIC)** with a little clay, very dense, moist (weathered basalt)
											Gray vugular **BASALT**, severely to moderately fractured, unweathered, very hard (a'a basalt)
			100	82			10				
											grades to dense and slightly fractured
UC= 18480 psi			100	100			15				
											grades to massive
			100	100			20				
UC= 17690 psi			100	100			25				
			100	100			30				
							35				

Date Started:	October 27, 2020	Water Level:	29.6 ft. 10/29/2020 2140 HRS	Plate
Date Completed:	October 30, 2020		19.5 ft. 10/30/2020 0015 HRS	
Logged By:	S. Latronic	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	A - 12.1
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	USCS	Description
UC= 18210 psi			95	58				grades to moderately fractured
			5	0			MH	Reddish brown **CLAYEY SILT**, hard (older alluvium)
	49				62			
			52				ML	Dark brown **CLAYEY SILT**, very stiff (older alluvium)
LL=62 PI=29 TXUU S_u=2.9 ksf	55	69			29	>4.5		
			29					
	54				19			
			69					grades with sandy silt
TXUU S_u=5.5 ksf	51	70			28	>4.5		
			71					
	53				17		CH	Brown with traces of gray **SILTY CLAY** with traces of fine sand, very stiff (older alluvium)
			55					

40 45 50 55 60 65 70

Date Started:	October 27, 2020	Water Level: ▼ 29.6 ft. 10/29/2020 2140 HRS	Plate
Date Completed:	October 30, 2020	▼ 19.5 ft. 10/30/2020 0015 HRS	
Logged By:	S. Latronic	Drill Rig: CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	A - 12.2
Total Depth:	122.5 feet	Drilling Method: 4" Solid-Stem Auger & PQ Coring	
Work Order:	8049-00 & 10(B)	Driving Energy: 140 lb. wt., 30 in. drop	

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Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	(Continued from previous plate) Description
LL=62 PI=33 TXUU S_u=9.0 ksf	38	83	83		57	>4.5				CH	grades with silty clay pockets locally, hard
	57		71		10		75				grades to stiff
	56	70	64		29	2.5	80				grades to very stiff
	50		64		16		85				grades with sandy silt locally
LL=62 PI=27 TXUU S_u=2.5 ksf	53	71	38		20	2.0	90			MH	Brown with some gray **CLAYEY SILT** with some sand and rounded basalt gravel, stiff (older alluvium)
	55		67		19		95			MH	Brown with some gray **CLAYEY SILT** with traces of fine sand, very stiff (older alluvium)
TXUU S_u=4.4 ksf Sieve - #200 = 88.9%	47	75	67		44		100			ML	Brown with some gray **SILT (BASALTIC)** with a little sand and traces of gravel, very stiff (older alluvium) grades more gravelly locally
							105				

Date Started:	October 27, 2020	Water Level:	29.6 ft. 10/29/2020 2140 HRS 19.5 ft. 10/30/2020 0015 HRS	Plate
Date Completed:	October 30, 2020			
Logged By:	S. Latronic	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	A - 12.3
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS
	57		83		19		110			ML
Direct Shear	50	75	43		38		115			ML
	65		88		13		120			ML
UC=2.8 ksf	62	65			30	>4.5	125			
							130			
							135			
							140			

(Continued from previous plate)

Description

grades slightly cemented locally

Orangish brown with traces of gray **CLAYEY SILT** with a little sand (basaltic), stiff, moist (older alluvium)

Gray **CLAYEY SILT** with a little fine sand, very stiff, moist (estuarine deposit)

Boring terminated at 122.5 feet

Date Started:	October 27, 2020	Water Level:	29.6 ft. 10/29/2020 2140 HRS 19.5 ft. 10/30/2020 0015 HRS	Plate
Date Completed:	October 30, 2020			
Logged By:	S. Latronic	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	A - 12.4
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring	
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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Approximate Ground Surface Elevation (feet): 69 *

Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	USCS	Description
LL=57 PI=32 Direct Shear	11 32	92			15/6" +50/1" 20		0		CH	Brown **SILTY CLAY** with a little sand (basaltic) and gravel (basaltic), very stiff to hard, moist (fill)
UC= 1630 psi			88 73	0 47	50/4"		5			Brown and gray **BRECCIA**, closely fractured, moderately weathered, medium hard to hard (welded clinker)
							10			grades to moderately fractured
UC= 7520 psi			90	70						Gray **BASALT**, slightly fractured, slightly weathered, very hard (basalt formation)
UC= 25940 psi			100	100			15			grades to massive grades to unweathered
			100	72			20			
							25			grades with pockets of brown silty clay locally
UC= 6750 psi			88	73						grades to slightly fractured
			17				30		ML	Brown **GRAVELLY SILT** with some sand (basaltic), stiff, moist (older alluvium)
							35			

Date Started:	November 10, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	November 11, 2020				
Logged By:	B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	A - 13.1
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	USCS	Description
TXUU S_u=2.7 ksf Sieve - #200 = 57.1%	52	73	60		16		ML	grades with some cobbles
UC= 21600 psi			100	100	10/0" Ref.			Gray **BASALT**, massive, unweathered, very hard (basalt formation)
UC= 18390 psi			100	100				
			87	69				
	34	88			26		CH	Reddish brown **SILTY CLAY** with some sand and gravel (basaltic), stiff, moist (older alluvium)
			100				MH	Brown with multi-color mottling **CLAYEY SILT** with some sand and traces of gravel (basaltic), stiff, moist (older alluvium)
	47				12			
			71					
LL=67 PI=33 TXUU S_u=2.3 ksf	42	82	36		34	1.3		grades to very stiff

40 45 50 55 60 65 70

Date Started:	November 10, 2020	Water Level: ▼ Not Observed	
Date Completed:	November 11, 2020		Plate
Logged By:	B. Aiu	Drill Rig: CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	122.5 feet	Drilling Method: 4" Solid-Stem Auger & PQ Coring	A - 13.2
Work Order:	8049-00 & 10(B)	Driving Energy: 140 lb. wt., 30 in. drop	

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

(Continued from previous plate)

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
	65		36		14		75	MH	grades to stiff
Direct Shear	58	61	36		14	3.0	80		grades to medium stiff
	47		21		17		85		grades to very stiff
TXUU S_u=3.6 ksf	61	64	31		20	2.0	90		grades to stiff
	53		10		12		95		
TXUU S_u=3.6 ksf	57	68	0		20	2.0	100		
	52		26		9		105		

Date Started:	November 10, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	November 11, 2020				
Logged By:	B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	A - 13.3
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS
	60	63	10		25	2.0				MH
	49		12		19		110			SM
TXUU S_u=5.1 ksf Sieve - #200 = 42.1%	45	77	24		40		115			
	61				9		120			ML
							125			
							130			
							135			
							140			

(Continued from previous plate)

Description

Brown with gray mottling **SILTY SAND (BASALTIC)** with traces of gravel (basaltic), medium dense, moist (older alluvium)

Brown with multi-color mottling **SANDY SILT**, stiff, moist (older alluvium)

Boring terminated at 122.5 feet

Date Started:	November 10, 2020	Water Level: ▼	Not Observed		Plate
Date Completed:	November 11, 2020				
Logged By:	B. Aiu	Drill Rig:	CME-75DG2	*(Energy Transfer Ratio = 89.5%)*	A - 13.4
Total Depth:	122.5 feet	Drilling Method:	4" Solid-Stem Auger & PQ Coring		
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop		

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Laboratory			Field							
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS
	18				50/3"		0			SP
										MH
					60/0" Ref.		5			
					50/0" Ref.		10			
							15			
							20			
							25			
							30			
							35			

Approximate Ground Surface Elevation (feet): 51 *

Description

8-inch **ASPHALTIC CONCRETE**

Brownish gray **GRAVELLY SAND**, moist (fill)

Brown **CLAYEY SILT** with some sand and gravel, hard, moist (fill)

BASALT, medium hard to hard (basalt formation)

Boring terminated at 10 feet

Date Started:	October 26, 2020	Water Level: ▽	Not Encountered
Date Completed:	October 26, 2020		
Logged By:	M. Hassani	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*
Total Depth:	10 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop

Plate

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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): 52 *

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
							0		8-inch **ASPHALTIC CONCRETE**
								SW	Grayish brown medium to coarse angular
LL=48 PI=25	16				50/5"			CL	**GRAVELLY SAND (BASALTIC)**, moist (fill)
			98	0					Brown and gray **SANDY CLAY** with some gravel (basaltic), very stiff, moist (fill)
									21-inch **CONCRETE**
							5		Gray dense **BASALT**, moderately to closely fractured, unweathered to slightly weathered, very hard (basalt formation)
UC= 18100 psi			100	63					
							10		
UC= 29640 psi			93	30					
							15		
			100	83					grades to slightly fractured locally
							20		
UC= 32340 psi			100	63					
							25		
			85	42					
							30		
								ML	Reddish brown **CLAYEY SILT** with some sand and a little gravel, hard, moist (older alluvium)
LL=44 PI=18	32				51				
			48				35		

Date Started:	October 26, 2020	Water Level: ▽	Not Encountered	Plate
Date Completed:	October 27, 2020			
Logged By:	S. Latronic	Drill Rig:	CME-45C TRUCK *(Energy Transfer Ratio = 78%)*	
Total Depth:	43 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring	A - 15.1
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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

(Continued from previous plate)

Description

	48				22					ML	grades to very stiff
			45							MH	Brown with some gray **CLAYEY SILT** with some gravel and a little cobbles (basaltic), hard, moist (older alluvium)
	26				40		40				
											Boring terminated at 43 feet
							45				
							50				
							55				
							60				
							65				
							70				

Date Started:	October 26, 2020	Water Level: ▽	Not Encountered	Plate
Date Completed:	October 27, 2020			
Logged By:	S. Latronic	Drill Rig:	CME-45C TRUCK *(Energy Transfer Ratio = 78%)*	
Total Depth:	43 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring	A - 15.2
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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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
											Approximate Ground Surface Elevation (feet): 56 *
							0				6-inch **ASPHALTIC CONCRETE**
	20	104			42					SM	Dark gray **SILTY SAND** with some gravel, moist (fill)
LL=46 PI=15	31				4/6" +25/0" Ref.	>4.5				ML	Brown **SANDY SILT** with some gravel (angular), medium stiff to stiff, moist (fill)
											CONCRETE
					10/0" Ref.		5				Light gray **BASALT**, slightly fractured to massive, unweathered to slightly weathered, hard (basalt formation)
					10/0" Ref.		10				Boring terminated at 10 feet
							15				
							20				
							25				
							30				
							35				

Date Started:	October 29, 2020	Water Level: ▽	Not Encountered	Plate
Date Completed:	October 29, 2020			
Logged By:	M. Hassani	Drill Rig:	CME-75DG2 *(Energy Transfer Ratio = 89.5%)*	
Total Depth:	10 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring	A - 16
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	

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Approximate Ground Surface Elevation (feet): 72 *

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
Direct Shear	16	74			27					SM	Brown **SILTY SAND** with some gravel, medium dense, moist (fill)
Sieve - #200 = 40.5%	22		67	58	25		5				Gray **COBBLES AND BOULDERS** (fill)
											Gray **CONCRETE**, very hard (fill)
											VOID
	13		0		50/3"		10			SW	Brown **GRAVELLY SAND** with a little silt, very dense, moist (fill)
	12		70	70	50/3"						Gray **CONCRETE**, very hard (fill)
							15			SW	Brown with tan **GRAVELLY SAND**, very dense, moist (fill)
UC= 9430 psi	14		82	18	50/3"						Grayish brown **BASALT**, severely to closely fractured, moderately weathered, medium hard (basalt formation)
			72	15			20				Yellowish brown **BASALT**, severely fractured, highly to extremely weathered, soft to medium hard (basalt formation)
							25				Grayish brown **BASALT**, closely fractured, moderately weathered, medium hard (basalt formation)
UC= 28420 psi			97	73							Gray **BASALT**, moderately fractured, slightly weathered to unweathered, very hard (basalt formation)
							30				Boring terminated at 31 feet
							35				

Date Started:	January 19, 2021	Water Level: ▼ Not Encountered	Plate
Date Completed:	January 19, 2021		
Logged By:	Steven Leong	Drill Rig: CME-45C TRUCK *(Energy Transfer Ratio = 78%)*	A - 17
Total Depth:	31 feet	Drilling Method: 4" Solid-Stem Auger & HQ Coring	
Work Order:	8049-00 & 10(B)	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 8049-00.GPJ GEOLABS.GDT 5/3/21

GEOLABS, INC.

Geotechnical Engineering

INTERSTATE ROUTE H-1 (EB) IMPROVEMENTS
OLA LANE OVERPASS TO
KALIHI STREET INTERCHANGE
HONOLULU, OAHU, HAWAII

Log of Boring

101A

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): 72 *

Description

Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	USCS	Description
							0	SM	Brown **SILTY SAND** with some gravel (basaltic), medium dense (fill)
	27	79			24		5		grades with clay
	33				54		10		grades to dense
Sieve - #200 = 34.2%	36	72			84		15		
									Grayish brown non-vesicular **BASALT**, moderately weathered, medium hard (basalt formation)
							20		Boring terminated at 17.5 feet
							25		
							30		
							35		

Date Started:	January 19, 2021	Water Level: ▼	Not Encountered	Plate
Date Completed:	January 19, 2021			
Logged By:	Steven Leong	Drill Rig:	CME-45C TRUCK *(Energy Transfer Ratio = 78%)*	
Total Depth:	17.5 feet	Drilling Method:	4" Solid-Stem Auger & HQ Coring	A - 18
Work Order:	8049-00 & 10(B)	Driving Energy:	140 lb. wt., 30 in. drop	