Native Formation Sampling Letter Report Dry Dock 5 Construction Dredging

Joint Base Pearl Harbor-Hickam, Oahu, Hawaii

JBPHH PEARL HARBOR HI SITE 19

Pearl Harbor Naval Complex National Priorities List Site

Naval Facilities Engineering Systems Command Pacific April 2024

This letter report presents the data and results from a sampling and analysis program to evaluate native formation dredged material for the construction of Dry Dock (DD) Number 5 (DD5) at Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (Figure 1). The objective of this sampling and analysis is to determine whether native formation material present above the -57 feet mean sea level (MSL) elevation within the dredge project area is subject to a response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or is eligible to be further evaluated for ocean disposal and/or beneficial reuse.

1. Overview

The DD5 dredging project area is located to the west-northwest of the existing DD Number 3 in Southeast Loch, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii. The native formation portion of the DD5 dredging project area, designated as DD5B, encompasses approximately 96,000 square feet and is located within Decision Unit (DU) SE-1 (Southeast Loch) of the Pearl Harbor Sediment CERCLA site footprint. DU SE-1 is designated for the remediation of soft sediment impacted by chemicals of concern (COCs) that include copper, lead, mercury, and polychlorinated biphenyls (PCBs). The selected remedy for DU SE-1, as documented in the record of decision (DON 2018), includes a combination of focused dredging, enhanced natural recovery, monitored natural recovery, and in situ treatment with activated carbon. The DD5B footprint is located within the DU SE-1 areas that are designated for enhanced natural recovery or monitored natural recovery.

Dredging to support DD5 construction is expected to remove approximately 70,000 cubic yards of consolidated native formation material from the DD5B dredge area following the removal of the overlying soft harbor sediments. The native formation layer is defined as the material present beneath the soft, unconsolidated harbor sediments unit and consists of interbedded layers of coralline detritus, coral formation, volcanic tuff, and older alluvial deposits (DON 2023). Additional investigation of native formation material above -57 feet MSL is required to determine whether the material is subject to response action under CERCLA or is eligible to be evaluated for ocean disposal suitability under Marine Protection, Research, and Sanctuaries Act (MPRSA) or for beneficial reuse as on-site construction fill in waters of the United States (WOTUS) under Section 404 of the Clean Water Act.

In accordance with the agreement reached between the United States (U.S.) Department of the Navy, U.S. Environmental Protection Agency Region 9, and the State of Hawaii Department of Health during the April 11–13, 2023 meeting, dredged material in areas designated for remediation under CERCLA is not considered subject to any response action under CERCLA if the COC concentrations of the material are below the lowest and most conservative remedial action level (RAL₀) defined for each DU. Native formation material with COC concentrations below RAL₀ do not require remedial action under CERCLA. Therefore, the material is considered to be non-CERCLA material and will be eligible to be evaluated for suitability for ocean disposal or for on-site beneficial reuse in WOTUS, in accordance with MPRSA and Section 404 of the Clean Water Act regulations, respectively.

2. Methodology and Field Sampling Activities

Field sampling activities for the DD5 native formation investigation were conducted in accordance with the work plan (WP) (DON 2023). The objective of the sampling and analysis is to characterize native formation material above -57 feet MSL within the DD5B dredge area footprint. The data provided by this sampling and analysis will be used to determine whether the native material meets the RAL₀ criteria and therefore will not require remedial action under CERCLA. Native material that meets the RAL₀ criteria will be eligible to be evaluated for suitability for ocean disposal or for on-site beneficial reuse in WOTUS. The following principal study question was identified for the work, as documented in the WP (DON 2023):

- *Principal Study Question #1:* Do COC concentrations in native formation material above -57 feet MSL meet the RAL₀ criteria?
 - Alternative Action 1: The native formation material satisfies the RAL₀ criteria, is not subject to CERCLA response action, and therefore is eligible for further evaluation for ocean disposal suitability under MPRSA regulations.
 - *Alternative Action 2:* The native formation material does not satisfy the RAL₀ criteria, is subject to CERCLA response action, and therefore is not eligible for ocean disposal suitability evaluation or beneficial reuse consideration.

Field sampling activities were conducted from October 9 to 14, 2023, in accordance with the WP. Sampling to determine whether the native formation material is subject to CERCLA response action was also conducted concurrently with sampling activities to evaluate the native formation material for ocean disposal suitability. Native formation core samples were collected from five coring locations within the DD5B footprint using a solid-stem auger drill rig with a modified California sampler to collect representative native formation material above the -57 feet MSL elevation. In accordance with the WP, discrete samples collected from the upper 0–1, 1–2, and 2–3-foot depth intervals of the native material were submitted for laboratory analysis of the DU SE-1 COCs to evaluate whether the native formation material is subject to CERCLA response action. A summary of the native formation sampling program is presented in Table 1.

The project team, in coordination with the U.S. Department of the Navy, evaluated each proposed sampling station to determine whether it was clear of utilities (e.g., phone cables, electrical cables, and oil or gas pipelines) that could be damaged by the drill sampler or boat anchor. Access to the sediment sampling stations was arranged with Pearl Harbor Port Operations. All sampling stations were identified in the field at predetermined coordinates using the Hawaii State Plane Zone 3 coordinate system (North American 1983 datum) and a differential global positioning system receiver using U.S. Coast Guard differential correction data accurate to approximately ± 3 feet. Once the sampling vessel arrived at the designated coordinates for an in-water sampling station, the vessel was anchored as necessary to support sampling operations and the actual location coordinates were recorded. Areas within a 10-foot radius of the designated coordinates were defined as the station locations. Vertical elevation control was determined for all sampling locations and was recorded in feet as the depth to sediment from the water surface to the nearest 0.1 foot. Water depth measurements were then converted to surface elevations (MSL datum) using tidal data from the National Oceanic and Atmospheric Administration (NOAA) Honolulu tide station (Station Identification 1612340).

Sampling was conducted in accordance with the explosives safety submission (ESS) determination request response letter approved by the Naval Ordnance Safety and Security Activity. The ESS determination request response letter confirmed that an ESS was not required for sediment

sampling because the likelihood of encountering underwater munitions and explosives of concern or material potentially presenting an explosive hazard is low. Surface and subsurface anomaly avoidance techniques were employed by a qualified unexploded ordnance technician for coring as required by the ESS determination request response. The collected cores were also visually inspected for munitions and explosives of concern by the unexploded ordnance technician.

All but one of the sampling stations were located within 10 feet of the target location identified in the WP. Sampling location DD5BS-03 was relocated westward from the target location due to insufficient water depth for the sampling vessel accessibility. Elevation of the harbor bottom range at the coring locations ranges from -28 to -43 feet MSL. Most of the cores are in areas that have been previously dredged to remove the overlying soft sediment; therefore, only a thin veneer of soft sediment (1 foot or less) was encountered at these locations. A thicker layer of soft sediment is present above the native formation layer at location DD5BS-02 of 3.4 feet, which is outside of the previous soft sediment dredge footprint. Detailed core logs are presented in Attachment 1 and summarized on Figure 2. Based on the core logs, the general stratigraphy at the site is characterized by a thin veneer of soft harbor sediment underlain by native formation material composed of coralline detritus of varying particle sizes (silt to gravel) and a layer of brown clay representing older alluvium, likely terrigenous in origin. A thin layer of volcanic tuff is present at location DD5BS-05 at -37 feet MSL elevation. This general stratigraphy is consistent with data from borings advanced during previous investigations within the area.

2.1 ANALYTICAL RESULTS

All samples were analyzed for copper, lead, mercury, and PCBs as congeners. the analytical results are compared to the RAL_0 criteria in accordance with the WP. The analytical results with comparisons to the RAL_0 criteria and the Pearl Harbor Sediment remediation goals, are presented in Table 2 and Figure 3.

Copper and lead are detected in all collected samples, but at concentrations well below the RAL₀ criterion and the Pearl Harbor Sediment remediation goal. Mercury is detected in most of the samples analyzed except for four samples from DD5B-S04 and DD5B-S05. All samples with reported mercury detections have concentrations that are below the RAL₀ criterion and the Pearl Harbor Sediment remediation goal. Most of the individual PCB congeners are non-detects. Total PCBs, calculated as twice the sum of the NOAA-18 congeners for consistency with the Pearl Harbor Sediment criterion, have detected concentrations below both the RAL₀ criterion and the Pearl Harbor Sediment remediation goal. The highest concentrations of PCBs are reported for location DD5B-S02 with 66 and 87 micrograms per kilogram at the 0-1 and 1-2 feet sampling depth intervals, respectively. As shown on Figure 2 and in Attachment 1, a relatively thicker layer of soft sediment is present at location DD5B-S02, with a thin layer of dark gray silty gravel at the transition between the soft sediment and the underlying silty sand native formation material. The levels of PCBs detected at location DD5B-S02 is likely attributed to comingling of the overlying soft sediment material within the upper 2 feet of the underlying native formation material. However, these PCBs concentrations are below the RAL_0 criterion, as well as the more conservative remediation goal threshold for the site; therefore, this material is concluded as not subject to CERCLA response action.

2.2 DATA QUALITY

Data validation is currently in progress; therefore, a preliminary summary on data quality parameters is presented and will be updated once the data validation process has been completed. All samples were extracted and analyzed within the recommended holding times. The laboratory blanks for chemical analyses contained low levels of copper and PCB-209. Detections of copper in the laboratory blank were below the limit of quantitation and were either not detected in the associated field samples

or were detected in the field samples at greater than five times the detected concentration in the laboratory blank. Therefore, detections of copper in the laboratory blank likely do not impact the results. Detections of PCB-209 were below the limit of quantitation and, therefore, likely do not impact the associated field sample results. Laboratory method blanks for all other analyses were not detected at the indicated detection limits, demonstrating no sample cross-contamination associated with analytical procedures.

Surrogate recoveries were below control limits for PCBs, potentially indicating low bias in the affected samples. All other analytes were within acceptance criteria. Laboratory control spike (LCS) and LCS duplicate (LCSD) recoveries were within acceptance criteria. Matrix spike (MS) and matrix spike duplicate (MSD) recoveries were outside of the acceptance criteria for PCBs. Recovery limits outside of the acceptance criteria are likely due to matrix interference and/or sample heterogeneity as LCS and LCSD recoveries were within acceptance criteria. All other analytes were within acceptance criteria.

LCS/LCSD and MS/MSD relative percent differences were within acceptance criteria for all analytes, indicating adequate precision.

3. Summary and Conclusion

The results from the sampling and analysis of the upper 3 feet of native formation material within the DD5B dredge footprint indicate some detected concentrations of COCs identified for DU SE-1 under CERCLA. However, the reported detected concentrations are below the RAL₀ criteria and are also below the more conservative Pearl Harbor Sediment remediation goals. Therefore, the native formation present within the DD5B dredge footprint is not subject to CERCLA response action and is eligible for further evaluation for suitability for ocean disposal or for beneficial reuse.

4. References

Department of the Navy (DON). 2018. *Final Record of Decision Pearl Harbor Sediment Joint Base Pearl Harbor-Hickam Oahu HI*. JBPHH HI: Naval Facilities Engineering Command, Pacific. September.

——. 2023. Final Work Plan Native Formation Investigation Dry Dock 5 Construction Dredging Joint Base Pearl Harbor-Hickam Oahu HI. Prepared by AECOM Technical Services, Inc. JBPHH HI: Naval Facilities Engineering Systems Command, Pacific. September.

Table 1: Native Formation Sampling Program Summary

	Coordinates (Hawaii State Pl	ane Zone 3, N	AD83 Datum)					
	Та	rget	Ac	tual	Water Depth	Top of Native Formation Elevation	Soft Sediment Thickness	Bottom Elevation of Sampled Interval	
Location ID	Easting (ft)	Northing (ft)	Easting (ft)	Northing (ft)	(ft)	(ft MSL)	(ft)	(ft MSL)	Notes
DD5BS-01	1653323	67194	1653321	67183	-37.1	-37.6	0.5	-40.6	_
DD5BS-02	1653321	67313	1653324	67318	-35.2	-38.6	3.4	-41.6	
DD5BS-03	1653420	67396	1653406	67415	-43.4	-43.4	0	-46.4	Original location water depth below -57 ft MSL
DD5BS-04	1653454	67546	1653462	67544	-28.0	-29.0	1.0	-32.0	—
DD5BS-05	1653515	67651	1653513	67630	-30.6	-31.1	0.5	-34.1	Relocated due to water depth too shallow for sampling vessel

Note: Only successful sampling attempts are included in the table; unsuccessful sampling attempts where no sample recovery occurred are not included.

n/a not available

not applicable/no data

ft foot

ID identification

NAD83 North American Datum 1983

Table 2: Analytical Chemistry Results Summary

			[DD5BS-0	1			DD5B-S0	2			DD5B-S0	3		DD5B-S04	1	DD5B-S05			
			JT216	JT217	JT218	JT220	JT224	JT221	JT222	JT226	JT227	JT228	JT229	JT212	JT213	JT214	JT208	JT209	JT210	
Parameter	RG ^a	RAL0 ^b	0–1 ft	1–2 ft	2–3 ft	0–1 ft	0–1 ft ^d	1–2 ft	2–3 ft	2–3 ft ^d	0–1 ft	1–2 ft	2–3 ft	0–1 ft	1–2 ft	2–3 ft	0–1 ft	1–2 ft	2–3 ft	
Metals (mg/kg))																			
Copper	214	1,900	21.8	25.8	16	18.6	46.2	17.6	16	15.6	38.4	18.9	13.8	18.9	11	21	97.4	31.1	30.9	
Lead	119	1,000	4.07	3.36	1.07	20.5	7.8	0.89	0.45	0.44	19.7	0.94	0.25	1.13	0.24	0.18	4.12	0.32	0.32	
Mercury	0.71	1.3	0.31	0.06	0.049	0.079	0.16	0.0089 J	0.0077 J	0.0072 J	0.051	0.016 J	0.02 U	0.016 U	0.018 U	0.017 U	0.123	0.016 U	0.016 U	
PCBs (µg/kg)			P								P									
PCB-008	_		0.57 U	0.56 U	0.53 U	2.8 U	3.2 U	0.57 U	0.53 U	0.55 U	0.55 U	0.55 U	0.14 J	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-018		<u> </u>	2.3 U	2.3 U	2.1 U	11 U	13 U	2.3 U	2.1 U	2.2 U	2.2 U	2.2 U	0.55 U	2.2 U	2.2 U	2 U	2.2 U	2.0 U	2.1 U	
PCB-028		<u> </u>	0.57 U	0.56 U	0.53 U	2.8 U	3.2 U	0.57 U	0.53 U	0.55 U	0.55 U	0.55 U	0.55 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-052	_		0.57 U	0.56 U	0.53 U	2.8 U	3.2 U	0.57 U	0.53 U	0.55 U	0.55 U	0.55 U	0.55 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-044	_		0.57 U	0.56 U	0.53 U	2.8 U	3.2 U	0.57 U	0.53 U	0.55 U	0.55 U	0.55 U	0.55 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-066	_		0.57 U	0.56 U	0.53 U	2.8 U	3.2 U	0.57 U	0.53 U	0.55 U	0.55 U	0.55 U	0.55 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-101	_		0.57 U	0.56 U	0.53 U	2.7 J	3.6 J	0.53 J	0.53 U	0.55 U	0.55 U	0.55 U	0.55 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-118	_		0.57 U	0.56 U	0.53 U	0.89	1.1 J	0.23 J	0.53 U	0.55 U	0.55 U	0.55 U	0.55 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-153	_		0.23 J	0.56 U	0.26 J	9.3	12	2	0.47 J	0.72 J	1.2 J	0.44 J	1.1 J	0.56 U	0.56 U	0.5 U	0.62 J	0.51 U	0.52 U	
PCB-105	_		1.1 U	1.1 U	1.1 U	5.6 U	6.4 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.14 J	1.1 U	1.1 U	1 U	1.1 U	1 U	1 U	
PCB-138	_		0.57 U	0.56 U	0.57 U	6.1	8.1	1.4 J	0.53 U	0.34 J	0.66 J	0.14 J	0.64 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-187	_		0.57 U	0.56 U	0.53 U	3.6	4.4 J	0.85 J	2.1 U	0.2 J	0.53 J	0.55 U	0.64 U	0.56 U	0.56 U	0.5 U	0.25 J	0.51 U	0.52 U	
PCB-128	—		0.57 U	0.56 U	0.53 U	2.8 U	3.2 U	0.57	0.53 U	0.55 U	0.55 U	0.55 U	0.64 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-180	_		0.57 U	0.56 U	0.53 U	6.3	8.4	1.6	0.53 U	0.37 J	0.79 J	0.55 U	0.64 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-170	_		0.57 U	0.56 U	0.53 U	3.5	4.6 J	0.85 J	0.53 U	0.22 J	0.48 J	0.55 U	0.64 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-195	—		0.57 U	0.56 U	0.53 U	0.64	0.76 J	0.18 J	0.53 U	0.55 U	0.15 J	0.55 U	0.64 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-206	—		0.57 U	0.56 U	0.53 U	2.8 U	3.2 U	0.57 U	0.53 U	0.55 U	0.55 U	0.55 U	0.64 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
PCB-209	_		0.57 U	0.56 U	0.53 U	2.8 U	0.7 J	0.53 J	0.53 U	0.55 U	0.55 U	0.55 U	0.64 U	0.56 U	0.56 U	0.5 U	0.55 U	0.51 U	0.52 U	
Total PCBs ^c	170	420	0.46 J	2.3 U	0.52 J	66 J	87 J	16 J	0.47 J	3.7 J	7.6 J	1.1 J	2.6 U	2.2 U	2.2 U	2 U	1.74 J	2.0 U	2.1 U	

not applicable/no data _

µg/kg microgram per kilogram

ft foot

J estimated concentration ^a Pearl Harbor Sediment remediation goal (DON 2018).

^b RAL₀ criterion to determine whether the native formation material is subject to CERCLA response action. ^c Calculated as two times the sum of the NOAA-18 congeners.

^d Duplicate sample.

mg/kg RG milligram per kilogram remediation goal

U non-detect concentration



LOCATION MAP



LEGEND



DD5B Native Formation Dredge Footprint

- DU Sub-Area Designated for Dredging
- DU Sub-Area Designated for ENR
- DU Sub-Area Designated for ENR + AC
- DU Sub-Area Designated for MNR
- DU Sub-Area Designated for MNR + AC

DU Sub-Area Designated for No Remedy

NOTES

- Map Projection: UTM State Plane Zone 3 unit feet, NAD 83 Datum.
 Basemap source: ESRI
 Abbreviation:

AC	activated carbon treatment
DU	decision unit
ENR	enhanced natural recovery
MNR	monitored natural recovery



Figure 1 Project Location Map Native Formation Sampling Letter Report Dry Dock 5 Construction Dredging PHNC National Priorities List Site JBPHH, Oahu, Hawaii



LEGEND



Actual Native Formation Sampling Location

Proposed Native Formation Sampling Location

DD5B Native Formation Dredge Footprint

— 2-ft Bathymetric Contour (ft MSL)

Bathymetry (ft MSL) High : -56

Low : -9

NOTES

- 1. Map Projection: UTM State Plane Zone 3 unit feet, NAD 83 Datum.
- 2. Basemap source: ESRI
- Source and the second se
- 4. Core log legend:

Harbor Water
Soft Harbor Sediment
Native Formation - Coralline Detritus
Native Formation - Volcanic Tuff
Native Formation - Older Alluvium



Figure 2 Sampling Locations and Stratigraphy Native Formation Sampling Letter Report Dry Dock 5 Construction Dredging PHNC National Priorities List Site JBPHH, Oahu, Hawaii



LEGEND



Actual Native Formation Sampling Location



Proposed Native Formation Sampling Location

DD5B Native Formation Dredge Footprint

— 2-ft Bathymetric Contour (ft MSL)

Bathymetry (ft MSL)

- High : -56

Low : -9

NOTES

- 1. Map Projection: UTM State Plane Zone 3 unit feet, NAD 83 Datum.
- 2. Basemap source: ESRI
- 3. Non-detect values are reported to the limit of detection
- 4. μg/kg microgram per kilogram ft foot J estimated concentration
- mg/kg milligram per kilogram MSL mean sea level PCBs polychlorinated biphenyls U non-detect concentration



Figure 3 Analytical Chemistry Results Native Formation Sampling Letter Report Dry Dock 5 Construction Dredging PHNC National Priorities List Site JBPHH, Oahu, Hawaii

Attachment 1: Native Formation Coring Logs

BORING EASTING 1,653,321.000 DRILLING EQUIPMENT PQ Core/ California Barrel PQ Core/ California Barrel Image: Construction of the							
DATE/TIME FINISHED 10/11/2023 DRILLING CONTRACTOR Geolabs GROUND WATER LEVELS: BORING NORTHING 67,183.000 DRILLING CONTRACTOR Geolabs GROUND WATER LEVELS: BORING EASTING 1.653,321.000 DRILLING EQUIPMENT PQ Core/ California Marrel DATUM NAD83 Hawaii State Plane Zone 3 (feet) SIZE AND TYPE OF BIT 4.5" PQ Core ANALYTICAL SAMPLE TYPE GROUND ELEVATION (FT MSL) 1.50 BOREHOLE DIAMETER (IN) 4.5 NUMBER OF ANALYTICAL SAMPLE SURFACE DESCRIPTION Mud/water interface measured at 1.7' below sea deck and adjusted by a tide CHECKED BY C. Smith COLLECT LOG MEASURE (1) (1) (1) Image: Stress of the s	am, Oahu, Hawaii						
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Elevation (ft milling) Recovery (ft) Soin/Bock Allow Soin Bock Allow							
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	REMARKS						



CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

	ì	COL	LEC	Т			LOG				MEAS	SURE		
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Project File: DD5.GPJ; Library: CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/2/23	_ _ _ _ _ _ _ _													



CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

	ì	COL	LEC	Т			LOG				MEAS	SURE		
(ff m		/pe oer	nts	(ft)	U	or pe		Esti	mate	d %	(m	ial Id ID	h (ft)	REMARKS
Elevation (ft msl)		Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Depth (ft)	
Project File: DD5.GPJ, Library: CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/223													- - 25 - 30 - 35	



- 40

JT216

JT217

JT218

JT219

-45

CLIENT NAVFAC

PROJECT NUMBER

Sample Type and Number

Elevation (ft msl)

-35

-40-

CAL 3

CAL 8

CAL 15

CAL 19

CAL 16 SM

ML

SM

detritus)

	C	0	M		BORING LC		BORING: DD5BS PAGE 4 (
NAV T NUI					GENERAL LOCATION Joint Base					, Hawaii		
COI	LEC	Т			LOG				MEAS	SURE		
ype ber	ints	Recovery (ft)	. <u>0</u>	or 'pe		Est	imate	ed %	(mq	cal nd ID	Depth (ft)	REMARKS
Sample Type and Number	and Number Blow Counts		Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and	Dept	
											-	

5 10 85

15

10 65 25

60 25

CLAYEY SILT; black (2.5Y 2.5/1), wet, very soft, organic odor (harbor deposit)

SILTY SAND; greenish gray (GLEY1 5/10GY) to gray (2.5Y 5/1), wet, loose, with various amounts of gravel, (coralline

SILTY SAND; light grayish brown (2.5Y

6/3), wet, medium dense, with some gravel, lesser amounts of clay lenses, dark grayish brown (2.5Y 3/2) in color,

(coralline detritus)

Project File: DD5.GPJ; Library: CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/2/23

-45-



CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER



Γ			-						Dry Dools ElS of JE	חחם	Ochu	Lou							
		Γ <u>ΝΑν</u> Ε CT NUN							Dry Dock EIS at JE					Намаіі					
					10/12/20	122 00.							TOTAL DEPTH OF BORING (FT BGS) 59.5						
		TIME ST.						DRILLING METHOD Manual DRILLING CONTRACTOR Geolabs											
				_			,						GROUND WATER LEVELS:						
		G NORT						DRILLER J. Loa		alifana		_							
			-				2 (fa at)		PMENT PQ Core/ C Barrel 4.5" PQ Co	aniom	la	_ ,	_			G			
							3 (feet)		le					TYPE Composite					
				-		1.30		BOREHOLE DIA											
						water int	orfood mo	ourod at 1.7' balau	v sea deck and adjust	od by	o tido		LOGGED BY M. Zinn CHECKED BY						
L	SUKFA							ation is 1.3' MSL		euby									
Γ	(COL	LEC	Т				LOG					MEA	SURE					
	Elevation (ft msl)	_ (1)	(0	Ŧ						Ect	imate	d %		₽	(tt)				
	on (f	Sample Type and Number	Blow Counts	Recovery (ft)	je.	USCS or Rock Type						u 70	PID (ppm)	Analytical Sample and ID	oth (REMARKS			
	evati	Ple	ő	ove	Graphic	S S S S S S S S		Soil/Rock Visual	Description	<u>e</u>	Sand	Fines		ple ;	Depth				
	Ш	sam and	Blow	Rec	0	۳ چ چ				Gravel	Sa	ЦЦ	₫	Ar					
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CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

(18	COL	LEC	т			LOG				MEA	SURE		
Elevation (ft msl)	Type nber	unts	ry (ft)	hic	s or ype		Est	imate	d %	(mdc	tical and ID	Depth (ft)	REMARKS
Elevati	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Тө Д	
- -15— -												-	
-20													
-25												25 	
-30												30 	

(Continued Next Page)



CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

						GENERAL LOCATION Joint Base Pe				, -	,		
sl)	СС	LLEC	т			LOG				MEA	SURE		
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Esti Gravel	imate auq S	Fines ö	PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
-35					CL-ML	CLAYEY SILT ; dark gray to gray, wet, very soft, with traces of coralline gravel, (harbor deposit)					ω	35 	
- -40	CAL				GM SM	SILTY GRAVEL with SAND; dark gray (5Y 4/1), wet, medium dense, (coralline detritus) SILTY SAND; light olive gray (5Y 6/2), wet, medium dense, with various amounts of gravel (coralline detritus)	40 25 10	25 40 65	35 35 25		JT220 JT221 JT223 JT222	40 	
-	CAL	20				grades to olive gray (5Y 5/2), medium to coarse sand, with clayey silt locally	30	40	30			-	
-	COR						20	60	20			— 45 —	
-45—	CAL	22				grades to grayish brown (2.5Y 5/2),	15	60	25			_	
-					SM	<u>SILTY SAND</u> ; light yellowish brown (2.5Y 6/4), wet, medium dense, (coralline detritus)						-	
-45	CAL					with stiff, brown clayey pockets locally, up to 1.5" thick	0	20	80			— 50 —	
_	CAL											_	



CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

sl)	COL	LEC	Т			LOG				MEAS	SURE		
n (ft m:	ype ber	unts	(ft)	ic.	or /pe		Est	imate	ed %	(mq	cal nd ID	Depth (ft)	REMARKS
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and I	Dept	
Ш	Sar anc	Blo	Re		28		ũ	S	ΪĒ		San		
					•								
-	CORE				•							_	
	CAL	21			•	medium to coarse sand, angular						- 55	
-		21											
-55					CL-ML	CII TV CI AV: dork brown (10VD 2/2)	0	0	100			_	
	CAL	58				<u>SILTY CLAY;</u> dark brown (10YR 3/3), moist, very stiff to hard, (older alluvium)			100			_	
-													
												_	
						End of Boring (-57.00 ft msl)							
-												-	



CLIEN		FAC					PROJECT NAME Dry Dock	EIS at JB	PHH,	Oahu	, Haw	aii						
PROJ	ECT NUM	/IBER					GENERAL LOCATION _ Join	t Base Pea	arl Ha	rbor H	lickan	n, Oahu	ı, Hawaii					
DATE	TIME ST	ARTE	D _1	0/13/20	23 12:	20 PM	DRILLING METHOD Manua	al			_ т	OTAL	DEPTH (of Bor	RING (FT BGS) 59.5			
DATE	TIME FIN	IISHE	D _1	0/13/20	23		DRILLING CONTRACTOR	Geolabs			_ 0	ROUN	D WATE	R LEVI	ELS:			
BORIN	NG NORT	HING	69	,317.000)		DRILLER J. Loane					${ar ar \Box}$ at time of drilling $\ \$						
BORI	NG EAST	ING _	1,653	3,324.00	00		DRILLING EQUIPMENT PQ Core/ California Barrel						$\underline{\Psi}$ after drilling					
DATU	M NAD8	3 Haw	/aii St	ate Plan	e Zone (3 (feet)	SIZE AND TYPE OF BIT 4.	5" PQ Cor	Э		_ A	NALY	FICAL SA	AMPLE	TYPE Composite			
GROL	JND ELE	VATIO	ON (F	T MSL)	2.00		BOREHOLE DIAMETER (IN)	4.5			_ N	IUMBE	r of an	IALYTI	CAL SAMPLES			
	PLETION											OGGE	D BY	M. Zinn	1			
SURF	ACE DES	SCRIF	PTION				easured at 1.7' below sea deck a vation is 1.3' MSL.	nd adjuste	d by a	a tide	C	HECK	ED BY					
(jii)	COL	LEC	Т				LOG					MEA	SURE					
Elevation (ft msl)	e r	s	ft)		. 0				Esti	mate	d %	(u	Analytical Sample and ID	(Ŧ				
tion (Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type		Soil/Rock Visual Description	n				PID (ppm)	/tica anc	Depth (REMARKS			
leva	nple Nu	U ≥	COVE	Grap	SC A				Gravel	Sand	Fines	Q	naly	ð				
ш	Sar ano	Blo	Re		2 5				Ğ	S	ΪĒ	ł	San					
-	CORE					DEC	KING							C 0				
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CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

	COL	LEC	т			LOG				MEA	SURE		
Elevation (ft msl)	e Type amber	ounts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description		imate		PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
Eleva	Sample Type and Number	Blow Counts	Recov	C.	USC Rock		Gravel	Sand	Fines	DID	Anal Sample	ے 15	
-15												_	
-20												20 	
-25												- 25 -	
-25												- 30	





CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

GENERAL LOCATION Joint Base Pearl Harbor Hickam, Oahu, Hawaii

	001	150	<u></u>			100							
(Ism	COL					LOG					SURE	- E	
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Est Gravel	imate Sand S	Fines p	PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
_												— 35 _	
-35	CAL				CL-ML	<u>CLAYEY SILT</u> ; dark gray to gray, wet, very soft, with traces of coralline gravel, (harbor deposit)	0	15	85			- - 40	
-40	CAL				SM	SILTY GRAVEL with SAND; dark gray (5Y 4/1), wet, medium dense, (coralline detritus)	10	65	25			_	
_	CAL				SM	SILTY SAND; light olive gray (5Y 6/2), wet, medium dense, with various amounts of gravel (coralline detritus)	20	60	20			_	
_	CAL				SM	SILTY SAND; olive gray (5Y 5/2), wet,	15	60	25			— 45 —	
-45	CAL					medium dense, with a little clay (coralline detritus)							
_	CAL				SM	SILTY SAND; light yellowish brown	0	20	80			_	
_	CORE					(2.5Y 6/4), wet, medium dense, with a little clay (coralline detritus)						— 50 _	
-50	CAL												





CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

GENERAL LOCATION _Joint Base Pearl Harbor Hickam, Oahu, Hawaii

sl)	COL	LEC	Т			LOG				MEAS	SURE		
Elevation (ft msl)	ype ber	ints	/ (ft)	J	or 'pe		Esti	mate	d %	(mc	rtical and ID	Depth (ft)	REMARKS
evatio	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and	Dept	
	Sam and	Blov	Rec		_⊃ %		Gra	ŝ	Ë	۵.	Sam		
-												_	
_	CORE											- 55	
	Un L				•								
-												-	
	CAL												
-55					CL-ML	<u>SILTY CLAY</u> ; dark brown (10YR 3/3), moist, very stiff to hard, (older alluvium)	0	0	100			_	
-												_	
					1	End of Boring (-56.5.00 ft msl)							
-												_	
					1		1						I

ELS: LING G TYPE Composite CAL SAMPLES
ELS: LING 3 TYPE _Composite CAL SAMPLES
LLING G TYPE _Composite CAL SAMPLES
G TYPE _Composite CAL SAMPLES
TYPE Composite
CAL SAMPLES
REMARKS



CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

	COL	LEC	Т			LOG				MEA	SURE		
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description		imate		PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
Elev	Samp and N	Blow	Reco	ة بيبيد	LUS Roci		Gravel	Sand	Fines	PIC	Aná Sampi	15	
-15—												_	
-20													
-25—												- 25 - - -	
-30—												- 30 - -	

(Continued Next Page)



CLIENT NAVFAC

PROJECT NAME _ Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

GENERAL LOCATION Joint Base Pearl Harbor Hickam, Oahu, Hawaii	GENERAL LOCATION	Joint Base Pearl Harbor Hickam, Oahu, Hawaii
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(Ist	COL	LEC	T		1	LOG				MEA	SURE		
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	n Estimated			PID (ppm) Analytical Sample and ID		Depth (ft)	REMARKS
Eleva	Sampl and N	Blow (Reco	Ğ	Rock		Gravel	Sand	Fines	DIA	Ana Sampl		
-35												35 	
_	CAL	0			ML	SANDY SILT; gray, wet, very soft soft, with trace gravel, gravel coralline, (fill)					JT227	— 45	
-45											JT228	_	
_	CAL	12			SM	<u>SILTY SAND</u> ; very pale brown (10YR 8/2), wet, very loose to loose, with a some gravel, coralline, (fill)	25	60	15		JT229 JT230	-	
_	CAL	5										_	
-	CAL	0			ML	varies to dark grayish brown (10YR 4/2), increased gravel content <u>SANDY SILT</u> ; gray, wet, very soft, (fill)	50 0	35 15	15 85			— 50	Little to no recovery
-50						<u>שאוש ו שובו,</u> gray, wei, very soit, (וווו)		UD	00			-	
_	CAL	0										_	
				<u> </u>								_	



CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

sl)	COL	LEC	Т			LOG				MEAS	SURE			
n (ft m:	ype ber	unts	(ft)	<u>i</u>	or /pe		Estimated %		d %	(mq	cal nd ID	ih (ft)	REMARKS	
Elevation (ft msl)	Sample Type and Number	Blow Counts Recovery (ft)		Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Depth		
	0, 0						0							
_	CAL	4			•							_		
	CAL	26										55	Little recovery	
-55					SW-SM	SILTY SAND; greenish gray (GLEY1 6/10Y), wet, loose to medium dense, trace cobble, coralline, (fill)	3	67	30			_		
_	CAL	13			•							_		
_	CAL	8				varies to to dark greenish gray (GLEY1 4/10Y), becomes gravelly	35	25	40			_		
-						varies to light brownish gray (2.5Y 6/2)	20	60	20			_		
					CL-ML	SILTY CLAY; brown, moist, stiff to very 			100			-60		

End of Boring (-58.50 ft msl)



CLIEN	T NAVE	AC					PROJECT NAM	PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii											
PROJE	ECT NUN	IBER					GENERAL LOC	GENERAL LOCATION Joint Base Pearl Harbor Hickam, Oahu, Hawaii											
DATE/	TIME ST.	ARTE	D 1	0/14/20	23 11:	20 AM													
DATE/	TIME FIN	IISHE	D 1	0/14/20	23														
BORIN	G NORT	HING					DRILLER J. Lo	bane				$\overline{\bigtriangledown}$ at time of drilling							
	IG EAST							PMENT PQ Core/ Barrel											
							SIZE AND TYPE OF BIT 4.5" PQ Core												
					1.30		BOREHOLE DIA	METER (IN) 4.5											
						,						LOGGED BY <u>M. Zinn</u>							
	ACE DES						easured at 1.7' belo vation is 1.3' MSL	w sea deck and adju	isted by	a tide		HECK	ED BY	1					
(Isi	COLLECT						LOC	3				MEA	SURE	-					
Elevation (ft msl)	ype ber	nts	(ft)	U.	or pe				Est	imate	ed %	(mc	Analytical Sample and ID	h (ft)	REMARKS				
vatio	ole T Num	Cou	ver	Graphic	USCS or Rock Type		Soil/Rock Visua	l Description	ē	p	se	PID (ppm)	alytic le ai	Depth					
Ë	Sample Type and Number	Blow Counts	Recovery (ft)	Ū	N S				Gravel	Sand	Fines	⊟	An						
	CORE		-			DEC	KING												
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CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

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(]s	COL	LEC	Т			LOG				MEA	SURE		
ן (ft m;	ype ber	nts	(ft)	U	or pe		Est	imate	ed %	(mc	cal DI Dr	Depth (ft)	REMARKS
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description		Sand	Fines	PID (ppm)	Analytical Sample and ID	Cept	
-15												_	
-20													
												- 25	
Project File: DD5.GPV; LIbrary: CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/223 													





CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

sl)	COL	LEC	Т			LOG				MEA	SURE		
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Esti Gravel	etimated %		PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
-35												35 	
-40												40 	
-	CAL	45			SM	SILTY SAND with GRAVEL; dark grayish brown (2.5YR 4/2), wet, medium dense, angular gravel, coralline, (fill)	30	50	20			— 45 —	
-45—	CAL	22			ML	SANDY SILT with GRAVEL; pale brown	15	25	60			_	45'-50': no recovery
_	CAL	7				(2.5Y7/3), wet, very soft, coralline, (fill)						_ _	
_	CAL	2										— 50 —	
-50—	CAL	0										_	50'-55': 2' recovery



CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

GENERAL LOCATION _ Joint Base Pearl Harbor Hickam, Oahu, Hawaii

(]s	COL	LEC	Т			LOG				MEASURE			
n (ft ms	ype ber	unts	Recovery (ft)	.c	or /pe		Est	mate	d %	(mq	cal nd ID	Depth (ft)	REMARKS
Elevation (ft msl)	ample T ind Num	Sample Type and Number Blow Counts		Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Dept	
	0.0	ш					<u> </u>				S		
-55	CAL	2 5 2				grades to with gravel pockets locally, varies to black (5Y 2.5/2) and pale brown (2.5Y 7/3) varies to greenish gray (GLEY1 6/10Y) olive gray (5Y 4/2)	25	55	30				
-	CAL	7		mm		varies to gray (10YR 6/1)			100			_	55'-60': 2' recovery
					CL-ML	SILTY CLAY; dark brown (10YR 3/3), moist, stiff to very stiff, (older alluvium)			100			60	
1													

End of Boring (-58.50 ft msl)

CLIE	NT	NAVF	AC					PROJECT NAME _ Dry Dock EIS at JBPHH, Oahu, Hawaii											
PRO	JEC		IBER					GENERAL LOC	earl Ha	lickar	am, Oahu, Hawaii								
DATE	E/TIN	IE ST.	ARTE	D _1	10/14/20	23 01:	10 PM	DRILLING MET	HOD Manual			ו	TOTAL DEPTH OF BORING (FT BGS) 60.0						
DATE	E/TIN	/IE FIN	IISHE	D _1	10/14/20	23		DRILLING CON	GROUND WATER LEVELS:										
BORI	NG	NORT	HING					DRILLER J. L	${ar ar ar ar ar ar ar ar ar ar $										
BOR	NG	EAST						DRILLING EQU	IPMENT PQ Core/ Ca	aliforn	ia		_						
DATI	<u>1</u> ML	NAD83	3 Haw	aii St	ate Plan	e Zone (3 (feet)	SIZE AND TYPI	E OF BIT	re		_ /	ANALYTICAL SAMPLE TYPE Composite						
GRO	UND) ELE\	/ATIC	DN (F	T MSL)	1.80		BOREHOLE DIAMETER (IN) 4.5 N						NUMBER OF ANALYTICAL SAMPLES					
СОМ	PLE	TION	INFO	RMA ⁻	TION							L	LOGGED BY M. Zinn						
SUR	FAC	E DES	CRIP	TION	Mud/v	water int 4'. Calcu	terface me	easured at 1.7' belo	ow sea deck and adjust	ed by	a tide	(CHECK	ED BY					
(jii)								LO	G				MEA	SURE					
Elevation (ft msl)		be er	ıts	(ft)		- e				Est	imate	d %	(m	Analytical Sample and ID	(£f)	DEMARKS			
ation	H H	sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type		Soil/Rock Visua	al Description	-	5	6	PID (ppm)	lytic: e an	Depth (ft)	REMARKS			
leva		āZ g	NO NO	€CO	Gra	USC Kock			·	Gravel	Sand	Fines	DIG	Ana					
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Project File: DD5.GPJ; Library. CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/223 - 0-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-																			
<u>م</u>	-				<u>Extra</u>										15				


CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

sl)	COL	LEC	Т			LOG				MEAS	SURE		
(ff m	/pe ber	nts	(ft)	0	pe pe		Esti	mate	ed %	(m	ial Id ID	(ff) ر	REMARKS
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	vel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Depth (ft)	
Ĕ	Sam and	Blov	Rec	0	⊃°S		Gravel	S	Fir	٩	Sam	-15-	
- 115- 												- 15 	



CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

Ī	(ls	COL	LEC	Т			LOG				MEAS	SURE		
	l (ft m;	/pe ber	nts	(ft)	0	e pe		Esti	imate	d %	(m	id ID	(ft) ר	REMARKS
	Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Depth (ft)	
	-35		E									0 V		
Project File: DD5.GPJ; Library: CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/223	-45	CAL	0			ML	<u>SANDY SILT</u> ; pale brown (2.5Y7/3), wet, very soft, with trace gravel, coralline, (fill)						- 45 	
Y.GLB; Report: L	_												_	45'-50': No recovery
GINT_LIBRARY	_	CAL	0										_	
brary: CTO-0049_	_	CAL	2										— 50 —	
File: DD5.GPJ; Li	-50	CAL	1										_	
Project	-					SM	<u>SILTY SAND</u> ; dark grayish brown (10YR 4/2), wet, medium dense, with some	15	55	30			_	50'-55': 2.5' recovery



CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

()s	COL	LEC	Т			LOG				MEAS	SURE		
n (ft ms	ype ber	ints	/ (ft)	.u	or 'pe		Est	imate	ed %	(mq	cal nd ID	Depth (ft)	REMARKS
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Dept	
						gravel and clay, (coralline detritus)							
	CAL	37										_	
	CAL	40										- 55	
												_	
				aaaaa	CL-ML	SILTY CLAY; yellowish brown (10YR	0	0	100				
-55	CAL	70				3/4), moist, very stiff to hard, (older	ľ	ľ	100			_	
		72				alluvium)							
												_	
-												_	
						End of Boring (-57.25 ft msl)							
												- 60	

CLIEI	ΝТ	NAVF	AC					PF	ROJECT NAME Dry Doc	k EIS at JB	PHH,	Oahu	, Haw	/aii			
PRO.	JEC.		IBER					GI	ENERAL LOCATION	nt Base Pe	arl Ha	irbor H	lickar	n, Oahu	, Hawaii		
DATE	E/TIN	IE ST	ARTE	D _1	10/14/20	23 02:	15 PM	DF	RILLING METHOD Manu	ıal			ד _	TOTAL I	DEPTH	of Bof	RING (FT BGS) 60.0
DATE	TIN	IE FIN	IISHE	D _1	10/14/20	23		DF	RILLING CONTRACTOR	Geolabs			_ 0		D WATE		
BORI	NG	NORT	HING	i					RILLER J. Loane								LLING
BORI	NG	EAST	NG					DF	RILLING EQUIPMENT P B	Q Core/ Ca arrel	liforni	ia		₫ А	FTER D	RILLIN	G
									ZE AND TYPE OF BIT $\stackrel{B}{=}$								
						2.10		BC	OREHOLE DIAMETER (IN	l) <u>4.5</u>							CAL SAMPLES
						wator int	orfooo m		red at 1.7' below sea deck	and adjusts	d by	a tida		CHECK		M. Zinr	1
301					of -0.4	4'. Calci	lated ele	evatio	n is 1.3' MSL.		u by		_ `			1	1
sl)		COL	LEC	Т					LOG					MEA	SURE		
Elevation (ft msl)		e re	ts	£		رە					Esti	imate	d %	_ ب	Analytical Sample and ID	(H	
tion	ŀ	and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type		Soi	I/Rock Visual Description	on	_			PID (ppm)	ytica ano	Depth (ft)	REMARKS
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Project File: DD5.GPJ; Library: CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/223 - 1- - 1-																	
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CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

GENERAL LOCATION Joint Base Pearl Harbor Hickam, Oahu, Hawaii

				_										
(lsu	`	COL	LEC				LOG					SURE		
Elevation (ft msl)		Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Esti Gravel	imate auq S	Fines p	PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
-15	5												- <u>15</u> 	
-20	_ _ _ _												-	
XY.GLB; Report: BORING LOG DD5; Date: 11/223	_ 5 _												— 25 — —	
Project Frie: DDS.GHJ: LIBrary: CT0-0049_GIN_LIBRARY:GLB: Report: BORING:LOG DDS; Date: 11/223 C- C-	_ 												- 30 	

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CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

		COI	LEC	т			LOG				MEAS			
l (ft m;	. [/pe oer	nts	(ft)	U	or pe		Est	imate	d %	(m	ial Id ID	ц(ft)	REMARKS
Elevation (ft msl)		Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Depth (ft)	
		σo										ů		
-35	-													
	-												_	
Project File: DD5.GPJ; LIbrary: CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/223 .5-	-					CL-ML	<u>CLAYEY SILT</u> ; pale brown (2.5Y7/3), wet, very soft, with trace gravel, coralline, (harbor deposit)						45 	
RY.GLB; R(-													
SINT_LIBRA	-													
y: CTO-0049_G	_												— 50	
5.GPJ; Librar	_												_	
Project File: DD) L	CAL	6			SM	<u>SILTY SAND</u> ; greensh gray (GLEY1 5/10Y), wet, very loose, with a little gravel, (coralline detritus)	10	50	40				



CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

()s	COL	LEC	Т			LOG				MEAS	SURE		
n (ft m	ype ber	unts	y (ft)	.c	or /pe		Est	mate	d %	(mq	cal nd ID	Depth (ft)	REMARKS
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Dept	
_	CAL	20				varies to light olive brown (2.5Y 3/2), becomes clayey	20	50	30			_	
-	CAL	35										— 55 —	
					CL-ML	SILTY CLAY; yellowish brown (10YR			100				
-55	CAL	67				3/3), moist, very stiff to hard, (older alluvium)						-	
-						End of Boring (-57.80 ft msl)						- 60	



CLIEN	T NAV	FAC					P	ROJECT NAME Dry Dock EIS at	JBPHH,	Oahu	, Haw	vaii			
PROJ	ECT NUM	/IBER	2				G	ENERAL LOCATION _ Joint Base	Pearl Ha	arbor H	lickar	n, Oahu	, Hawaii		
DATE/	TIME ST	ARTE	ED _1	10/10/20	23 01:	15 PM	D	RILLING METHOD Manual			ד _	OTAL I	DEPTH	of Bof	RING (FT BGS) 58.0
DATE/	TIME FIN	NISHE	ED _1	10/10/20	23		D	RILLING CONTRACTOR _ Geola	bs		_ 0	ROUN	D WATE	R LEV	ELS:
BORIN	IG NORT	HING	67	,543.000	C		D	RILLER J. Loane				∑ A		of Dri	LLING
BORIN	IG EAST	ING	1,653	3,459.00	00		D	RILLING EQUIPMENT PQ Core	/ Californ	ia		V A	FTER D	RILLIN	G
DATU	NAD8	3 Haw	vaii St	ate Plan	e Zone 3	B (feet)	SI	IZE AND TYPE OF BIT 4.5" PQ	Core		- 4			AMPLE	TYPE Composite
								OREHOLE DIAMETER (IN) 4.5							CAL SAMPLES
	LETION											OGGEI	D BY	M. Zinr	ı
SURF	ACE DES	SCRIF	TION					ired at 1.7' below sea deck and adj	usted by	a tide	c	HECK	ED BY		
				<u>of -0.</u>	1'. Calcı	lated elev	evatio	on is 1.6' MSL	-						1
sl)	COL	LEC	T			i		LOG				MEA	SURE		
Elevation (ft msl)	er oe	ts	£		. o				Est	imate	d %	Ê		(ft)	
ion	hgu	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type		Soi	il/Rock Visual Description				PID (ppm)	Atica	Depth	REMARKS
evat	Nu	Ŭ ≥	No.	Brap	S S		30		Gravel	Sand	Fines	₽	nal) iple	De	
Ξ	Sample Type and Number	Blo	Re		يدر				Gra	ů.	Ē		Analytical Sample and ID		
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	T <u>NAVE</u> Ect Num		1			PROJECT NAME _Dry Dock EIS at JBF GENERAL LOCATION _Joint Base Pea					, Hawaii		
(1	COL	LEC	т			LOG				MEA	SURE		
(ft ms	er er	ts	(£		, υ		Esti	mate	d %	ĥ		(£	
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
-15— -15— - -20— - -25— - - - - - - - - - - - - - - - - - - -	CAL	13			CL-ML GM	CLAYEY SILT: light gray, wet, soft, with a little gravel (harbor deposit) SILTY GRAVEL with SAND; dark gray (5Y 4/1), wet, medium dense, grades with dense sandy gravel pockets locally, subangular gravel, (coralline detritus)	5	0	95		JT212	- 15 	

Project File: DD5.GPJ; Library: CTO-0049_GINT_LIBRARY.GLB; Report: BORING LOG DD5; Date: 11/2/23

CAL 55

0

50 35 15

varies to gray (10YR 6/1)

JT213

JT214



CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

	_		-			GENERAL LOCATION JOINT Base Fe	anna		nontai	i, ean	,		
sl)	СО	LLEC	т			LOG				MEA	SURE		
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description		mate		PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
Eleva	Sampl and N	Blow (Recov		USC Rock		Gravel	Sand	Fines	DID	Ana Sample		
_	CORE					varies to white (10YR 8/1), poorly graded, angular gravel up to 2" in diameter	80	15	5		JT215		
_	CAL	13				varies to light brownish gray (10YR 6/2)						— 35	
-35	CAL	16			GC	CLAYEY GRAVEL with SAND; very dark grayish brown (10YR 3/2), wet, medium dense, sand increases with depth(coralline detritus)	60	10	30			_	
	CAL	20										_	
-												_	
-	CAL	28				varies to light olive brown (2.5Y 5/4), subangular gravel up to 5" in diameter	40	35	25			— 40 —	
-40	CAL	19				grades with dark brown clay layers (10YR 3/3) locally	5	75	20			_	
-	CAL	30										-	
-	CORE											—45	
-	CAL	17			SM	grades to <u>SILTY SAND with GRAVEL</u> ; light olive brown (5Y 4/1), wet, medium dense, decreasing gravel content with depth (coralline detritus)	25	55	20			-	
-45	CAL	17										-	
_	CAL	19										-	
-	CORE												
-	CAL	22										— 50 —	
-50—	CAL	29										-	
	CAL	24										_	



CLIENT NAVFAC

PROJECT NAME _ Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER



sl)	COL	LEC	Т			LOG				MEAS	SURE		
n (ft m	ype ber	unts	y (ft)	<u>ic</u>	or /pe		Esti	mate	d %	(mq	cal nd ID	Depth (ft)	REMARKS
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Dept	
ш	Sar an	Blo	Re		22		õ	<i>м</i>	ш	1	Sar		
-					•								
												_	
-	CORE				•							55	
	CAL	29										00	
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-55	CAL	29											
												_	
-					•								
	CAL	37			•		ļ					_	l de la constante de
						End of Boring (-57.50 ft msl)							

ULUET JANKEG PROJECT NUMBER ORDER TO NUMBER CORRECT NUMBER ODATETIME STARTED 1008/2023 DATETIME STARTED 1008/2023 DORING MARTHING 008/2023 DORING MARTHING 008/2023 DORING MARTHING 07/20 DEPTI MARTHING DATUM MARTHING 07/20 DEPTI MARTHING DATUM MARTHING 07/20 DEPTI MARTHING DATUM MARTHING MARTHING 008/14/20 DATUM MARTHING MARTHING 008/14/20 DATUM MARTHING MARTHING 008/14/20 SUBFACE DESCRIPTION 008/14/20 SUBFACE DESCRIPTION MARTHING MARTHING 10/20 COUPLETION INFORMATION 200 SUBFACE DESCRIPTION MARTHING Marthing 008/20 SUBFACE DESCRIPTION MARTHING Marthing 008/20 SUBFACE DESCRIPTION MARTHING SUBFACE DESCRIPTION MARTHING Marthing 008/20 SUBFACE DESCRIPTION MARTHING Marthing 000000000000000000000000000000000000	Ļ																			
DATE/TIME ENARTED 1092023 10:44 AM DATE/TIME ENARTED 1092023 10:44 AM DATE/TIME ENARTED 1002023 DORING CREATING 07:62000 DORING CREATING 07:62000 DORING CREATING 07:62000 DATUM MAD03140001 State 1000000 DATUM MAD03140001 State 10000000 DATUM MAD03140001 State 100000000 DATUM MAD03140001 State 1000000000000000000000000000000000000			T NAVE	FAC					PROJECT NAME	Dry Dock EIS at J	BPHH,	Oahu	, Haw	Hawaii						
DATE/TIME ENARTED 1092023 10:44 AM DATE/TIME ENARTED 1092023 10:44 AM DATE/TIME ENARTED 1002023 DORING CREATING 07:62000 DORING CREATING 07:62000 DORING CREATING 07:62000 DATUM MAD03140001 State 1000000 DATUM MAD03140001 State 10000000 DATUM MAD03140001 State 100000000 DATUM MAD03140001 State 1000000000000000000000000000000000000																				
DATE/TIME FINISHED 109/2023 BORING NORTHING 07/202000 DRILLING CONTRACTOR Coolinbs GROUND KIESAFLOOD DATUM MADB3 Haveil State Plane Zone 3 (set) DATUM MADB3 Haveil State Plane Zone 3 (set) DRENOE DATUM MADB3 Haveil State Plane Zone 3 (set) DRENOE DESCRIPTION MADB MADB3 Haveil State Plane Zone 3 (set) SUFACE DESCRIPTION MADB4 Haveil Interface measured at 17 biolow sea dock and adjusted by a tice of DC Collabert (set) MADB MADB3 Haveil State Plane Zone 3 (set) SUFACE DESCRIPTION MADB4 Haveil Interface measured at 17 biolow sea dock and adjusted by a tice of DC Collabert (set) MADB MADB MADB4 Haveil (set) MADB4 Haveil (s		DATE/	TIME ST.	ARTE	E D 1	10/9/202	3 10:4	4 AM												
BORING NORTHING 67,823.000 DRILLER J.Lane V.ATTIME OF DRILLING																				
BORING EASTING 1,053,512,000 DATUM NAD03 Havail Skein Plane Zone 3 (tem) SIZE AND TYPE OF BIT <u>THEY Composite</u> BOREHOLE DAMETER (N) <u>4.5</u> COMPLETION INFORMATION SURFACE DESCRIPTION INFORMATION																				
DATUM MADES Have State Plane Zone 3 (feet) GROUND ELEVATION (T MSL) 2.30 COMPLETION INFORMATION SURFACE DESCRIPTION Muthater informers and at 1.7 before sea dock and adjusted by a tide OULECT LOG COLLECT COLLECT COG COLLECT COLLECT COG COLLECT COG COG COLLECT COG COG COLLECT COG COG COG COG COG COG COG COG														_						
GROUND ELEVATION (FT MSL) 2.30 BOREHOLE DIAMETER (M) 4.5 NUMBER OF ANALYTICAL SAMPLES COMPLETION INFORMATION LOGGED BY M.Zim LOGGED BY M.Zim SURFACE DESCRIPTION M.Michael inferior measured at 1.7: below sea dark and adjusted by a lide CHECKED BY IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII				-						Barrel										
COMPLETION INFORMATION LOGGED BY M.Zm. SURFACE DESCRIPTION MudWater interface measured at 1.7 below sea deck and adjusted by a tile CHECKED BY																				
SURFACE DESCRIPTION Multivater interace measured at 1.1 % below sea dock and adjusted by at the CHECKED BY CHECKING OF OF OF							2.30		BOREHOLE DIAW	ETER (IN) _4.5										
color: Calculated alexation is 23 MSI COLLECT MEASURE in the second seco									and at 1 7 holes.		ted by	a tida			-	IVI. ZITIT	I			
Image: Second Control of Co	Ľ	SURFA									led by									
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CLIENT NAVFAC

		NAVFAC PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii											
PROJE		MBER		GENERAL LOCATION Joint Base Pearl Harbor Hickam, Oahu, Hawaii									
-	COL	LLEC	т			LOG	MEA	SURE					
(ft ms													
Elevation (ft msl)	Sample Type and Number	Blow Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and ID	Depth (ft)	REMARKS
	CAL	12			ML	SANDY SILT; light gray, wet, soft, with a						- 15 	
	CAL	19			GM	little gravel (coralline), (harbor deposit) grades to <u>SILTY GRAVEL with SAND</u> ; light gray (10YR 7/2), fine to coarse, angular, wet, medium dense, decreasing gravel content with depth (coralline	60	15	25		JT208 JT209		
-30	CAL	32				detritus) varies to very pale brown (10YR 7/3), subangular to angular	40	35	25		JT210 JT211	-	
												_	



CLIENT NAVFAC

PROJECT NUMBER

PROJECT NAME _ Dry Dock EIS at JBPHH, Oahu, Hawaii

	00	LLEC	:т			LOG				MEA	SURE					
t msl)							Fet	imate	d %			(H				
Elevation (ft msl)	Sample Type and Number	Blow Counts	Blow Counts Recovery (ft)		USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	(mqq) OI9	Analytical Sample and ID	Depth (ft)	REMARKS			
-	COR	E														
-	CAL	30										— 35 —				
-35—	CAL	38					10	05	05			_				
-		72				varies to yellowish brown (10YR 5/4), silt increases, becomes slightly plastic	40	25	35			_				
-	-	-										_				
		15		-1. <u>V</u>	GM	<u>TUFF</u> ; very dark brownish (10YR 3/2), wet, soft to medium hard, moderate to highly weathered, (volcanic tuff)	60	15	25			—40				
					GM	grades to <u>SILTY GRAVEL with SAND;</u> light olive brown (10YR 3/3), fine to	40	30	30			_				
-	CAL	20				coarse, subangular, wet, medium dense, medium to coarse sand, slightly plastic (coralline detritus)										
-40												_				
-	CAL	28										_				
-												_				
	COR											—45				
-		24				varies to brownish yellow (10YR 4/6), becomes sticky, medium plasticity	40	20	40							
-		28										_				
-45						grades with very stiff clayey silt pockets locally	10	25	65			_				
_	CAL	29										-				
						varies to pale brown (10YR 7/4)	65	25	10			_				
-	COR	=			2	grades with very stiff clayey silt pockets	10	65	25							
-	CAL	12				locally						50				
-												_				
-50	CAL	26					40	35	30			_				
												_				
	CAL	38	<u> </u>	10 4	1	(Continued Next Pa	10	65	25							



CLIENT NAVFAC

PROJECT NAME Dry Dock EIS at JBPHH, Oahu, Hawaii

PROJECT NUMBER

sl)	COLLECT			LOG						MEA	SURE		
itt m	ype ber	nts	(ft)	c	or pe		Est	imate	d %	(mc	cal Dd ID	h (ft)	REMARKS
Elevation (ft msl)	Sample Type and Number	w Counts	Recovery (ft)	Graphic	USCS or Rock Type	Soil/Rock Visual Description	Gravel	Sand	Fines	PID (ppm)	Analytical Sample and I	Depth	
	San anc	Blow	Re		٦٣		G	S	ΪĒ	ш	A San		
						varies to light yellowish brown (10YR 3/2)							
-							50	30	20			_	
	∧ ss	16											
-													
_	VI I						40	25	35			-	
				~ . 0		End of Boring (-54.25 ft msl)							
-55													
												L	