

**NOTICE TO PROVIDERS OF PROFESSIONAL SERVICES
REQUEST FOR QUALIFICATION (RFQ)
RFQL-ENV-1800006
ALA MOANA WASTEWATER PUMP STATION NO. 3**

The City and County of Honolulu, Department of Environmental Services, is seeking professional engineering services in accordance with Hawaii Revised Statutes (HRS) §103D-304 for the Ala Moana Wastewater Pump Station No. 3 (the Project or AMPS 3) to plan and design a deep raw sewage storage lift station in Kakaako, Honolulu, Hawaii.

BACKGROUND:

AMPS3 will require complete professional engineering services to include but not limited to planning, design, services during bidding and construction and post construction services including all required permits and clearances for the work, public outreach to major stakeholders, and assistance in land acquisition and easements as required for this Project. All work necessary for this Project shall be the responsibility of the Consultant.

The City will rely on information from ENV's on-going wastewater program to develop the current and future requirements for the Project.

SCOPE OF WORK:

The scope of work under this solicitation involves all planning, design, and services during bidding and construction and post construction services necessary to construct a large deep raw sewage storage lift station to control and convey flows and mitigate emissions from the planned Ala Moana-Kakaako Sewer (AMKS) Tunnel to existing Ala Moana Wastewater Pump Stations (AMPS) No. 1 and 2. Additionally, the scope of work includes the design of sewer connections to the AMKS Tunnel and the decommissioning of the existing Beachwalk and Moana Park Wastewater Pump Stations and design odor control system for the tunnel, AMPS 1 through 3, and the surrounding Kaakako sewer basin. The scope of work also includes coordinating design work with other design consultant(s) for the decommissioning of the Fort DeRussy Wastewater Pump Station.

AMPS 3 is proposed to be located in the vicinity of the existing Ala Moana WWPS Nos. 1 and 2. One possible site for the AMPS 3 is Lot "I" adjacent to the existing AMPS 1 and AMPS 2 (please refer to Attachment 2 – "KKOPS"). The final site of the AMPS 3 is yet to be determined. The proposed alignment of the AMKS Tunnel is shown in Attachment 1.

STATEMENT OF QUALIFICATIONS:

Joint Ventures (JV) may submit a Statement of Qualification (SOQ); however, any award shall be contingent on completion of proper registration pursuant to HRS Section 425. **Qualifications of sub consultant(s) should not be included within the SOQs and will not be considered as part of the SOQs.**

In accordance with HRS 103D-101 and Hawaii Administrative Rules (HAR) 3-131-1.02, potential offerors shall identify and eliminate any potential conflicts of interest. Therefore, consultants, subconsultants, contractors, subcontractors and JVs who have participated or are currently participating in the conceptual development of AMPS 3 may have a conflict of interest pursuant to the HRS Sections 103D-101 and 103D-405, and HAR Sections 3-122-13 and 3-131-1.02, and, if so, will not be considered for the Project. Conflict of interest considerations include, but are not limited to, whether a potential offeror developed, prepared or furnished any reports, specifications, design, plan, or work of any kind in the conceptual development of AMPS 3, which, depending on the facts of each case, would likely preclude it from submitting an offer. Likewise, consideration is given to whether a potential offeror is privy to information that is not publically disclosed or is not available to other offerors such that it gives the potential offeror an unfair advantage (e.g. information received that is useful to this solicitation; whether the information benefited the prospective offeror).

The SOQ should reflect Consultant's capabilities, experience, expertise, and capacity to successfully provide planning, design, and services during bidding and construction and post construction services for the project as described above.

The SOQ must include experience and professional qualifications regarding the following types of large deep storage lift station designs.

1. Deep raw wastewater lift station that conveys and controls the flow from up to 120' depth to existing Ala Moana WWPS Nos. 1 and 2.
2. 60-80 mgd WWPS.
3. Construction within a politically, culturally, and ecologically sensitive historic area.
4. Construction within a dense urban area with high groundwater tidally influenced and deep coral with mixed soils (Refer to Attachment 3).

The SOQ must include experience and professional qualifications regarding:

1. Design and construction of trunk sewers and sewer connections.
2. Phasing and deactivation of at least three wastewater pump stations with flow range from 10- 40 mgd.
3. Phasing and support to startup the deep storage lift station including equipment and operational testing, commissioning, and post construction optimization.

PROJECT SCHEDULE:

Current Capital Improvement Budget projects construction funding for this project in Fiscal Year 2024. Planning /Permitting and Design Phases should be completed no later than June 2023.

SUBMITTAL MATERIALS:

Qualified firms interested in being considered for the above contract are invited to submit their qualifications in accordance with HRS §103D-304. The SOQ shall include the following:

1. Letter of Interest
2. Information on the firm/consultant/JV:
 - a. Name of the firm/JV name, principal place of business, location of all its offices
 - b. The age of firm/JV and its average number of employees over the past ten years;
3. Project Team Composition (Do not include sub-consultants):
 - a. Key Team Members education, training, title, project role and responsibilities, office locale, experience, and qualifications.
 - b. Proposed staff commitment.
 - c. Client references –up to ten (10) who may be contacted, including at least five (5) for whom services were rendered within the past two (2) years.
 - d. Any promotional or descriptive literature which the firm desires to submit.
 - e. In accordance with HAR §3-122-63. (b), the Statements of Qualifications and related information submitted by the Offerors (Submittal Materials), except those portions designated “**confidential**,” will be open to public inspection upon posting of this Contract. Offerors shall designate in writing those portions of their Submittal Materials that contain trade secrets, proprietary, confidential commercial and financial information, or information that are confidential due to privacy interests that are to remain confidential, subject to HAR §3-122-58.
 - f. Material submitted are limited to text and photos only.

The specific proprietary information, trade secrets, confidential commercial and financial information with privacy interest, must be clearly identified as such. Material designated as confidential must be **readily separable** from the Submittal Materials to facilitate inspection of the non-confidential portion of the Submittal Materials. Designation of the entire Submittal Materials as confidential will not be acceptable.

EVALUATION CRITERIA:

Submittal materials will be evaluated on the following criteria, in descending order of importance, as required by HRS Section 103D-304:

1. Experience and professional qualifications relevant to all lift storage stations and gravity sewer design stated above;
2. Past performance on projects with similar scope for public agencies or private industry, including timely completion, project completed with minimal designer effected change orders, effective design (constructible, operable, maintainable), post construction optimization, corrective actions and other responses to notices of deficiencies; and
3. Capacity to accomplish the work on time.

Pursuant to HRS Section 103D-304(h), the City will negotiate with the first ranked consultant. If a satisfactory contract cannot be negotiated with the first ranked consultant, negotiations with that consultant shall be formally terminated and negotiations with the second ranked consultant on the list shall commence, and so forth.

DEADLINE:

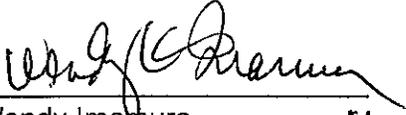
1. An original, five (5) hard copies, and one (1) compact disk (CD) containing Portable Document Format (PDF) files of the submittal materials packet shall be submitted no later than June 15, 2018 at 2:00 P.M. Hawaii Standard Time to:

City & County of Honolulu
Department of Budget and Fiscal Services
Division of Purchasing
530 South King Street, Room 115
Honolulu, Hawaii 96813

Attention: Professional Services Advertisement No. RFQL-ENV-1800006

2. NO FACSIMILE SUBMITTALS WILL BE CONSIDERED.
3. Materials submitted for only parts of the project may not be considered.

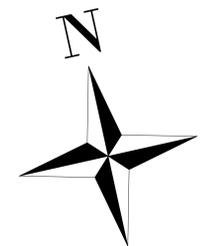
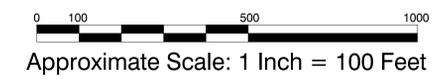
Further inquiries regarding the service required shall be directed in writing to the Purchasing Division at email address bfspurchasing@honolulu.gov. Questions in regards to this request for Statements of Qualification shall not be accepted after May 21, 2018.


Wendy Imamura
Purchasing Administrator
City and County of Honolulu

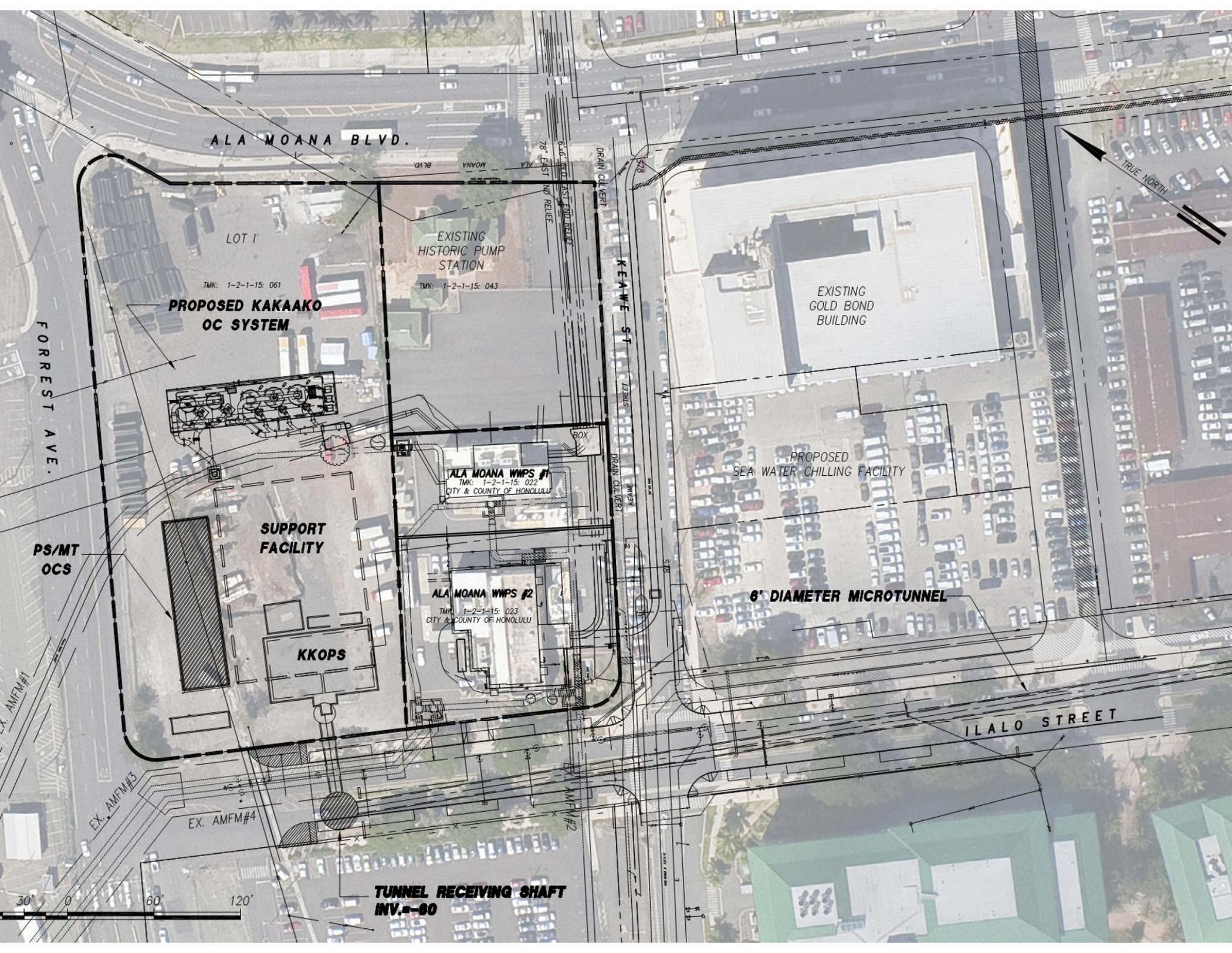
Attachment 1



CONCEPTUAL 10 FT. DIAMETER TRUNK SEWER ALIGNMENT
LOCATION MAP
ALA MOANA - KAKAAGO TRUNK SEWER PROJECT



Attachment 2



ALA MOANA BLVD.

LOT 1

TMK: 1-2-1-15: 061

**PROPOSED KAKAAKO
OC SYSTEM**

EXISTING
HISTORIC PUMP
STATION

TMK: 1-2-1-15: 043

EXISTING
GOLD BOND
BUILDING

PROPOSED
SEA WATER CHILLING FACILITY

**SUPPORT
FACILITY**

ALA MOANA WFPS #1
TMK: 1-2-1-15: 022
CITY & COUNTY OF HONOLULU

ALA MOANA WFPS #2
TMK: 1-2-1-15: 023
CITY & COUNTY OF HONOLULU

KKOPS

6" DIAMETER MICROTUNNEL

FOREST AVE.

KEAWE ST

ILALO STREET

TRUE NORTH

30' 0 60' 120'

**TUNNEL RECEIVING SHAFT
INV. = -80**

Attachment 3

Ala Moana
WWPS

B-20

Forrest Ave.

B-16

University of Hawaii
School of Medicine

B-17

B-18

Kewalo
Basin

Honolulu Harbor

Existing FMs

Keawe St.

Auahi St.

Coral St.

Cooke St.

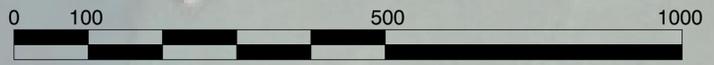
Ala Moana Blvd.

Ward Avenue

Koula St.

Ohe St.

Ahui Street



Approximate Scale: 1 Inch = 100 Feet

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-20

Sheet 1 of 7

LOCATION: FORREST AVE, OAHU, HAWAII

DATE(S) DRILLED: 9-13-10 to 9-15-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
0							8" Asphalt Concrete Pavement						
							FILL Brown silty gravel (GM), moist						
							Tan coralline fine sand (SP), very loose, wet						
5		1	2	100			LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						
							Gray clayey coralline gravel with sand (GC), very loose, wet						Gray water return
10		2	2	100			LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						No recovery Gray water return
							LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						No recovery Gray water return
							LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						No recovery Gray water return
15		3	3	11			contains coralline gravel						No recovery Gray water return
							LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						No recovery Gray water return
20		4	8	33			contains coralline gravel						No recovery Gray water return
							LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						No recovery Gray water return
							LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						No recovery Gray water return
25							LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						Grayish tan water return
							LAGOONAL DEPOSIT Gray lean clay with trace fine sand (CL), very soft to soft, wet						Grayish tan water return
							CORAL REEF LIMESTONE Off white to gray coral reef limestone, strongly cemented, hard, closely fractured, wet						Coral limestone at tip of sampler
							CORAL REEF LIMESTONE Off white to gray coral reef limestone, strongly cemented, hard, closely fractured, wet						Grayish tan water return
30							CORAL REEF LIMESTONE Off white to gray coral reef limestone, strongly cemented, hard, closely fractured, wet						Grayish tan water return

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-20

Sheet 2 of 7

LOCATION: FORREST AVE, OAHU, HAWAII

DATE(S) DRILLED: 9-13-10 to 9-15-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
30													
		PQ-5		100	95		contains fissures and some voids						Grayish tan water return
35													
		PQ-6		100	92		contains more voids infilled with a tan silty sand						Tan water return
40													
		PQ-7		97	58		becomes moderately hard to hard, crushed to moderately fractured with voids infilled with a tan silty sand and gravel layers						Tan water return
45													
		PQ-8		100	35		becomes brown weakly to strongly cemented coral reef limestone, moderate hardness, crushed to closely fractured with coarse coralline silty sand and gravel zones with shell fragments						
50													
		PQ-9		40			contains zones of weakly cemented gravel						
55													
		PQ 10		35			CORALLINE DETRITUS Off white weakly cemented silty coralline gravel and sand (GM), wet contains coral gravel fragments and coarse coralline sand						
60													

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-20

Sheet 3 of 7

LOCATION: FORREST AVE, OAHU, HAWAII

DATE(S) DRILLED: 9-13-10 to 9-15-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS	
60		5	25	78			Off white silty coralline gravel (GM), loose, wet							
		6	7	94			grades with fine to coarse sand	38.6						
	PQ 11			0										No recovery
65		7	11	22			becomes white, very loose to loose							
		8	6	78			Off white silty sand to sandy silt with gravel (SM-ML), loose to medium stiff, wet	32.7						Gravel = 21% Sand = 29% Fines = 50%
	PQ 12			100	29		contains off white coralline reef cobble and gravel fragments							Tan water return
							contains off white and gray coral cobble and gravel fragments							Tan water return
	PQ 13			20										
75		9	31	67			Tan silty sand with gravel (SM), medium dense, wet							Gs = 2.676
		10	10	89			grades with more silt, loose to medium dense	26.8						Tan water return No recovery
	PQ 14			0										
80		11	25	17			becomes off white to white, loose	37.3						Gravel = 25% Sand = 46% Fines = 29%
		12	5	100				30.8						
	PQ 15			50			becomes light brown to white							
85		13	26	100		grades to loose to medium dense	21.9	81.5					TXUU	
		14	20/5"	90		grades to very dense	21.0						Sampler refusal Gs = 2.726	
	PQ 16			100	77									
						CORAL REEF LIMESTONE Light brown to tan coral reef limestone, strongly cemented, closely to moderately fractured				361				
90						Off white to brown coral reef limestone, strongly								

90% Draft Submittal

Date Printed: 1/31/2011

FIGURE A-18

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-20

Sheet 4 of 7

LOCATION: FORREST AVE, OAHU, HAWAII

DATE(S) DRILLED: 9-13-10 to 9-15-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
92.5							cemented, hard, closely fractured, contains trace basalt gravel						
95	PQ	17		100	97		BASALT LAVA FLOWS Gray slightly vesicular basalt, slightly weathered, very hard, moderately fractured with brown weathering at joints			844			Light gray water return
97.5							grades to slightly vesicular, closely to moderately fractured			13680			
100	PQ	18		100	80		grades to slightly vesicular, closely to moderately fractured						
102.5							contains olivine weathering in fractures						Light gray water return
105	PQ	19		88	28		contains olivine weathering in fractures						
107.5							grades to brownish gray						
110	PQ	20		80	25		grades to brownish gray						Gray water return
112.5							CORAL REEF SANDSTONE Tan cemented coralline sandstone cobble and gravel, low hardness, closely fractured, wet						Tan water return
115	PQ	21		55	37		CORAL REEF LIMESTONE White, moderately cemented coral limestone, moderately hard to hard, closely fractured, contains voids and fissures						
117.5							grades with zones of crushed to closely fractured coral limestone						Light brown water return
120	PQ	22		100	32		grades with zones of crushed to closely fractured coral limestone						

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-20

Sheet 5 of 7

LOCATION: FORREST AVE, OAHU, HAWAII

DATE(S) DRILLED: 9-13-10 to 9-15-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
125		PQ 23		60	17								Light brown water return
130		PQ 24		100	58		grades to closely to moderately fractured						No water return
135		PQ 25		50	30								No water return
140		PQ 26		70			INTERBEDDED ALLUVIUM AND CORALLINE DEPOSIT Tan to light brown silt with subangular to subrounded coralline gravel and coralline reef limestone fragments (ML), wet						Tan water return Basalt cobble at tip of core barrel
145		PQ 27		83			OLDER ALLUVIUM / WEATHERED TUFF Brown fused volcanoclastic sediments, primarily fused brown tuff and sand, rock-like Brown elastic silt with subrounded gravel (MH), hard, wet						PP = 4.5+ tsf Light brown water return
150		PQ 28		93									Light brown water return

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-20

Sheet 6 of 7

LOCATION: FORREST AVE, OAHU, HAWAII

DATE(S) DRILLED: 9-13-10 to 9-15-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
155	PQ	29		58			Brown volcaniclastic sediment, primarily fused brown tuff and sand, rock-like	52.0			73.4	28.9	24" slipped out of barrel at surface PP = 4.5+ tsf
160	PQ	30		0									No recovery
160		15											No recovery
165	PQ	31		73									PP = 4.5+ tsf Light brown water return
170	PQ	32		100									Light brown water return
175	PQ	33		77			contains subrounded basalt gravel						Light brown water return
180	PQ	34		23			Brownish gray rounded to subrounded poorly graded basalt cobbles and gravel (GP)						Brown water return
							Brown with reddish brown fine coarse sandy silt						

90% Draft Submittal

Date Printed: 1/31/2011

FIGURE A-18

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-20

Sheet 7 of 7

LOCATION: FORREST AVE, OAHU, HAWAII

DATE(S) DRILLED: 9-13-10 to 9-15-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
185		16	30/3"	4			(MH), hard, wet						
		PQ 35		35			contains zones of cemented shell fragments						Brown water return
190		PQ 36		100			Brown volcanoclastic sediments primarily fused brown tuff and sand (rock-like) with basalt cobbles						Brown water return
195		PQ 37		77			grades to gray						Brown water return
		PQ 38		100			grades to light gray to brown						PP = 4.5+ tsf
200							becomes tan, fused, moderately hard						Light brown water return
							Boring completed at 200.5 feet below existing ground surface on 9/15/2010						
							Summary of Groundwater Levels						
							Date Depth Below Ground						
							9/13/10 5.25'						
							9/15/10 3.5'						
205													
210													

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-16

Sheet 1 of 7

LOCATION: UH MEDICAL SCHOOL PARKING LOT C, OAHU, HAWAII

DATE(S) DRILLED: 9-22-10 to 9-27-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
0							5" Asphalt Concrete Pavement						Auger grinding 0' to 5' bgs
							FILL Tannish brown silty gravel with sand (GM), moist						
5		1	36	100			Brownish tan silty coralline gravel with sand and trace shells (GM), medium dense, moist						
10		2	4	56			LAGOONAL DEPOSITS Gray silty fine sand (SM), very loose to loose, wet						No recovery
	PQ-1			0									Light gray water return
15		3	16	50			Light gray silty subangular coralline gravel with trace sand (GM), loose, wet						No recovery
	PQ-2			0									
20		4	1	88			Gray silt with fine sand with trace coral gravel and shells (ML), very soft, wet						Light gray water return
	PQ-3			0									No recovery
25		5	6	83			becomes tannish gray, grades with more sand and coarse subangular coral gravel, soft to medium stiff						Light gray water return
	PQ-4			0									No recovery
30		6	2	89			grades with less sand, trace shells, very soft to soft						

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-16

Sheet 2 of 7

LOCATION: UH MEDICAL SCHOOL PARKING LOT C, OAHU, HAWAII

DATE(S) DRILLED: 9-22-10 to 9-27-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
30	PQ-5			0									No recovery Off white to gray water return
		7	8	83			becomes darker gray, medium stiff						Off white to gray water return No recovery
35	PQ-6			0									
		8	2	100			grades with more fine sand, very soft to soft						
40	PQ-7			0									No recovery
		9	3	100			grades with less sand						
45	PQ-8			0									Light gray water return No recovery
		10	7	100			becomes grayish brown with more fine sand						
50	PQ-9			0			VOLCANIC CINDER DEPOSIT Dark gray silty cinder sand (SM), loose, wet						No recovery
		11	75/1"	100			Black silty basalt coarse sand with subrounded gravel (SM), very dense, wet becomes moderately cemented, moderately hard						Gray water return
55	PQ 10			57	28								Brownish gray water return
							CORALLINE REEF DEPOSIT Off white coral reef cobbles and gravel, moderately to strongly cemented, contains fissures and zones of gravel with trace silt						Gray water return
60	PQ 11			33	25		contains less zones of coral reef gravel						

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-16

Sheet 3 of 7

LOCATION: UH MEDICAL SCHOOL PARKING LOT C, OAHU, HAWAII

DATE(S) DRILLED: 9-22-10 to 9-27-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
60													
		12	92	100			BEACH DEPOSIT Tan silty coralline sand with subrounded coralline gravel (SM), dense, wet grades with less gravel, more medium grained sand, trace shells, medium dense to dense						
		13	30	83									
	PQ	12		50			Tan cemented coralline sandstone cobbles, moderately cemented, moderately hard						Gray water return Drilling lubricant present on sample
		14	122	83			becomes very dense, less cemented						
		15	28	89			becomes medium dense	19.5					Gravel = 5% Sand = 85% Fines = 10% Gray water return No recovery
	PQ	13		0									
		16	24/3"	33			Brownish gray sandy silt with gravel, very dense						Sampler refusal Rods drop 24" from 73.3' to 75.5'
75													
		17	1/12"	61			CORALLINE DETRITUS Yellowish tan silty coralline gravel with sand (GM), very loose, wet	40.9					Gs = 2.84
	PQ	14		0									No water return No recovery Sampler refusal
		18	100/4"	100			Brownish gray silty coralline gravel with sand (GM), very dense, wet						
		19	50/3"	44			contains coralline gravel and cobbles, moderately hard						No water return
	PQ	15		57									No water return
80													
		20	35	72			Off white subangular coralline gravel with silty sand (GM), medium dense, wet grades with coarser gravel, loose	26.1	80.5				
		21	8	44			contains off white coral gravel and cobbles						
	PQ	16		23									
85													
		22	10	56			White to tan silty subangular coralline gravel with coarse to medium grained sand (GM), very loose, wet						No water return
		23	4	39			becomes very loose to loose						
90													

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-16

Sheet 4 of 7

LOCATION: UH MEDICAL SCHOOL PARKING LOT C, OAHU, HAWAII

DATE(S) DRILLED: 9-22-10 to 9-27-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
95	PQ	17	22	67			contains gravel sized coral reef limestone fragments						No water return
		24	13	56			Off white silty subangular coralline gravel with coarse to medium grained sand (GM), loose, wet						
		25	6	50			becomes medium dense						
100	PQ	18	14	56			becomes loose	22.0					No recovery
		26	36	67			becomes loose						
		27	18	50			contains gravel sized coral fragments						Gs = 2.80
	PQ	19	36	67			contains gravel sized coral fragments						No water return
105		28	18	50			Off white silty sand with coralline gravel (SM), medium dense, wet	21.0					Gravel = 19% Sand = 57% Fines = 24%
		29	34	61			contains gravel sized coral fragments						No water return
	PQ	20	30	44			contains gravel sized coral fragments						No water return
		30	34	61			Tan silty coralline gravel with sand (GM), medium dense, wet	21.5	70.9				TXUU
110		31	30	44			contains gravel and cobble sized coral fragments						No water return
	PQ	21	14	56			contains gravel and cobble sized coral reef limestone fragments						No water return
115		32	30/3"	100			becomes very dense	19.9	74.3				TXUU
		33	30/3"	100			becomes very dense						Sampler refusal
120	PQ	23	0	0			becomes very dense						No recovery

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-16

Sheet 5 of 7

LOCATION: UH MEDICAL SCHOOL PARKING LOT C, OAHU, HAWAII

DATE(S) DRILLED: 9-22-10 to 9-27-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
125		33	44	67			becomes medium dense						
		PQ 24		38			contains gravel to cobble sized coral fragments						No water return
130		PQ 25		33			contains more cobble sized coral reef limestone fragments						No water return
135		PQ 26		40			contains gravel sized coral fragments and basalt gravel						No water return
							BASALT LAVA FLOWS Gray basalt, slightly weathered, hard, moderately fractured						
140		PQ 27		60	33		becomes slightly vesicular basalt, slightly weathered, hard, closely to intensely fractured						
145		PQ 28		33	13		Gray basalt with brown weathering, moderately hard, intensely fractured grades to brown highly weathered, moderately hard basalt cobbles						
							contains gravel sized brown highly weathered basalt						
150		PQ 29		40									

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-16

Sheet 6 of 7

LOCATION: UH MEDICAL SCHOOL PARKING LOT C, OAHU, HAWAII

DATE(S) DRILLED: 9-22-10 to 9-27-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
155	PQ	30	40	17			Gray basalt, highly to moderately weathered, moderately hard to hard, intensely fractured to crushed, brown stains in joints						
160	PQ	31	22				CORALLINE DETRITUS Off white coralline cobble, strongly cemented, moderately hard contains gravel sized coral gravel fragments						
165		34	19	100			MARINE DEPOSIT Orangish brown silt with trace fine to medium grained sand (ML), wet becomes stiff						PP = 1.67 tsf
165	PQ	32	26				CORALLINE DETRITUS Off white poorly graded coralline gravel (GP), wet						
170		35	10	6			becomes very loose						Per driller, sample slipping out at core barrel, unable to sample No recovery
170	PQ	33	0										No recovery
175	PQ	34	0										No recovery
175		36	15/3"	0			becomes very dense						No recovery
180		37	21	100			OLDER ALLUVIUM Brown with specks of orangish brown elastic silt (MH), very stiff, wet						

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-16

Sheet 7 of 7

LOCATION: UH MEDICAL SCHOOL PARKING LOT C, OAHU, HAWAII

DATE(S) DRILLED: 9-22-10 to 9-27-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
180	PQ	35		97			Brown elastic silt with subrounded basalt gravel (MH), wet						No water return
185	PQ	36		50			Brownish gray silty basalt gravel						No water return
190	PQ	37		30			CORALLINE DETRITUS Off white to tan well graded coralline gravel						No water return
195	PQ	38		37			grades with cobble sized coralline debris						No water return
200	PQ	39		73									No water return
200							Boring completed at 200.0 feet below existing ground surface on 9/27/2010 Summary of Groundwater Levels Date Depth Below Ground 9/22/10 6.75' 9/23/10 5.5' 9/24/10 4.5' 9/27/10 7.0'						

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-17

Sheet 1 of 6

LOCATION: KAKAAKO WATERFRONT PARK, OAHU, HAWAII

DATE(S) DRILLED: 9-9-10 to 9-21-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
0							2" Asphalt Concrete Pavement						Auger grinding 0' to 5'
							FILL Brown silty coralline gravel (GM), moist						
5		1	43	72			Brown elastic silt with sand and coral and basalt gravel (MH), hard, moist						PP = 2.75 tsf
10		2	53	100			Black silty angular basalt gravel with sand and trace shells (GM), medium dense, wet						Dark gray water return
15		3	2	11			Off white silty coralline gravel with sand (GM), very loose, wet						
		4	19	39			becomes tan, grades with more sand, medium dense						Off white water return
20		PQ-1		33			Off white, gray, and black coralline and basalt with gravel with trace glass fragments						
		5	14/3"	0			CORALLINE DEPOSIT Off white to gray moderately cemented coral reef limestone cobbles and gravel, contains fissures and voids, moderately hard, wet						Sampler refusal No recovery
25		PQ-2		32	12		grades with silty coralline gravel with sand and shell fragments (GM), medium dense, wet	27.4					
30							CORAL REEF LIMESTONE Off white to gray coral reef limestone, hard,						No water return

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-17

Sheet 2 of 6

LOCATION: KAKAAKO WATERFRONT PARK, OAHU, HAWAII

DATE(S) DRILLED: 9-9-10 to 9-21-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
30		PQ-3		100	83		intensely to closely fractured, medium porosity						No water return
35		PQ-4		63	42		becomes more off white, moderately hard to hard contains voids and fissures contains gravel sized fragments contains cobble and gravel sized coral fragments						No water return
40		PQ-5		18			CORALLINE DETRITUS Off white silty coralline gravel with sand (GM), weakly cemented, medium dense, wet						No water return
45		7	22	50				27.5					No water return
		PQ-6		0									No recovery
50		8	5	22			becomes tan to grayish, very loose						No water return
		PQ-7		21			contains off white to light gray finger coral and coral gravel						No water return
55		9	4	72			LAGOONAL DEPOSITS Gray silty coral gravel (GM), loose to very loose, wet	64.3					No water return
		PQ-8		24			contains coral gravel fragments and finger coral						No water return
		10	10	50			grades with more clay and trace sand, very loose	47.8	76.3				TXUU
60		11	52	83			Grayish tan clayey sand with coral gravel, very	59.8					

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-17

Sheet 3 of 6

LOCATION: KAKAAKO WATERFRONT PARK, OAHU, HAWAII

DATE(S) DRILLED: 9-9-10 to 9-21-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
60							dense, wet						No water return
	PQ-9			96	50		CORAL REEF LIMESTONE Off white to reddish tan coral reef limestone, hard, closely fractured						No water return
65	PQ 10		100		43		grades to crushed to closely fractured			982			No water return
							contains boulder, cobble and gravel sized coral reef fragments, moderately hard contains fissures and some large voids						No water return
70	PQ 11			43	18		CORALLINE DEPOSIT Off white silty coralline gravel with sand (GM), loose, wet						Gravel = 51% Sand = 27% Fines = 22%
	12	16	50				grades with more fine gravel and silt	10.8	72.8				No water return No recovery
75	13	9	50					13.2					No water return No recovery
	PQ 12			0									No water return No recovery
	14	32	39				Off white well graded sand with silt and gravel (SW-SM), medium dense, wet	16.9	101.3				Gravel = 39% Sand = 56% Fines = 5% Gs = 2.720
80	15	9	67				becomes loose	16.6					No water return
	PQ 13			25			contains off white coralline gravel fragments						No water return
	16	14	28				Off white coralline gravel with sand and trace silt (GW), loose, wet	15.0					Gravel = 81% Sand = 18% Fines = 1%
85	17	4	33				becomes very loose to loose						No water return
	PQ 14			25			contains gravel sized coral fragments						No water return
	18	17	44				becomes loose	18.0	70.9				TXUU
90	19	13	50				becomes medium dense	21.4					

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-17

Sheet 4 of 6

LOCATION: KAKAAKO WATERFRONT PARK, OAHU, HAWAII

DATE(S) DRILLED: 9-9-10 to 9-21-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
		PQ 15		29									No water return
		20	86	83			Off white silty coralline gravel with sand (GM), dense, wet	19.9	80.3				Gs = 2.717
95		21	26	72			becomes medium dense	20.4					No water return
		PQ 16		0									No recovery
		22	20	100			grades with more gravel, loose						No water return
100		23	11	56			becomes medium dense	21.3					No water return
		PQ 17		0									No recovery
		24	3	33			becomes very loose	24.7					No water return
105		25	4	44			grades with more silt and sand, pocket of yellowish tan, very loose to loose						No water return
		PQ 18		0									No recovery
		26	12	89			grades with more sand and cemented sand cobbles, loose	21.2					No water return
110		PQ 19		0									No recovery
		27	22	83			contains cemented coralline gravel and cobble fragments						No water return
115		PQ 20		10									No water return
		28	30	50			becomes medium dense						No water return
120													No water return

90% Draft Submittal

Date Printed: 1/31/2011

FIGURE A-15

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-17

Sheet 5 of 6

LOCATION: KAKAAKO WATERFRONT PARK, OAHU, HAWAII

DATE(S) DRILLED: 9-9-10 to 9-21-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
0	PQ	21		0									No recovery
29			35	50			becomes brownish tan with less silt						
125	PQ	22		0									No recovery
30			63	100			becomes off white with more silt						No water return
130	PQ	23		0									No recovery
31			49	78			grades with less sand, more coral gravel and cobble fragments						No water return
31							grades off white to tan						No water return
135	PQ	24		36									
32			50/3"	100			BASALT LAVA FLOWS Gray to yellowish brown basalt, slightly weathered, moderately hard, closely fractured						Sampler refusal No water return
140	PQ	25		95	58		grades moderately to closely fractured with vertical fissures			11708			No water return
140							contains cobble sized basalt with weathering in joints						No water return
145	PQ	26		25	0								
150			29	61			CORALLINE DEPOSIT Off white silty coralline gravel with sand and weakly to moderately cemented coralline cobbles (GM), medium dense, wet						No water return

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-17

Sheet 6 of 6

LOCATION: KAKAAKO WATERFRONT PARK, OAHU, HAWAII

DATE(S) DRILLED: 9-9-10 to 9-21-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: SEE END OF LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
155	PQ	27		21			contains off white coral cobble and gravel fragments with large voids						
155		34	90/6"	100			becomes very dense						Sampler refusal
160	PQ	28		42			contains moderately to strongly cemented coralline cobble and gravel fragments						No water return
160		35	21	83			becomes medium dense						No water return
165	PQ	29		45			grades with more strongly cemented coralline cobbles						No water return
165		36	40	72			grades with more sand, dense						No water return
170	PQ	30		19									Sampler refusal No recovery
170	PQ	31	20/3"	0	41		CORAL REEF LIMESTONE Off white coral reef limestone, moderately hard to hard, closely to moderately fractured, low porosity						No water return
170							Boring completed at 170.0 feet below existing ground surface on 9/21/2010						
175							Summary of Groundwater Levels Date Depth Below Ground 9/09/10 9.2' 9/10/10 8.0' 9/20/10 7.3' 9/21/10 8.3'						

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-18

Sheet 1 of 6

LOCATION: AHUI STREET, OAHU, HAWAII

DATE(S) DRILLED: 10-25-10 to 10-26-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: 10-25-10 / 5.4 FT BGS

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
0							6" Asphalt Concrete Pavement						
							24" Base Course Gray silty basalt gravel (GM), moist						
							FILL / LAGOONAL DEPOSIT Gray fat clay with trace sand (CH), moist						
5	1	6	100				becomes soft to medium stiff						Silty coralline gravel in sampler shoe
							Gray and tan coralline gravel with silt and sand (GM), wet						
10	2	11	67				becomes stiff						
	PQ-1		100		42		CORAL REEF LIMESTONE Off white and gray coral reef limestone, strongly cemented, hard, closely to intensely fractured, with voids and open work gravel layers, wet						
15							contains cobble and gravel sized coral limestone fragments						Gray water return
	PQ-2		72		33								No water return at 18' bgs
20							becomes dark gray, hard, closely fractured, with more voids infilled with a cemented gray silty sand						No water return
	PQ-3		65		55								
25							grades with more cemented silty sand						No water return
	PQ-4		100		50								
30							becomes less cemented with more gray silt						

90% Draft Submittal

Date Printed: 1/31/2011

FIGURE A-16

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-18

Sheet 2 of 6

LOCATION: AHUI STREET, OAHU, HAWAII

DATE(S) DRILLED: 10-25-10 to 10-26-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: 10-25-10 / 5.4 FT BGS

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
30							contains gray gravel sized coral fragments and gray cemented sandstone with trace shells, wet						No water return
		PQ-5		43	0								
35			66	17			Gray cemented sandstone (GW), medium dense, wet						No water return
		PQ-6		71	36		Tan coral reef limestone, moderately hard, closely to intensely fractured, with a zone of coralline gravel, wet						
40							grades hard to low hardness, moderately to closely fractured						No water return
		PQ-7		100	92								
45							contains voids, fissures and trace shell fragments						No water return
		PQ-8		100	68								
50							becomes crushed						
		PQ-9		0			CORALLINE DEPOSIT White to off white silty fine coralline gravel with sand (GM), wet						No water return No recovery
55			14	89			becomes medium dense						
		PQ 10		60			contains cobble and gravel sized coral fragments with sand, voids and shell fragments						
60													

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-18

Sheet 3 of 6

LOCATION: AHUI STREET, OAHU, HAWAII

DATE(S) DRILLED: 10-25-10 to 10-26-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: 10-25-10 / 5.4 FT BGS

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
60		5	34	100			White silty coralline gravel with sand, medium dense, wet	27.7	94.8				
		6	4	100			White to off white silty coralline sand with gravel (SM), very loose to loose, wet	27.6					
	PQ	11		21			contains cobble and gravel sized coral fragments with some voids						
65		7	19	67			becomes loose						Sample disturbed
		8	10	100			becomes loose to medium dense	27.5					
	PQ	12		83			contains cobble and gravel sized coral fragments, grades with large voids						
		9	23	100			becomes loose	30.0	92.7				Gravel = 12% Sand = 56% Fines = 32% Gs = 2.79
		10	8	100				28.0					
	PQ	13		0			CORALLINE DETRITUS Grayish tan moderately cemented sandstone gravel (GW), wet						No recovery
75		11	34	100			becomes medium dense						
		12	12	94			becomes grayish tan silty coralline gravel with sand with less cemented sandstone	35.8					
	PQ	14		100			contains gravel sized coral fragments						MOHS = 3 - 5
80		13	137	100			grades with more cemented sandstone, very dense	12.6	99.4				
		14	13	78			Tan silty sand with coralline gravel (SM), medium dense, wet	19.3					Gravel = 27% Sand = 56% Fines = 17%
	PQ	15		63			contains off white coralline sand and gravel sized coral fragments						
85		15	18	56			Tan well graded gravel with silty sand (GW), loose, wet	11.5	86.9				Gravel = 61% Sand = 34% Fines = 5% TXUU
		16	26	61			becomes medium dense	21.3					Gs = 2.80
90	PQ	16		100									

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-18

Sheet 4 of 6

LOCATION: AHUI STREET, OAHU, HAWAII

DATE(S) DRILLED: 10-25-10 to 10-26-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: 10-25-10 / 5.4 FT BGS

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
92.5		17	172	100			Tan well graded coralline gravel with sand (GW), very dense, wet						
95.0		PQ 17		100	88		CORAL REEF LIMESTONE White to tan coral reef limestone with voids, hard, moderately fractured, wet						
97.5							contains more voids and fissures						
100.0		PQ 18		100	70					181			MOHS = 4
102.5							becomes closely to intensely fractured						End drilling 1445 10/25/10 Begin drilling 0850 10/26/10
105.0		PQ 19		93	48					366			No water return
107.5							becomes stained reddish brown						
110.0		PQ 20		100	73		BASALT LAVA FLOWS Dark gray vesicular basalt, slightly weathered, hard, closely fractured, contains a seam of brown silt, wet						No water return
112.5							becomes moderately to closely fractured						
115.0		PQ 21		100	100					9596			No water return
117.5													
120.0		PQ 22		100	75		Brown to tan cemented sandstone, moderately hard, closely to intensely fractured, wet						No water return
122.5							becomes cemented sandstone, low hardness, moderately to closely fractured						

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-18

Sheet 5 of 6

LOCATION: AHUI STREET, OAHU, HAWAII

DATE(S) DRILLED: 10-25-10 to 10-26-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: 10-25-10 / 5.4 FT BGS

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
							Gray extremely to highly weathered basalt, low hardness, intensely fractured, wet						No water return
		PQ 23		88	83		CORAL REEF LIMESTONE Off white coral reef limestone, moderately hard to hard, closely fractured						No water return
125							White coral, hard, closely to intensely fractured, wet						No water return
		PQ 24		37	27		CORALLINE DETRITUS White silty well graded coralline gravel with sand (GM), wet						No water return
130			18	15	56		becomes medium dense contains gravel sized subrounded coral fragments						No water return
		PQ 25		57									No water return
135													No water return
		PQ 26		22									No water return
140													Sample disturbed
		PQ 19	95	100			White well graded coralline gravel with sand (GW), dense, wet						No water return
		PQ 27		64			contains gravel and cobble sized coral fragments						No water return
145													No water return
		PQ 28		90									No water return
150													No water return

SAND ISLAND WASTEWATER TREATMENT PLANT & SEWER BASIN FACILITIES

LOG OF BORING B-18

Sheet 6 of 6

LOCATION: AHUI STREET, OAHU, HAWAII

DATE(S) DRILLED: 10-25-10 to 10-26-10

GROUND SURFACE ELEVATION: N/A

GROUNDWATER LEVEL / DATE: 10-25-10 / 5.4 FT BGS

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LBS / 30 IN

DRILLING METHOD: 4-INCH SSA, WASH BORE, PQ WIRELINE

DRILL EQUIP: MOBILE DRILL B-54

BOREHOLE BACKFILL: CEMENT GROUT

DEPTH (FT)	SAMPLE TYPE	SAMPLE NO.	SAMPLING RESISTANCE	RECOVERY, %	RQD, %	GRAPHIC LOG	DESCRIPTION	WATER CONTENT, %	DRY UNIT WEIGHT, pcf	UCS, psi	LIQUID LIMIT	PLASTICITY INDEX	OTHER TESTS AND REMARKS
155		PQ 29		100			INTERBEDDED CORAL REEF LIMESTONE AND CORALLINE DETRITUS White coral reef limestone, hard, closely to intensely fractured, with large voids and gravel layers						No water return
160		PQ 30		48			contains gravel and cobble sized coral fragments, wet						No water return
165		PQ 31		50			becomes gray and orangish brown						No water return
170		PQ 32	18	44			OLDER ALLUVIUM Brown mottled reddish brown elastic silt with trace sand (MH), very stiff, wet						PP = 1.3 tsf TV = 0.68 tsf
175		PQ 33		100	33		INTERBEDDED ALLUVIUM AND CORAL REEF LIMESTONE Brownish tan coral reef limestone interbedded with a brown elastic silt, low hardness, intensely fractured						PP = 2.7 tsf TV = 0.9 tsf
175							Boring completed at 174.0 feet below existing ground surface on 10/26/2010						