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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

HAR-ED
7858.05

March 29, 2005

TO: GENEVIEVE SALMONSON, DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

FROM: RODNEY K. HARAGA
DIRECTOR OF TRANSPORTATION

SUBJECT: FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR, KAUAI JOB H. C. 7275, TMK: 3-2-03 & 3-2-04, LIHUE, KAUAI, HAWAII

The Department of Transportation has reviewed the comments received during the 30-day public comment period which began on September 8, 2004. The agency has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish the notice of availability for this project in the next available OEQC Environmental Notice.

Enclosed are a completed OEQC Publication Form and four copies of the final EA. Please call Marshall H. Ando of the Harbors Division at 587-1961 or our consultant W. Y. Thompson at 488-0388 if you have any questions.

Encs.

2005-04-08 FONSI
SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR

APR - 8 2005

HARBORS DIVISION
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

FINAL
ENVIRONMENTAL ASSESSMENT
FOR THE

SEGMENTED PIER 3 IMPROVEMENTS
AT
NAWILIWILI HARBOR

JOB NO. H.C.7275

LIHUE, KAUAI, HI
TAX MAP PLAT: 3-2-03 & 3-2-04

PROJECT CONSULTANTS:
NISHIMURA KATAYAMA OKI AND ASSOCIATES
STRUCTURAL CONSULTING ENGINEERS
826 KAHEKA STREET, STE 302
HONOLULU, HI 96814

PREPARED BY:
ARNOLD OKUBO & ASSOCIATES, INC.
94-529 UKEE STREET, STE 107
WAIPIO GENTRY INDUSTRIAL PARK
WAIPAHU, OAHU, HI 96797

March 2005

HARBORS DIVISION
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

FINAL ENVIRONMENTAL ASSESSMENT FOR THE

SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR

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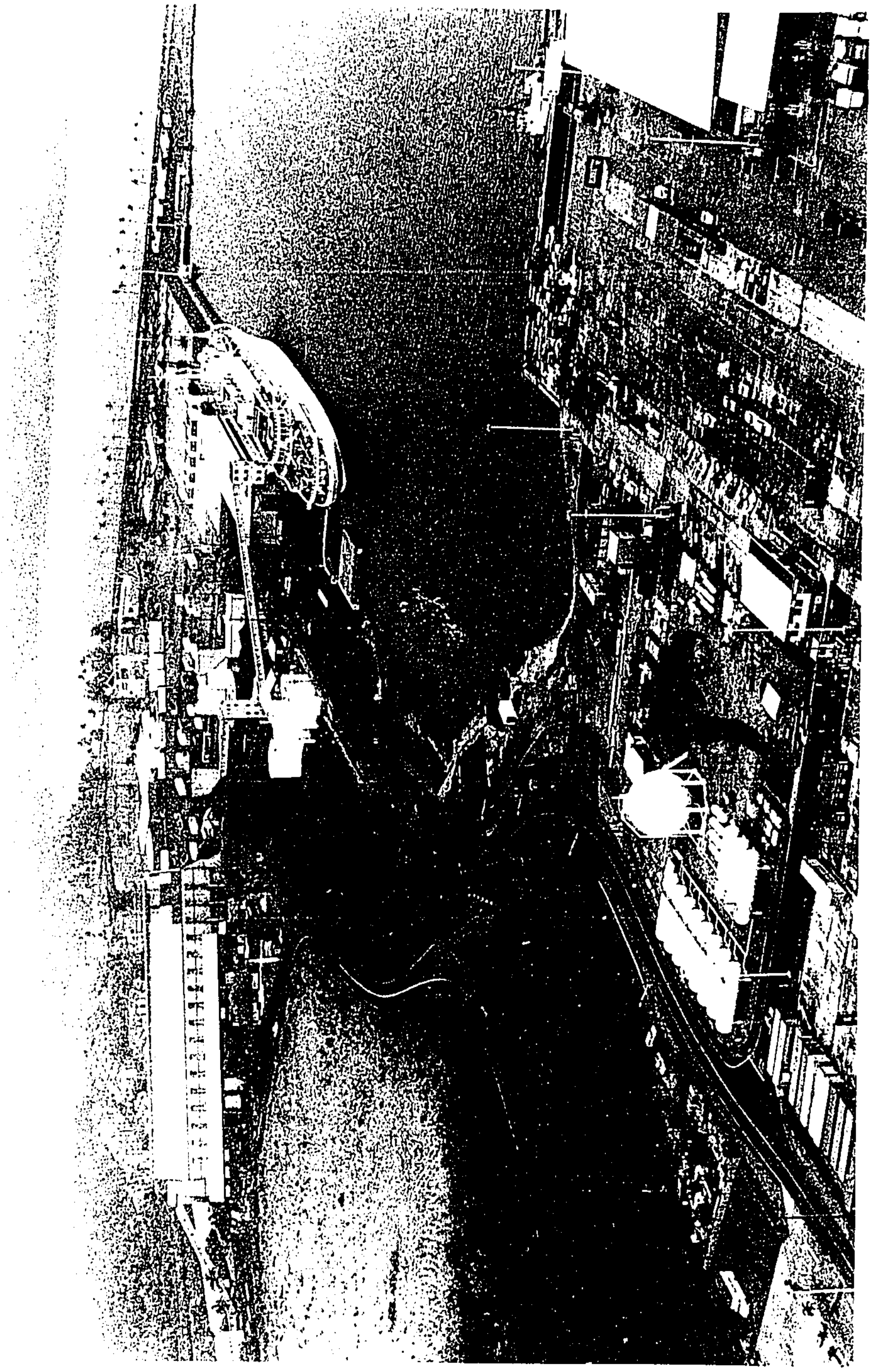
March 2005



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SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR
HARBORS DIVISION: JOB NO. HC 7275
Lihue, Kauai, HI

PROJECT SUMMARY:

The main purpose of this project is to provide docking for large cruise ships at Nawiliwili Harbor. The original plan was to accommodate two (AHCL) American Hawaii Cruise Lines' 840 feet long ships. This plan was to extend Pier 2 so these two ships could be docked in the harbor at the same time. During this time, AHCL suddenly ceased operations. The (NCL) Norwegian Cruise Lines then began regular cruise service to Nawiliwili Harbor. The ships used by the NCL are 965 feet long. To fit two 965 feet long ships along Pier 2 would be unfeasible. The next plan studied was to accommodate a second 965 feet long ship at Pier 3. Studies showed that this was not possible but an 856 feet long cruise ship could dock at the Pier 3 with improvements. The final plan is to build a pier segment to serve as a breasting dolphin and designed to be integrated as a part of Pier 3 in the future. Dredging will also be included in the project.

Pier 1 is primarily for inter-island cargo by Matson Navigation Company. As their cargo arrives every Saturday, Pier 1 can be used by a large cruise ship in conjunction with Pier 2 at other times. Pier 3 is primarily for inter-island cargo by Young Brothers Limited. Their cargo arrives every Tuesday and Friday. When two cruise ships are scheduled to arrive at Nawiliwili Harbor the same day, Pier 3 will be used to dock the shorter length ship when Pier 3 is not being used by Young Brothers Limited.

Minor ancillary improvements include improved lighting, new comfort station, revetment wall and walkway. The cost of the project is estimated to be slightly over $5 million. Project completion date is expected to be one year after award of contract.

SECTION 1

PROPOSING AGENCY AND APPROVING AUTHORITY

APPLICANT FOR THE PROJECT:

The applicant for the Nawiliwili Segmented Pier 3 Improvements project is:
State Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

The contact person for this agency is:
Marshall H. Ando, P.E.
Design Engineer
Harbors Division
79 S. Nimitz Highway
Honolulu, HI 96813

APPROVING AGENCY:

The approving agency is:
Department of Transportation
Rodney K. Haraga, P.E., Director
869 Punchbowl Street
Honolulu, HI 96813

SECTION 2

PARTIES CONSULTED OR CONTACTED

STATE:

Department of Land and Natural Resources (4 copies)
Department of Business, Economic Development and Tourism
Department of Health (3 copies)
Lihue Public Library

FEDERAL:

Fish & Wildlife Service
U.S. Corps of Engineers
National Marine Fisheries Service

SECTION 3

SUMMARY DESCRIPTION OF AFFECTED ENVIRONMENT

GENERAL DESCRIPTION:

Kauai is the northernmost island of the eight major islands that comprise the State of Hawaii. Its steeped in Hawaiian history and its claim to fame is that it was never conquered by Kamehameha I. Its ruler peacefully accepted the rule of Kamehameha I rather than risk war. Kauai is also the island in Hawaii where Captain Cook first laid anchor. He arrived at Waimea Bay which is on the southwestern part of the island. The area of the island is 552.3 square miles and relatively circular in shape with towering central mountain peaks. Structurally, the island can be considered to be a single large shield volcano. The highest peak is Mt. Kawaikini at an elevation of 5,243 feet. The neighboring peak, Mt. Waialeale is at 5,148 feet and is famous for its high recorded rainfall. Kauai is the oldest of the main Hawaiian Islands. Geologically speaking, its age is estimated to be between 2 to 4 million years. The County seat is at Lihue. As with the other islands, the prevailing east-northeast trade winds affect the physical features of the island and lifestyles of its people. With an abundant water supply captured by its central mountain peaks, it was a prime agricultural community at one time. With the demise of the sugar and pineapple plantations, the character of the island has changed and the major industry today is tourism.

Nawiliwili Harbor, the island's principal industrial port, is located in the district of Lihue and is on the outskirts of Lihue City. Kauai is about 75 miles northwest of Oahu and separated by the Kauai Channel. The air distance from Honolulu International Airport to nearby Lihue Airport is 103 miles. The development of Nawiliwili into a port was a slow process. The port at Nawiliwili first opened to shipping in July 1930 after Federal funds were made available for construction of a breakwater and dredging of a turning basin. The work was performed by the U.S.

Army Corps of Engineers. Improvements to the port have been made in ensuing years. History records that the Nawiliwili and Hilo Harbors, came under enemy submarine shelling a few days following the December 7, 1941, bombing of Pearl Harbor.

DRAWING NO. 1: GENERAL LOCATION PLAN shows Nawiliwili Harbor and its environs.

CLIMATE:

Kauai is known as the "Garden Island" because of its lush greenery arising from the heavy rainfall it receives. The central mountain peak, Mt. Waialeale, has an average annual rainfall of 460 inches and has recorded a maximum annual rainfall of 683 inches! To some meteorologists, it probably is the wettest spot on earth. Climatic measurements recorded at Lihue Airport which is a little over a mile away from Nawiliwili Harbor are:

Rainfall average: 43 inches per year.

Temperature average coolest month: 71.6° F

" " warmest " : 79.5° F

Kauai as a whole receives an annual average of 100 inches of rain, the highest of any island in the State.

The trade wind frequency in Hawaiian waters averages 65% or more annually. The trades prevail 90% of the time during June to August and less during the winter months of January to March- 40% to 60% of the time. The trades are from the east-northeast direction. Speeds are 5 to 20 knots faster in the channels than over the open ocean. At Lihue Airport, mean wind speeds are 10 knots; winds of 11 to 16 knots occur 41% of the time and winds of 7 to 10 knots occur 37% of the time.

FAUNA:

The project site is extensively paved and graveled and is devoid of trees and plants. As such, it is not a habitat for animal wildlife except for unwelcome rodents, common to wharf areas, and stray animals that may enter the property.

A number of native birds on Kauai, some classified as endangered or threatened, may be found near or fly over the project site. These are listed in **APPENDIX A: BIOTA SURVEY.** Introduced birds are common to the low level community areas where food is easy to find. The absence of mongoose on Kauai has benefitted the avifauna population.

Two protected mammal species may be seen in this or nearby areas. The rare Hawaiian Bat occasionally flies over the project area in search of food. The protected Hawaiian Monk Seal has been seen in various coastal areas of the Hawaiian Islands in recent years. It may enter the Nawiliwili Bay area by chance. Since it, too, is a protected species, it may not be disturbed. But the busy Nawiliwili Harbor with its industrial activities does not lend itself as a habitat for these two mammals.

The green sea turtle, *honu* in Hawaiian, is another protected species that is sometimes found in waters and beaches of Kauai. The busy Nawiliwili Harbor with its ships and other sea-going crafts make this a poor habitat for the green sea turtle. It has been found on sandy beaches of Kauai shores which have provided nesting sites.

Of particular concern is the Newell's Shearwater, a seabird. This endemic seabird nests in burrows in the interior highlands of the island. This bird is attracted by bright urban lights and every year several hundred of them fly into wires and buildings. While some die, others that are injured are sometimes rescued and returned to the wild. Wildlife biologists on Kauai, with the support of the public, have developed a program which has a 90% recovery rate for these injured birds. Since bright lights attract these seabirds, a procedural guide has been developed by wildlife biologists. This calls for the installation of outdoor lights to be shielded and faced downward to minimize the allure of lights. The recommendations of wildlife biologists are found in this guide: "The Newell's Shearwater Light Attraction- A Guide for

Architects, Planners and Resort Managers" available at the Department of Land and Natural Resources. These recommendations will be included in this project.

FLORA:

Nawiliwili Harbor is an industrial port and the project site (Pier 2 and Pier 3) is largely paved over with concrete and asphalt and hosts numerous industrial structures including fuel tanks. Therefore, plants are not expected to be found in this industrial environment. The only noteworthy vegetation seen in the project area was a lone *noni* shrub, a plant native to Polynesia and purported to have medicinal properties. Its scientific name is *Morinda citrifolia* or commonly called the Indian mulberry. It probably rooted by chance. This plant will be removed as it is not part of any landscaping scheme. The edges of the paved areas are infested with weeds: coat buttons, finger grass, and garden spurge. The weeds are controlled and eradicated from time to time. The list of flora are shown in **APPENDIX A: BIOTA SURVEY.**

AQUATIC RESOURCES:

A biological marine survey resulted in recording of 53 taxa within the survey area. These were identified as being 4 algae, 26 invertebrates and 23 fishes genus or species. See **TABLE NO.1: BIOTA OCCURRING IN NAWILIWILI HARBOR.** A complete report can be found in **APPENDIX B: MARINE ENVIRONMENTAL ASSESSMENT** prepared by Sea Engineering, Inc. Invertebrates included rock mussel and fanworm; rarely observed were tube-sponge, banded shrimp, lobster, octopus, black urchin and sea cucumber. Two benthic environments were examined:1) the pier pilings of the docks; and 2) the rock and ruble bottom. Thirty five species occurred in the pier habitat and thirty one in the bottom with seventeen species common to both.

Some of the common fishes observed during the survey included the *mamo,* Abudefduf abdominalis; *aholehole,* Kuhilia sandvicensis;

TABLE NO. 1:
BIOTA OCCURRING IN NAWILIWILI HARBOR

Phylum/Class	Order/Family	Genus Species	Author, Date	Pilings	Rocks
Chlorophyta	Bryopsidaceae	*Bryopsis sp*			
Phaeophyta	Dictyotaceae	*Lobophora variegata*	(Lamouroux) Wormsley		
Phaeophyta	Dictyotaceae	*Padina sp.*			
Rhodophyta	Rhodomelaceae	*Acanthophora spicifera*	(Vahl) Boergesen		x
Porifera	Chalinidae	*Sigmadocia caerulea*	Hechtel, 1965	x	
Porifera	Chondrillidae	*Chondrosia chucalla*	de Laubenfels, 1936	x	
Porifera	Desmacellidae	*Biemna fistulosa*	(Topsent, 1897)	x	
Porifera	Mycalidae	*Mycale armata*	Thiele, 1903	x	
Porifera	Mycalidae	*Zygomycale parishii*	(Bowerbank, 1875)	x	
Porifera	Suberitidae	*Suberites zeteki*	de Laubenfels, 1936	x	
Hydrozoa	Pennariidae	*Pennaria disticha*	Goldfuss, 1820	x	
Anthozoa	Aiptasiidae	*Aiptasia sp.*		x	
Anthozoa	Pocilloporidae	*Pocillopora damicornis*	(Linnaeus, 1758)		x
Anthozoa	Acroporidae	*Montipora capitata*	(Dana, 1846)		x
Polychaeta	Chaetopteridae	*Chaetopterus sp.*		x	
Polychaeta	Sabellidae	*Sabellastarte spectabilis*	(Grube,1878)	x	x
Crustacea	Cirripedia	*Balanus eburneus*	Gould	x	
Crustacea	Cirripedia	*Chthamalus proteus*	Dando & Southward, 1980	x	
Crustacea	Stenopididae	*Stenopus hispidus*	Rathbun, 1907		x
Crustacea	Palinuridae	*Panulirus penicillatus*	Oliver, 1791)		x
Gastropoda	Littorinidae	*Litoraria scabra*	(Linnaeus, 1758)	x	
Bivalvia	Mytilidae	*Brachidontes crebristriatus*	(Conrad, 1837)		x
Cephalopoda	Octopodidae	*Octopus cyanea*	Gray, 1849		x
Ectoprocta	Vesiculariidae	*Amathia distans*	Busk, 1886	x	
Echinoidea	Diadematidae	*Echinothrix diadema*	Linnaeus, 1758		x
Holothuriidea	Holothuriidae	*Actinopyga obesa*	(Selenka, 1867)		x
Urochordata	(Ascidacea)	*Ascidia sydneiensis*	Stimpson, 1855	x	x
Urochordata	(Ascidacea)	*Didemnum* sp.		x	
Urochordata	(Ascidacea)	*Herdmania momus*	(Savigny, 1816)	x	
Urochordata	(Ascidacea)	*Phallusia nigra*	Savigny, 1816	x	x
Osteichthyes	Synodontidae	*Saurida* sp.			
Osteichthyes	Kuhliidae	*Kuhlia sandvicensis*	(Steindachner, 1876)	x	
Osteichthyes	Carangidae	*Carangoides orthogrammus*	(Jordan& Gilbert, 1882)	x	
Osteichthyes	Carangidae	*Seriola dumerili*	(Risso, 1810)	x	
Osteichthyes	Lutjanidae	*Lutjanus fulvus*	(Quoy and Gaimard, 1824)	x	x
Osteichthyes	Mullidae	*Mulloidichthys flavolineatus*	(Lacepede, 1801)	x	x
Osteichthyes	Mullidae	*Mulloidichthys vanicolensis*	(Valenciennes, 1831)	x	x
Osteichthyes	Mullidae	*Parupeneus multifasciatus*	Quoy & Gaimard, 1824	x	x
Osteichthyes	Mullidae	*Parupeneus porphyreus*	Jenkins, 1903	x	x
Osteichthyes	Chaetodontidae	*Chaetodon auriga*	Forsskal, 1775	x	x
Osteichthyes	Chaetodontidae	*Chaetodon lunula*	(Lacepede, 1803)	x	x
Osteichthyes	Pomacentridae	*Abudefduf abdominalis*	(Quoy & Gaimard, 1824)	x	x
Osteichthyes	Pomacentridae	*Stegastes fasciolatus*	(Ogilby, 1889)	x	x
Osteichthyes	Serranidae	*Cephalopholis argus*	Bloch & Schneider, 1801	x	x
Osteichthyes	Labridae	*Thalassoma duperrey*	(Quoy and Gaimard, 1824)		x
Osteichthyes	Scaridae	*Scarus sp. (juv.)*			x
Osteichthyes	Acanthuridae	*Acanthurus blochii*	Valenciennes, 1835	x	x
Osteichthyes	Acanthuridae	*Acanthurus dussumieri*	Cuvier & Valenciennes, 1835	x	x
Osteichthyes	Acanthuridae	*Acanthurus triostegus*	(Linnaeus, 1758)	x	x
Osteichthyes	Acanthuridae	*Ctenochaetus strigosus*	(Bennett, 1828)		x
Osteichthyes	Zanclidae	*Zanclus cornutus*	(Linnaeus, 1758)	x	x
Osteichthyes	Tetraodontidae	*Arothron hispidus*	(Linnaeus, 1758)		x
Osteichthyes	Tetraodontidae	*Canthigaster jactator*	(Jenkins, 1901)		x

Source: Appendix B

TABLE 2: WATER QUALITY CHARACTERISTICS OF NAWILIWILI HARBOR

Sampled December 10, 2001, October 30 and October 31, 2003.

	Date	Time	Temp. (°C)	DO (mg/l)	DO Sat. (%)	Sal. (ppt)	pH
Sta. 1	12-10-01		23.8	6.98	98	30	--
"	10-30-03	1000	26.1	4.75	64	17.518	7.8
"	10-30-03	1545	26.6	4.90	68	18.993	8.1
Sta. 2	12-10-01		23.2	7.46	101	25	--
Sta. 3	12-10-01		23.2	7.35	99	25	--
"	10-30-03	1025	25.9	4.44	61	19.771	8.0
"	10-30-03	1535	26.8	4.35	60	18.511	8.1
Sta. 4	12-10-01		23.2	6.81	94	28	--
"	10-30-03	1045	26.3	4.62	66	24.116	8.1
"	10-30-03	1600	26.8	4.75	65	16	8.1
Sta. 4d	10-30-03	1650	26.7	3.85	58	34.621	8.3
Sta. 5d	10-30-03	1450	--	--	--	34.612	8.3

		Turbidity (ntu)	TSS (mg/l)	Ammonia (µg N/l)	Nitrate + nitrite (µg N/l)	Total N (µg N/l)	Total P (µg N/l)	Chl. a (µg /l)
Sta. 1	12-10-01	1.75	10	39	7	248	--	--
"	10-30-03	47.5	52	45	41	428	47	1.36
"	10-30-03	27.3	33	11	31	308	72	2.43
Sta. 2	12-10-01	1.03	7.0	20	24	162	--	--
Sta. 3	12-10-01	1.42	7.4	16	10	243	--	--
"	10-30-03	17.7	23.4	< 1	10	306	40	1.40
"	10-30-03	13.4	16	< 1	< 1	291	42	3.60
Sta. 4	12-10-01	2.11	3.7	10	43	224	--	--
"	10-30-03	15.6	21.6	30	43	289	45	0.92
"	10-30-03	--	--	--	--	--	--	--
Sta. 4d	10-30-03	1.68	14	1	10	146	23	0.95
Sta. 5d	10-30-03	2.06	14	< 1	5	140	22	1.71

Dissolved oxygen (DO) values all indicated water close to saturation for oxygen. Turbidity values were reasonable for a harbor and river mouth (as were TSS). Nutrient values were all reasonable as well, and not indicative of water quality problems, or excessive runoff influences.

Source: Appendix B

moana, Parupeneus multifasciatus; *to'au*, Lutjanus fulvus; *weke'ula*, Mulloidichthys vanicolensis; *ulua*, Carangoides orthogrammus; and *kahala*, Seriola dumerili. The *akule*, Selar crumenophthalmus also can be found here.

Additional fish species observed were; *Mulloidichthys flavolineatus, Parupeneus porphyreus, Chaetodon auriga, Stegastes fasciolatus, Thalassoma duperrey, Scarus* sp. juveniles, *Acanthurus dussumieri, Acanthurus triostegus, Ctenochaetus strigosus, Arothron hispidus, Canthigaster jactator* and a large specimen of the introduced grouper, *Cephalopholis argus*.

The existing water quality can be seen in **TABLE NO. 2: WATER QUALITY CHARACTERISTICS OF NAWILIWILI HARBOR.**

The Department of Land and Natural Resources has regulations pertaining to fishing state-wide. It should be noted that the project area within the harbor is governed by the following regulations which makes it illegal to: 1) use any net, except a landing net not more than 3 feet in any dimension, excluding handle; 2) snag any fish; and 3) take or possess more than 75 *akule* per person per day. Refer to **DRAWING NO. 2: NAWILIWILI HARBOR PLAN.** Shoreline fishing is permitted except from the port facilities of the Department of Transportation which is under intense security.

SOILS:

The underlying soils in the project land area are classified as being Rough Broken Land (rRR) according to the U.S. Soil Conservation soil survey report. However, part of the area is fill material which was laid during the construction of the rockwall revetment of Pier 2.

Test boring logs indicate subsurface soil conditions vary significantly within the project site. This is reflected in **APPENDIX C: SOILS INVESTIGATION.** The area to be dredged (water area) shows a wide range of sandy silt and silty sand before encountering weathered rock or basalt- 60 feet to 111 feet. The soil data are shown in the boring log tables shown in **APPENDIX C.** Due to the variation of the silt/sand depth, the pier support piles will be approximately 43 feet before achieving the required pile driving resistance. The design capacity load for each pile is 120 tons. The drilled shaft length will vary from approximately 60 to 77 feet.

The landside (land area) consisted mainly of medium dense silty sands and medium stiff silty clay. Much of this area is built-up or fill area and as such cobbles and occasional boulders were found. Basalt was found at depths from 11 to 69 feet. The depth before ground water was found below the existing grade ranged from 2.5 feet to 9.1 feet as can be expected due to tidal fluctuation.

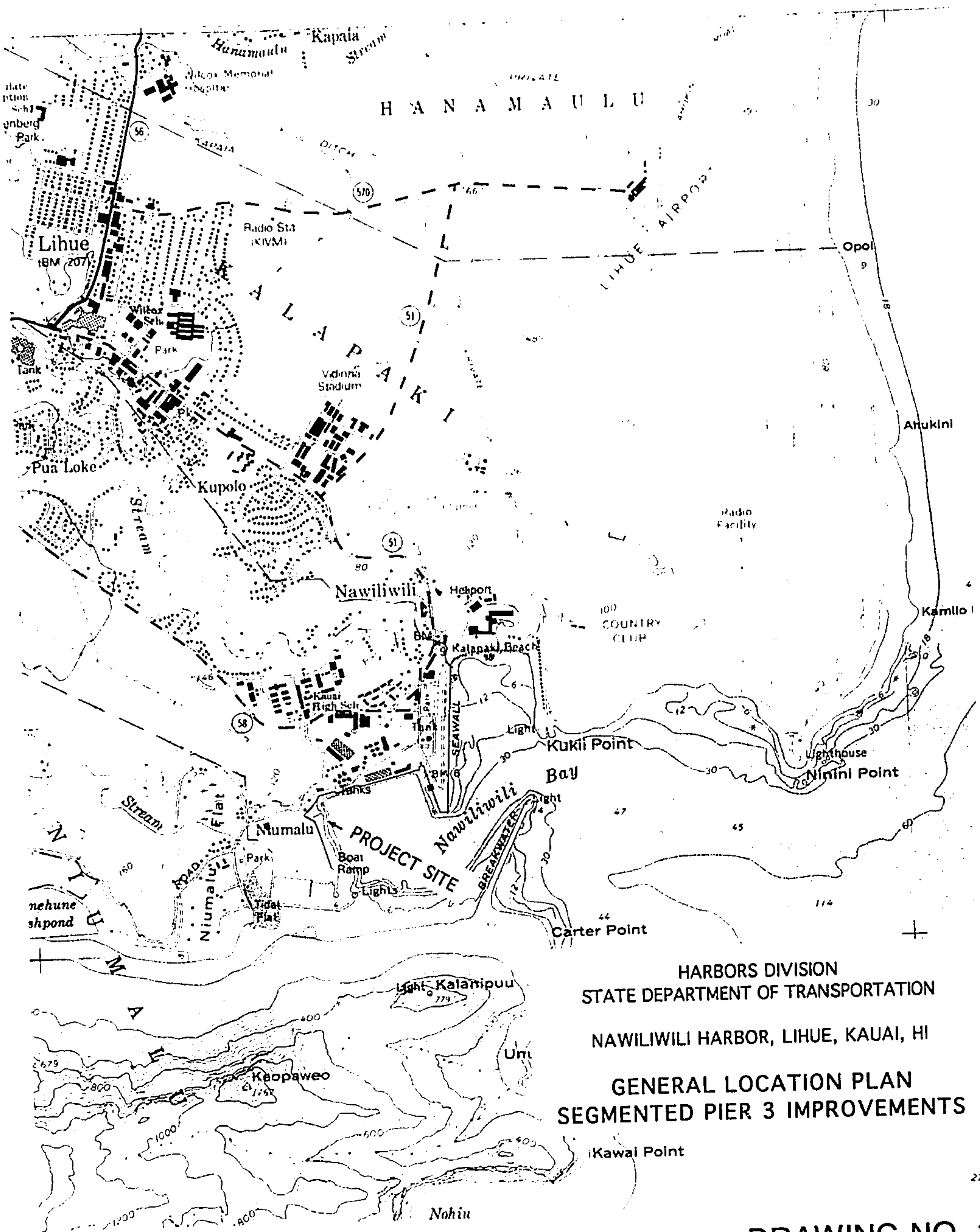
UTILITIES:

The Nawiliwili Harbor is serviced by various utilities for proper functioning as the principal port for Kauai. Water service is provided by County Water Department. County sewer mains are not available in the harbor area. Telephone and electrical services are provided by the utility companies. The Nawiliwili Pier 3 Extension project will not require greater utility capacity that which is now provided. New connections will be made but these will not require off-site expansion of facilities by utility companies.

LAND CLASSIFICATION:

The State lands of Nawiliwili Harbor are in the Urban District as designated by the State Land Use Commission (LUC). The segmented pier will be in the harbor waters which is in the LUC Conservation District.

The County of Kauai has zoned the Nawiliwili Harbor as I-G, Industrial-General. This area is also in the Special Management Area district.



HARBORS DIVISION
STATE DEPARTMENT OF TRANSPORTATION

NAWILIWILI HARBOR, LIHUE, KAUAI, HI

GENERAL LOCATION PLAN
SEGMENTED PIER 3 IMPROVEMENTS

DRAWING NO. 1

SECTION 4

GENERAL DESCRIPTION
4A: TECHNICAL CHARACTERISTIC

NAWILIWILI HARBOR:

The harbor lies southwest of Lihue Town at the confluence of the Hule'ia River and Niumalu Stream. Refer to **DRAWING NO. 1: GENERAL LOCATION PLAN.** The mouth of these combined streams in Nawiliwili Bay includes the ship entrance channel and harbor basin which has been enlarged and deepened by dredging. The shoreline surrounding the harbor basin has been modified with protective concrete piers with sheet piles and rock walls.

The measurement of tides within the harbor according to the Department of Commerce's NOAA survey were:

Mean Higher High Water (MHHW)	+1.9 feet
Mean High Water (MHW)	+1.4 "
Mean Tide (Approximate MSL)	+0.8 "
Mean Low Water (MLW)	+0.2 "
Mean Lower Low Water (MLLW)	0

The above data are referenced to mean lower low water datum. Further,an astronomical tide of 1.9 feet was selected for design because of the frequency of occurrence of this tide level.

During exceptional weather conditions (e.g.; hurricanes Iwa and Iniki), tide levels are predicted to rise. The following table, provides an engineering design baseline for such a condition:

Astronomical tide	1.9 feet
Pressure setup	1.1
Wind setup	0.0
Wave setup and unknown storm surge	2.0
Design water level rise	5.0 feet (MLLW)

Nawiliwili Harbor is the principal port for Kauai. Pier 1 is used on a weekly basis by Matson Navigation Company's container barges. Pier 2, at one time, was used extensively for the shipping of raw sugar from the Kauai sugar mills. Piers 1 and 2 are now used to accommodate cruise ships. Pier 3 services the Young Brothers inter-island barge shipments on a weekly basis. Pier 3 is also used to moor the smaller cruise ship when there are two ships in the harbor at the same time. The project site for the improvements to Nawiliwili Harbor Pier 3 Improvement is shown in **DRAWING NO. 2: NAWILIWILI HARBOR PLAN.** The project at Pier 3 is to accommodate a second cruise ship at Nawiliwili Harbor <u>at times when the inter-island barges are not in port</u>.

<u>MASTER PLAN 2010</u>:

The 2010 Master Plan for Nawiliwili Harbor prepared in 1987 was influenced by certain factors which include:

- The increasing growth in population and economy of the Neighbor Island communities;
- The dramatic increase in cruise passenger vessel calls to certain Neighbor Island commercial ports and the emerging requirements to develop security measures to protect against terrorist activities;
- The technological advancements in the load carrying capacities of cargo handling equipment, and in the use of larger and faster vessels;
- The new requirements for Federal/State navigational improvement projects; and in operations and maintenance of commercial deep draft harbors where more financial responsibility will be imposed on the State; and
- The growing financial demands on the Harbors Division to improve and maintain statewide port facilities.

A 1993 progress report, MASTER PLAN UPDATE FOR NAWILIWILI HARBOR, listed the following projects that were completed, or under construction, based on the 2010 Master Plan (of 1987):

- Realignment of Jetty Road and reconstruction of the revetment wall;
- Concrete walkways along Kanoa Street and Wilcox Road for safety of cruise ship passengers;

- Improvement of waterline system;
- Harbor District Shop/Warehouse improvements;
- Paving of 5 acres of inter-island container yard at Pier 1;
- Intersection improvements by the Highway Division of roads servicing the harbor;
- Construction of Pier 3 and related container yard;
- Reconstruction of Pier 1 related improvements; and
- New Harbor District Office.

The existing Pier 3, as built, extends only part way toward Pier 2 as the main purpose was to service the Young Brothers inter-island barges. Refer to **DRAWING NO. 3: 1993 MASTER PLAN.**

PRE-SEPTEMBER 2001 PIER 2 IMPROVEMENT PLAN:

In recent years, the present Nawiliwili Harbor Pier 2 served the 682 feet long American-Hawaiian Cruise Lines ship, the Independence. The second ship of the cruise line company was the Patriot which was 704 feet in length. The two ships could dock at the Pier 2 at the same time. However, the cruise line company had plans to add two 856 feet long ships to their fleet which were being built with the intention of possibly docking the two ships at the same time at Nawiliwili Harbor. **DRAWING NO. 4: ORIGINAL PLAN BEFORE SEPTEMBER 11, 2001** shows the Pier 2 extension that was first proposed to service the two 840 feet long ships of the American Hawaii Cruise Lines.

Since September 11, 2001, following the terrorist attack on the World Trade Center in New York and the Pentagon, the economy of the State which relies heavily upon the visitor industry took a sharp down-turn. The safety of airline travel discouraged vacationers from flying. The West Coast and Japan air travel markets dwindled. This left those businesses dependent upon tourism struggling to survive.

One of those businesses hit hard was the American Hawaii Cruise Lines which was forced into bankruptcy and lost their two existing ships and the two new ships which were being built. However, despite this loss to the State travel industry, other cruise lines have moved into this visitor industry slot. At present, regular service to Nawiliwili Harbor has been provided by the Norwegian Lines. Their ships are longer, such as the Norwegian Star with a length of 965 feet which now calls regularly at the harbor. For comparison purposes, the famed Queen Elizabeth 2 is 963 feet in length. The Pier 3 improvement will be required in order to adequately serve a 965 feet ship and a 856 feet ship at the same time. These are the larger ships of the Norwegian Lines and those of other cruise companies who have indicated or made dock reservations for use of Nawiliwili Harbor. **DRAWING NO. 5: SITE PLAN** is based on the cruise ships having lengths of 965 feet, or so. A preliminary schedule of ships stopping at Nawiliwili Harbor in 2004 and 2005 is shown in **APPENDIX G: SHIP SCHEDULE.**

The proposed Pier 3 improvement will be a segmented (stand alone) pier. The pier will be erected on 24-inch octagonal precast reinforced concrete piles and 5 feet diameter drilled shafts. The pier will be constructed of precast reinforced concrete planks, 14-inch thick. An 8-inch reinforced concrete topping will be laid over the concrete planks. The final surface of the pier will be a $1^1/_2$-inch asphaltic concrete pavement. The use of precast reinforced concrete planks will facilitate construction due to the relative inaccessibility of the segmented pier. The following drawings depict the segmented pier construction details: **DRAWING NO. 6: SEGMENTED PIER 3 PLAN** and **DRAWING NO. 7: SEGMENTED PIER 3 DETAILS.** Details of the drilled shaft and pile can be seen in **DRAWING NO. 8: DRILLED SHAFT & PILE DETAILS.**

A sloping ramp will connect the segmented pier to the shoreline. The construction of the ramp will be similar to the pier construction with the use of 14-inch thick precast reinforced concrete planks, 6-inch concrete topping supported on piles. **DRAWING NO. 9: ACCESS RAMP DETAILS** shows the ramp construction details.

Test borings results of the harbor bottom can be found in **APPENDIX C: SOILS INVESTIGATION.** The precast prestressed reinforced piles will be in varying lengths. The piles will be 24-inch octagonal in shape. The piles will be placed in pre-drilled holes. After placing, the piles will be trimmed to the adjust to the pier elevation. The piles will be furnished by the contractor and may be cast on Oahu or on Kauai depending on production economics.

No technical difficulty is anticipated in the segmented Pier 3 improvement project.

DREDGING:

The present depth of the project area is less than the required 35-foot depth for large ships to safely navigate the harbor. An estimated 30,951 cubic yards will be removed under this project as noted on **DRAWING NO. 9: DREDGING SITE PLAN.** The dredged material will be transported in water-tight vehicles to a de-watering and stockpiling location near the project site. It is anticipated that the County of Kauai will subsequently use the dried dredged material for landscaping purposes. The test results of the analyses of the water and the material to be dredged are shown and can be found in ATTACHMENT A of **APPENDIX E: MARINE ENVIRONMENTAL ASSESSMENT.**

The harbor bottom material appears to be suitable for the use intended by the County of Kauai. Samples were tested for eight (8) metals and twenty eight (28) pesticides and non-volatile solvents. Nothing was observed in the samples tested that were within the detection limits. Based on the test borings of the harbor bottom, the dredged material will be sandy silt and silty sand with some cobble and boulder material.

A marine survey and its findings- TABLE 1: BIOTA OCCURRING IN NAWILIWILI HARBOR (from **APPENDIX E**) is shown on the next page. The assessment of the project site shows that it is biologically typical of a harbor environment, with a high proportion of introduced invertebrates and an almost total lack of reef corals or other sensitive marine organism that might be adversely impacted by construction activities. As for fishes, it is expected that they will migrate to other areas during construction and eventually return to their present composition upon completion of construction activities. The spaces between the rocks for the new rock rip-rap revetment will offer new habitat.

DEMOLITION:

As part of the dredging work, the boat ramp and docking facility that is no longer in service will be demolished and removed. These boating facilities have been relocated to the nearby Department of Land and Natural Resources Nawiliwili Small Boat Harbor.

OTHER IMPROVEMENTS:

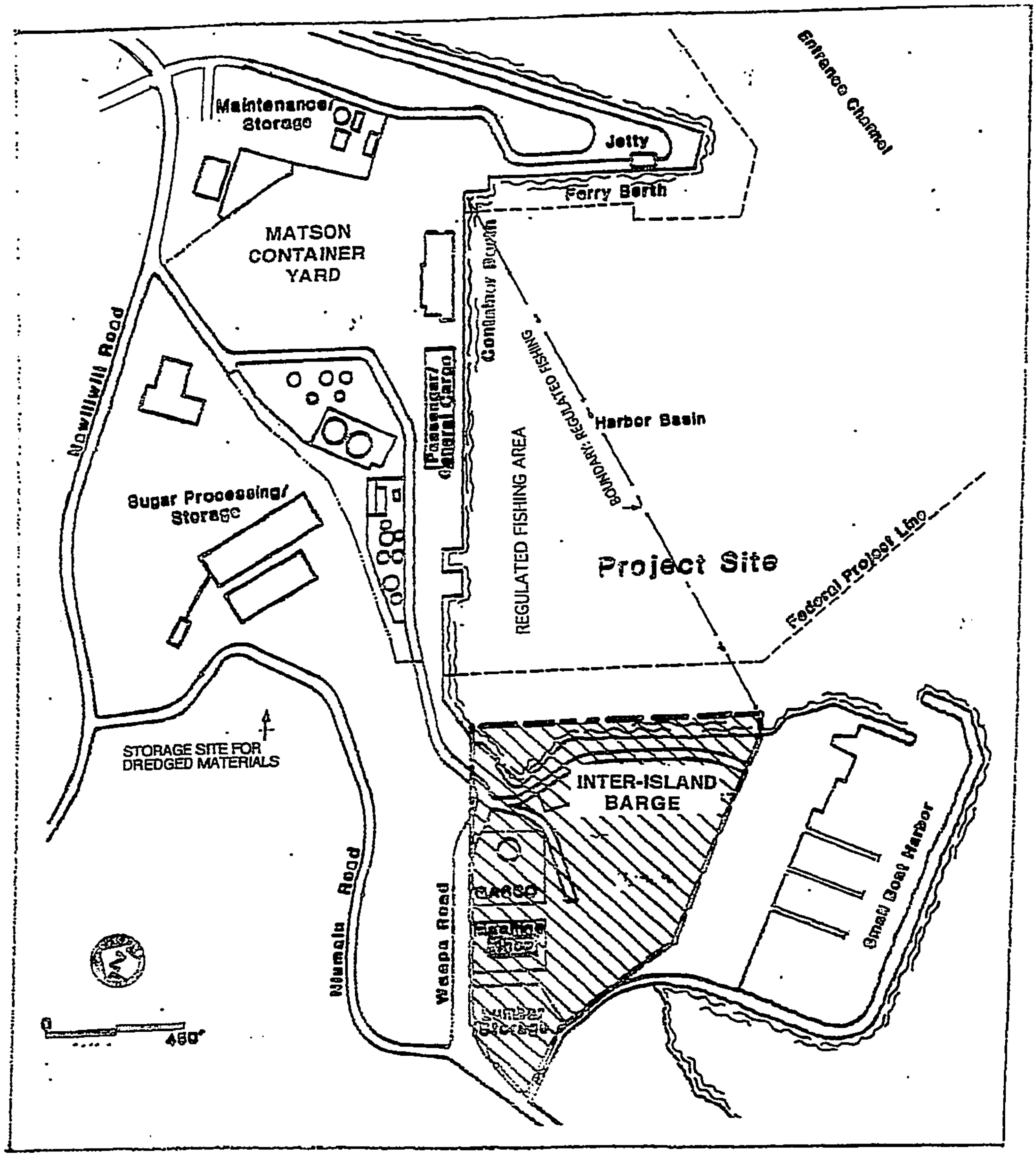
A new a-c pavement will be provided for pedestrian access from Pier 3 to the Pier 2 parking lot and restroom.

Since the present restroom facility is in poor condition, a new comfort station will be installed to properly accommodate the cruise ship passengers and others. Refer to **DRAWING NO. 11: LOCATION PLAN - COMFORT STATION & LEACH FIELD.** This facility will be located within existing Pier 2 shed structure. **DRAWING NO. 12: COMFORT STATION** shows the plan and details of this new structure. The existing restroom facility located outside the Pier 2 shed will be removed. Tests of asbestos and lead containing materials of the existing building have been carried out and health concerns will be addressed in the construction documents. A leaching field will dispose of the wastewater after settling in a 1,000-gallon septic tank. The septic tank and leach field will be constructed above the groundwater level. This is shown in **DRAWING NO. 13: LEACH FIELD DETAILS.** This renovation of the comfort station will also bring it into conformity with new EPA restrictions relating to Large Capacity Cesspools.

Parking stalls for buses, limousines, taxis and cars will be laid out for the convenience and expeditious handling of passengers.

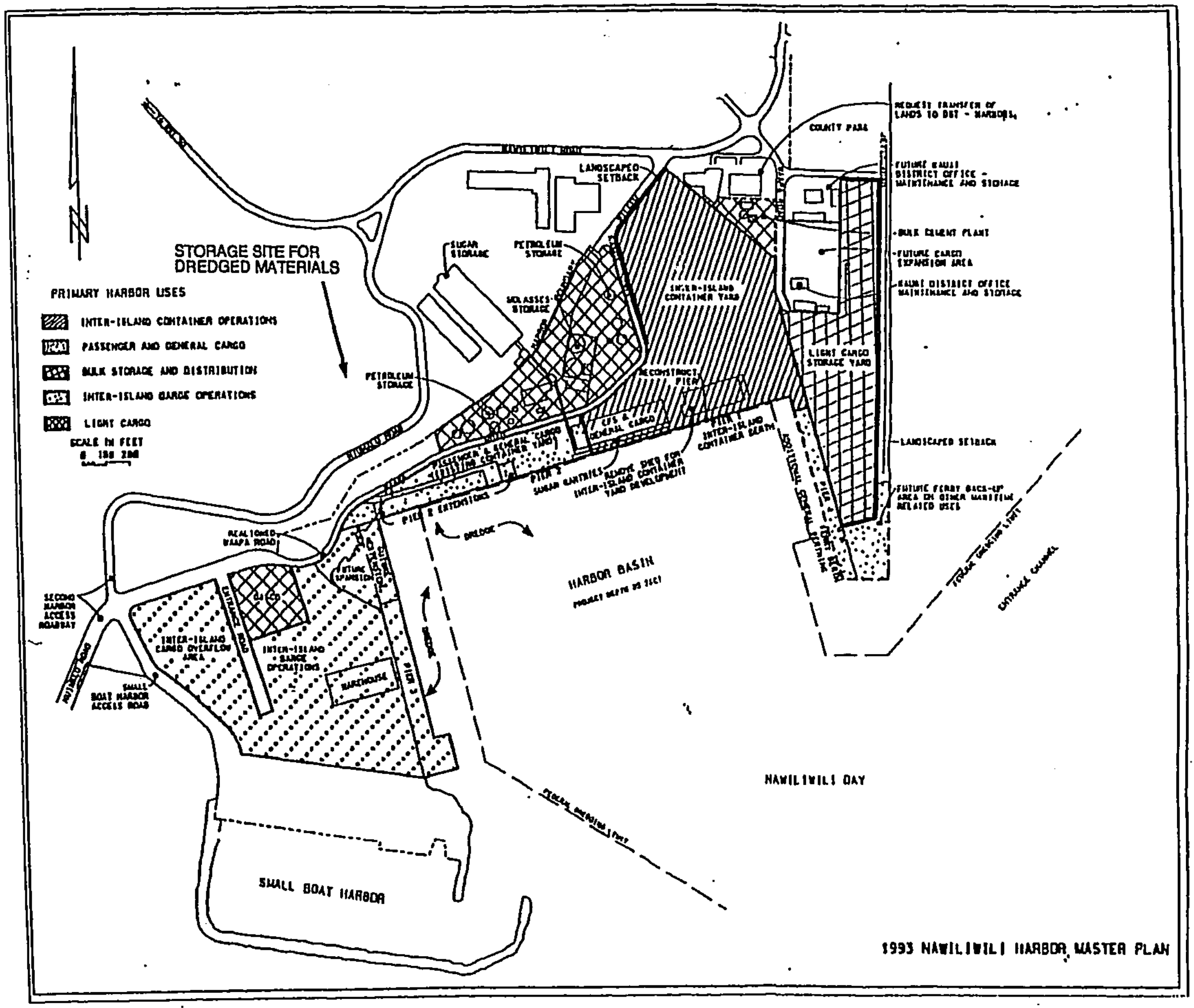
Additional site lighting will be installed for the safety and convenience of the ship passengers. The added security concerns generated by the September 11, 2001, tragedy justifies this added protection measure.

The total project is estimated to cost over $6.5 million but will be adjusted based on available funds. The source of the funds is from the Harbor Special Funds.

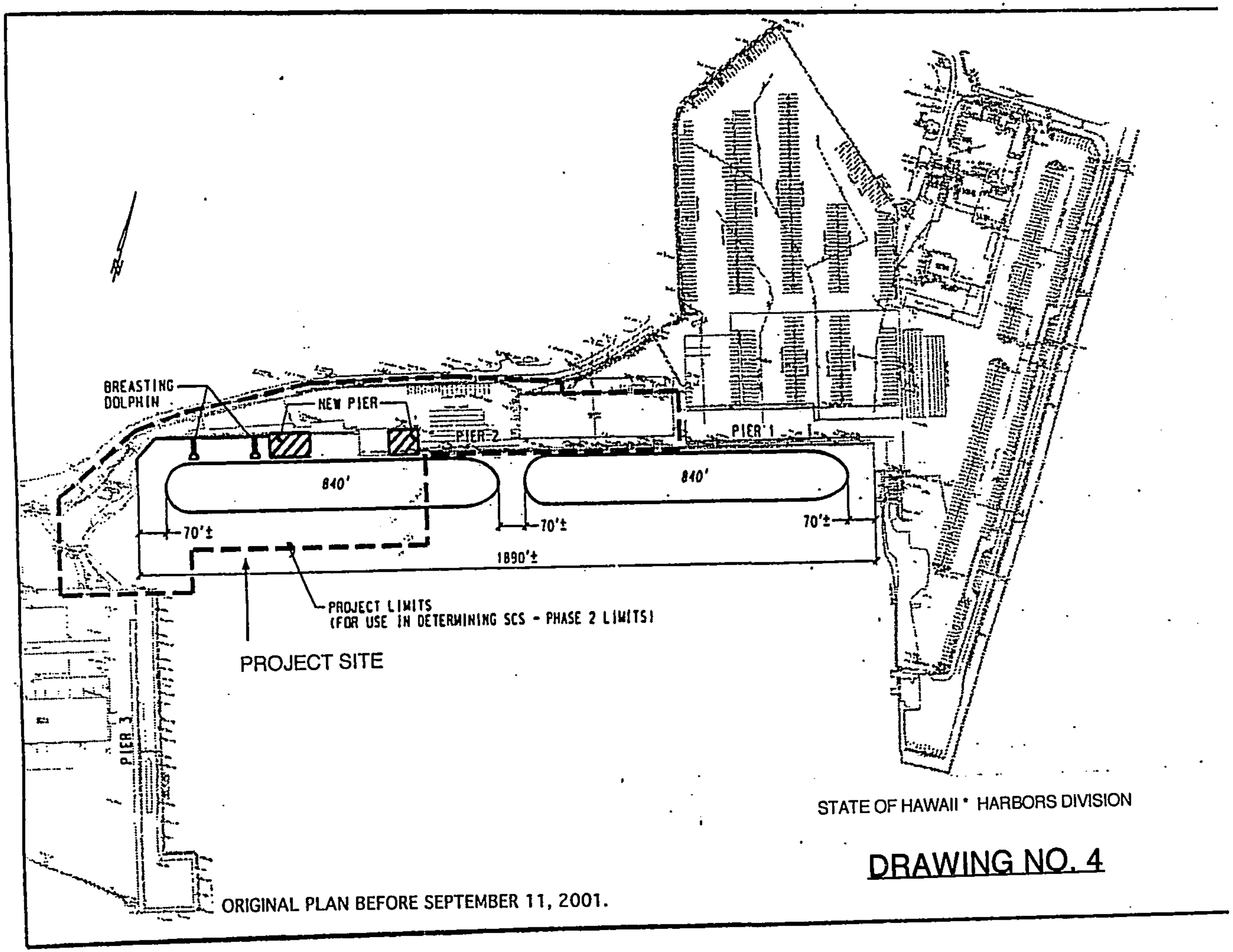


DRAWING NO. 2

NAWILWILI HARBOR PLAN


STORAGE SITE FOR DREDGED MATERIALS
PRIMARY HARBOR USES
INTER-ISLAND CONTAINER OPERATIONS
PASSENGER AND GENERAL CARGO
BULK STORAGE AND DISTRIBUTION
INTER-ISLAND BARGE OPERATIONS
LIGHT CARGO
SCALE IN FEET
HARBOR BASIN
NAWILIWILI BAY
SMALL BOAT HARBOR
1993 NAWILIWILI HARBOR MASTER PLAN

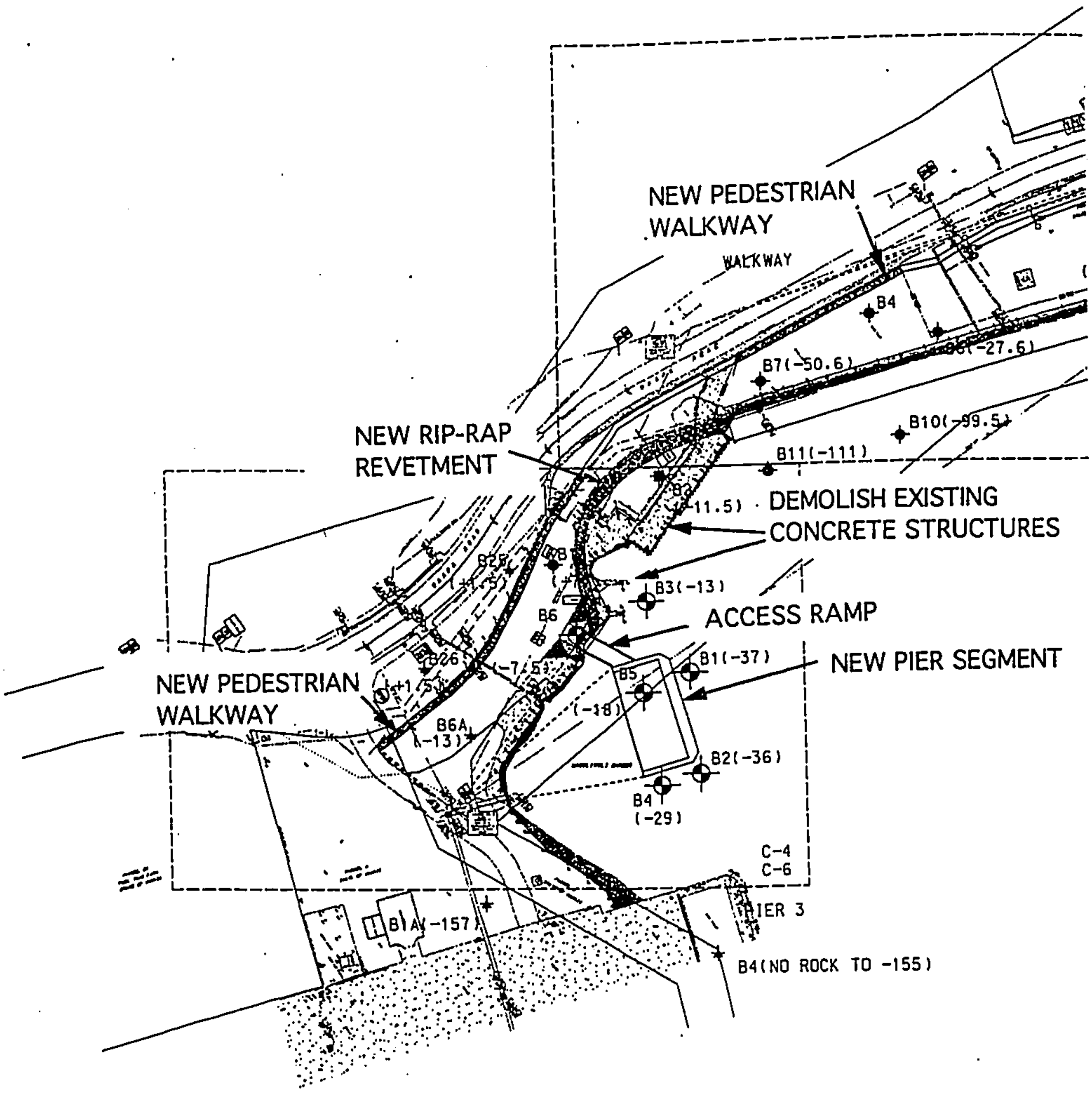
DRAWING NO. 3



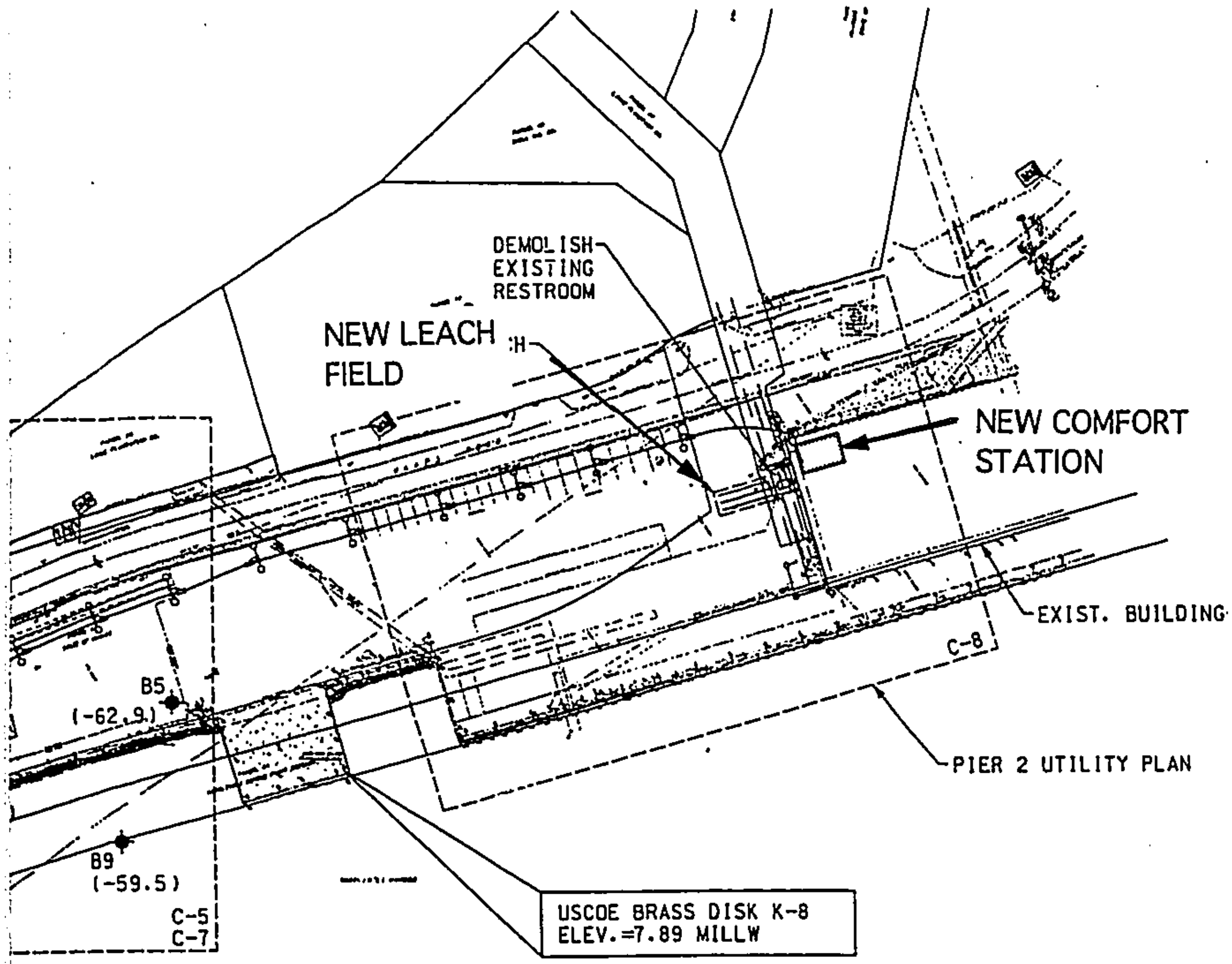
ORIGINAL PLAN BEFORE SEPTEMBER 11, 2001.

STATE OF HAWAII * HARBORS DIVISION

DRAWING NO. 4



MASTER SITE PLAN



ES

NT

NOTE:
SEE DREDGING SITE PLAN
FOR DREDGING LIMITS

LEGEND

APPROXIMATE BORING LOCATIONS

PREVIOUS BORING LOCATIONS AND APPROX. BASALT ELEVATION (W.O. 3476)

PREVIOUS BORING LOCATIONS AND APPROX. BASALT ELEVATION (W.O. 1920)

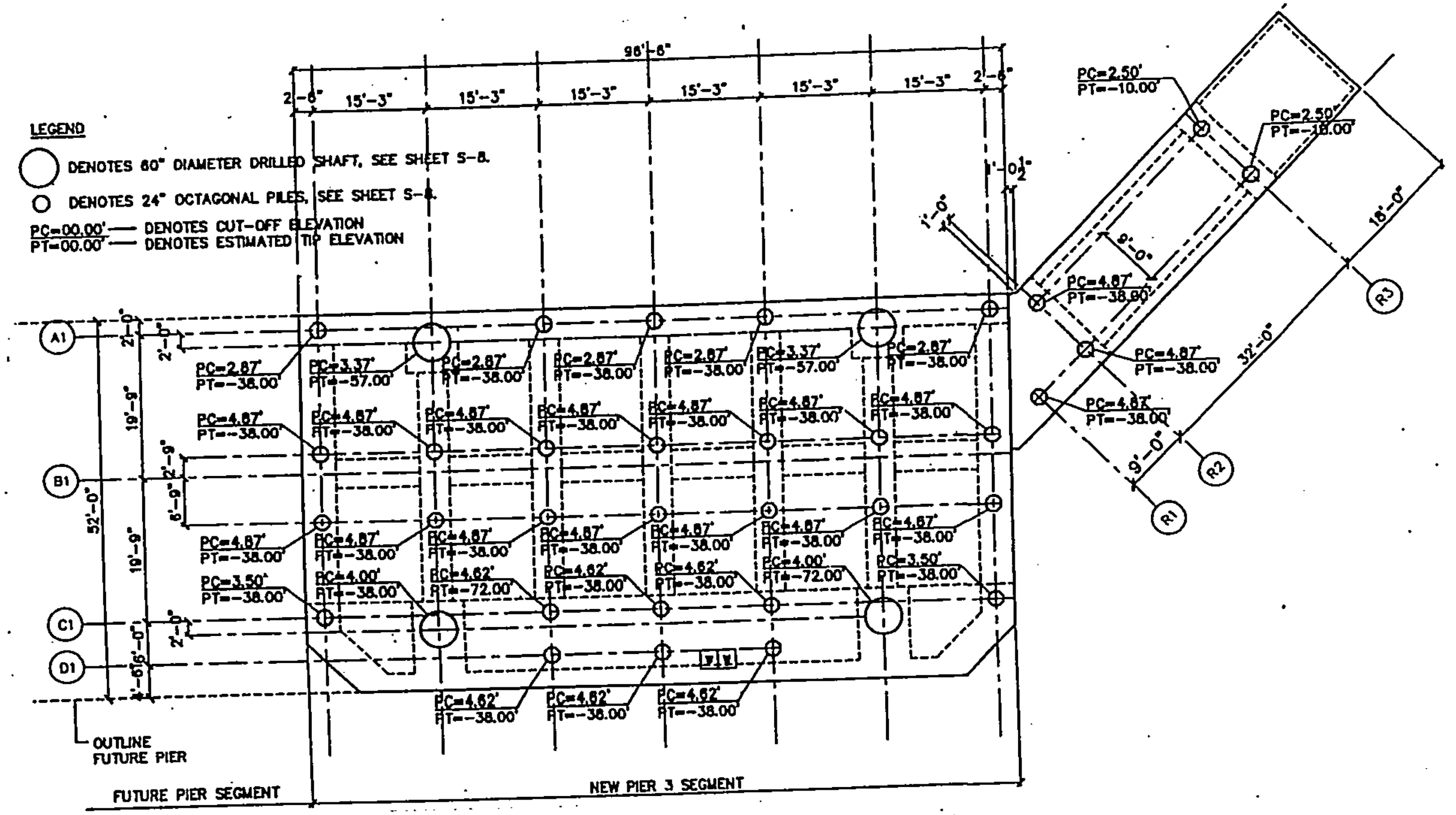
PREVIOUS BORING LOCATIONS AND APPROX. BASALT ELEVATION (W.O. 885)

NOTE:

1. COORDINATES ARE REFERRED TO GOVERNMENT TRIANGULATION STATION "NAWILIWILI"

2. ELEVATIONS ARE REFERRED TO USCOE BRASS DISK - 8, ELEVATION=7.89 MILLW

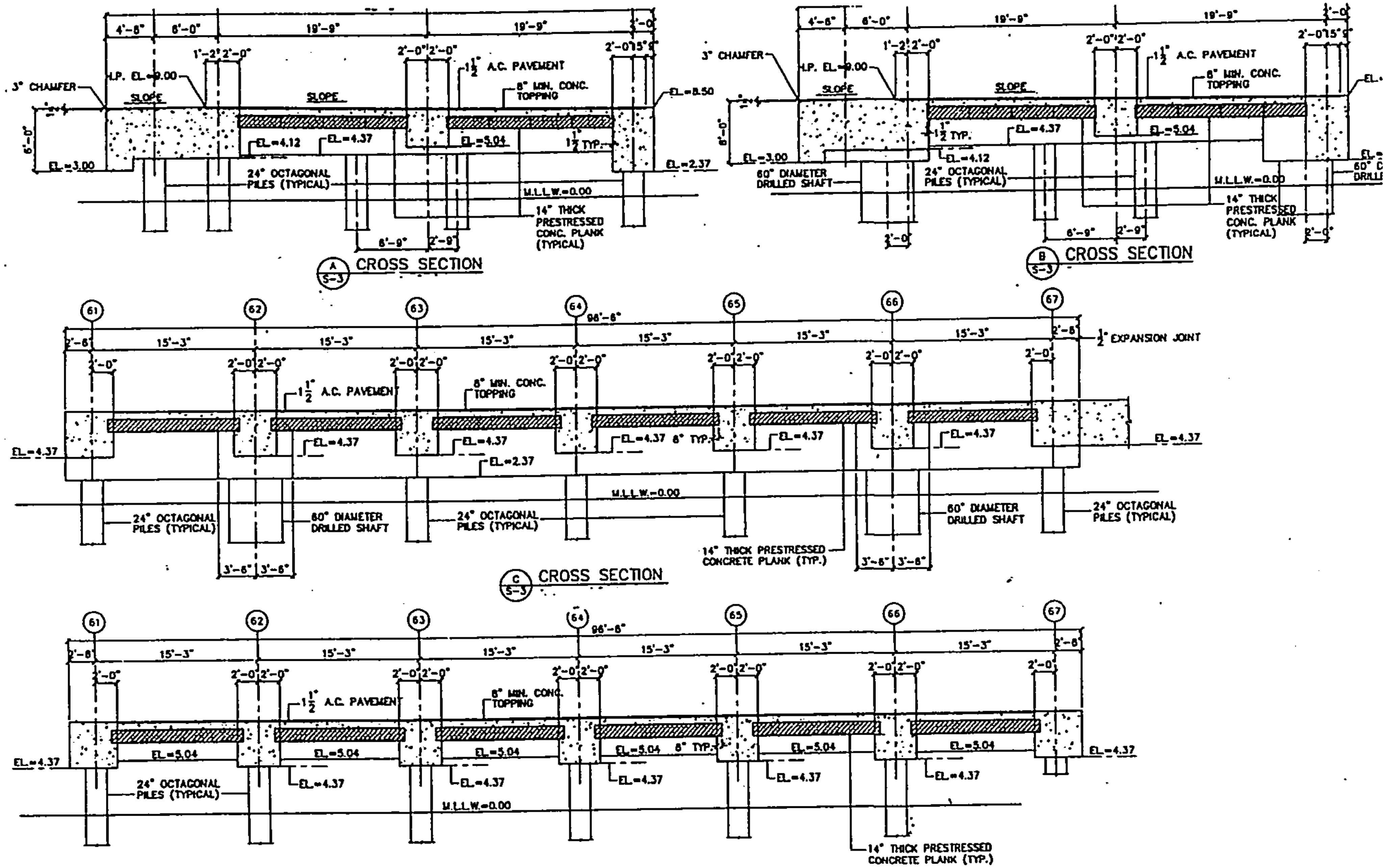
DRAWING NO. 5



SEGMENTED PIER 3 PLAN

DRILLED SHAFT & PILE LOCATIONS

DRAWING NO. 6



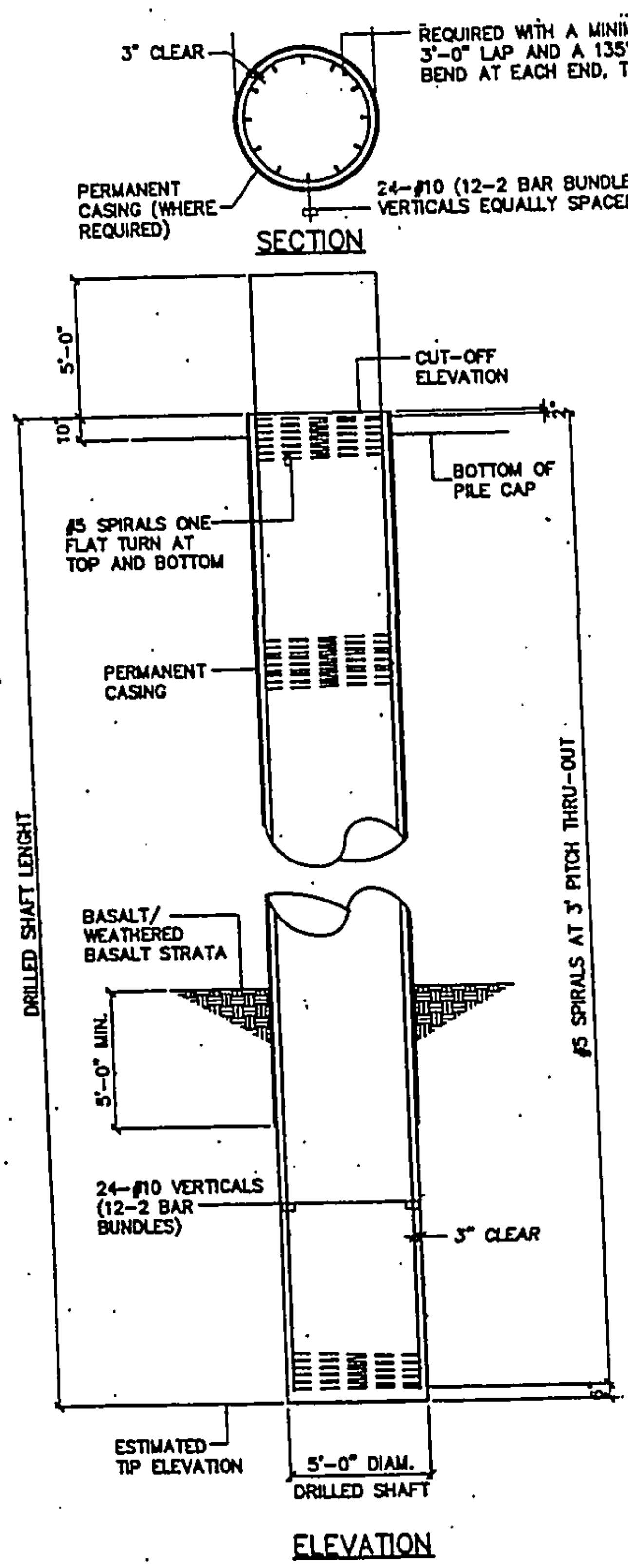
SEGMENTED PIER 3

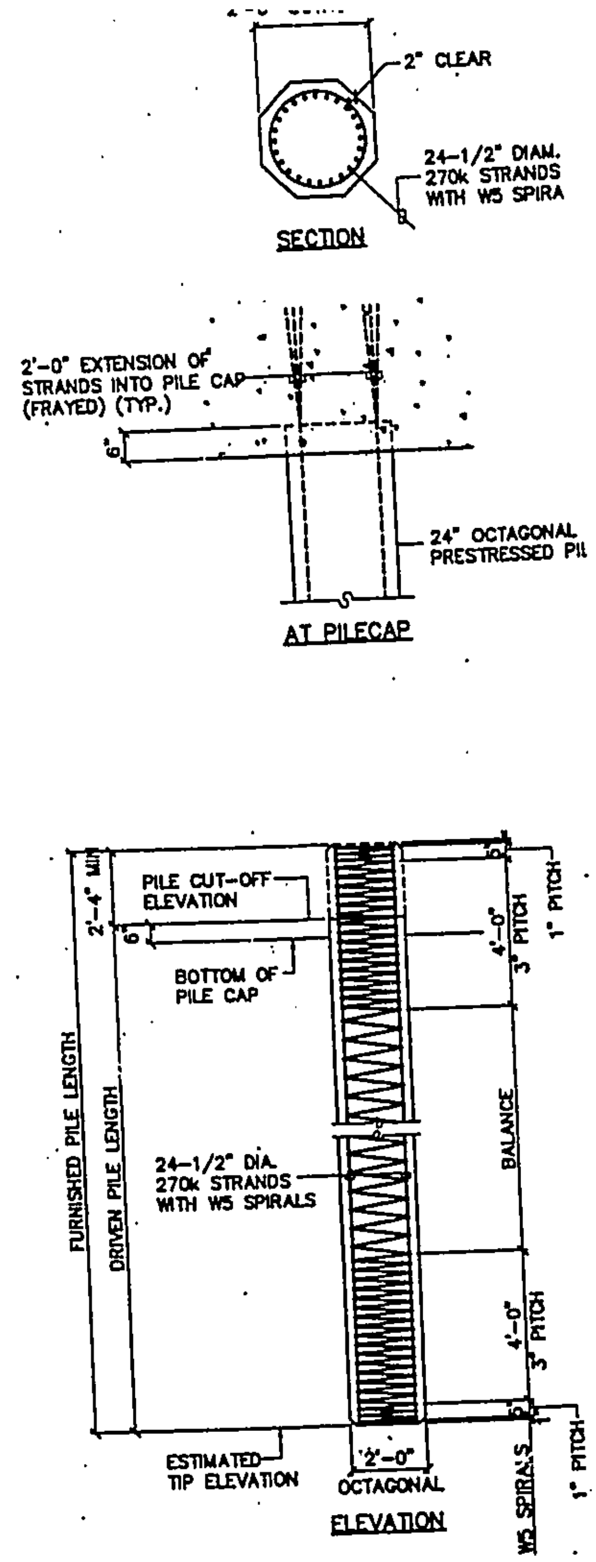
CROSS SECTION DETAILS

DRAWING NO. 7

NOTES:

1. DRILLED SHAFT CONCRETE SHALL BE 4,000 PSI STRENGTH AT 28 DAYS.
2. CONCRETE SPACERS SHALL BE USED TO MAINTAIN THE REINFORCEMENT CAGE IN POSITION WITHIN TH SHAFT.
3. SPIRALS SHALL BE TERMINATED AT THE TOP AND BOTTOM WITH A 135° HOOK AROUND VERTICAL REINFORCEMENT.



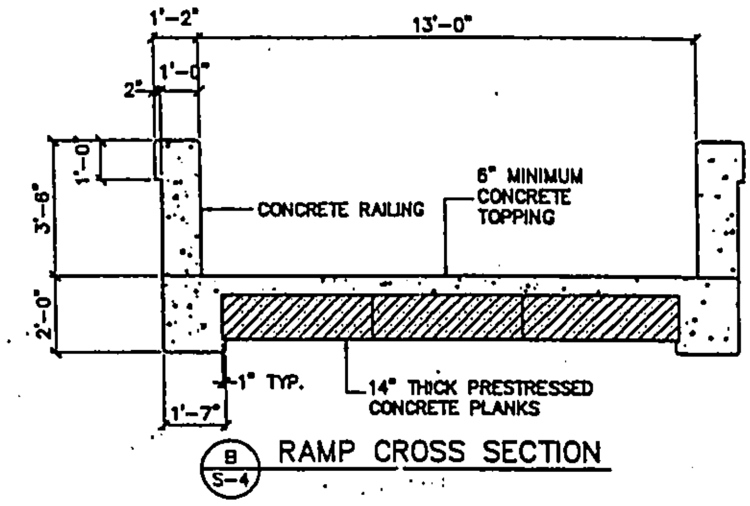


(A / S-8) DRILLED SHAFT DETAIL

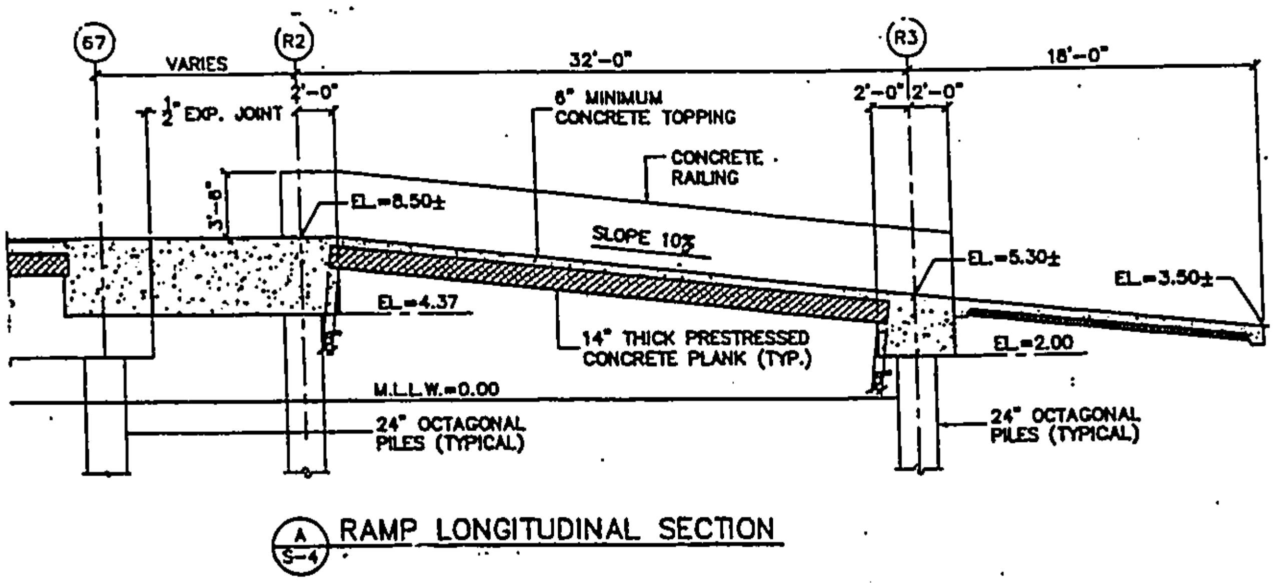
(B / S-8) 24" DIAMETER OCTAGONAL PILE

DRILLED SHAFT & PILE DETAILS

DRAWING NO. 8



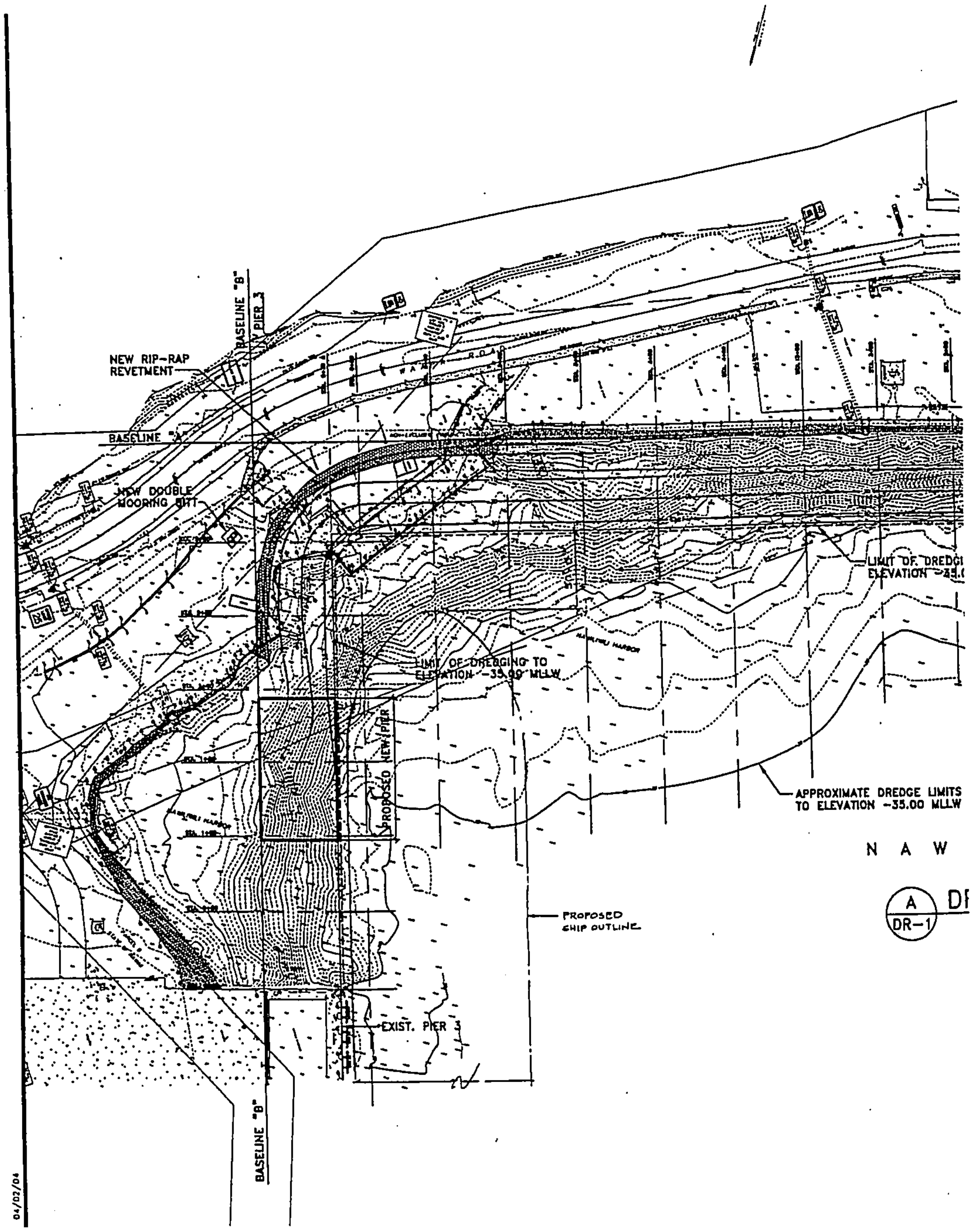
RAMP CROSS SECTION



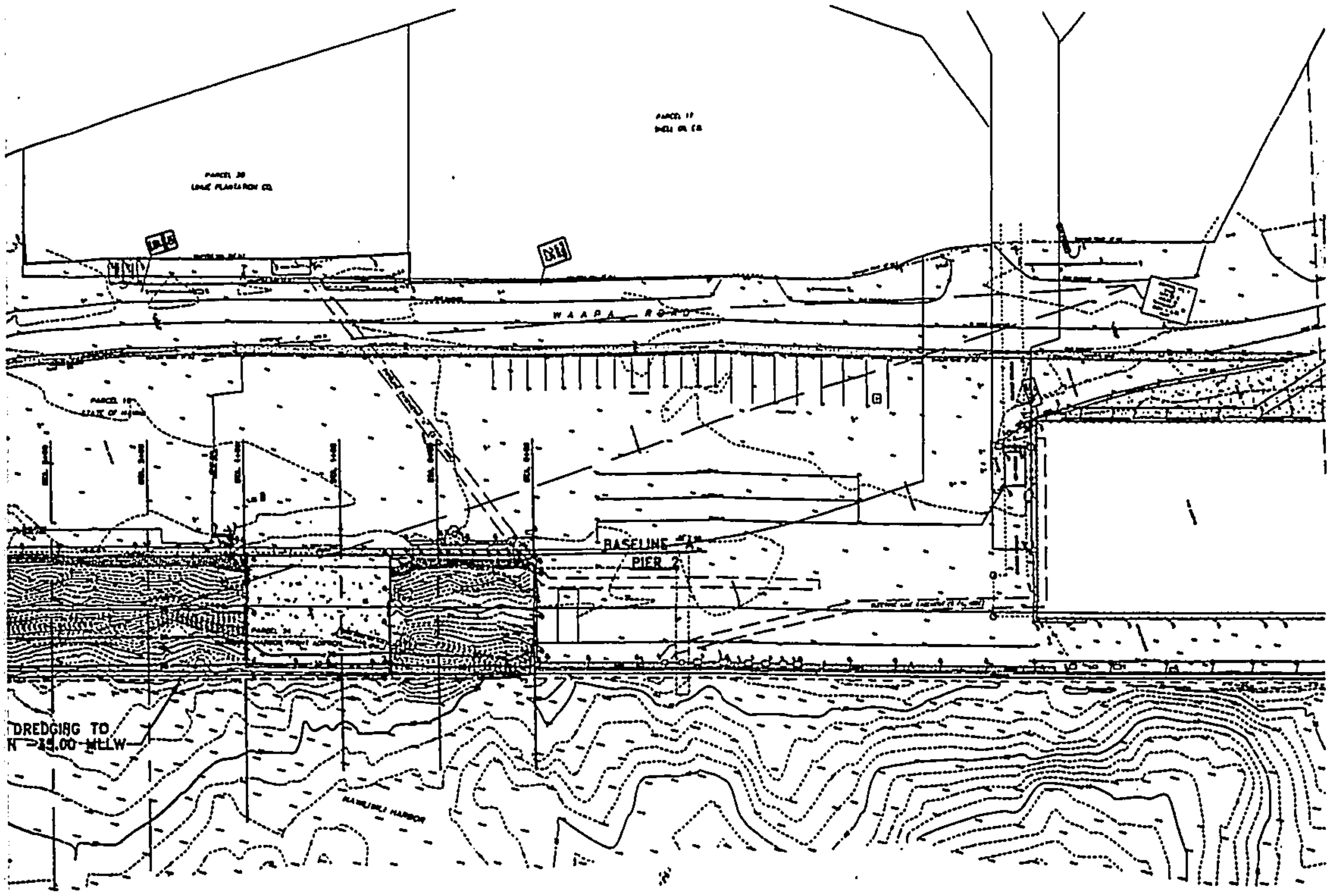
RAMP LONGITUDINAL SECTION

ACCESS RAMP DETAILS

DRAWING NO. 9



NEW RIP-RAP REVETMENT
BASELINE "B"
PIER 3
BASELINE "A"
NEW DOUBLE MOORING BITT
LIMIT OF DREDGING TO ELEVATION -35.00 MLLW
APPROXIMATE DREDGE LIMITS TO ELEVATION -35.00 MLLW
PROPOSED NEW PIER
PROPOSED SHIP OUTLINE
EXIST. PIER 3
BASELINE "B"
N A W
A
DR-1
04/02/04



LIMITS
MLLW

W I L I W I L I H A R B O R

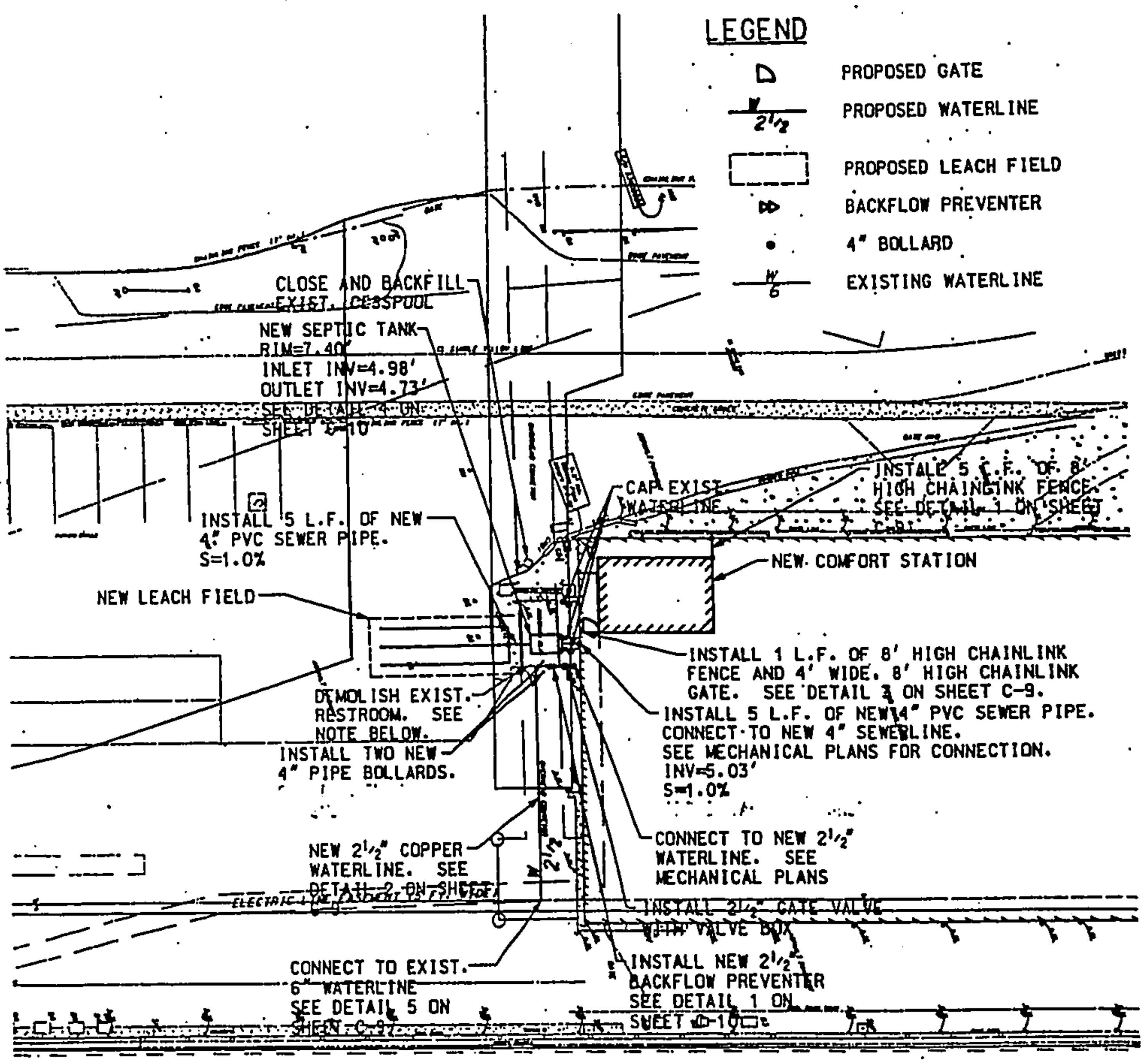
DREDGING SITE PLAN – PIER 3

SUMMARY OF APPROXIMATE QUANTITY TO BE DREDGED

BASELINE "A" STA. 0+00 TO 3+00	=	3,270 C.Y.
BASELINE "A" STA. 3+00 TO 6+50	=	20,601 C.Y.
BASELINE "A" STA. 6+50 TO 6+70	=	3,089 C.Y.
BASELINE "A" STA. 6+70 TO BASELINE "B" STA. 3+00	=	1,376 C.Y.
BASELINE "B" STA. 0+00 TO 3+00	=	2,615 C.Y.
TOTAL APPROXIMATE QUANTITY	=	30,951 C.Y.

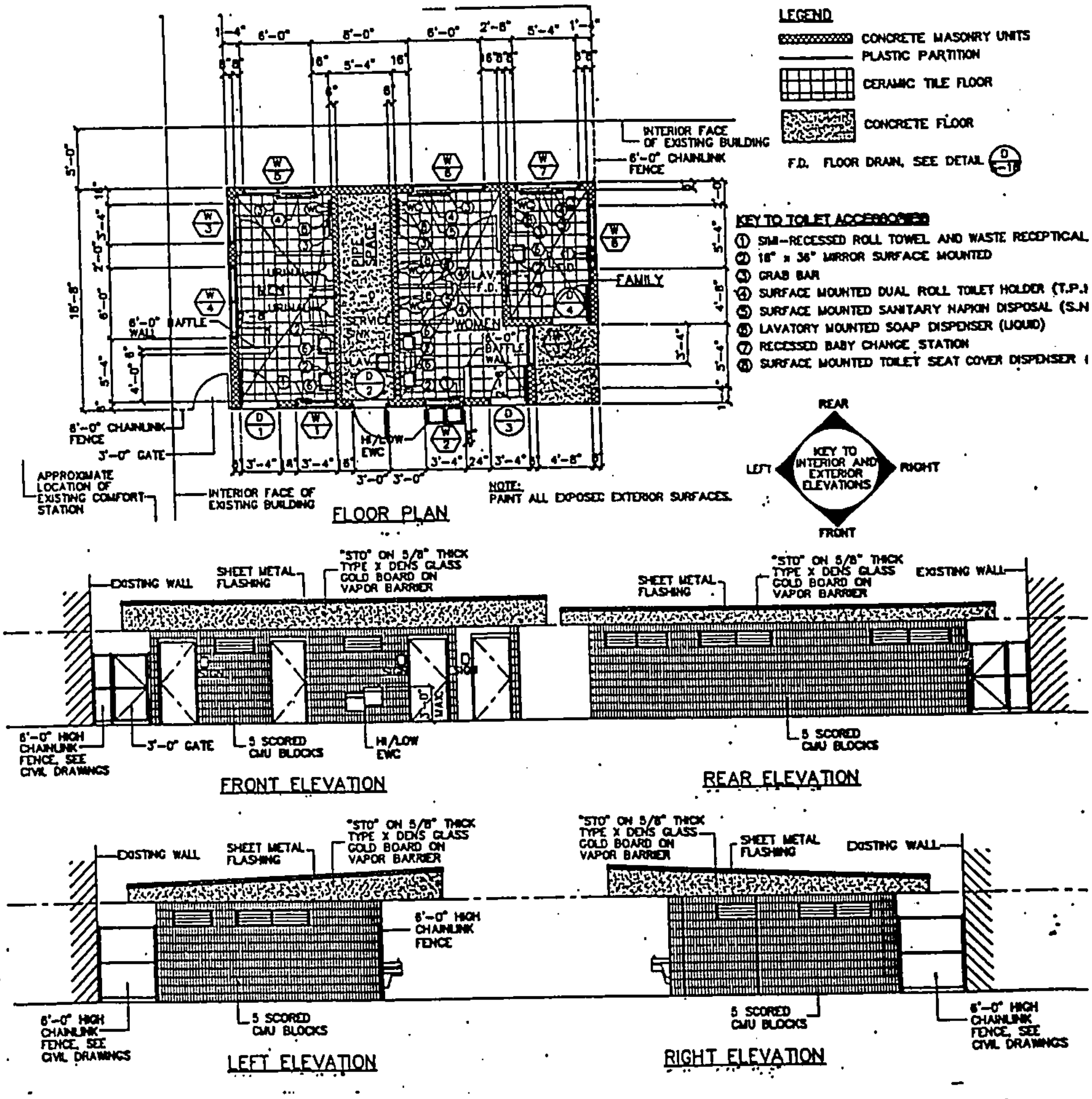
* FOR BIDDING PURPOSE ONLY.
CONTRACTOR TO VERIFY ALL QUANTITIES.

DRAWING NO. 10



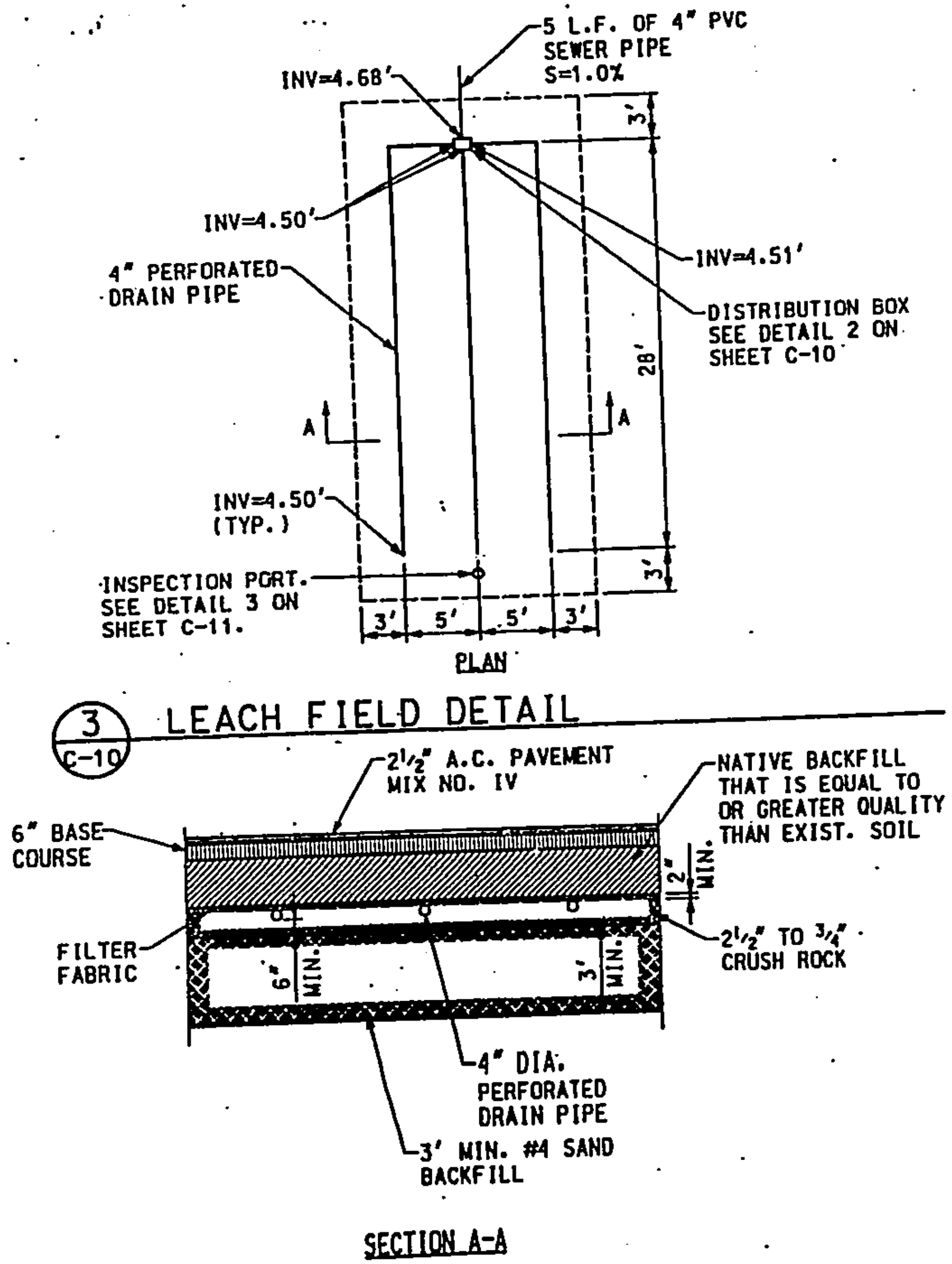
LOCATION PLAN: COMFORT STATION & LEACH FIELD

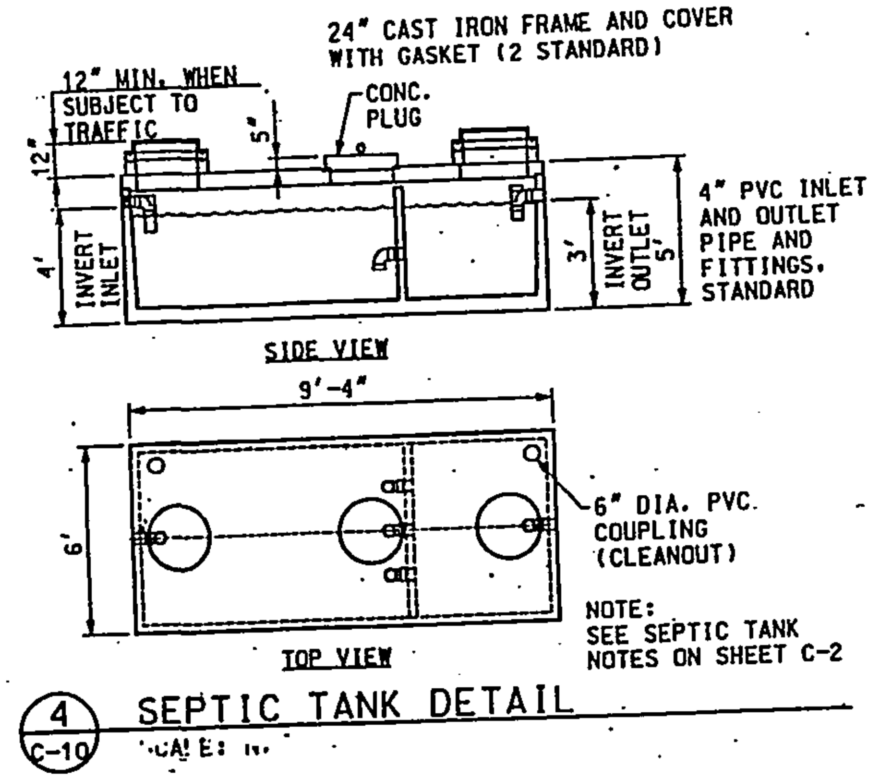
DRAWING NO. 11



COMFORT STATION
PLAN & ELEVATION DETAILS

DRAWING NO. 12





LEACH FIELD DETAILS

DRAWING NO: 13

SECTION 4

GENERAL CHARACTERISTIC
4B: SOCIAL AND ECONOMIC CHARACTERISTICS

SOCIAL:

Population: The population of Kauai County during the past years were:

Year-1980	Year-1990	Year-2000
39,082	51,177	58,463

The racial or ethnic categories in the year 2000 were:

·One race:	44,525
White	17,255
African American	177
American Indian and Alaska Native	212
Asian	21,042
Native Hawaiian/Pacific Islander	5,334
Other race	505
Two or more races:	13,938

The following tabulation shows the major background of race alone or in combination with one or more races:

White	27,113
African American	518
American Indian and Alaska Native	1,376
Asian	31,752
Native Hawaiian/Pacific Islander	14,171
Other race	2,445

The totals may add up to more than the County total due to the individual reporting more than one race.

Since the 2000 census reported population figures in a different format, ethnic (race) comparisons with previous years could not be made.

The next tabulation, which is more of a national interest, is a count of the Hispanic or latino race on Kauai:

- Hispanic or latino:

Hispanic	4,803
Non-Hispanic	53,660

Jobcount: The jobcounts by industry for the County of Kauai for the years shown were:

	Y-2000	Y-1990	Y-1980
• Nonagriculture	25,450	23,950	15,150
Construction & Mining	1,000	1,400	1,100
Manufacturing	500	900	1,300
Durable goods	50		
Nondurable	450	900	1,300
Food processing	250	750	1,200
Printing & Publishing	100		
Transp., comm., utilities	1,750	2,350	1,600
Transportation	1,450		
Communication	-		
Utilities	-		
Trade	7,450	7,050	3,700
Wholesale	550	500	350
Retail	6,950	6,550	3,400
Finance, ins. & real estate	1,100	1,400	950
Services & Miscellaneous	9,500	7,500	3,750
Hotels	3,700	3,800	1,850
Health services	1,450	1,150	
Government	4,100	3,350	2,750
Federal	450	350	250
State	2,600	2,100	1,650
Local	1,050	900	850
• Agriculture, wage & salary	950	1,150	1.550
Sugar		950	1,400
Other		200	150

The closing of the sugar plantations has altered the social fabric of the community. From a predominant agricultural base, jobs now largely center on the services (hotel) industry and retail shops which are heavily dependent on the visitor industry. The improvements to provide adequate docking facilities at Pier 3 are needed to sustain the visitor industry.

Individual farm ownership and farm cooperatives will see some growth as is evident from recent farm development projects with new type of crops taking over former sugar cane lands.

ECONOMICS OF THE CRUISE INDUSTRY:

The Northwest Cruise Ship Association, in a statement issued in December 2001, estimates the cruise industry's annual economic benefit to Hawaii at $91.9 million. This includes: $28.6 million spent by passengers on pre- and post-cruise packages; $16.1 million for shore excursions; and $24.7 million in fuel costs. The average cruise ship passenger spends an average of $83 per day on shore.

A study by Leo A. Daly on the cruise ship industry summed up the possible contribution made to each island as follows:

Islands	1998	2004	2020
Oahu			
* Spending & Ops	$78,353,383	$374,022,255	$429,549,089
* Jobs	736	3,230	2,676
Maui			
* Spending & Ops	$81,202,044	$391,920,720	$439.926.809
* Jobs	779	3,418	2,832
Kauai			
* Spending & Ops	$48,526,401	$233,159,599	$264.401,537
* Jobs	461	2,022	1,675
Hawaii			
* Spending & Ops	$96,597,596	$464,744,982	$525,061,897
* Jobs	922	4,043	3,350
Total			
*** Spending & Ops**	**$304,679,423**	**$1,463,847,556**	**$1,658,939,332**
*** Jobs**	**2,898**	**12,713**	**10,532**

The above study was made in January 1999, prior to the September 11, 2001 attack on the World Trade Center in New York. However, the cruise industry is recovering despite the 9-11 event and the departure of the American Hawaii Cruises from our State. The economic figures above indicate the potential that was forecast and is now a target goal for the State.

In a study conducted by the State Department of Business, Economic Development and Tourism, the following typical figures for cruise ship stop-overs taken during September-November 2001 were released. It was found that the average cruise ship visitor spent $84.40 per person per day. This was further defined based on the passenger's origin. The East Coast visitor spends an average of $94.20 per day. The West Coast visitor was credited with $82.60 per day. The European traveller spent $87.40 per day while the Canadians spent an average of $67.70 per day per person. This study was to show that despite the down turn of tourism following the September 11, 2001 attack and the bankruptcy of the American Hawaii Cruises, one segment of the visitor industry was holding firm.

A more detailed analysis are shown in the **TABLES 2 & 3** on the following pages which cover the period of January 2002 to June 2002. In summary, the figures are similar to the initial study taken shortly after the September 11. 2001 disaster. The six-month study resulted in the following data:

Total Lodging:	$ 18.51
Total Food/beverage:	12.64
Total Entertainment:	3.61
Total Transportation:	10.45
Total Shopping:	17.32
All Others:	8.16
Shore Tour Spending	20.79
Total Spending/Person/Day:	$ 91.48

TABLE 3: CHARACTERISTICS OF ALL OVERNIGHT VISITORS BY ISLANDS

DBEDT

Total Cruise Passengers by MMA: January - June 2002

	Passenger Type			Visitors by MMA				
	Total	Out-of-State Visitors	Hawaii Residents	U.S. West	U.S. East	Canada	Europe	Other
Total Passengers	118,515	114,947	3,544	34,115	64,466	6,811	2,282	5,273
Island Visitation (Number of Passengers)								
Oahu	118,515	114,947	3,568	34,115	64,466	6,811	2,282	5,273
Kauai	107,538	104,300	3,238	32,779	58,493	6,180	2,070	4,785
Maui County	112,927	109,527	3,400	34,412	61,426	6,490	2,174	5,024
Maui	112,927	109,527	3,400	34,412	61,426	6,490	2,174	5,024
Molokai	1,160	1,107	53	354	686	100	42	25
Lanai	1,718	1,684	34	532	942	46	59	84
Big Island	110,897	107,558	3,339	33,793	60,322	6,373	2,135	4,934
Visited a Neighbor Island	118,515	114,947	3,568	34,115	64,466	6,811	2,282	5,273
Neighbor - only or plus Oahu	118,515	114,947	3,568	34,115	64,466	6,811	2,282	5,273
Number of islands visited	4.02	4.02	4.01	4.02	4.03	4.02	4.04	4.02
Purpose of Trip (Number of Passengers)								
Honeymoon	4,381	4,307	73	1,821	2,630	211	62	284
Wedding	785	778	7	175	497	48	13	44
Convention Conference	840	809	32	195	468	85	7	53
Business	1,766	1,661	105	643	883	81	5	48
Friends & relatives	10,409	9,990	420	4,431	4,668	410	88	193
Play Golf	3,204	3,152	52	1,112	1,720	198	34	88
Leisure	99,484	96,516	2,969	29,840	54,738	6,028	2,073	4,638
Type of Accommodation (Number of Passengers)								
Hotel	63,979	63,676	303	16,363	37,644	4,373	1,739	3,717
Hotel only	58,990	58,772	218	14,465	33,175	3,949	1,639	3,533
Condo	4,469	4,300	170	2,141	2,018	203	39	99
Condo only	2,001	1,873	128	913	813	82	0	66
Timeshare	2,314	2,266	47	843	1,064	140	88	107
Timeshare Only	809	809	0	337	386	34	0	49
Cruise only	47,019	45,283	1,733	17,272	23,847	2,270	534	1,340
Bed & Breakfast	840	778	62	146	533	7	47	42
Bed & Breakfast only	316	316	0	41	176	0	0	0
Friends & relatives	2,872	2,643	228	1,181	1,204	115	46	94
Friends only	1,536	1,431	105	742	602	56	0	31
Other accommodation	3,605	2,325	1,281	673	1,371	129	55	97
Other accommodation only	2,494	1,275	1,219	348	746	95	9	37
Length of Stay	6.74	6.78	5.66	6.78	6.64	7.38	7.68	7.27
LOS before Cruise	1.08	1.13	0.81	0.84	1.20	1.47	1.52	1.37
LOS in Hawaii During Cruise	4.49	4.50	4.07	4.54	4.48	4.54	4.63	4.31
LOS in Hawaii After Cruise	1.17	1.16	1.58	1.40	0.96	1.28	1.52	1.60
Type of Visitors								
No Answer	16,239	13,640	2,598	2,403	9,083	809	557	784
First Timers	39,943	39,864	79	6,700	27,878	2,159	1,318	1,820
Repeat Visitors	62,333	61,442	891	27,010	27,513	3,843	407	2,670

Source: DBEDT

TABLE NO. 4: PER PERSON PER DAY SPENDING BY CATEGORY AND BY MMA

Per Person Per Day Spending by Category and by MMA

[illegible]	[illegible]	[illegible]		Visitors by MMA			
	[illegible]	[illegible]	U.S. West	U.S. East	Canada	Europe	Other
Total Lodging	[illegible]	[illegible]	$14.43	$19.60	$23.76	$25.16	$22.76
Total Food & Beverage	[illegible]	[illegible]	13.87	12.52	14.58	12.89	14.67
Food at Restaurants	7.60	3.30	4.87	7.47	9.36	9.34	10.20
Dinner Shows	3.45	2.21	3.30	3.03	2.31	1.89	2.25
Groceries	1.59	1.95	1.71	1.41	2.07	1.25	2.21
[illegible]	[illegible]	[illegible]	3.58	2.76	2.88	3.19	2.61
[illegible]	[illegible]	[illegible]	11.39	10.33	8.88	8.30	9.71
Inter-island airfare	4.65	2.96	3.32	4.56	2.81	3.94	4.09
Ground transportation	1.97	0.58	1.58	1.93	1.52	2.82	2.53
Rental vehicles	3.30	0.25	3.42	3.30	2.91	1.16	2.79
Other transportation	0.52	0.37	0.57	0.51	0.44	0.35	0.50
[illegible]	[illegible]	[illegible]	16.46	17.94	14.69	18.67	17.92
Fashion and Clothing	3.39	2.35	5.32	3.35	5.30	5.32	6.47
Jewelry / Watch	4.86	3.80	4.03	3.35	2.57	4.18	3.63
Cosmetics / Perfumes	0.50	0.21	0.45	0.40	0.37	0.83	1.06
Leather Goods	0.31	0.36	0.32	0.38	0.23	0.35	0.56
Hawaii food Products	1.60	0.30	1.29	1.67	1.23	1.11	1.44
Souvenirs	4.56	0.97	3.95	4.79	4.48	4.79	4.77
All Other	8.16	6.40	7.23	9.23	4.89	4.28	6.92
Shore Tour Spending	20.79	5.41	18.17	22.42	15.69	14.37	15.64
Shore Tour: Honolulu (Oahu)	3.19	0.99	2.61	3.73	1.97	1.78	2.62
Lahaina (Maui)	4.53	0.73	3.45	5.28	3.45	3.80	3.36
Kahului (Maui)	2.83	0.54	2.13	2.71	0.75	0.90	1.36
Kona side (Big Island)	2.23	0.40	2.85	2.45	1.88	1.34	1.82
Hilo side (Big Island)	3.84	1.08	3.23	4.36	2.13	2.40	3.12
Nawiliwili (Kauai)	4.97	1.67	4.51	5.40	4.43	3.85	3.57
Total Spending Per Person Per Day	$91.48	$34.99	$83.34	$96.78	$84.87	$87.86	$90.45
Sample size	10,983	378	3,760	4,375	509	232	547

Source: DBEDT

A recent study commissioned by the Norwegian Cruise Lines, which has taken over the role of the now-defunct American Hawaii Cruise, indicates some enlightening statistics. Under full operation, the Norwegian Cruise Lines could be providing 10,200 jobs with wages of $270 million. Passengers are expected to contribute $355 million to the islands' economies. According to the company reports, another ship will take over the schedule set for the new Pride of America. This new ship was damaged while under construction. The Norwegian Pride of Aloha liner, now under renovation, will assume the schedule of the Pride of America in the interim period. By the end of the year it is possible that three ships of the Norwegian Cruise Lines will be plying the Hawaiian Archipelago waters. Norwegian Cruise Lines estimates that in year 2007, they will bring 670,000 passengers to Hawaii as compared to 242,000 in year 2002.

The air travel industry figures for Lihue Airport are shown below for comparison purposes.

AIR PASSENGERS

Year	Inter-Island	Overseas	Total
2000	2,684,000	199,491	2,883,521
2001	2,396,481	282,436	2,678.917

SECTION 4

GENERAL CHARACTERISTIC
4C: ENVIRONMENTAL CHARACTERISTICS

EXISTING ENVIRONMENT:

The Nawiliwili Pier 3 Improvement project is located in a fenced industrial area that is heavily built up with pavement, piers, rock walls and revetments, metal buildings, etc. It is not an environment that shelters or sustains rare or endangered biota. The Nawiliwili Harbor is the chief port on Kauai, one of the eight ports in the State, and is the center of shipping commerce for the island. The activities at the harbor include Matson Navigation Company ships loading and unloading overseas containers at Pier 1 which are forwarded to Kauai from Honolulu; cruise ships which transport tourists at Piers 1 and 2; and the Young Brothers barges which transport inter-island cargo at Pier 3. The large steel warehouse located on the hill behind the harbor at Pier 2 was once used by the sugar industry and is still a dominate feature near the harbor. The structure is used for storage today.

The port activities may include some heavy traffic at peak hours due to trucks hauling goods, employee traffic, and buses and limousine escorting tourists to scenic sites. Traffic from construction activities will add to those of existing harbor operations. However, this is of temporary nature lasting only for the duration of construction period.

There is considerable noise generated from the activities occurring at the harbor. This is to be expected from an industrial center with multiple activities involving commerce for the island. In this respect much of the construction-generated noise from the Pier 3 Segmented Pier project will most likely be blended into the ambient noise levels of the project area. The noise from pile driving activities are mitigated to some extent by being limited to day-light hours when ambient noise levels are high.

Present air quality levels meet national ambient air standards. Air quality impacted from construction activities will be of temporary duration. No additional deterioration of air quality is expected after the project has been completed.

The quality of the harbor water suggests a well-mixed surface water. Some water samples were slightly more brackish. However, the salinity in the project area was depressed compared to ocean values. One striking feature is the discharge from Hule'ia Stream into the harbor following heavy rains. The salinity of the surface water was brackish while deeper water samples proved to be essentially seawater.

EXISTING SOIL CONDITIONS:

The findings indicate that with the exception of one sample at Pier 2 which showed a high level of TPH-diesel and another sample at the north Pier 3 area which showed a high level of arsenic, the chemical concentrations in the soils encountered in the borings are generally within acceptable levels.

The subsurface investigation to determine the levels of contamination in the existing soils of he project site is summarized in the **"FINAL REPORT, SUBSURFACE INVESTIGATION OF THE PIER 2 AND NORTH PIER 3 IRMPROVEMENT"** prepared by Earth Tech, Inc. The report is attached as **APPENDIX H** to this assessment. The summary of the chemical analyses of the soil samples taken is included in **TABLE NO. 5: SUBSURFACE INVESTIGATION, NAWILIWILI HARBOR** which is listed on page 46 of this assessment.

OTHER FEATURES:

Nawiliwili Bay is also the site of the State Division of Boating and Ocean Recreation small boat harbor for berthing of recreational fishing boats, and a ramp for launching trailer-mounted boats. Adjoining the small boat harbor is the Niumalu County Park. This park is used by canoe clubs in a sport that has State-wide interest.

SECTION 5
ARCHAEOLOGICAL AND CULTURAL ASSESSMENT

HISTORICAL REPORT:

Nawiliwili Harbor is located in what used to be the Puna District and is the Lihue District today. It is in the *ahupua`a* of Nawiliwili. The *ahupua`a* most likely derives its name from the blossoms of *wiliwili* trees which grew in abundance nearby in early days. Since Nawiliwili Bay was developed into a deep draft harbor port, little archaeological vestiges remain of what probably was a well-populated area in olden times.

Overlooking Nawiliwili Bay, where Kauai High School is located, was once a large paved *heiau* called *Kuhiau*. No trace of this *heiau* can be found today. It was the largest and most famous temple on the island. Below this, in the bay, is a rock called *Paukini*. This rock is said to have been the companion or sister *heiau* and probably the home of the *kahuna* for the *heiau*. Development of the wharves has not yet touched his fabled rock. There is the possibility of another significant *pohaku* or rock may exist in the Pier 2 vicinity which will require study to determine its significance. However, since it is purported to be outside of the project area and, thus, will not be effected by the project, no additional study will be carried out at this time.

The *menehune*, or storied little brown work-people of Kauai, were said to live in this area. The legend of the *menehune* lives on in nearby *Alekoko*, commonly known as the *Menehune* Fishpond.

In early sailing ship history, Nawiliwili Bay was deemed to be virtually the only natural harbor on Kauai. However, since the bay opened directly to the tradewinds, other protected anchorages on the west side of the island were used. These were at Koloa and Waimea Bay. After agriculture became an important industry with the growing of sugar cane at Lihue Plantation, the development of a modern harbor facility at Nawiliwili began. Congress approved funds for a breakwater and dredging of a turning basin which were completed by the U.S. Army Corps of Engineers in 1930. Other improvements by the Territorial government were subsequently carried out. After Statehood, the State government continued to make additional improvements.

Further details can be found in report submitted by Cultural Surveys of Hawaii`i, **APPENDIX D: HISTORICAL/CULTURAL ASSESSMENT.**

CULTURAL ASSESSMENT:

It is highly improbable that there will be any appreciable cultural impacts from the Pier 3 segmented pier project since the work will be in an existing industrial site which dates back more than 70 years. The use of the sea for sustenance and recreation is a feature of Hawaiian life. Until the September 11, 2001 attack on the United States by terrorists, fishing was permitted from the piers and within the harbor. However, new security regulations prohibit fishing from the pier areas. **DRAWING NO. 2: NAWILIWILI HARBOR PLAN** delineates the area of the inner harbor where fishing is regulated.

While fishing within the bay is permitted, there is a conflict between pole or hand fishermen and the commercial fishermen using gill nets within the bay. It appears that this confrontation may be eliminated or minimized by new regulations which may be developed by the Department of Land and Natural Resources.

Besides fishing, the use of canoes within the bay is a normal occurrence. This vestige of Hawaiian history is an important part of the renaissance of the Hawaiian culture today. There is no regulation, save the national security measures, governing the use of canoes within the harbor area save the common sense practice of those paddling canoes not to encroach upon the path of ocean-going ships. Since the ship schedule is published for each year ahead of time, the canoe enthusiasts will be able to schedule events without undue conflicts with the shipping industry.

A detailed cultural assessment is contained in **APPENDIX D.**

SECTION 6

MAJOR IMPACTS AND ALTERNATIVES

TRAFFIC:

There will be increase in traffic generated in the future when more than one cruise ship is allowed to dock at Nawiliwili Harbor. While there will be a slight increase in passenger arrivals, it will not affect the peak hour traffic as the cruise ship will have different arrival and departure times.

Construction generated traffic is of a temporary nature. During the construction period, scheduling of construction traffic to avoid normal peak hour harbor traffic will be implemented to prevent congestion and so as not to interfere with the cruise ship passengers itineraries. Police supervision may be necessary at times when the precast piles, and dredging and pile-driving equipment are brought to and from the project site.

HARBOR SHIP DOCKING:

The project will facilitate the docking of the 856 feet long and similar size cruise ships, and minimize interference with the Pier 1 container operations and the Pier 3 barge services. Due to the length of the newest cruise ships and the configuration of the Nawiliwili Harbor, special care must be taken by harbor pilots in navigating the ship into port. The harbor pilots have undergone training to handle this demanding task.

ARCHAEOLOGICAL/CULTURAL:

No archaeological impacts from the Pier 3 Segment Pier will result since the work will be confined within an established industrial wharf area. The existing restrictions on entry to the wharf area which has curtailed the free passage of fishermen will remain for the foreseeable future. This restrictive regulation is part of the nation-wide approach to cope with the terrorist threat facing us today. As such, what little effect this has on the local cultural ways as related to the sea must be accepted as part of the public's understanding of today's extraordinary circumstance involving security.

AIR QUALITY:

An assessment of the air quality study was made which included a traffic study. The traffic study disclosed that the peak traffic occurred during normal work rush hours and not necessarily traffic created by passengers from the cruise ship. The traffic analysis was based on vehicle counts conducted by the Department of Transportation and used by the Traffic Consultant.

The air quality assessment by the B.D. Neal & Associates was first based on an earlier proposal to dock two ships of the American Hawaii Cruise Lines (AHCL) at Pier 2. These cruise ships were to be the 840 feet cruise ships for which orders had been placed. This did not materialize as the firm filed for bankruptcy following the economic down-turn caused by the event of September 11, 2001. The final assessment was based on the premise that only one ship, such as of the Norwegian Cruise Lines' Norwegian Star, which is 965-foot in length, would utilize the Pier 2 section at any one time. Further, the traffic generated by the ship passengers is minimal during peak traffic hours as reported by the traffic consultant. The final conclusion was that, based on the foregoing premise, the proposed project will have virtually no impacts on air quality.

This assessment is shown in **APPENDIX E: AIR QUALITY ASSESSMENT & TRAFFIC STUDY.**

NOISE AND VIBRATION:

A study was conducted to evaluate noise and vibration impacts of this project. This is contained in **APPENDIX F: NOISE VIBRATION STUDY** by Y. Ebisu & Associates. The work on constructing the segmented (stand alone) Pier 3 improvements will generate noise that will be caused by dredging equipment, pile driving machinery, and trucks involved in the hauling of dredge materials.

The dredging operation noise levels are estimated to range from 75 to 88 dBA for floating barge cranes with proper mufflers. Noise levels are not expected to exceed 60 dBA at the closest residences. The predicted noise levels are comparable to the background ambient noise levels. The trucks to transport the dredged materials away from the harbor area will intermittently exceed 85 dBA at 50 feet from the roadways. Since other heavy equipment (e.g., cargo trucks) will be also operating in the area, it would be difficult to differentiate the source.

Pile driving will be the chief source of noise disturbance with probable levels 98 dBA at a distance of 100 feet to 78 dBA at 1000 feet distance. Maximum noise levels in the residential areas are expected to range between 72 and 79 dBA. Noise levels indoors will be slightly less. Lower levels are expected at Kauai High School due to the shielding effect of the high bluffs north of Wa'apa Road.

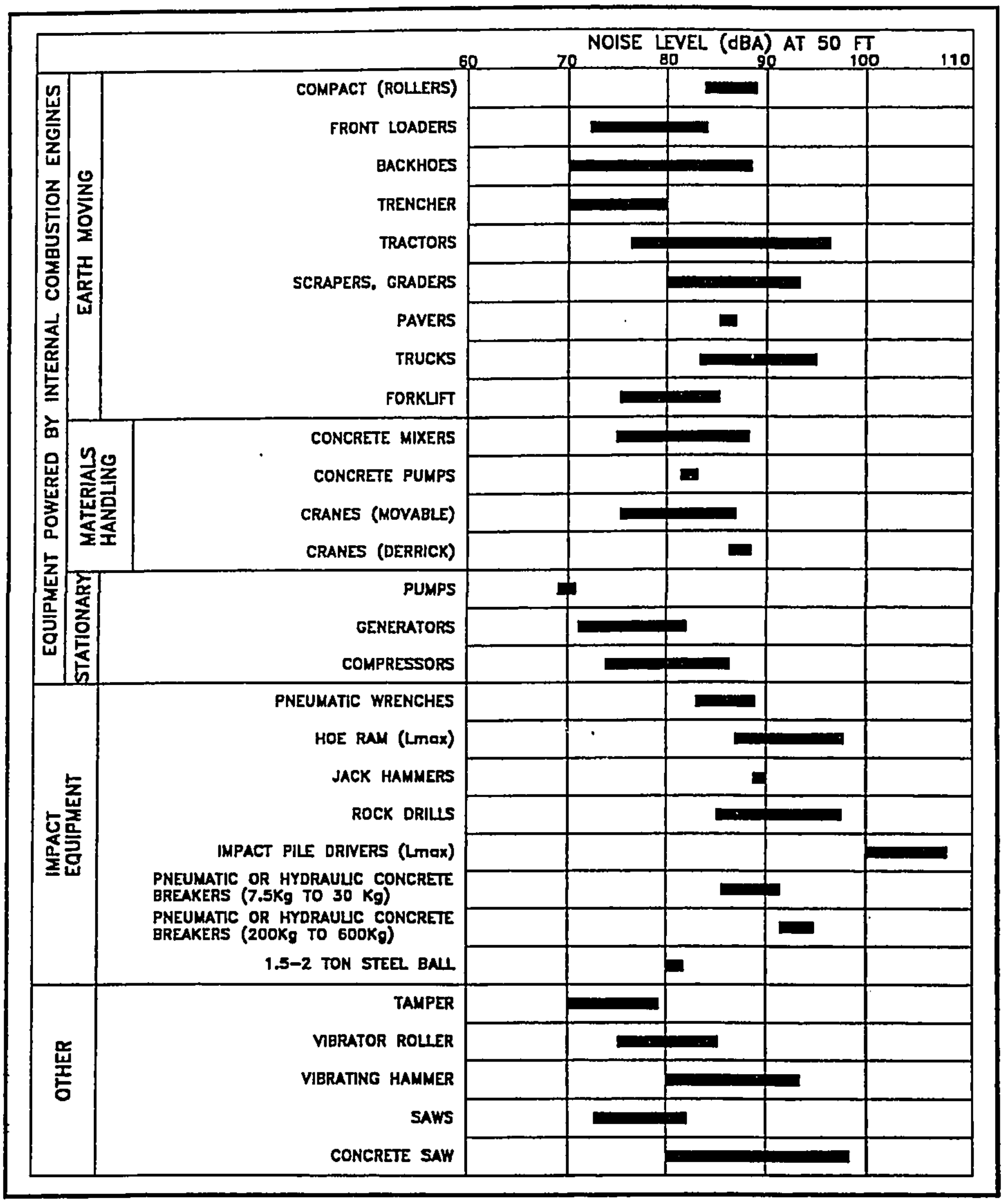
The noise effects can be seen in RANGES OF CONSTRUCTION EQUIPMENT NOISE LEVELS, taken from FIGURE 7 of **APPENDIX F**; and probable noise levels at selected locations is noted on MAXIMUM NOISE LEVELS DURING PILE DRIVING OPERATIONS, taken from FIGURE 9A of **APPENDIX F**.

The following list is the sound levels from different sources for comparison purposes:

Quiet wilderness area	20-30 dBA
Quiet suburban residential area	48-52 dBA
Business Office	50-60 dBA
Noisy urban area	80-90 dBA
Adjacent to freeway	90 dBA
Jet airplane at 100 feet	120-130 dBA

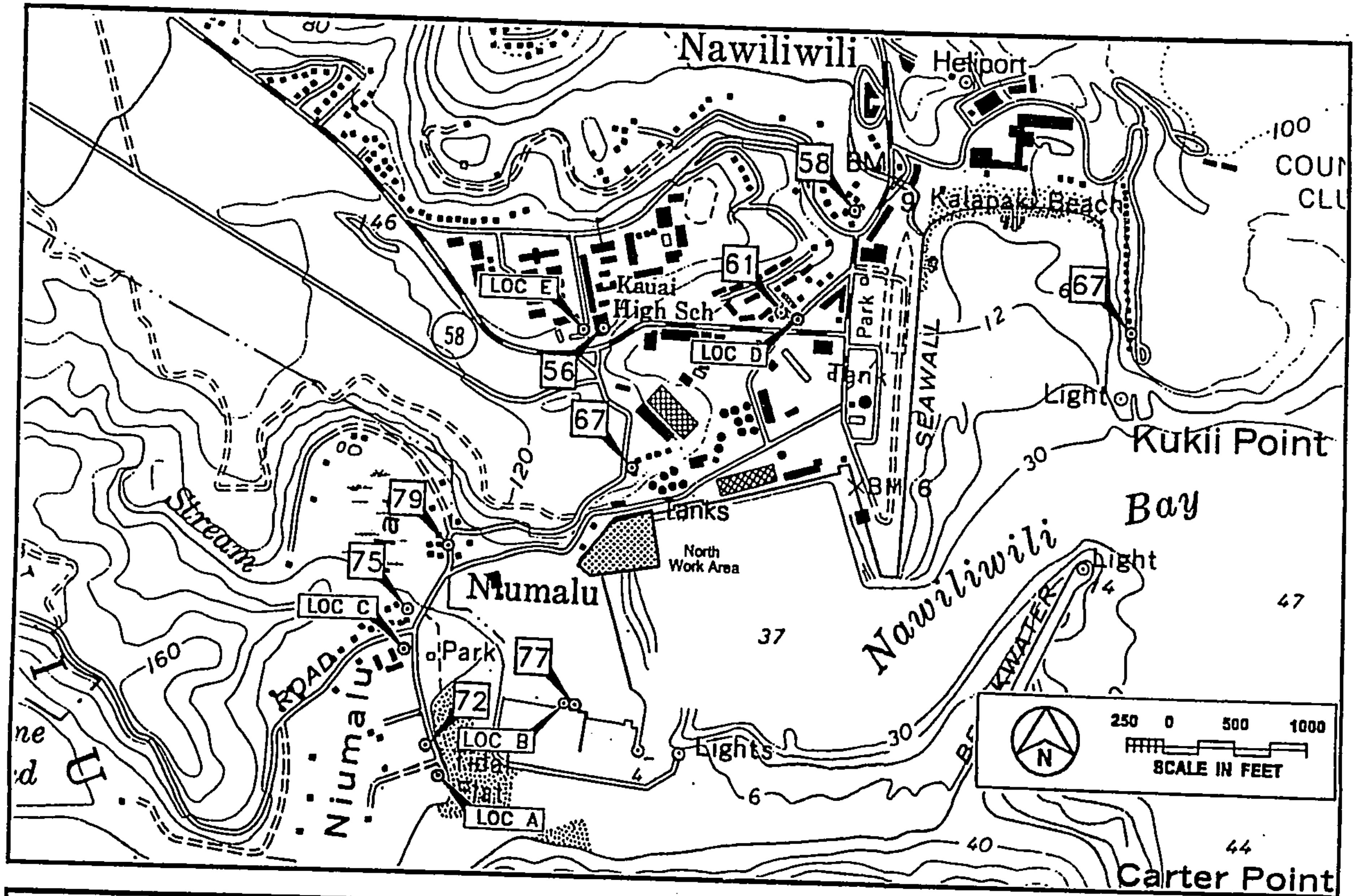
(Taken from Department of Energy publication.)

Vibrations from pile driving operations have the potential to cause architectural and structural damage to buildings, and create discomfort to those exposed to high levels of vibration. The final vibration level will be determined by the blow of the pile driver



RANGES OF CONSTRUCTION EQUIPMENT NOISE LEVELS

FIGURE 7



MAXIMUM NOISED LEVELS (IN dBA) DURING PILE DRIVING WITHIN THE NORTH WORK AREA

FIGURE 9A

which normally ranges from 30,000 to 50,000 foot-pounds. SUMMARY OF BUILDING DAMAGE CRITERIA, taken TABLE 1 of **APPENDIX F**, shows the various levels of damage that may be caused by vibration. The vibration intensities and its nuisance value for causing damaging effect are reflected in this table. The vibration levels at residences has been calculated in the low ranges and no damage is foreseen. Vibration levels of slightly higher levels that may be expected to occur at various locations are noted on FIGURE 12A: PEAK VIBRATION LEVELS DURING PILE DRIVING, taken from **APPENDIX F.**

WATER QUALITY:

Tests to determine the existing quality of the harbor water were performed. The analysis examined the water for: ammonia, dissolved oxygen, nitrate + nitrite, pH, salinity, temperature, total nitrogen, total phosphorus, total suspended solids, and turbidity. These tests from various locations showed a reasonably well-mixed surface water in the harbor. Slight variations in the salinity content were noted at two locations. However, the salinity within the harbor was depressed compared with typical oceanic values. It was concluded that dissolved oxygen values all indicated water close to saturation for oxygen. The turbidity and total suspended solid values were reasonable for a harbor and river mouth. Also, nutrient values were reasonable and indicated no water quality problems. The water quality test results, **TABLE NO. 2: WATER QUALITY CHARACTERISTICS OF NAWILIWILI HARBOR** is shown in **SECTION 3**. The complete report of the marine survey is contained in **APPENDIX B: MARINE ENVIRONMENTAL ASSESSMENT** prepared by Sea Engineering, Inc.

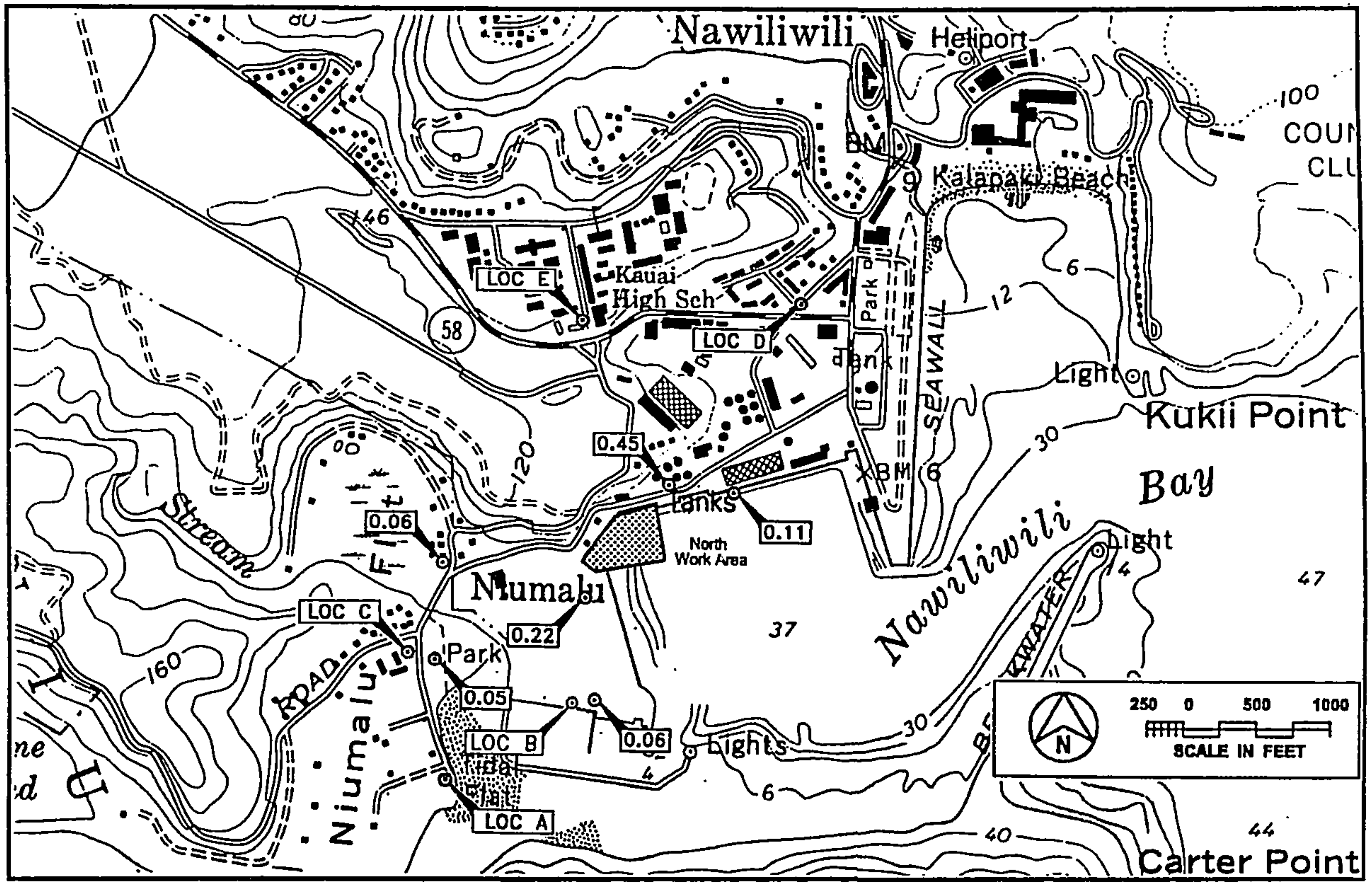
During construction, the waters in the harbor will be affected to some extent by construction activities. However, mitigation measures shall ensure that turbidity arising from the contractor's work shall be contained. Since swimming and pole fishing in the vicinity of the project area are prohibited for safety and security reasons, no adverse impacts from construction

TABLE 1

SUMMARY OF BUILDING DAMAGE CRITERIA

PEAK GROUND VELOCITY (mm/sec)	PEAK GROUND VELOCITY (in/sec)	COMMENT
193.04	7.6	Major damage to buildings (mean of data).
137.72	5.4	Minor damage to buildings (mean of data).
101.16	4.0	'Engineer structures' safe from damage.
50.8	2.0	Safe from damage limit (probability of damage <5%).
		No structural damage.
33.02	1.3	Threshold of risk of 'architectural' damage for houses.
25.4	1.0	No data showing damage to structures for vibration <1 in./sec.
15.24	0.6	No risk of 'architectural' damage to normal buildings.
10.16	0.4	Threshold of damage in older homes.
5.08	0.2	Statistically significant percentage of structures may experience minor damage (including earthquake, nuclear event, and blast data for old and new structures).
		No 'architectural' damage.
3.81	0.5 to 0.15	Upper limits for ruins and ancient monuments.
1.0	0.04	Vertical vibration clearly perceptible to humans.
0.32	0.01	Vertical vibration just perceptible to humans.

Source: 'State-of-the-Art Review: Prediction and Control of Groundborne Noise and Vibration from Rail Transit Trains'; U.S. Department of Transportation; December 1983.



PEAK VIBRATION LEVELS (IN INCHES / SEC.) DURING PILE DRIVING WITHIN THE NORTH WORK AREA

FIGURE 12A

work are expected on these activities. Upon completion of the project, the quality of the harbor waters is expected to return to its former state with no adverse lasting impact as a result from the Pier 3 construction work.

The impacts caused by dredging, pile driving and pre-drilling operations will temporarily raise some of the harbor water quality values such as total suspended solids and turbidity. These will be of temporary nature and return to normal values after the discontinuation of dredging, pile driving and pre-drilling operations. No adverse wide-spread effect is expected to ensue as BMP (Best Management Practice) plans will provide suitable mitigation measures to control and contain instances of pollution.

DREDGING:

Dredging will be accomplished by a suitable method appropriate for the site. The method will be the contractor's choice, however, it must conform with applicable regulations of the U.S. Army Engineer District Office's enforcement for this type of work. Dredging will be by barge-mounted clamshell bucket, long reach excavator, and/or suction equipment. Noise caused by the dredging equipment and disturbance to the harbor bottom will be unavoidable impacts. The removal of the dredged material shall be carried out in compliance with the Clean Water Act. The de-watering of the dredged material will be at a site which is secured and made water-tight with berms and waterproof materials. Storage of the de-watered dredged material will be at site above the harbor next to the bulk sugar storage warehouse. The site is a former drainage basin. The dredged materials will be used by the County in the future for landscaping purposes at sites elsewhere.

The demolished concrete structures of the abandoned boat ramp and dock facilities will be stored separately from the dredged harbor bottom material. These concrete debris will be disposed at an approved land-fill site.

EXCAVATION:

The on-shore materials excavated in the Pier 2 and North Pier 3 areas will be kept separate from the dredged harbor materials. Due to evidence of TPH-diesel and arsenic concentrations, the materials shall be stored in a separate stockpile for use in place or disposed, as determined by the Engineer, at a suitable approved landfill site.

COMFORT STATION:

A new comfort station will replace the existing restroom. The present facility at Pier 2 is deemed inadequate to properly service the cruise ship passengers. To service this new comfort station, a leaching field will supplant the existing waste water injection facility. While disposal of the waste water would best be served by connecting to the County sewer system, the cost would be prohibitive. The nearest connection to the County sewer main is 3000+ feet away and would require a lift (pump) station. In addition, the existing County sewer lines will be unable to handle this additional load without improvements to the County sewer system.

The existing restroom will be removed. Care in the handling and disposal of any asbestos and lead-containing materials will follow applicable regulations.

ALTERNATIVES:

The project to accommodate two cruise ships was originally planned at Pier 2. However, the length of the cruise ships that were to be accommodated were in the 840-foot range. The new cruise ships with Hawaii as its base will be 965-foot in length. Pier 2 cannot accommodate the docking of two ships of this class.

Other alternatives at the harbor will be cost prohibitive such as relocating the Matson and Young Brothers docking facilities and dredging in basalt rock.

No other harbor on Kauai can have a cruise ship docked without extensive renovation at much higher costs.

SPORTS AND FISHING:

The Nawiliwili Bay has been a popular local fishing site both from shore and by boats. Due to harbor development, fishing opportunities have been reduced; more so with the elevated national security status. Present rules states crafts of any kind shall remain 100 yards from the cruise ships. No shoreline fishing is allowed in Nawiliwili Harbor. The security regulations are such that the community must cope and do their best with regards to fishing for sport or subsistence. There is some disagreement between shoreline and boat net-fishing. This matter is within the jurisdiction of the Department of Land and Natural Resources, Division of Aquatic Resources.

Canoe racing has grown in a State-wide sport. Canoe racing events, unless supervised and scheduled, may conflict with the cruise ships navigation within the Nawilwili Bay. Canoe paddling in Nawiliwili Bay is outside of the harbor area and in the area fronting Kalapaki Beach.

SECTION 7
MITIGATION MEASURES

NOISE LEVELS:

Pile driving will be conducted only during daylight hours in conformity with applicable Department of Health regulations. The hours are 7:00 a.m. To 6:00 p.m. on weekdays and 9:00 a.m. To 6:00 p.m. on Saturdays. Since a resort is located on the northeast section of Nawiliwili Bay, the contractor's starting time for pile driving will be no earlier than 9:00 a.m. No construction work is permitted on Sundays and holidays. The contractor will be required to use cushions over the piles while driving to lessen noise impacts. Pile driving equipment shall be fitted with suitable mufflers in good operating condition.

Traffic noise levels from haul and dump trucks during the work day will be along established roads and the sound will be typical for an industrial area such as for a wharf. All vehicles shall be fitted with mufflers and the engines properly tuned. It would be difficult to differentiate the noise of the contractor's trucks from the existing sound of large transport diesel-driven buses, Matson container haulers, and Young Brothers inter-island cargo trucks during the normal work day. The use of trucks for night work, when sound levels are very noticeable, is not contemplated unless unforeseen problems arise.

Dredging will be in compliance with applicable regulations relating to working hours and noise levels of the Department of Health. Predicted noise levels are expected to be within allowable limits. Dredging equipment shall be equipped with suitable mufflers in good operating condition.

Project activities shall comply with the Administrative Rules of the Department of Health, Chapter 11-46: Community Noise Control. Pre-construction meeting with the community will be arranged to ensure the contractor's schedule is acceptable to the public and to assure resident's concerns will be considered.

VIBRATION LEVELS:

The vibration levels induced by pile driving operations are expected to be of low risk to the nearest residences. Using the wharf fuel tanks, which are the nearest structures to the pile driving activity, as a target, a damage criteria level of 2.0 inches/second shall be used to identify potential risk. Monitoring may be discontinued if the measurements do not exceed the 2.0 inches/second criteria level at this point. Monitoring employing industry standard seismograph shall be used on this project to ensure levels are within acceptable limits. If vibration levels exceed the criteria level, alternate pile driving methods or foundation plans shall be taken under advisement.

AIR QUALITY:

As reported in **SECTION 6,** the proposed project will have virtually no impacts on air quality other than what exists today. Should conditions substantially change, another assessment may be justified. Dust control during construction will be required in compliance with applicable regulations of the Department of Health, HAR, §11.60.1-33 on Fugitive Dust.

Particular attention will be given to dust control during work on the construction of the comfort station and related septic tank system, the removal of concrete structures and the paving of the new pedestrian walkway. Dust control measures shall be provided on roadways during truck hauling of dredged materials and debris.

WATER QUALITY:

Harbor Water: The dredging and pile driving activities will be allowed to proceed upon the completion and acceptance of a BEST MANAGEMENT PLAN (BMP) approved by the U.S. Army District, Honolulu, and the Department of Health. The area to be dredged is shown in **DRAWING NO. 10: DREDGING SITE PLAN - PIER 3.** The BMP will specifically address the methods/system to minimize or prevent water pollution of the harbor waters. The only discharge into the harbor waters will be non-polluting concrete structural materials and clean rip-rap. The use of silt curtains will be mandatory during dredging, pile driving operations and pier construction work.

Monitoring in compliance with Department of Health regulations will ensure that proper precautions to reduce or contain probable pollutants are in effect.

Since swimming and pole fishing in the vicinity of the project area are prohibited for safety and security reasons, no adverse impacts from construction work are expected on these activities. Upon completion of the project, the quality of the harbor waters is expected to return to its former state with no adverse lasting impact as a result from the Pier 3 construction work.

Underground Water: The location of the new comfort station, **DRAWING NO. 11: COMFORT STATION AND LEACH FIELD** and its related leaching field shall conform to the Department of Health Regulations. The comfort station design is shown in **DRAWING NO. 12: COMFORT STATION.** The leaching field, see **DRAWING NO. 13: LEACH FIELD DETAILS,** was designed based on the test borings of the site and percolation tests. The trapped solid waste material will be periodically pumped out and disposed at an approved sewer station. The waste water will be processed in a septic tank before allowing the leachate to be disposed as shown on **DRAWING NO. 13.** A permit from the Department of Health will be required for this facility at which time detailed performance figures will be provided.

AQUATIC RESOURCES:

By judicious use of silt curtains to contain pollution, there is good reason to believe that there will be no permanent disturbance of the harbor as related to aquatic or marine life. Upon completion of pier construction, there will be a period of re-growth of the dense fouling community alga and invertebrates on the new surfaces such as existed prior to the proposed work. The fishes, which appear abundant and diverse at this time, will have had its habitat temporarily disrupted; however, it should recover in due time to its present composition.

Special precautionary guides will shall be established for the protection of endangered species. At all times the possible presence of the green sea turtle shall be monitored. The turtle may be seen at times within the harbor. In such event, work shall cease until the turtle leaves the area. While it is remote, the wide-ranging monk seal may enter the harbor. Similar precautions for the green sea turtle shall be applicable.

SPOIL MATERIAL:

The dredged material (spoils) will be transported in water-tight vehicles to a suitable upland site. This will be to prevent seepage from the dredged materials to re-enter harbor waters. The use of berms for containment of the dredged material or other suitable water-proofing method will be required. Since samples of the harbor bottom material have been tested and found free of metals, pesticides and non-volent solvents within detection limits, the dredged material will be acceptable for landscaping purposes. As mentioned above, dust control will be in conformance with applicable regulations regarding storage of the dredged materials before disposal.

The concrete structures that are demolished will be kept separate from the dredged harbor material. It shall be disposed at an approved landfill site.

EXCAVATED ON-SHORE MATERIALS:

The excavation of on-shore materials shall receive special care due to the presence of TPH-diesel and arsenic contaminated soils. **TABLE NO. 5: SUBSURFACE INVESIGATION AT NAWILIWILI HARBOR,** taken from **APPENDIX H,** lists the soil analyses at the project site. Workers shall take health and safety precautions appropriate for handling the contaminated soils. Precautions outlined in **SECTION 4.1.1 OF APPENDIX H**, for petroleum impacted soils shall be carried out. Similarly, precautions outlined in **SECTION 4.1.2 OF APPENDIX H**, for arsenic impacted soils shall be followed.

While the subsurface soil shows evidence of contamination, analytical results indicate that the soil in the construction area does not qualify as hazardous waste under the Resource Conservation and Recovery Act, RCRA. If the soil cannot be used in place, it will be disposed off at a County solid waste landfill approved by the appropriate government officials. Another disposal method is to use the excavated materials on site with a minimum 2-foot thick layer of clean soil.

For the safety of the construction workers, personal protective equipment and monitoring instruments will be required.

SECURITY:

The Nawiliwili Harbor, a valuable transportation terminal, is under heavy security. The area is not open to the general public. Those engaged in harbor activities have been approved for entry into the fenced harbor area. In this respect, the contractor and his employees must receive proper clearance for entry. To ensure security is not breached, the contractor shall coordinate his work schedule with the Harbor Master. The contractor shall provide the Harbor Master his work schedule in timely fashion and immediately report any changes. No one shall be allowed entry into the harbor area without prior clearance and without a valid reason.

TABLE NO. 5: SUBSURFACE INVESTIGATION AT NAWILIWILI HARBOR

Table 5: Summary of April 2004 Soil Analyses, Nawiliwili Harbor-DOT Kauai

Soil Boring ID No.	SB-1		SB-2		SB-3		SB-4	SB-5	SB-6		SB-7	Regulatory Action Levels [1]
Sampling Depth	2.0 ft bgs	3.0 ft bgs	2.0 ft bgs	4.0 ft bgs	2.0 ft bgs	4.0 ft bgs	4.0 ft bgs	4.5 ft bgs	1.5 ft bgs	5.5 ft bgs	4.0 ft bgs	
Sampling Date	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	
Sample ID	NH-NP-SB01-S2.0	NH-NP-SB01-S3.0	NH-NP-SB02-S2.0	NH-NP-SB02-S4.0	NH-NP-SB03-S2.0	NH-NP-SB03-S4.0	NH-SW-SB04-S4.0	NH-SW-SB05-S4.5	NH-RR-SB06-S1.5	NH-RR-SB06-S5.5	NH-RR-SB07-S4.0	
TPH-diesel	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	***5,800***	ND(20)	5,000
TPH-gasoline	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	2,000
TPH-oil	ND(40)	ND(40)	ND(40)	ND(40)	ND(40)	ND(40)	ND(40)	82	ND(40)	ND(40)	ND(40)	5,000
Vinyl Chloride	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	0.18
1,1 dichloroethylene	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	0.47
1,1,1 trichloroethane	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	3.0
Trichloroethylene	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	1.5
Tetrachloroethane	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	5.0
Benzene	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	0.19	ND(0.02)	ND(0.02)	ND(0.02)	1.7
Toluene	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	0.07	ND(0.05)	ND(0.05)	ND(0.05)	34
Ethylbenzene	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	0.50
Xylenes	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	23
MTBE	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	20
Acenaphthene	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.14	ND(0.10)	18
Benzo(a)pyrene	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	1
Fluoranthene	0.11	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	11
Naphthalene	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	41
PCBs	ND[2]	ND[2]	ND[2]	ND[2]	ND[2]	ND[2]	NT	NT	NT	NT	NT	1.0
Lead	21	37	ND(5.0)	ND(5.0)	110	70	49	ND(5.0)	ND(5.0)	ND(5.0)	9.2	400
Cadmium	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	38
Chromium	22	32	97	140	63	80	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	4.5E+02*
Nickel	1,200	1,000	950	1,200	970	1,200	NT	NT	NT	NT	NT	2.0E+04*
Arsenic	***53***	***84***	ND(5)	***80***	***64***	***93***	NT	NT	NT	NT	NT	1.6E+00*
Antimony	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	NT	NT	NT	NT	NT	4.1E+02*
Magnesium	***24,200***	15,800	1,040	2,270	4,070	6,110	NT	NT	NT	NT	NT	1.9E+04*
Silver	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	NT	NT	NT	NT	NT	5.1E+03*
Copper	210	150	200	130	120	130	NT	NT	NT	NT	NT	4.1E+04*
Zinc	47	93	33	36	39	42	NT	NT	NT	NT	NT	1.0E+05*
Aluminum	23,500	19,800	48,600	32,100	37,000	31,200	NT	NT	NT	NT	NT	1.0E+05*
Iron	630	620	700	640	650	600	NT	NT	NT	NT	NT	1.0E+05*
Organotin	ND(0.011)	ND(0.011)	ND(0.014)	ND(0.014)	ND(0.013)	ND(0.012)	NT	NT	NT	NT	NT	1.8E+02*

All concentrations in parts per million (ppm)
Bold italics denotes detected value exceeds the DOH Tier 1 Soil Action Level or EPA Region IX Industrial soil PRG

ft. bgs feet below ground surface
ND not detected above method reporting limit (MRL). The MRL is listed in parentheses.
NT analyte not tested

[1] Sources: State of Hawaii, Department of Health, Technical Guidance Manual For Underground Storage Tank Closure and Release Response, March 2000, and * EPA Region IX Industrial soil PRGs
[2] Seven PCB Aroclors (1016, 1221, 1232, 1242, 1248, 1254, 1260), MRLs ranging from 0.05 to 0.20 ppm.

Source: APPENDIX H - EarthTech, Inc.

SECTION 8

DETERMINATION BY AGENCY

The Segmented Pier 3 Improvement at Nawiliwili Harbor project is a not a new feature, per se, but a programmed feature common to harbor facilities where shipping growth determines the extent of improvement. The proposed project is a programmed extension of the present pier. The existing Pier 3 was constructed during a time when the sugar industry was the dominant economic force on Kauai and utilized most of the harbor and a pier to serve the inter-island shipping was needed. Today, only one sugar mill remains on the island and Port Allen at Hanapepe is its shipping center. The Nawiliwili Harbor dock facilities now service inter-island barge shipping and cruise ships instead of the bulk sugar ships of former times. The cruise ships of today are larger, well over 900-foot in length, and requires adequate docking facilities. Pier 2 can only accommodate one ship of the 965-foot class. Hence, the need for the Segmented Pier 3 Improvement.

In view of the above, a Finding of No Significant Impact will be assigned to this project.

SECTION 9

FINDINGS AND REASONS

The project will not substantially alter the harbor facilities. Rather, it is a programmed improvement to the existing wharf facilities. The project will provide adequate accommodations suitable for the cruise ships of today. Dredging of the harbor is necessary to give the cruise ships greater depth for safety in navigating the harbor.

The construction methods are common to this type of work and mitigation measures will be provided to safeguard the environment. The impacts arising from this project are associated with construction work and these are generally of temporary nature-dust, noise, traffic, etc.

The economic benefits to be gained by this project justifies the Segmented Pier 3 improvements.

In evaluating the potential environmental effects of the project based on the significance criteria of HAR 11-200-12, the following were considered:

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resources:

   The project site is already a developed industrial site for harbor operations. There will be no expansion of industrial activities outside of the present boundaries. The dredging of the harbor will remove 31,000 cubic yards of materials which is to provide a safe navigation depth of 35 feet. No records have been found of any cultural site located within the project site. This area has previously been disturbed by site clearing and construction development.

2. Curtails the range of beneficial uses of the environment:

   The segmented pier construction and related improvements will expand the harbor potential to serve an additional 856 feet long cruise ship. With modifications to the existing Pier 3 RO/RO facility, a ship with a length of 965 feet may be accommodated. The project site is already zoned for harbor use; no expansion of the present zoning is required.

3. Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS; and any revision thereof and amendments thereto, court decisions, or executive orders:

   The proposed development is consistent with the Environmental Policies established in chapter 344, HRS, and the National Environmental Policy Act.

4. Substantially affects the economic or social welfare of the community or State:

   The improvements to Pier 3 is in conformance with previous Master Plan for the harbor development. The project will bring added economic benefits to the Kauai community and generate additional income for businesses.

5. Substantially affects public health:

   The project is strictly a maritime activity and will be in compliance with applicable health regulations to ensure that there is no adverse impact on public health.

6. Involves substantial secondary impacts, such as population changes or effect on public facilities:

   The Pier 3 improvement project is not a development project *per se*. It is a visitor related project not related to any land development undertaking. Rather, the project is intended to make better use of the existing harbor facilities.

7. Involves a substantial degradation of environmental quality:

   The project will be located within an active harbor industrial site and will conform to the existing uses. No improvement other than harbor-related low rise structures will be built.

8. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions:

The Pier 3 improvement project conforms to the Nawiliwili Harbor Master Plan. It is the realization of one of the goals of the Master Plan.

9. Substantially affects a rare, threatened, or endangered species, or its habitat:

Being an industrial site for harbor uses, it is not considered a habitat for animal or plant species. The area is highly utilized for harbor operations and does not support any animal or plant species. However, animal species such as the green sea turtle may occasionally venture into the harbor.

10. Detrimentally affects air or water quality or ambient noise levels:

During construction, noise levels, ambient air quality and harbor water quality will be affected. However, the impacts are of temporary nature being construction related. Compliance with applicable regulations will mitigate adverse impacts. This will be by the preparation and approval of Best Management Plans (BMP) for dredging, pile driving, etc., to ensure adherence to NPDES guidelines.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters:

The Pier 3 improvement project is within a tsunami zone. This is inherent in a project of this nature. This aspect of the project will be taken into consideration in the engineering design of the structures.

12. Substantially affects scenic vistas and view planes identified in county or state plans or studies:

The segmented pier is a low rise structure and will not affect scenic views of the harbor.

13. Requires substantial energy consumption:

During construction, the energy consumption is that commonly associated with the heavy construction industry. Upon completion, only nominal energy consumption will be required related to harbor activities- lighting and servicing functions.

In view of the above, the Department of Transportation herewith issues a negative declaration of Findings of No Significant Impact (FONSI) as being applicable for this project.

REFERENCES

Atlas of Hawaii, 2nd Ed., Department of Geography, University of Hawaii, University of Hawaii Press, 1983

Civil Engineering Handbook, 3rd Ed., Leonard Church Urquhart, Editor, McGraw-Hill Company, 1950

Data Book- 2000, Department of Business, Economic Development & Tourism. State of Hawaii

Final Environmental Assessment, Realignment of Wa'apa Road, Job H.C. 7232, NKN Project Planning, March 1998

Geology and Ground-Water Resources of the Island of Kauai, G.A. MacDonald, D.A. Davis, and D.C. Cox, Bulletin 13, Hawaii Division of Hydrography, 1960

Kauai - The Separate Kingdom, Edward Joesting, University of Hawaii Press, 1984

Marine Atlas of Hawaii Bays, Jean McKean Grace, Ed., Sea Grant College, University of Hawaii Press, 1974

Master Plan Update for Nawiliwili Harbor, 1993 Edition, Harbors Division and Task Force for Nawiliwili Harbor, February 1994

Port Engineering, 3rd Ed., Per Bruum, Gulf Publishing Company, 1981

Ports of Hawaii, Edited by Elaine Fogg Stroup, Part 67, Propeller Club of the United States, 1950

Ports of Hawaii, Propeller Club of Hawaii, Port of Honolulu, Red Dot Publishing Co., 1967

Standard Handbook for Civil Engineers, 3rd Ed., Frederick S. Merritt, Ed., McGraw-Hill, 1983

Statewide Cruise Facilities Study, for Harbors Division, Department of Transportation, Leo A. Daly, January 1999

Statistical Abstract of the Kaua'i Economy, 2002, Office of Economic Development, County of Kaua'i, June 2002

Valuing Hawai'i's Humpback Whale: The Economic Impact of Humpbacks on Hawai'i's Ocean Tour Boat Industry, Dan Utech, Hawaiian Islands Humpback Whale National Marine Sanctuary, December 1, 1999

Volcanoes in the Sea, Gordon A. MacDonald, Agatin T. Abbot, The University of Hawaii Press, 1970

PERMITS/CLEARANCES:

U.S. Department of the Army
Department of Health Section 401 WQC
Department of Health Wastewater Disposal
NPDES
Coastal Zone Management
Conservation District Use
State Historic Preservation
Various Construction Permits

Participants in the preparation of this EA:
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Ernest Hirata & Associates, Inc.
Y. Ebisu & Associates
Cultural Surveys of Hawaii
Paul Breese, Wildlife Biologist
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Barry D. Neal, Meteorologist
Julian Ng, P.E., Traffic Consultant
Earth Tech, Inc.

COMMENTS
& RESPONSES

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

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October 8, 2004

Mr. Marshall Ando
Department of Transportation – State of Hawai'i
869 Punchbowl Street
Honolulu, Hawai'i 96813

Mr. George Nishimura, P.E.
Nishimura Katayama and Oki, Inc.
826 Kaheka Street, Suite 302
Honolulu, Hawai'i 96814

Dear Messrs. Ando and Nishimura:

The Office of Environmental Quality Control (OEQC) has reviewed the draft environmental assessment entitled "Segmented Pier 3 Improvements at Nawiliwili Harbor, Job No. HC 7275," situtated offshore of the judicial district of Lihu'e. OEQC offers the following comments for your consideration and response.

1. **Technical Appendices Note** – The last page of the draft environmental assessment (DEA) notes that "[t]he Appendixes, the technical portion of this Report, have not been included. Anyone wishing to see or receive a copy may call the Harbors Division: Marshall Ando, P.E. He can be reached at phone 587-1961." Required studies on which conclusions vital to a determination are drawn must be included in the environmental assessment prior to submittal. Please clarify what these technical appendices are, and how they are a part of the draft environmental assessment and why they were not included in the draft environmental assessment.

Thank you for the opportunity to comment. If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist, at (808) 586-4185.

Sincerely,

Genevieve Salmonson
GENEVIEVE SALMONSON
Director

RECEIVED
OCT 12 2004
NISHIMURA, KATAYAMA & OKI, INC.

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GOVERNOR

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IN REPLY REFER TO:
HAR-ED
7777.05

March 10, 2005

TO: GENEVIEVE SALMONSON, DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
DEPARTMENT OF HEALTH

FROM: RODNEY K. HARAGA
DIRECTOR OF TRANSPORTATION

SUBJECT: SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR, KAUAI – JOB H. C. 7275

Thank you for your review of the Draft Environmental Assessment for the subject project.

In response to your comments of October 8, 2004, the appendix that the Technical Appendices Note refers to is Appendix H, Subsurface Investigation for Pier 2 and North Pier 3. This appendix will be included in the final environmental assessment.

Should you have any questions, please contact Marshall Ando of the Harbors Division Engineering Design Section at 587-1961.

c: George Nishimura, P. E., President
Nishimura, Katayama & Oki, Inc.
✓William Y. Thompson, P. E.

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

09070CEC.04

September 23, 2004

Mr. W.Y. Thompson, P.E.
98-1051 Kahapili Street
Aiea, Hawaii 96701

Dear Mr. Thompson:

Subject: Request Review and Comment on Draft Environmental Assessment (DEA) for Segmented Pier 3 Improvements at Nawiliwili Harbor, Lihue, Island of Kauai
TMK Nos.: (4) 3-2-003 & (4) 3-2-004:074
File No. Water Quality Certification (WQC) 0000642
Department of Army (DA) File No. To Be Determined

Thank you for the opportunity to review and comment on the subject DEA. The Department of Health (Department), Clean Water Branch (CWB), acknowledges receipt of the following documents transmitted with your letters of August 24, 2004 and September 8, 2004, respectively:

Title	Dated	Copy
a. DEA Segmented Pier 3, Improvements Nawiliwili Harbor, Lihue Kauai	August 2004	1
b. Segmented Pier 3 Improvements, Job Specification Nawiliwili Harbor, Lihue Kauai (Internet Posting)	June 10, 2004	2
c. Segmented Pier 3 Improvements, Construction Drawings Nawiliwili Harbor, Lihue Kauai		1
d. Complete Report of Subsurface Investigation	June 2004	2

The following are our general comments based on the information contained in the documents listed above:

1. The Honolulu Engineer District of the U. S. Army Corps of Engineers should be contacted at (808) 438-9258 to identify whether a Federal license or permit (including a DA permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution Control Act (commonly known as the "Clean Water Act"), a Section 401 WQC is required

for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...."

2. Article XV- Environmental Permits and Controls

   a. Page 15-3 of the "Segmented Pier 3 Improvements, Job Specification" cited incorrect Section 401 WQC file number. [please see (b) of page 15-3] File No. WQC 0000280 was assigned to Harbors Division/Department of Transportation's (HD/DOT) Barber Point Harbor Improvements project. Correction is needed.

   b. Pages 15-2 to 15-3 of the "Segmented Pier 3 Improvements, Job Specification" needed to be updated to reflect the correct National Pollutant Discharge Elimination System (NPDES) permit requirements. An NPDES permit coverage is required for the following activities, as appropriate:

      (1) Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi);

      (2) Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required before the commencement of the construction activities.

      (3) Discharge of treated effluent from leaking underground storage tank remedial activities;

      (4) Discharge of once through cooling water less than one (1) million gallons per day;

      (5) Discharge of hydrotesting water;

      (6) Discharge of construction dewatering effluent;

      (7) Discharge of treated effluent from petroleum bulk stations and terminals;

      (8) Discharge of treated effluent from well drilling activities;

      (9) Discharges of treated effluent from recycled water distribution systems;

      (10) Discharges of storm water from a small municipal separate storm sewer system; and

(11) Discharge of circulation water from decorative ponds or tanks.

The CWB requires that a Notice of Intent (NOI) to be covered by an NPDES general permit for any of the above activities be submitted at least 30 days before the commencement of the respective activities. The NOI forms may be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/index.html.

c. The HD/DOT may be required to apply for an individual NPDES permit if there is any type of activity in which processed/treated sanitary effluent is discharged from the project into State waters and/or coverage of the discharge(s) under the NPDES general permit(s) is not permissible. An application for the NPDES permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at http://www.state.hi.us/doh/eh/cwb/forms/indiv-index.html.

3. Article XVI - Water Quality Monitoring

   a. Site-specific Best Managements Practices and applicable receiving water quality monitoring and assessments plans are part of the Section 401 WQC application requirements.

   b. Applicable receiving water quality monitoring and assessment plan shall be site-specific and project-specific. Only those requirements applicable to this project should be specified in this article. Citing File No. WQC 0000280 in this article may not be appropriate. In addition, there are nine (9) sampling stations required in this article (as cited in File No. WQC 0000280), but, there are only five (5) stations identified in "Figure 3 - during construction water monitoring stations." Please reevaluate the adequacy of Article XVI requirements. Clarification and revisions may be warranted.

4. Article XVII - Excavation, Handling and Disposal of Contaminated Soil

   Please contact Department's Solid and Hazardous Branch for details.

5. Article XIX - Substrates with Lead-Contaminated Paint

   Please contact Department's Solid and Hazardous Branch for details.

6. Article XXVII - Sanitary Sewer System

   Please contact Department's Waste Water Branch for detailed requirements for the installation of the proposed Septic Tank and leach field and new comfort station foundation.

7. Hawaii Administrative Rules, Section 11-55-38, also requires the owner to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD. Please submit a copy of the request for review by SHPD or SHPD's determination letter for the project.

File No. WQC 0000642 has been assigned to this project. Please include File No. WQC 0000642 and the following certification in all future correspondences with the Department regarding your application for a Section 401 WQC for the subject project:

> **"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."**

Failure to provide the File No. WQC 0000642 assigned to this project in any future correspondence or inquiry may be a basis to delay the processing of your inquiry or application for a Section 401 WQC.

If you have any questions, please contact Mr. Edward Chen of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

EC:bt

c: Regulatory Branch, HED/COE
CZM Program, Office of Planning/DBEDT
HD/DOT
DAR/DLNR
OCCL/DLNR
SHWB/DOH
WWB/DOH
Chief, DEPH/Kauai

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IN REPLY REFER TO:
HAR-ED
7778.05

March 8, 2005

TO: DENIS R. LAU, P. E., CHIEF
CLEAN WATER BRANCH
DEPARTMENT OF HEALTH

FROM: GLENN M. OKIMOTO
HARBORS ADMINISTRATOR

SUBJECT: SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR, KAUAI – JOB H. C. 7275

Thank you for your review of the Draft Environmental Assessment for the subject project. The following are in response to your comments of September 23, 2004:

Item 1 - The U. S. Army Corps of Engineers has informed us that a Section 401 WQC permit is required for this project. We will be submitting an application for this permit.

Item 2.a – The reference to the 401 WQC File No. 280 will be changed to read Section 401 WQC File No. 0000280.

Item 2.b – An NOI will be filed for coverage under the NPDES general permit.

Item 2.c – No processed/ treated effluent will be discharged into State waters.

Item 3.a – The successful contractor will be required to comply with applicable BMP and water monitoring/assessment plan during construction.

Item 3.b – Reference to File No. WQC 0000280 will be deleted from the Article. The entire Article will be reevaluated and required changes will be made.

Item 4 – The Solid and Hazardous Waste Branch has been consulted about the removal, handling and disposal of contaminated soils. The materials will be disposed of at an approved site.

Item 5 – The project specification's Article XIX – 19 Waste Disposal reads," The Contractor shall comply with all applicable federal, state and local regulations concerning generation, collection, storage, handling, transportation and disposal of hazardous and non-hazardous waste." We will monitor the Contractor's work to ensure compliance with all requirements and regulations.

Item 6 – The design of the waste disposal system (leach field, etc.) has been coordinated with the Department of Health's Waste Water Branch.

Item 7 – The State Historic Preservation Office (SHPD) has determined that "no historic properties will be affected." A copy of SHPD's (September 17, 2004) letter is attached for your use and information.

Should you have any questions, please contact Marshall Ando of the Harbors Division Engineering Design Section at 587-1961.

Att.

c: George Nishimura, P. E., President
Nishimura, Katayama & Oki, Inc.
✓William Y. Thompson, P. E.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

HAWAI'I HISTORIC PRESERVATION DIVISION REVIEW

Log #: 2004.2834
Doc #: 0409NM10

Applicant/Agency: Marshall Ando, P.E.
For: DOT Harbors

Address: DOT –Harbors Division
79 S. Nimitz Highway
Honolulu, HI 96813

SUBJECT: Chapter 6E- Historic Preservation Review – DEA Segmented Pier 3 Improvements Nawiliwili Harbor

Ahupua`a: Nawiliwili
District, Island: Lihue, Kauai
TMK: (4) 3-2-03 and 3-2-04

1. We believe there are no historic properties present, because:
___a) intensive cultivation has altered the land
_✓_b) residential development/urbanization has altered the land
___ c) previous grubbing/grading has altered the land
___d) an acceptable archaeological assessment or inventory survey found no historic properties
___e) other:

2. This project has already gone through the historic preservation review process, and mitigation has been completed ___.

_✓_Thus, we believe that "no historic properties will be affected" by this undertaking

Staff: Nancy McMahon [signature] Date: 9/17/04

Title: Archaeologist for Kaua'i

R/S 05.0393

'04 OCT 12 P2:38

HARBORS DIVISION

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801-3378

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EMD/SHWB

October 6, 2004

S1005JF

Mr. Marshall Ando, P.E.
Department of Transportation
Harbors Division
79 South Nimitz Highway
Honolulu, Hawaii 96813

Dear Mr. Ando:

SUBJECT: Comments to Draft Environmental Assessment (EA)
Segmented Pier 3 Improvements
Nawiliwili Harbor, Lihue, Kauai
TMK No. 3-2-03 and 2-3-04

The Department of Health (DOH), Solid and Hazardous Waste Branch (SHWB) received the *Draft Environmental Assessment for Segmented Pier 3 Improvements, Nawiliwili Harbor, Lihue, Kauai* on September 2, 2004. We reviewed the document and are providing you with the following comments.

1. Based on the *Marine Environmental Assessment for the Segmented Pier 3 Improvements, Nawiliwili Harbor, Kauai,* dated April 2004 (provided as Appendix B), the sediment was only tested for metals and pesticides using the Toxicity Characteristic Leaching Procedure (TCLP). As stated in the report, the information obtained from this test method can only determine whether the sediment can be disposed of at a permitted landfill as a non-hazardous waste. However, the draft EA is proposing to use the dredged material as landscaping material. We do not believe that there is sufficient data to defend the use of dredge material for this purpose. We recommend that further testing be done to determine the total concentration of each of the contaminants of concern.

2. Due to the petroleum and arsenic concentration in the excavated on-shore materials, the draft EA recommends either leaving the material in-place, returning the material into the same excavation, disposing of the waste as non-hazardous waste at a municipal solid waste landfill, or creating an on-site disposal unit. We suggest for the options relating to onsite management of the contaminated material that DOT-Harbors contact the DOH-Hazard Evaluation

RIS 05.0393

'04 OCT 12 P2:38

HARBORS DIVISION

Mr. Marshall Ando
October 6, 2004
Page 2

Emergency Response (HEER) Office as the report documents that a release was reported to the HEER Office in 1996, and that an investigation/response action was to be performed.

3. Based on the contaminant levels found in the materials, we believe that this material may be disposed of as a non-hazardous waste at a permitted landfill such as Kekaha Landfill. However, we recommend that you contact the landfill to coordinate its disposal as the landfill may have more stringent requirements. Should DOT-Harbors decide to create its own landfill, a solid waste management permit may be required.

If you have any questions regarding this letter, please contact Ms. Lene Ichinotsubo of our Solid Waste Section at (808) 586-4226.

Sincerely,

STEVEN Y.K. CHANG, P.E., CHIEF
Solid and Hazardous Waste Branch

c: Mr. Clarence Callahan, HEER Office

'04 NOV 26 P2:12

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

ENGINEERING BR.
DEPT. OF TRANSPORTATION
HARBORS DIVISION

'04 NOV 26 P3:05

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
File: EHA/HEER Office
2004-497-DE

'04 DEC -1 P1:59

October 23, 2004

Mr. Marshall Ando, P.E.
Department of Transportation
Harbors Division
79 South Nimitz Highway
Honolulu, Hawaii 96813

Subject: Comments following the October 18, 2004 meeting concerning the proposed improvements at Nawiliwili Harbor, Lihue, Kauai

Dear Mr. Ando:

The Department of Health (DOH), Hazard Evaluation and Emergency Response Office (HEER) discussed with you and your support contractors the proposed improvements at Nawiliwili Harbor, Lihue, Kauai. The following comments are provided in response to your questions and are intended to clarify the HEER Office position on the use, storage, disposal, and sampling of excavated and dredged soils at the site. The comments are based on information provided at the meeting and in recent mailings to the Solid and Hazardous Waste Branch Office (SHWB).

Site Definition

According to our legal advisor, Kathy Ho of the Attorney General's Office, HRS 128D-1 defines "facility" to mean among other things " ...any site or area where a hazardous substance or pollutant or contaminant has been deposited, stored, disposed of, or placed, or otherwise comes to be located. . . ."

HRS 128D-1 does not, however, define "site." According to Kathy, this definition is left to the discretion of the agency. Kathy states that the agency interpretation should include areas located within a reasonable distance from the "facility" and which are under the control of the landowner. I believe the HEER Office would be in agreement that any area along the shoreline and controlled by DOT Harbors, including Piers 1, 2 and 3 and their immediate vicinity, would be considered the "site".

Use and/or disposal of Arsenic impacted soils

As stated in the October 18th, 2004 meeting, the HEER Office would agree that any soil with arsenic at the levels observed (i.e., 53 to 93 mg/kg) could be used "on-site" with the institution of provisions to minimize exposure to humans and the water.

Based on the Draft Environmental Assessment for the Segmented Pier 3 Improvements, dated August 2004, the HEER Office understands the options for disposal being considered include: leaving the soil in-place, returning the soil to the same excavation, using the soil on-site with a minimum 2-foot thick layer of clean soil overlying it, or disposing of the soil as a non-hazardous waste at a municipal solid waste landfill.

Once a method(s) of disposal is selected, we suggest you contact the HEER Office to confirm that your selection is in accordance with regulatory guidelines.

Use and/or disposal of dredged materials

The proposed use in landscaping of sediments dredged from the harbor provides a direct contact risk to the public. Therefore, the harbor sediments must be analyzed for total Metals, VOCs, SVOCs, PCBs, and Organo chlorine pesticides. The TCLP analyses were performed to determine if the material should be classified as a hazardous waste and be disposed of accordingly. TCLP results are not acceptable for use in assessing risk to public health and the environment.

Use and/or disposal of petroleum impacted soils

As stated in the October 18th, 2004 meeting, the HEER Office would agree that any soil with total petroleum hydrocarbon contamination at the levels observed (i.e., 0-5,800 mg/kg) could be used "on-site" with the institution of provisions to minimize exposure to humans and the water.

Based on the Draft Environmental Assessment for the Segmented Pier 3 Improvements, dated August 2004, and the October 18th 2004 meeting, the HEER Office understands the options for disposal being considered include: leaving the soil in-place, returning the soil to the same excavation, using the soil on-site with a minimum 2-foot thick layer of clean soil overlying it, disposing of the soil as a non-hazardous waste at a municipal solid waste landfill, or conducting on-site remediation.

Once a method(s) of disposal is selected, we suggest you contact the HEER Office to conform that your selection is in accordance with regulatory guidelines.

Stockpiling of Soils

Arsenic and petroleum contaminated soils should be stockpiled separately at the site, with proper containment measures instituted for each stockpile. Mixing of the soils should be avoided. Stockpiled soils should be disposed of as soon as practicable.

Groundwater Sampling

Due to the detection of TPH(d) above the DOH Tier 1 Action Level in a soil sample from boring SB-6, as well as visual and olfactory evidence of petroleum contamination in adjacent borings, the HEER Office will require a ground water sample from the vicinity of SB-6. The groundwater sample should be analyzed for the same suite of contaminants as the soil samples from SB-6.

Additional Information Request

The HEER Office has a copy of report submitted to George Abcede by Ernest K. Hirata & Associates, Inc..(DR 95-212) titled, *"Hydrocarbon Contamination Test Results Pier 1 Improvements – Nawiliwili Harbor, Lihue, Kauai, Hawaii and dated November 29, 1995."* This report indicates the presence of BTEX components above Tier 1 levels at several locations. However, it is unclear from the report figure where the exact sample locations are on Pier 1 and where they are relative to the proposed leach field at Pier 2 and borings SB-5, 6, and 7.

The HEER Office is requesting any information for this Pier 1 project that will help put the sample locations in perspective relative to activities planned for the Pier 2 and 3 improvements.

If you have any questions regarding this letter, please contact me at 808-586-0958.

Sincerely,

Diane England

Diane Fordik England, Project Manager
Site Discovery, Assessment, and Remediation Section

cc: K. Kawaoka
L. Ichinotsubo

'04 NOV 26 P2:12

'04 DEC -1 P1:59

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 SOUTH NIMITZ HIGHWAY
HONOLULU, HAWAII 96813-4898

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:
HAR-ED
7791.05

March 8, 2005

TO: STEVEN Y. K. CHANG, P. E., CHIEF
SOLID AND HAZARDOUS WASTE BRANCH
DEPARTMENT OF HEALTH

FROM: GLENN M. OKIMOTO
HARBORS ADMINISTRATOR

SUBJECT: SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR, KAUAI – JOB H. C. 7275

Thank you for your review of the Draft Environmental Assessment for the subject project. The following are in response to your comments of October 6, 2004:

1. After meeting with your staff on October 18, 2004 and reviewing your staff's follow-up letter dated October 23, 2004, we have determined that it would not be prudent to utilize the dredged material for landscaping purposes. We plan to dispose of the material at an approved municipal solid waste landfill as non-hazardous waste.

2. Per your recommendation, we have contacted the HEER Office to discuss the handling of the petroleum and arsenic contaminated soils. Based on this discussion, the soils will be stockpiled separately from the dredged materials and will be appropriately disposed of.

3. Based on current test results, the dredged and excavated materials are likely to be treated as non-hazardous waste and is intended for disposal as indicated in Item 1. We are currently communicating with the County of Kauai about the use of the Kekaha landfill site for disposal.

Should you have any questions, please contact Marshall Ando of the Harbors Division Engineering Design Section at 587-1961.

c: George Nishimura, P. E., President
Nishimura, Katayama & Oki, Inc.
✓William Y. Thompson, P. E.

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

YVONNE Y. IZU
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

'04 OCT 13 P1:49

LD-NAV

'04 OCT 14 P1:14

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 8, 2004
DOTPIER3KAUAI.RCM

Mr. Marshall Ando, P.E.
Department of Transportation
Harbors Division
79 South Nimitz Highway
Honolulu, Hawaii 96813

Dear Mr. Ando:

SUBJECT: Draft Environmental Assessment
Department of Transportation Harbors Divisions Segmented
Pier 3 Improvements, Nawiliwili, Lihue, Island of Kauai
TMK: (4) 3-2-3 and 3-2-4

Thank you for the opportunity to review and comment on the subject matter.

The Department of Land and Natural Resources' (DLNR) Land Division made available or distributed a copy of the document pertaining to the subject matter to the following DLNR Divisions for their review and comment:

- Division of Aquatic Resources
- Engineering Division
- Office of Conservation and Coastal Lands
- Land-Kauai District Land Office

Enclosed please find a copy of the Division of Aquatic Resources comment.

The Department of Land and Natural Resources has no other comment to offer.

Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 1-808-587-0384.

Very truly yours,

DIERDRE S. MAMIYA
Administrator

C: KDLO

SUSPENSE DATE: September 27, 2004

STATE OF HAWAII
Department of Land and Natural Resources
Division of Aquatic Resources

MEMORANDUM

To: William Devick, Administrator
From: Richard Sixberry, Aquatic Biologist
Subject: Comments on Draft Environmental Assessment

Comments Requested By: Dede Mamiya - Land Division

Date of Request: 9/17/04 Date Received: 9/20/04

Summary of Project

Title: Segmented Pier 3 Improvements

Proj. By: Dept. of Transportation (DOT) - Harbors

Location: Nawiliwili Harbor, Lihue, Kauai

Brief Description:

The DOT plans to build a pier segment to serve as a breasting dolphin and designed to be integrated as a part of Pier 3 in the future. Dredging will also be included in the project. During dredging, the boat ramp and docking facility that is no longer in service will be demolished.

Ancillary improvements will include improved lighting, new comfort station, revetment wall and walkway.

Comments:

Mitigation measures have been proposed by the applicant, including Best Management Practice, which should limit or prevent excessive impact to aquatic resource values within Nawiliwili Harbor. We suggest that those mitigation measures be incorporated, as conditions, into the permit process.

Significant long-term impacts adverse to aquatic resource values are not expected from the activities proposed. However we suggest the following mitigation measures to insure minimum impact to the aquatic environment.

A. Best Management Practices should be implemented to insure that water quality and marine resources are protected and preserved.

B. No construction materials should be stockpiled in the aquatic environment.

C. All construction-related materials should be placed or stored in ways to avoid or minimize disturbance to the aquatic environment.

D. All construction-related material should be free of pollutants.

E. Extreme care must be taken to ensure that no debris, petroleum products, or deleterious materials or wastes be allowed to fall, flow, leach, or otherwise enter the water.

F. Turbidity and siltation from dredging and installing the steel piles should be minimized and contained in the immediate vicinity of construction through the use of effective silt containment devices and the curtailment of construction during adverse weather conditions.

Richard Sixberry
Aquatic Biologist

cc: Jeff Newman, USFWS

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 SOUTH NIMITZ HIGHWAY
HONOLULU, HAWAII 96813-4898

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:
HAR-ED
7776.05

March 7, 2005

TO: DIEDRE S. MAMIYA, ADMINISTRATOR
LAND DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

FROM: GLENN M. OKIMOTO
HARBORS ADMINISTRATOR

SUBJECT: SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR, KAUAI – JOB H. C. 7275

Thank you for your review and your coordination for review of the Draft Environmental Assessment for the subject project.

In response to comments from the Department of Land and Natural Resources Division of Aquatic Resources, we will ensure that:

1. Best Management Practices are implemented to insure water quality and marine resources are protected and preserved;

2. No construction materials are stockpiled in the aquatic environment;

3. All construction related materials are placed and/or stored in a manner to minimize disturbance to the aquatic environment;

4. All construction related materials are free of pollutants;

5. Extreme care is taken to ensure no debris, petroleum products, or deleterious materials or wastes do not fall, flow, leach, or otherwise enter into the water; and,

6. Turbidity and siltation from dredging activities and installation of piles is minimized and contained in the immediate vicinity of the construction work potentially through the use of silt containment devices, as well as curtailment of these activities during adverse weather.

In addition, we will be in compliance with the requirements of the Department of the Army Permit and Department of Health Clean Water Branch's Section 401 Water Quality Certification for this project.

We understand that the Department of Land and Natural Resources has no other comments.

Should you have any questions, please contact Marshall Ando of the Harbors Division Engineering Design Section at 587-1961.

c: George Nishimura, P. E., President
Nishimura, Katayama & Oki, Inc.
William Y. Thompson, P. E.
Department Land and Natural Resources Division of Aquatic Resources
Department Land and Natural Resources Engineering Division
Department Land and Natural Resources Office of Conservation and Coastal Lands
Department Land and Natural Resources Land Division – Kauai District Land Office

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Correspondence: KA 05-61

REF.:OCCL:TM

OCT - 4 2004

W.Y. Thompson, P.E.
98-1051 Kahapili Street
Aiea, Hawaii 96701

Dear Mr. Thompson,

SUBJECT: Draft Environmental Assessment (DEA) for Segmented Pier 3 Improvements at Nawiliwili Harbor Located at Nawiliwili Harbor, Island of Kauai, in the vicinity of TMK: (4) 3-2-003 and (4) 3-2-004

The Office of Conservation and Coastal Lands (OCCL) is in receipt of your DEA for Segmented Pier 3 Improvements at Nawiliwili Harbor on the island of Kauai.

According to your information, the State Harbors Division is proposing to build a pier segment to accommodate larger ships. Other improvements include lighting, a new comfort station, revetment wall and walkway.

Pursuant to Executive Order 3411 signed by the Governor on December 19, 1988, and Conservation District Use Permit (CDUP) KA-2400 approved by the Board of Land and Natural Resources (BLNR) on August 23, 1991, for the construction of Pier 3 and the subdivision of State-owned submerged lands located at Nawiliwili Harbor, the subject area is under the control and management of the Department of Transportation for harbor related purposes. Condition #1 of CDUP KA-2400 specifically states:

> That the applicant petition the Division of Land Management for an Executive Order setting aside the subdivided land for Harbor purposes.

Therefore, the OCCL has no objections to the proposed improvements. Should you have any questions, please feel free to contact Tiger Mills of our Office of Conservation and Coastal Lands staff at 587-0382.

Sincerely,

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

cc: Chairperson
KDLO
DOT, Harbors Division

W. Y. Thompson. P.E.
98-1051 Kahapili Street
Aiea, HI 96701
Phone: (808) 488-0388

March 23, 2005

Office of Conservation & Coastal Lands
Department of Land & Natural Resources
Attn: Mr. Samuel J. Lemmo, Administrator
P.O. Box 621
Honolulu, HI 96809

Dear Sir:

SUBJECT: Request for Conservation District Use
Segmented Pier 3 Improvements at Nawiliwili Harbor
Job No. H.C. 7275
Lihue, Kauai, HI
Reference: OCCL:TM (KA 05-61)

Thank you for your letter of October 4, 2004. The Division of Harbors, State Department of Transportation, is pleased to note that there are no objections to the proposed improvements at Nawiliwili Harbor. We appreciate your expeditious determination which has allowed the final planning of the project to proceed.

Should we need further assistance from your office, we will contact Mr. Tiger Mills of your staff as suggested.

Sincerely,

W.Y. Thompson

c: Division of Harbors, Marshall Ando, P.E.
George Nishimura, P.E., NKO, Inc.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

HAWAI'I HISTORIC PRESERVATION DIVISION REVIEW

Log #: 2004.2834
Doc #: 0409NM10

Applicant/Agency: Marshall Ando, P.E.
For: DOT Harbors

Address: DOT –Harbors Division
79 S. Nimitz Highway
Honolulu, HI 96813

SUBJECT: Chapter 6E- Historic Preservation Review – DEA Segmented Pier 3 Improvements Nawiliwili Harbor

Ahupua'a: Nawiliwili
District, Island: Lihue, Kauai
TMK: (4) 3-2-03 and 3-2-04

1. We believe there are no historic properties present, because:
___a) intensive cultivation has altered the land
_✓_b) residential development/urbanization has altered the land
___ c) previous grubbing/grading has altered the land
___d) an acceptable archaeological assessment or inventory survey found no historic properties
___e) other:

2. This project has already gone through the historic preservation review process, and mitigation has been completed ___.

_✓_Thus, we believe that "no historic properties will be affected" by this undertaking

Staff: Nancy McMahon

Date: 9/17/04

Title: Archaeologist for Kaua'i

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 SOUTH NIMITZ HIGHWAY
HONOLULU, HAWAII 96813-4898

IN REPLY REFER TO:
HAR-ED
7779.05

March 7, 2005

TO: MELANIE A. CHINEN, ADMINISTRATOR
STATE HISTORIC PRESERVATION DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

FROM: GLENN M. OKIMOTO
HARBORS ADMINISTRATOR

SUBJECT: SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR, KAUAI – JOB H. C. 7275

Thank you for your review of the Draft Environmental Assessment for the subject project and your finding that "no historic properties will be affected" applies to this project.

Should you have any questions, please contact Marshall Ando of the Harbors Division Engineering Design Section at 587-1961.

c: George Nishimura, P. E., President
Nishimura, Katayama & Oki, Inc.
William Y. Thompson, P. E.

UNIVERSITY OF HAWAI'I AT MĀNOA
Environmental Center

October 7, 2004
EA: 0303

Mr. George Nishimura, PE
Nishimura, Katayama & Oki, Inc
826 Kaheka Street, Suite 302
Honolulu, Hawai'i 96814

Dear Mr. Nishimura:

Draft Environmental Assessment (DEA)
Nawiliwili Harbor – Segmented Pier 3 Improvements
Lihue, Kauai

The State Department of Transportation (DOT) proposes to expand facilities at Nawiliwili Harbor in the Lihue district of Kauai to accommodate an 856 foot-long cruise ship. The plan also includes dredging approximately 30,000 cubic yards and installing a new comfort station, improved lighting, and a revetment wall and walkway. The total cost of the Pier 3 plan is estimated to be slightly over $5 million. Project completion is anticipated one year after the contract is awarded.

Permits required for this project include a Dredge and Fill permit pursuant to §404 of the Clean Water Act (CWA), a §401 Water Quality Certification, a State Conservation District Use permit, and a National Pollution Discharge Elimination System (NPDES) permit (CWA §402).

The Environmental Center conducted this review with the assistance of Jacquelin Miller, Environmental Center; Marshall Mock, Physical Science/Kauai Community College; and Kerry Halford, Environment Center.

General Comments

This proposed action will result in permanent modifications and structural developments at Nawiliwili Harbor. Previous harbor developments and expansions elsewhere in Hawai'i and throughout the Pacific have resulted in significant long-term secondary and cumulative impacts. As a result, it is a virtual certainty that this expansion will have significant impacts, both at the development site and upon the infrastructure of Kauai, and pursuant to §343-5, Hawai'i Revised Statutes, and §11-200-12(b), Hawai'i Administrative Rules (HAR), a full EIS should be prepared.

There is essentially no discussion in this draft EA of the long-term impacts of the new and major expansion of the harbor facilities. This is a highly significant deficiency in the draft EA.

In addition, the "Note" on the last page of the draft EA stating that the "Appendixes" or technical portions of the report have not been included creates a serious deficiency in the document. HAR §11-200-9(a) states, in part:

> *The proposing agency shall...prepare an environmental assessment pursuant to section 11-200-10 of this chapter which shall also identify potential impacts, evaluate the significance of each impact, and provide for detailed study of significant impacts...*

Full public review and evaluation of the significance of the proposed action is not feasible in the absence of technical information relating to the substantive project activities. It seems, in this instance, that the DOT is withholding information from the public, as repeated attempts on the part of the Environmental Center to obtain the excluded information were not afforded the courtesy of a response. We conclude, therefore, that the DOT has failed to make these reports available as required by the EIS Rules, and our reviewers suggest that this draft EA fails to comply with the relevant provisions of the State law and should be withdrawn.

DREDGING

According to the draft EA, the present depth of the Harbor is insufficient to service the new fleet of cruise liners, and dredging to 35 feet will be required. At the outset, this depth seems insufficient compared with both Honolulu and Barber's Point Harbors, both of which have designed depths of 42 feet, either planned or already achieved. Although no specific reference to the present depth of Nawiliwili Harbor was found in the document, a total of 30,951 yd^3 is proposed as a needed excavation to achieve the desired depth (§4/p 16). At a minimum, evaluation of potential environmental effects requires a figure illustrating the existing bathymetry of the harbor with an indication of the locations and volumes of dredging required to achieve the targeted depth of 35 feet. The final document should indicate the rationale used for only going to a depth of 35 feet and a justification for not going deeper.

Our reviewers found it difficult to believe that results of all of the sub-surface testing for metals, pesticides, and non-volatile solvents came back showing undetectable levels. The Water Resources Research Center recently conducted watershed studies in Nawiliwili, using funding from the State Department of Health (DOH), and these surveys identified widespread use of agricultural pesticides and termiticides. In view of the high rainfall and sediment runoff to the harbor, and the presence of TPH-diesel, arsenic, and apparently lead- and asbestos-contaminated soils in the on-shore materials, it is inconceivable that these contaminants would not be present in the harbor sediments. An indication of the precision of the instrumentation used in testing these samples as well as the location of the onshore sites that have tested positive and their relation to the harbor sediment samples should be included in the final document.

The draft EA mentions that the dredged material will be stockpiled at a dewatering site across from the existing bulk sugar storage warehouse (Drawing #3). Since dredged material has a high percentage of organics, it also can create a significant odor problem at a dewatering site. What activities and structures are within a potential "odor zone" of this stockpiled area? Will any other commercial facilities, hotels, etc. be affected by the odors? What measures are proposed to mitigate odor problems at the dewatering site?

The draft EA notes that demolished concrete structures of the abandoned boat ramp and dock facilities will be stored separately from the dredged harbor bottom material and then disposed at an approved land-fill site. Has the DOT considered using these materials for artificial reef or fish aggregation structures? Approval to dispose of this material in the ocean should be pursued with the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency pursuant to precedents on other islands.

Leach Field

Drawing #13 illustrates the leach field that will be constructed to accommodate the anticipated increased demand for restroom facilities. However, neither the capacity of the existing system nor that proposed for the new facilities is specified. The use of leach fields in such proximity to the coast seems problematic, particularly when designed for a commercial public restroom facility adequate for cruise ship traffic, and our reviewers suggest that DOT consult with the State DOH to verify that the proposed wastewater discharge design is consistent with State and Federal law.

Funding

In the draft EA no mention was made of the source of funding for the project, and the anticipated $5 million allocation for the project needs to be fully discussed in the final document.

Cultural Environment

The needs of the community have not been sufficiently addressed in the draft EA. Nawiliwili harbor hosts numerous non-commercial users, including recreational boaters, fishermen, and canoe races, and multiple user conflicts with the cruise ships could be significantly problematic.

In view of serious deficiencies noted previously, we suggest that the present draft EA falls substantially short of compliance with provisions of Chapter 343, HRS and should be withdrawn. In addition, we have serious doubts regarding the reliability of sediment testing results reported in this document, given results of watershed surveys recently conducted in the vicinity of the harbor. We further suggest that the magnitude of likely impacts of this proposed harbor expansion is substantially in excess of the criteria of presumptive significance, and that a full EIS be required for this project to better ensure adequate planning for Nawiliwili Harbor construction and its subsequent operations on Kauai.

Thank you for the opportunity to review this Draft EA.

Sincerely,

John T. Harrison, Ph.D.
Environmental Coordinator

cc: OEQC
DOT
James Moncur, WRRC
Jacquelin N Miller
Marshall Mock
Kerry Halford

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IN REPLY REFER TO:
HAR-ED
7775.05

March 8, 2005

TO: JOHN T. HARRISON, PH.D., DIRECTOR
ENVIRONMENTAL CENTER
UNIVERSITY OF HAWAII

FROM: GLENN M. OKIMOTO
HARBORS ADMINISTRATOR

SUBJECT: SEGMENTED PIER 3 IMPROVEMENTS AT NAWILIWILI HARBOR, KAUAI – JOB H. C. 7275

Thank you for your review of the Draft Environmental Assessment for the subject project. The following is provided in response to your comments of October 7, 2004.

General Comments
This project is in conformance with the Nawiliwili Harbor Master Plan. Due to lack of adequate available funding when Pier 3 was constructed in 1994, the total length of Pier 3 was not built.

The purpose of this project is to augment existing berthing facilities in compliance with the Master Plan, and within the limits of currently appropriated funds. Currently appropriated funds are insufficient to complete the full build out of Pier 3. The proposed pier segment will enhance usage of the existing pier, and no significant additional impacts are expected to arise as a result of its construction. It is therefore our conclusion that a full EIS is not required for this project.

The subsurface investigation report has been forwarded to your office. This report will be included in the Final Environmental Assessment.

Dredging
The depth necessary for vessels currently using and expected to use this facility does not exceed -35.0 feet MLLW. The dredge depth of –35.0 feet, is to allow the project area to be consistent with the federally authorized depth of the harbor basin and existing berths. A depth of –35 feet MLLW provides safe and adequate depth for berthing vessels calling to Nawiliwili Harbor. Should there be a future need to increase the depth of the harbor facility, the environmental concerns for additional dredging will be addressed at that time.

The testing of harbor sediment materials has been performed in conformance with current regulatory requirements.

Discussions with the Department of Health have lead to the conclusion that the dredged spoils can be disposed of at an approved municipal solid waste disposal site. The Harbors Division is seeking approval from the County of Kauai for the disposal of the dredged material at their Kekaha landfill site.

The use of the concrete debris resulting from the demolition of the abandoned boat ramp and dock facility as material for an artificial reef has been discussed with the Department of Land and Natural Resources' Aquatic Resources Division. They have indicated that the concrete debris is unacceptable for use as artificial reefs.

Leach Field
The existing rest room outside of the Pier 2 shed is serviced by a large capacity cesspool. EPA regulations will prohibit the use of large capacity cesspools after April 5, 2005. We anticipate requesting an extension for closure of this cesspool to complete the subject project. The new rest room facility is designed to improve service to harbor users and passengers. Design of the leach field has been discussed with the Department of Health to ensure compliance with current regulations. A leach field is necessary because of the unavailability of municipal sewer service in close proximity to the site.

Funding
The funding source and allocation will be added to the Final Environmental Assessment.

Cultural Environment
Recreational usage at Nawiliwili Harbor is limited. A sign reading "No Wind Surfing, Jet Skis, Water Skiing, Kayaking, Water Crafts, Wave Skis Within Nawiliwili Harbor" is posted at the harbor. An additional sign posted by the Department of Land and Natural Resources' Division of Boating and Ocean Recreation reads, "No Swimming, Polluting, Diving, Lay-Net Fishing in Boat Harbor." Canoe races are not held within Nawiliwili Harbor; rather, they are held at Kalapaki Beach fronting the Marriott Resort. This information will be included in the Final Environmental Assessment.

Should you have any questions, please contact Marshall Ando of the Harbors Division Engineering Design Section at 587-1961.

c: George Nishimura, P. E., President
Nishimura, Katayama & Oki, Inc.
William Y. Thompson, P. E.

APPENDICES

APPENDIX A
BIOTA SURVEY

FAUNA SURVEY FOR THE
PIER 2 EXTENSION ON NAWILIWILI HARBOR
ISLAND OF KAUAI
October 3, 2001

The bird and mammal fauna of the immediate area is composed of both native and introduced species. It is also possible that endemic Hawaiian creatures classified as endangered or threatened by the U. S. Fish & Wildlife Service may enter or fly over the project site. These are the Nene, Newell's Shearwater, Dark-rumped Petrel, plus four endangered water birds: the Hawaiian Stilt, the Hawaiian Duck, the Hawaiian Coot, and the Hawaiian Gallinule. Also, the Hawaiian Bat and the Hawaiian Monk Seal may come near the site.

FAUNA LIST

These birds may possibly be found near or flying over the project site.

NATIVE BIRDS

Common Name	Hawaiian Name	Scientific Name
* Hawaiian Goose	Nene	Nesochen sandvicensis
* Hawaiian Duck	Koloa maoli	Anas wyvilliana
* Hawaiian Gallinule	Alae ula	Gallinula chloropus sandwichensis
* Hawaiian Coot	Alae keokeo	Fulica americana alai
* Hawaiian Stilt	Aeo	Himantopus mexicanus knudseni
Hawaiian Owl	Pueo	Asio flammeus sandwichensis
Pacific Golden Plover	Kolea	Pluvialis fulva
Wandering Tattler	'Ulili	Heteroscelus incanus
Sanderling	Hunakai	Calidris alba
Ruddy Turnstone	Akekeke	Arenara interpres
Black-Crowned Night Heron	Auku'u	Nycticorax nycticorax hoactli
Great Frigatebird	Iwa	Fregata minor palmerstoni
Brown Booby	'A	Sula leucogaster plotus
Red-footed Booby	'A	Sula sula rubripes
White-Tailed Tropicbird	Koa'e Kea	Phaethon lepturus dorotheae
Red-tailed Tropicbird	Koa'e Ula	Phaethon rubricauda rothschildi
Hawaiian Noddy Tern	Noio	Anous minutus melanogenys
Sooty Tern	Ewa Ewa	Sterna fuscata oahuensis
White Tern	Manu o ku	Gygis alba rothschildi
+ Newell's Shearwater	Ao	Puffinus newelli
Wedge-tailed Shearwater	Uau kani	Puffinus pacificus
* Dark-rumped Petrel	Uau	Pterodroma phaeopygia sandwichensis
Laysan Albatross	Moli	Diomedea immutabilis
Pintail Duck	Koloa mapu	Anas acuta
Shoveler Duck	Koloa moha	Anas clypeata

* Indicates classification as endangered by US Fish & Wildlife Service
+ Indicates classification as threatened by US Fish & Wildlife Service

INTRODUCED BIRDS

Common Name	Scientific Name
Barn Owl	Tyto alba
Cattle Egret	Bubulcus ibis
Black Francolin	Francolinus francolinus
Red Jungle Fowl	Gallus gallus
Spotted Dove	Streptopelia chinensis
Zebra Dove	Geopelia striata
Domestic Pigeon	Columba livia
Japanese White-Eye	Zosterops japonicus
Common Mynah	Acridotheres tristis
House Sparrow	Passer domesticus
House Finch	Carpodacus mexicanus
Java Sparrow	Padda oryzivora
Chestnut Mannikin	Lonchura malacca
Spotted Munia (Ricebird)	Lonchura punctulata
Northern Cardinal	Cardinalis cardinalis
Red-crested Cardinal	Cardinalis coronata
Western Meadowlark	Sturnella neglecta
White-rumped Shama	Copsychus malabaricus
Chinese Thrush	Garrulax canorus

MAMMALS

The Hawaiian Bat, the State's only native land mammal, is widely distributed on the main Hawaiian Islands. It could possibly inhabit or fly over the project site from time to time. The Hawaiian Monk Seal is primarily found in the Leeward Islands of Hawaii. In recent years it has been seen with some frequency swimming near and coming ashore on beaches of the main islands, including Kauai.

NATIVE MAMMALS

Common Name	Scientific Name
*Hawaiian Bat	Lasiurus cinereus semotus
*Hawaiian Monk Seal	Monachus schauinslandi

Other mammals that could be present are all introduced by humans. It is probable that the following introduced mammals could be found at the project site:

INTRODUCED MAMMALS

Common Name	Scientific Name
Rat	Rattus rattus
House Mouse	Mus musculus
Cat	Felix catus
Dog	Canis familiaris

* Indicates classification as endangered by US Fish & Wildlife Service

The project site, Pier 2 at Nawiliwili Harbor, is surrounded by buildings, paved roads, work areas, and commercial and recreational boating activities. This immediate area provides very limited wildlife habitat.

The Island of Kauai has a rich avifauna which is benefited by the absence of the Indian mongoose. When this animal was released on the other main Hawaiian Islands to help control rats in the sugar cane fields in the late 1880's, fortunately, none were placed on Kauai. The absence of the mongoose is credited with Kauai having the largest population of Hawaiian ducks and Hawaiian gallinules of any island.

Kauai has a rapidly growing nene population, which is probably the result of the absence of mongoose. State Wildlife Biologist Tom Telfer estimates that there are now approximately 500 nene established on Kauai. These individuals and their progeny grew from a few dozen released beginning in the 1980's.

The Newell's Shearwater, a seabird that nests in burrows in the interior mountains of Kauai, is restricted almost entirely to this island due also to the absence of the mongoose. This endemic seabird has been the subject of an active program by the State Division of Wildlife and Forestry, Department of Land and Natural Resources. Every year on Kauai, several hundred Newell's Shearwaters are attracted to bright urban lights, fly into wires and buildings and fall stunned to the ground where they can be injured by automobiles and dogs. Wildlife biologists have developed a "Save Our Shearwaters" program involving the cooperation of the public that recovers 90% of these birds and successfully returns them to the wild.

The Wildlife and Forestry Division of the State Department of Land and Natural Resources has prepared a leaflet entitled "The Newell's Shearwater Light Attraction Problem... A Guide for Architects, Planners, and Resort Managers". The primary recommendation is to install lights that are shielded and face downward to reduce their attraction to birds. It is recommended that any lights on the proposed pier extension will follow the guidelines advocated by the Department of Land and Natural Resources.

The proposed extension of Pier 2 at Nawiliwili Harbor would appear to have little or no hazard or impact on the wildlife as the project site is an industrial area and is not a habitat for wildlife.

ADDENDUM TO
FAUNA SURVEY OF THE
NAWILIWILI HARBOR

Island of Kauai
November 20, 2003

Green Sea Turtles (*Honu*) Chelonia mydas

The green sea turtle, a reptile, is currently listed as a "threatened species" by the U.S. Fish and Wildlife Service. The number of green sea turtles has greatly increased in Hawaiian waters in recent years. This remarkable recovery is probably due to passage of federal and state laws in the 1970's. These laws made it illegal to kill or harass any green sea turtle in Hawaii. Based on the increased population of green sea turtles in the Islands, the *honu* are likely to be found in the area of Nawiliwili Bay as well as other shores on Kauai.

Hawaiian Monk Seal Monachus schauinslandi

The great majority of these marine mammals are found in the Northwestern Chain of the Hawaiian Islands, stretching beyond Kauai to Midway and Kure. However, in recent years, more of these mammals have been observed coming ashore along the coasts of the main Hawaiian Islands including Kauai. As a result of this trend, the Hawaiian monk seals, listed as "endangered" by the U.S. Fish and Wildlife Service, may be expected to be seen in the area of Nawiliwili Bay and other coastal areas on Kauai.

Submitted by Paul Breese

Note: This report supplements the previous fauna assessment and covers the entire harbor- to wit, Piers 1 to 3.

NAWILIWILI HARBOR SEGMENTED PIER PROJECT

Botanic Survey by Bunichi Usagawa
October 5, 2001

	Status	Abundance	Comments
Rubiaceae Morinda citrifolia Noni	P	C	one tree
Compositae Tridax procumbers Coat Buttons	X	U	
Gramineae Chloris Radiata Finger grass	X	C	
Euphorbiaceae Euphorbia hirta Garden spurge	X	C	

Dominant Species: None.

References: <u>In Gardens of Hawaii</u> by Marie C. Neal

Status:

E - Endemic-only in Hawaii
I - Indigenous and elsewhere
P - Polynesian
X - Exotic

Abundance:

A - Abundant
C - Common
O - Occasional
U - Uncommon
R - Rare
LC - Locally Common

APPENDIX B
MARINE ENVIRONMENTAL ASSESSMENT

MARINE ENVIRONMENTAL ASSESSMENT FOR THE SEGMENTED PIER 3 IMPROVEMENTS NAWILIWILI HARBOR, KAUAI

Prepared for:

W.Y. Thompson P.E.
98-1051 Kahapili Street
Aiea, HI 96701

Prepared by:

Sea Engineering, Inc.
Waimanalo, Hawaii

and

AECOS, Inc.
Kaneohe, Hawaii

April 2004

#4-11

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1.0 INTRODUCTION

Nawiliwili Harbor is the principal port for the Island of Kauai and receives virtually all ocean-going cargo entering the island. The harbor is located about 1.6 km (1 mi) southwest of Lihue on Nawiliwili Bay, adjacent to the confluence of Hule'ia River and Niumalu Stream (Figure 1). Development of the harbor was first proposed in 1912 (Harbors Committee of Kauai, 1924), initially constructed in 1930, and then enlarged and deepened to 12 m (40 ft) in 1956 (Sun Low Tom and Hara, 1973). In 1960, the breakwater which protects the harbor's east side was rehabilitated and the harbor's entrance was dredged (Sun Low Tom and Hara, 1973; Department of the Army, 1973). A small boat harbor that is separated from the river mouth by a rock jetty was dredged in 1973 from a tidal mud flat on the west side of the main basin (Department of the Army, 1973).

To accommodate expanding shipping requirements, the State is presently proposing improvements to the Pier 2 and 3 berthing areas in Nawiliwili Harbor. The proposed project entails building a new 96.5-foot long, segmented pier, located 97.5 feet off the north end of Pier 3; construction of a riprap revetment along the shore between Piers 2 and 3; and dredging of 31,000 cy of material from that corner of the harbor (Figure 1). Sea Engineering, Inc. and AECOS, Inc. were contracted to complete a physical marine, marine biological and water quality assessment in support of the environmental assessment and marine permit applications for the proposed project.

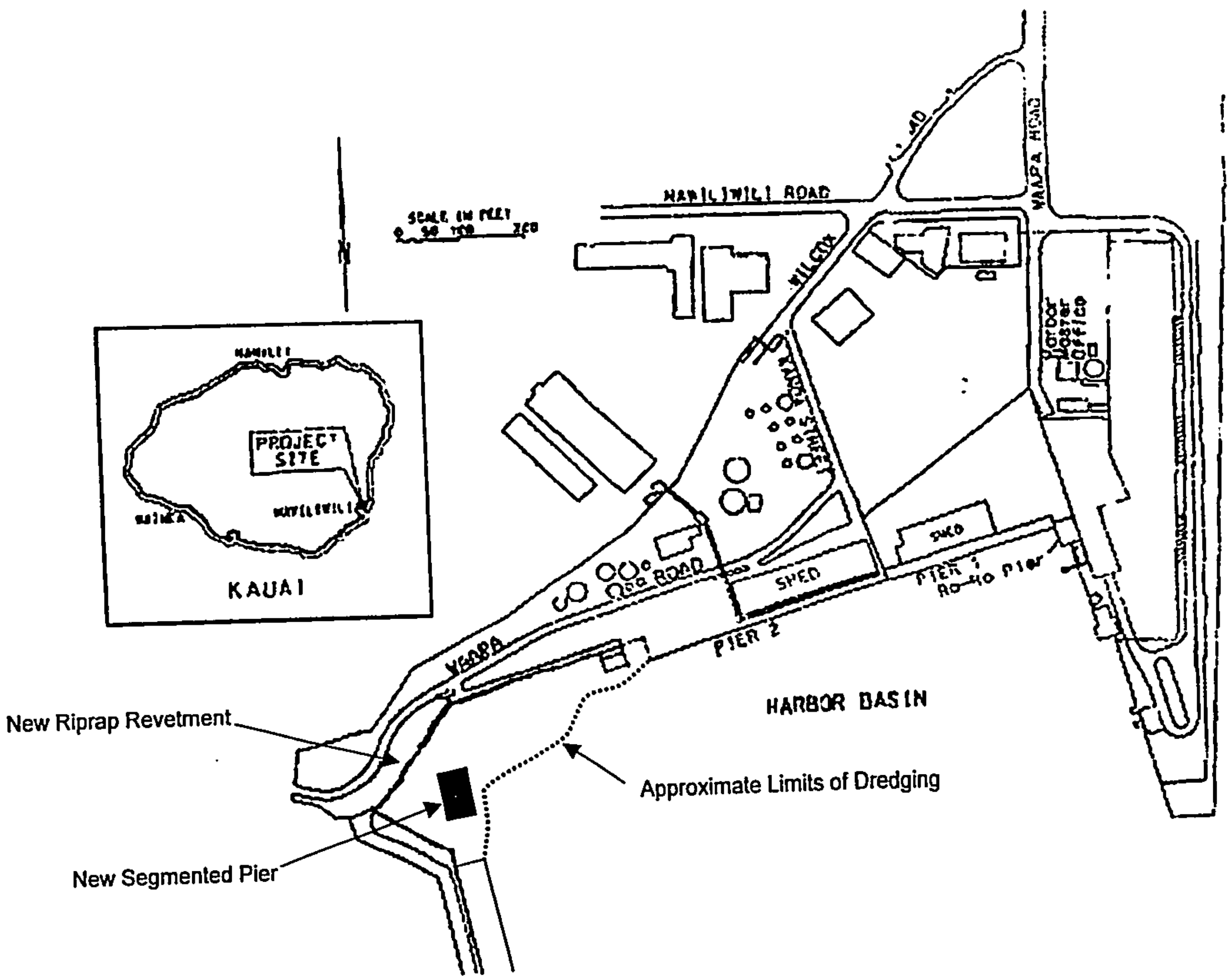

Figure 1 – Project Site

2.0 PHYSICAL MARINE ENVIRONMENT

2.1 Coastal Setting

The harbor is located about 1.6 km (1 mi) southwest of Lihue on Nawiliwili Bay, adjacent to the confluence of Hule'ia River and Niumalu Stream. The mouth of these combined streams at Nawiliwili Bay includes an entrance channel and harbor basin that have been enlarged and deepened by dredging. The shoreline on the east, north and west sides of the harbor basin has been modified to hardened surfaces, consisting of either concrete piers or rock walls. Because of the relatively enclosed nature of the harbor basin and the influence of river outflow, the water column is highly stratified, and a net transport of water out of the harbor occurs at the surface. Environmental conditions are estuarine, with surface salinity around 25‰ in the basin and 13‰ further inside at the mouth of the Hule'ia River (Department of the Army, 1973). Sediment discharge from the combined river and stream flow occurs principally during intense rainfall, but a sand bar which formerly built up between floods and restricted the Hule'ia River entrance does not rebuild under present reduced wave conditions (Department of the Army, 1973).

2.2 Winds

Prevailing Winds: Wind data are recorded hourly at the Lihue Airport, located approximately two miles northwest of Nawiliwili Harbor. The information is tabulated on an annual and monthly basis by the Air Weather Service of the United States Air Force. The resultant yearly wind histogram for the period between 1950 and 1967 is shown in Table 1.

The prevailing winds are the northeast trades, which approach from the sector north-northeast clockwise through east-southeast. At Lihue Airport, winds from this sector occur 74-percent of the time. Mean wind speeds are 10 knots; winds of 11 to 16 knots occur 41% of the time, and winds of 7 to 10 knots occur 37% of the time (Table 1).

Hurricane Winds: The Hawaiian Islands are exposed to occasional tropical storms and hurricanes. Notable storms that have occurred during the past 40 years are summarized in Table 2. Hurricane Hiki, Della, Nina and Fico passed within about 200 miles of the islands, Dot and Iniki passed over Kauai, and Iwa passed within 30 miles of Kauai.

Table 1 – Surface Winds, Percentage Frequency of Wind Direction and Speed
(From hourly observations) Total observations - 137,717
LIHUE KAUAI HAWAII WBAP, Station 22536

Speed (xnts) Dir.	1 - 3	4 - 6	7 - 10	11 - 16	17 - 21	22 - 27	%	Mean Wind Speed
N	.2	.8	1.5	.8	.1		3.4	8.6
NNE	.1	.6	3.5	4.2	.5		9.0	10.9
NE	.2	1.3	13.0	20.4	1.8	.1	36.8	11.6
ENE	.1	1.0	8.7	11.6	.9		22.3	11.2
E	.1	.5	2.1	1.7	.1		4.7	15.1
ESE	.1	.3	.6	.2			1.2	8.1
SE	.1	.2	.4	.1			.8	7.6
SSE	.1	.2	.6	.3			1.2	9.5
S	.1	.3	.8	.6	.1		1.9	9.6
SSW	.1	.3	.5	.3			1.2	8.7
SW	.2	.6	.7	.4	.1		2.0	8.4
WSW	.3	1.3	.7	.2			2.5	6.3
W	.7	3.5	2.0				6.2	5.7
WNW	.5	2.1	.7				3.3	5.3
NW	.3	.6	.2				1.2	5.1
NNW	.1	.7	.7	.2			1.7	7.0
Variable								
Calm							.5	
	3.2	14.7	36.7	41.0	3.7	.2	100	10.1

Table 2 – Historical Hurricane Characteristics

Name	Date	Maximum Sustained Wind Speed (knots)	Lowest Sea Level Pressure (mbs)	Direction	Forward Speed (knots)	Eye Diameter (n.m)
Hiki	Aug 50	65	983	WNW	5	10-20
Della	Sep 57	-	-	NW	6	-
Nina	Nov 57	80	-	NNW	8	-
Dot	Aug 59	65	984	NNW	9	20-30
Fico	Jul 78	100	955	WNW	10	30
Iwa	Nov 82	65	972	NE	32	20-30
Iniki	Sep 92	100	945	N	20	10

The report *Hurricanes in Hawaii*, by Hariguchi (1984), presents model design hurricanes for the Hawaiian Islands based on the characteristics of the historical storms. One of the model hurricanes, which is considered applicable to the Nawiliwili Harbor area for design purposes, is based on the characteristics of Hurricanes Dot and Iwa, and the parameters are shown in Table 3.

Table 3 – Model Hurricane (East-Southeast Approach)

Maximum sustained wind speed	65 knots
Maximum wind gust	90 knots
Minimum seal level pressure	979 millibars
Wind Speed/Storm Radius:	
Radius of 34-kt winds	160 nautical miles
Radius of 50-kt winds	50 nautical miles
Radius of 64-kt winds	20 nautical miles
Direction of movement	Toward 300,T.
Speed of movement	11 knots
Eye diameter (nTa)	20 nautical miles

Extreme Winds - Table 1 shows that during the period from 1950 to 1967, the strongest wind recorded at the Lihue Airport was from NNE with a speed somewhat less than 56 knots.

Hurricanes Iwa (1982) and Iniki (1992) were the most severe hurricanes to hit Hawaii in recent years.

During the Hurricane Iwa, the maximum sustained wind speed recorded was 63 knots at Lihue Airport, with a peak gust of 79 knots (reference 1), and during Iniki, the maximum sustained wind speed was 84 knots, and a peak gust was 106 knots.

2.3 Waves

Prevailing Waves - Wave data for Nawiliwili Harbor were collected for 430 days by Marine Advisers, Inc, during the two-year period from July 1962 to July 1964. A pressure wave gauge was installed in approximately 36 feet of water near the end of the main breakwater. The percent frequency histogram of the wave data was extracted from the study report (U.S. Army Engineer District, 1970) and is shown in Table 4.

The histogram shows that typical waves entering Nawiliwili Harbor are 1 to 3 feet in height and 8 to 10 seconds in period. Waves greater than 3 feet occurred 21% of the time and greater than 12 feet occurred one-half percent of the time. The maximum recorded wave height was 12.9 feet with a 10-second period.

Table 4 – Nawiliwili Harbor Wave Height Observations (Percent Occurrence)
(25 July 1962 – 27 July 1964)
(from U.S. Army Engineer District, Honolulu)

Period (seconds)	Wave Height (feet)								Total (%)
	0-1	1-2	2-3	3-4	4-5	5-6	6-12	12+	
6	0.2	0.2	1.0	-	0.5	-	0.2	-	2.1
7	0.5	1.8	1.4	-	-	-	-	-	3.7
8	1.9	16.5	3.3	1.6	0.4	2.5	3.4	-	29.6
9	-	1.6	0.7	-	0.4	0.5	0.5	-	3.7
10	6.8	12.1	6.8	1.9	3.7	2.1	2.4	0.5	36.3
11	-	1.2	-	-	-	-	-	-	1.2
12	3.5	8.4	0.6	-	-	-	-	-	12.5
13	0.7	0.2	-	-	-	-	-	-	0.9
14	0.7	3.5	0.2	-	-	-	-	-	4.4
15	0.2	1.6	0.2	-	0.3	-	-	-	2.3
16	0.2	1.4	0.3	-	-	-	-	-	1.9
17	-	-	-	-	-	-	-	-	-
18	-	1.2	-	-	-	-	-	-	1.2
19	-	-	-	-	-	-	-	-	-
20	-	-	0.2	-	-	-	-	-	0.2
Total	14.7	49.7	14.7	3.5	5.3	5.1	6.5	0.5	100.0

Hurricane Waves - A deepwater hurricane wave was calculated for the Hawaiian model hurricane parameters using methodology described in the Shore Protection Manual (U.S. Army, Corps of Engineers, 1984). The hurricane parameters used in the calculations were:

- Pressure reduction at the center of hurricane = 1 inch of mercury
- Radius of maximum winds = 18 n. miles
- Hurricane forward speed = 11 knots.

The resultant deepwater hurricane wave characteristics are:

- wave height = 26 feet
- wave period = 11 seconds.

The design deepwater hurricane wave theoretically shoals and breaks before reaching the breakwater, with a breaker height of 28 feet at a water depth of about 30 feet (for an estimated bottom slope of 1:20). However, it will reach the harbor entrance without breaking. The design wave was determined to be 25 feet at the harbor entrance, slightly reduced in height due to shoaling effect.

2.4 Design Still Water Level Rise

The design still water level rise was determined by summing the water level rise components of astronomical tide, pressure setup, wind setup and wave setup, and additional storm surge.

Astronomical-Tide - Tidal data was based on the Tide Tables, based on tide data from U.S. Department of Commerce, National Oceanic and Atmospheric Agency, National Ocean Survey (2001). The tides at Nawiliwili Harbor are given below with reference to mean lower low water datum:

Mean Higher High Water	+ 1.9 (feet)
Mean High Water	+ 1.4
Mean Tide (approx. MSL)	+ 0.8
Mean Low water	+ 0.2
Mean Lower Low Water	0

An astronomical tide of 1.9 feet was selected for design because of the frequency of occurrence of this tide level.

Pressure Setup - The calculated water level rise due to atmospheric pressure reduction during the model hurricane occurrence is 1.1 feet, given the central pressure reduction of 1 inch of mercury.

Wind Setup - Wind setup is negligible because of the very narrow continental shelf off the southeast coast of Kauai.

Additional Storm Surge - During Hurricane Iwa, water level recordings in Nawiliwili Harbor indicated that the maximum water level rise above predicted tide level was 1.3 feet (Chiu, et al, 1983). Subtracting a theoretical pressure setup of 0.3 feet, which was calculated for Nawiliwili Harbor during the Hurricane Iwa event, a remaining water level rise of 1 foot occurred. The additional rise observed should be added to the other components to cover the "worst case" situation in the harbor. During Hurricane Iniki, the maximum water level rise recorded was 5.8 feet above MLLW. The tide-corrected water level rise was 4.1 feet. Subtracting a predicted storm surge of 1.7 feet, the remaining water level rise is 2.4 feet. These water level components include wave setup and an unknown additional storm surge. During Hurricanes Iwa and Iniki, the component ranged from 1.0 to 2.4 feet. The additional storm surge is therefore estimated to be 2.0 feet.

The design water level rise is therefore:

Astronomical tide	1.9 (feet)
Pressure setup	1.1
Wind setup	0.0
Wave setup and unknown storm surge	2.0
Design water level rise	5.0 (feet)

The water level rise in Nawiliwili Harbor to be used for design is therefore 5.0 feet above mean lower low water.

2.5 Wave Characteristics at the Proposed Pier

Waves at the proposed pier in Nawiliwili Harbor were evaluated by three methods:

(1) wave diffraction analysis,
(2) combination of wave diffraction and wave transmission, and
(3) wave generation in the harbor.

Results from the various methods were compared and the worst case selected for design purposes.

A wave diffraction analysis was performed for waves with an 11-second period, approaching the entrance channel approximately from the ESE, which is perpendicular to the breakwater. This wave direction was chosen since the deepwater waves reach the harbor entrance with minimum wave refraction.

A wave diffraction diagram was drawn manually based on methodology described in the Shore Protection Manual. The diagram gives diffraction coefficients of less than 0.06 along the proposed berthing area (Figure 2). Using a diffraction coefficient of 0.05 the design 25-foot hurricane wave at the harbor entrance reduces to 1.3 feet at the proposed pier.

Combined Wave Diffraction and Transmission - The maximum transmission of wave energy over the breakwater occurs when an incoming deepwater wave breaks on the structure. Beyond a certain height, the waves break further seaward, with some energy dissipating before reaching the breakwater. Given the water depths and bottom slope seaward of the breakwater, the largest wave that can break directly on the breakwater is 23 feet high with a period of 11 seconds.

The wave energy transmitted into the harbor produces a wave 2.5 feet high just inside the breakwater. This wave will undergo diffraction while moving across the harbor to the proposed pier site. The diffraction coefficient for this case is about 0.50 as shown in Figure 3. The resultant transmitted wave height at the study area is therefore 1.3 feet.

Wave energy also enters the harbor directly, moving up the entrance channel and then diffracting as it crosses the harbor. Due to the effect of local variations in the nearshore bottom, the wave height at the entrance channel corresponding to the 23-foot wave at the breakwater is only 19 feet high. This 19-foot wave at the entrance channel will be reduced by diffraction effects to 1.0 feet at the proposed pier.

Since the wave transmission and diffraction can occur simultaneously, the resultant wave heights at the proposed pier are additive. Superimposing the waves from the two different mechanisms gives resultant wave height of 2.3 feet at the proposed pier.

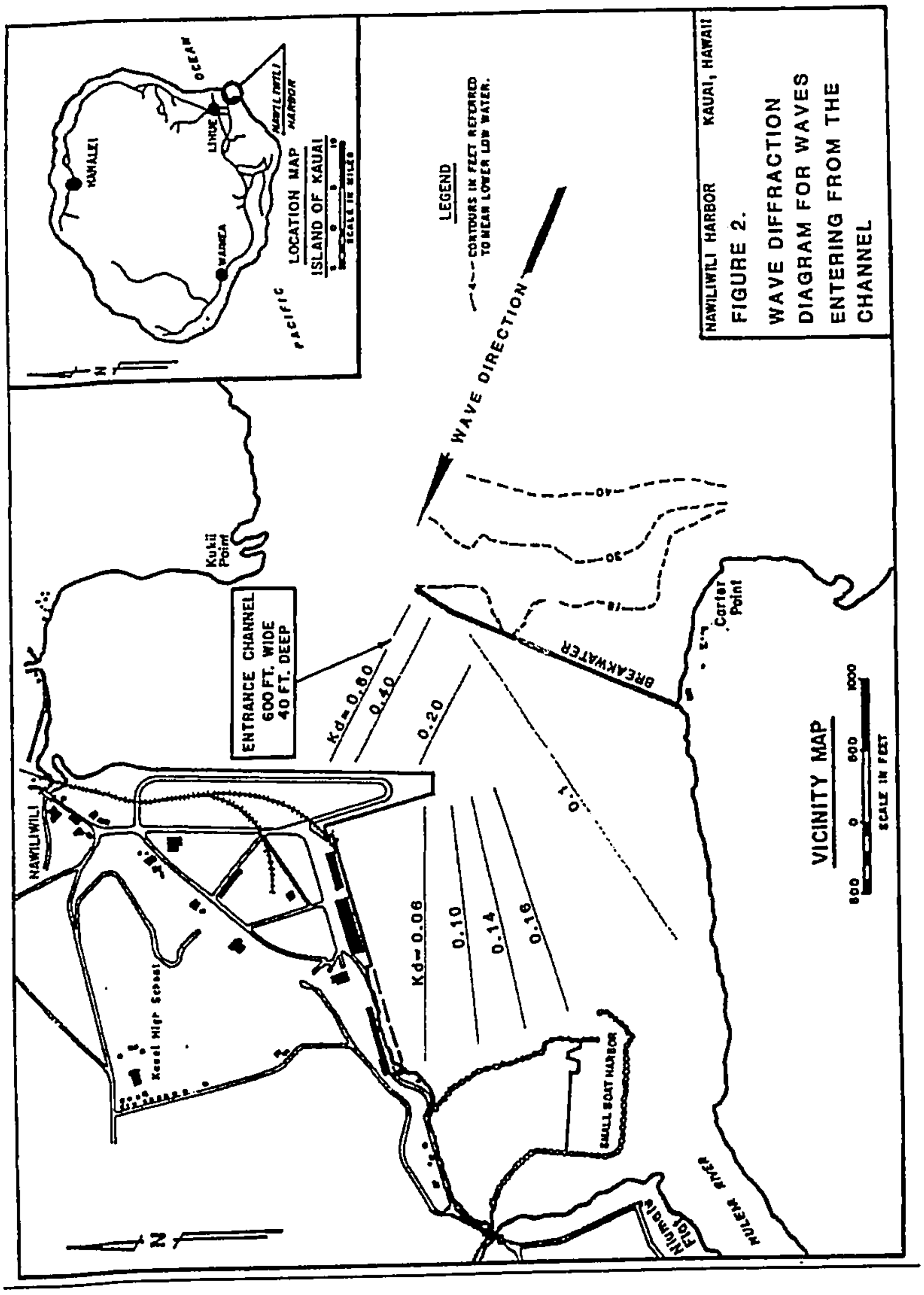

Figure 2 – Wave Diffraction Diagram for Waves Entering from the Channel

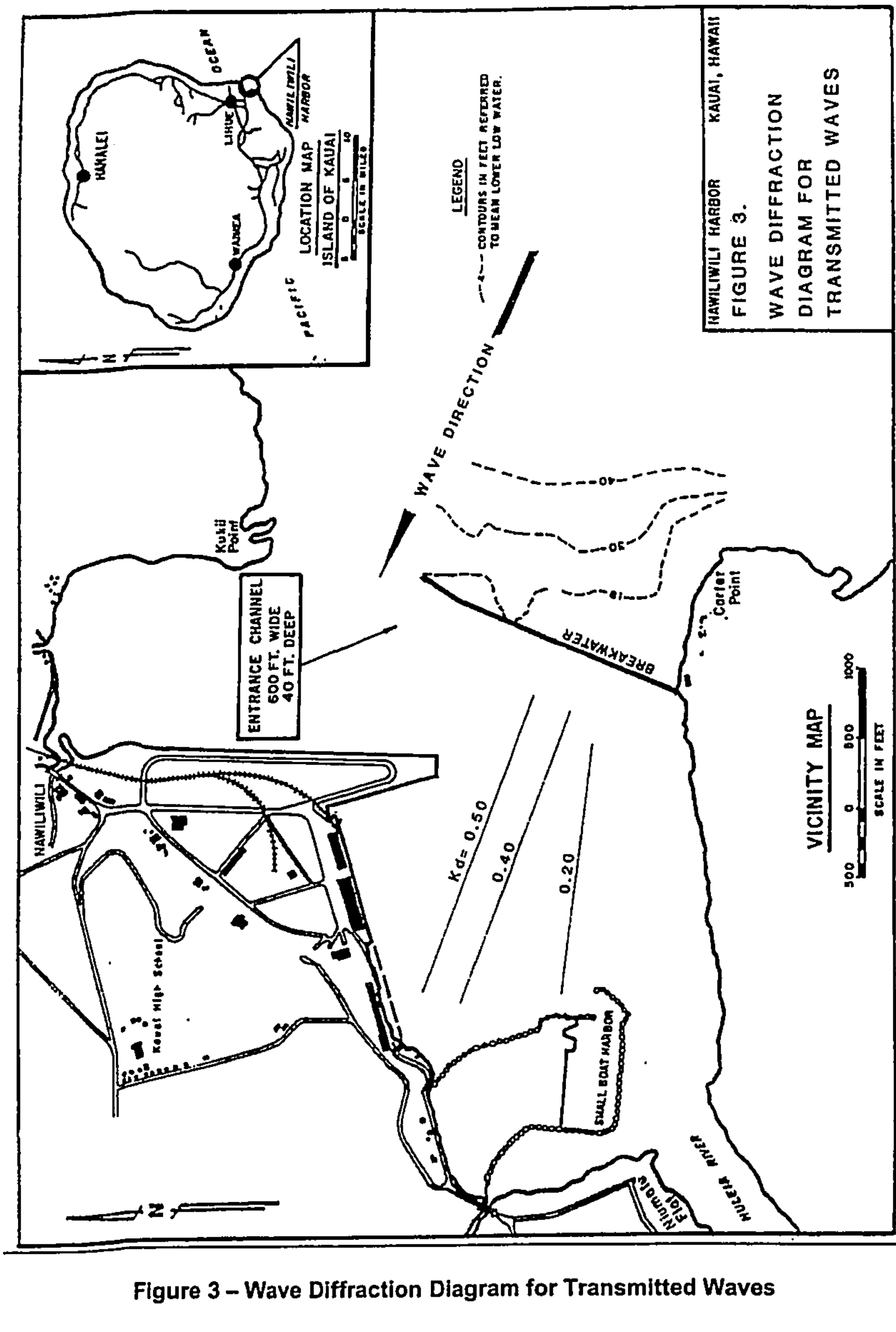

Figure 3 – Wave Diffraction Diagram for Transmitted Waves

Wave Generation in the Harbor - For the third method waves generated in the harbor were calculated for the maximum fetch length of 3000 feet and water depth of 40 feet, using methodology described in the Shore Protection Manual. The calculated wave height and period are 2.3 feet and 2.6 seconds, respectively, for a wind speed of 63 knots.

Results from three methods are summarized in Table 5. The design wave at the proposed pier will be 2.3 feet in height with an 11-second period.

Table 5 – Waves at the Proposed Pier

Method	Wave Period (seconds)	Wave Height (feet) Pier section
Wave Diffraction	11	1.3
Diffraction & Transmission	11	2.3
Locally Generated Wave	2.6	2.3

2.6 Currents

Several environmental studies (Sunn, Low, Tom & Hara; 1967, 1972; Department of Health, 1969) all resulted in consistent descriptions of the circulation and mixing in Nawiliwili Harbor. The Hule'ia River discharges into the west end of the harbor and the fresh water volume results in a pronounced salinity gradient throughout the inner bay. The surface layer is low salinity, and deeper layers approach the salinity of seawater. The degree of stratification decreases with distance seaward.

The high degree of stratification apparently exists in the inner harbor because of low mixing and weak circulation. Sunn, Low, Tom & Hara (1972) concluded that, in the inner harbor, there was a net seaward transport in the surface layer, due to stream inflow. Dye tracer studies indicated that the surface layer was approximately four feet thick. Below that depth, they found very weak mid-depth and bottom currents. They concluded that the tidal cycles resulted in very little mixing or transport in inner Nawiliwili Harbor, and that the overall transport was dependent upon the discharge rate of the Hule'ia River.

Current drogues were tracked during a weak flood tide on November 26, 2001 (Figure 4), and the results were consistent with the above description. Winds were moderate and gusty from the east and southeast. Surface drogues were deployed at a water depth of 0 to 4 feet, while deep drogues were placed at water depths of 15 to 20 feet. Surface drogues moved down wind at speed ranging between .1 to .4 ft/s, while the deep drogue moved to the south and east at speed of only .01 to .02 ft/s (Figure 4, Table 6).

In contrast to the inner harbor, Sunn, Low, Tom & Hara (1972) observed relatively strong mixing and transport in Kalapaki Bay. Although the Nawiliwili stream discharge during their fieldwork was 7 cfs, there was only localized stratification near the stream mouth. Dye tracer studies indicated strong vertical mixing and a net seaward movement of water out of Kalapaki Bay. The major difference is the exposure of Kalapaki Bay to incoming waves and surges, and the proximity of the bay to the open coastal waters.

Table 6 – Current Drogue Measurements

Measurement	Type	Time	Distance (feet)	Speed (ft/s)
1-1	Surface	9 :33		
1-2	Surface	9 :54	213	.16
2-1	Surface	9 :59		
2-2	Surface	10 :26	177	.10
2-3	Surface	10 :40	210	.26
2-4	Surface	10 :45	118	.40
3-1	Surface	10 :47		
3-2	Surface	11 :03	262	.26
4-1	Deep	9 :33		
4-2	Deep	10 :23	40	.01
4-3	deep	11 :05	50	.02

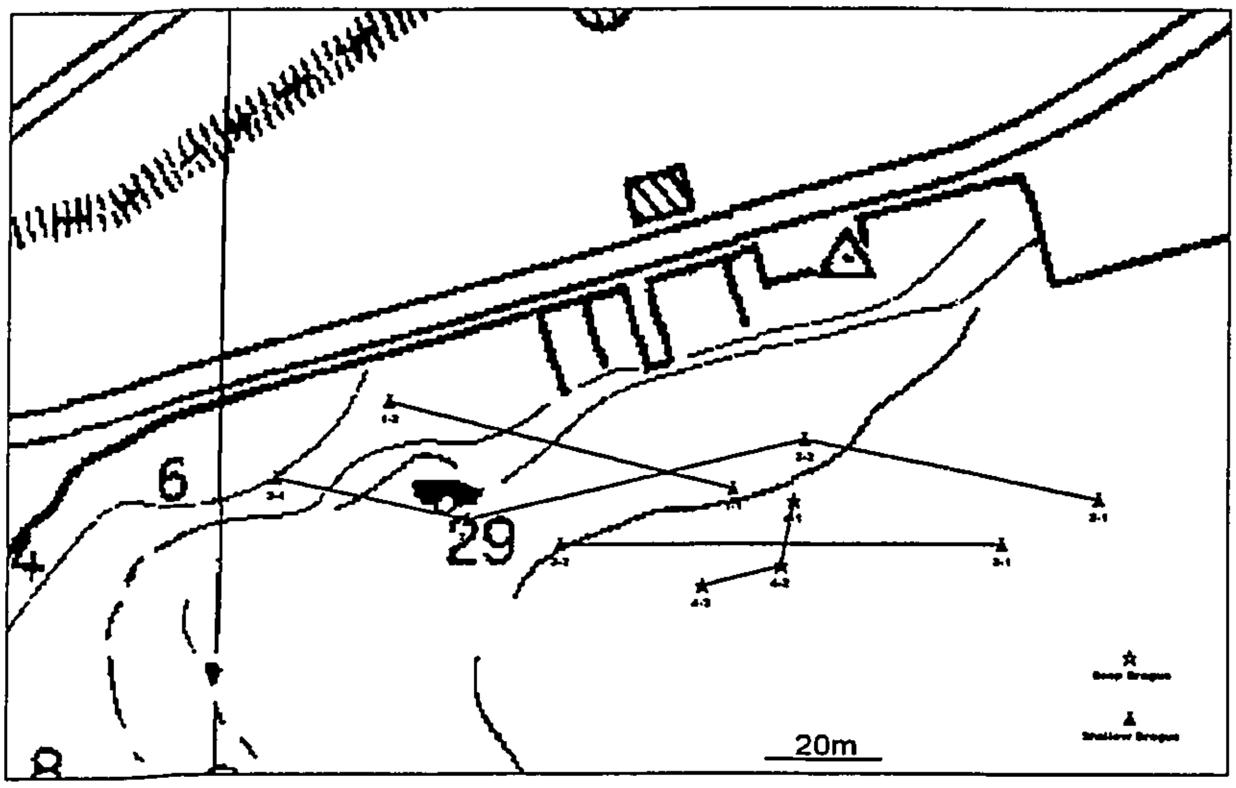

Figure 4 – November 26, 2001 Current Drogue Measurements

3.0 SEDIMENT SAMPLING

Sediment samples were obtained during the geophysical investigation from selected bores and strata. These samples were analyzed for grain size and Toxicity Characteristic Leaching Procedure (TCLP) for metals and pesticides. The latter test determines the potential for a soil or sediment to give up toxic substances in a landfill situation. That is, each sample is manipulated in a manner designed to mimic standardized chemical conditions and a leachate produced which is then analyzed. Thus, the results do not necessarily reflect total concentration of an analyte, but establish if the sample can be disposed of in a landfill as a non-hazardous waste. Only sediment layers, presumed to have been deposited since the harbor was dredged, were to be analyzed. However, sediment size-fraction analysis suggests this was not always the case.

The survey site (Figure 1) lies along the north side of the Nawiliwili Harbor inner basin, starting from the west end of existing Pier 2 to the north end of Pier 3, a distance of approximately 244 m (800 ft). At the northeast end of this area, concrete pier pilings support Pier 2; another small pier with pilings occurs about midway along the study area. Otherwise, the substratum is mostly fossilized consolidated reef and rubble that has been dredged to a maximum of about 12 m (40 ft), with loose boulders and cobbles lying on the bottom. The bottom becomes more densely covered with fine sand and silt with increasing depth, and substantial trash (such as car tires and other man-made debris) occurs close to the piers.

3.1 Methods

Sediment samples were obtained over a period of several weeks as geophysical drilling proceeded in the project area. In all, four separate bores were made (Figure 5) by the boring contractor between October 10 and November 8, 2001. From each bore, three samples were obtained to be composited into a single sample for analytical purposes. However, due to a mix-up at the laboratory, TCLP analyses were completed on each of the three samples obtained from the first boring (BO-08). The samples were collected as the first (top) three, 6-inch sections from each boring. In all cases, size-fraction analysis was performed on each individual sample (not on the composite). Two additional sediment samples were obtained from test borings B-03 and B-04 in March of 2004, these representing an area of additional proposed dredging between Pier 2 and Pier 3 (Figure 5).

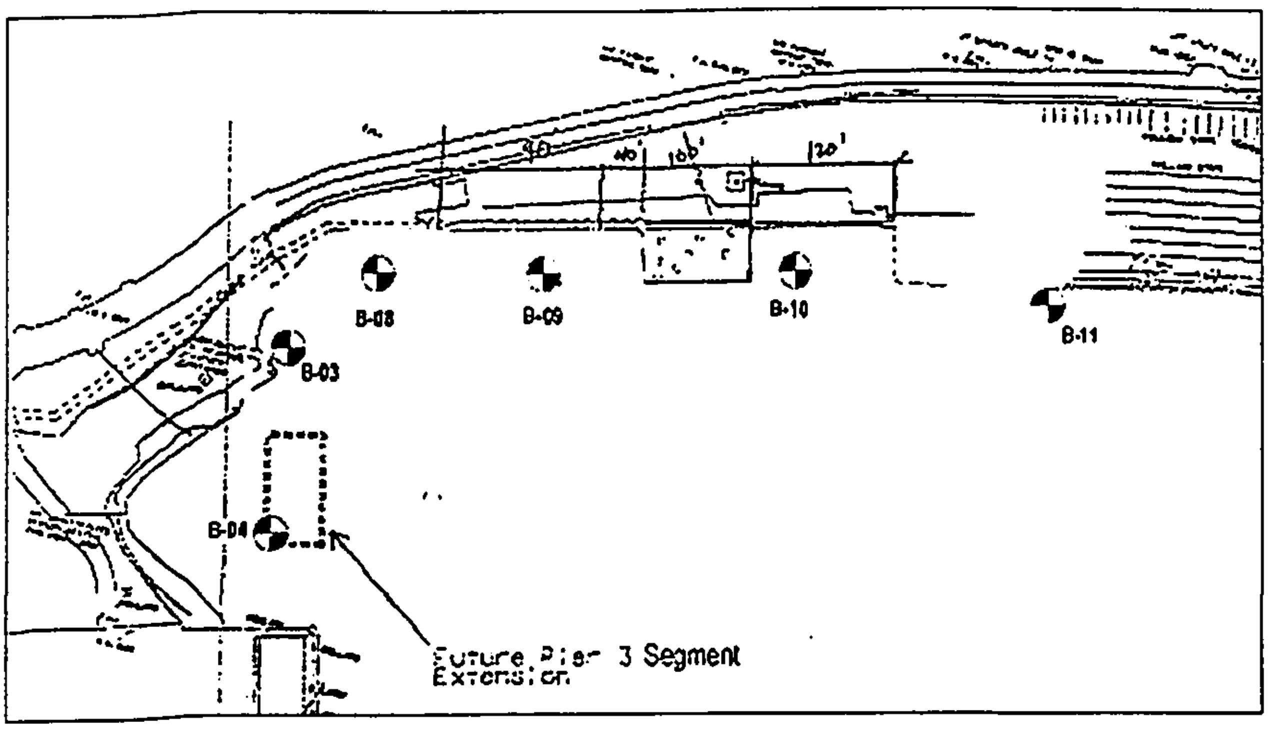

Figure 5 – Northwest corner of Nawiliwili Harbor (Project Area)
showing proposed sediment bore locations provided by Arnold Okuba & Assoc.

TCLP was done by EnviroMatrix Analytical in San Diego, California. After extraction, the leachate was analyzed for toxic metals (barium, cadmium, chromium, lead, silver, arsenic, mercury, and selenium) and for selected organics.

Size-fraction analysis was done by *AECOS* Inc. in Kane'ohe, O'ahu. Results detail the composition of each sample with respect to standard size categories or fractions (size range of particles). Results are reported by dry weight of each standard fraction, percent that each fraction comprises of the sediment, and cumulative percent from largest to smallest particles. The cumulative percent values are plotted, providing a visual analysis of each sediment type.

3.2 Sediment Characteristics Results

Sediment size-fraction results are best understood by reference to the cumulative frequency plots in Attachment A. Plots that describe a line going more or less directly from lower left to upper right (e.g., sample 3 of BO-08 or BO-08/3) are considered poorly sorted sediments with no particular size-fraction dominating the material. Sediment cumulative curves that are mostly flat, rising steeply at some point then leveling off again (e.g., sample 1 of BO-08) are sorted sediments, suggesting some physical process has resulted in concentrating particular size fractions. Such sediments may be named by the predominate fraction: e,g., coarse sand, fine sand, silt, etc. Physical processes such as waves or currents removing fine material or settlement of silt or clay carried in by weak currents can produce highly sorted sediments.

Indeed, we expect new sediment deposits in this part of the dredged basin to be dominated by the finest fractions — to be silt or clay.

Samples 1 and 2 of BO-08 appear to represent fine material, but mostly sand-sized fractions, and thus may not be sediment deposited after dredging in this area; they may represent an old beach deposit. Sample 3 seems to be clearly from below the former dredged depth (i.e., is poorly sorted, old reef deposit).

Samples analyzed from BO-09 all appear to be similar, except that sample 1 (BO-09/1) is composed of finer material than samples 2 and 3. The latter are similar to samples 1 and 2 of BO-08, although have a greater proportion of silt and clay (pan fraction). The shallowest sample from BO-10 (BO-10/1) is likewise very fine material (80% silt/clay) and resembles BO-08/1. BO-10/2 is similar to BO-08/2; and BO-10/3 is also similar, but includes some larger chunks of material. Both of these samples are 40% silt/clay.

All three samples from BO-11 are similar to each other, but dissimilar to the other sediments tested in being comprised of mostly coarse material, with only a small amount of (< 10%) silt/clay, and showing less sorting with depth. It seems unlikely that these sandy pebble and sandy gravel sediments represent harbor bottom deposits.

The two most recent samples, B-03 and B-04, are also plotted on a "Percent Finer Than" scale. These sediments are poorly to moderately sorted and similar in composition to the other sediment samples.

The results of analyses on sediment samples are provided as Attachment A. Eight (8) metals and 28 pesticides and non-volatile solvents were tested for in six samples. Nothing was detected in any sample. The values given in the results tabulation are the detection limits for that analyte (that is, "< 5" is to be read "less than 5" and 5, in this case, is the detection limit). These results are the same as reporting "ND" or not detected for all analytes in all samples.

4.0 WATER QUALITY

Water samples were obtained from five locations (and two depths) in Nawiliwili Harbor in the vicinity of the proposed project area (Figure 6). Sampling was undertaken on December 10, 2001 from the shoreline. In October 2003, samples were again collected from the shoreline at most of the same locations. However, two additional harbor samples at Stations 4 and 5 (labeled 4d and 5d, respectively) were collected at depths below the turbid layer by divers in an attempt to sample harbor water not influenced by the influx of freshwater from heavy rains during the several days previous to the sampling on October 30, 2003.

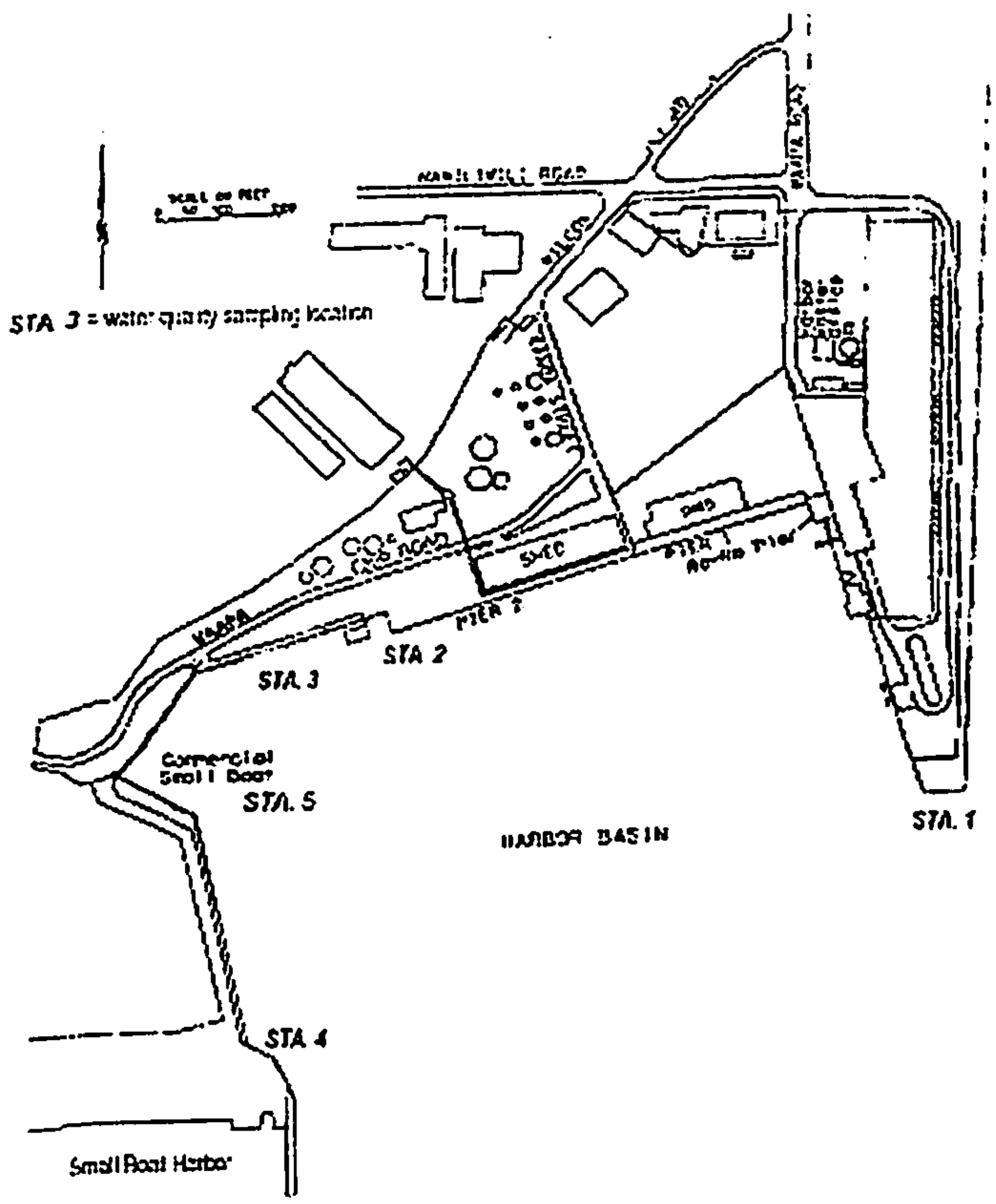

Figure 6 – Nawiliwili Harbor Showing Locations of Water Quality Sampling Stations for the December 10, 2001 and October 30, 2003 Sampling Events.

4.1 Methods

Methods and instruments used for these analyses are listed in Table 7. Note that temperature, salinity (in December 2001), pH (in October 2003), and dissolved oxygen (DO) were measured in the field. All other analyses were performed on samples that were collected, placed on ice, and shipped cold to *AECOS* Inc. in Kane'ohe, O'ahu. Nutrient samples were frozen and then shipped to *AECOS* Laboratory of Hawaii in Kailua, Kona.

Table 7 – Analytical Methods and Instruments Used for the December 10, 2001 Water Quality Sampling Event in Nawiliwili Harbor

Analyses List	Method	Reference	Instrument
Ammonia	alkaline phenol	Koroleff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 550 DO meter (Nov 2001) or YSI Model 85 DO meter (Feb 2002)
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
pH	EPA 150.1	EPA (1979)	pHep 3
Salinity (field)	refractive index or salinity	---	temperature compensating refractometer (Nov 2001) or YSI Model 85 DO meter (Feb 2002)
Temperature	thermister calibrated to NBS cert. Thermometer (EPA 170.1)	EPA (1979)	YSI Model 550 DO meter (Nov 2001) or YSI Model 85 DO meter (Feb 2002)
Total Nitrogen	persulfate digestion /EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion /EPA 365.1	Koroleff in Grasshoff et al. (1986) / EPA (1993)	Technicon AutoAnalyzer II
Total Suspended Solids (TSS)	Method 2540D (EPA 160.2)	Standard Methods 18th Edition (1992); EPA (1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 18th Edition (1992); EPA (1993)	Hach 2100P Turbidimeter

D'Elia, C.F., P.A. Stendler, & N. Corwin. 1977. *Limnol. Oceanogr.* 22(4): 760-764.

EPA. 1979. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency, EPA 600/4-79-020.

EPA. 1993. Methods for the Determination of Inorganic Substances in Environmental Samples. EPA 600/R-93/100.

EPA. 1994. Methods for Determination of Metals in Environmental Samples, Supplement 1. EPA/600/R-94/111. May 1994.

Grasshoff, K., M. Ehrhardt, & K. Kremling (eds). 1986. Methods of Seawater Analysis (2nd ed). Verlag Chemie, GmbH, Weinheim.

Standard Methods. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 p.

4.2 Water Quality Results

The results of water quality analyses are provided in Table 8. In general, on December 10 there was not much variation between sample locations and very little pattern, suggesting reasonably well-mixed surface water in the harbor. The two samples from the project area were slightly more brackish than the two stations outside the project area, this despite the close proximity of Station 4 to the Hule'ia River mouth. However, salinity at all four locations was depressed compared with typical oceanic values.

Results in October 2003 were very different. The influence of turbid, brackish water from the river was so significant that additional deeper samples (Sta. 4d and 5d) were collected to represent the majority of the harbor water mass. Indeed, salinity of these latter, deeper samples is essentially seawater (~34 ppt), whereas all of the surface water samples are clearly brackish. The *AECOS* (2004) report stated:

> The water quality measured in October in Nawiliwili Harbor was obviously affected by heavy rains that had brought significant runoff and freshwater from Hule'ia River to the harbor. The surface water appeared to be reasonably well mixed, as evidenced by the similarity of values observed at all surface sampling stations. However, Station 1 appeared to be most influenced by the freshwater influx from Hule'ia Stream. Salinity was low, and turbidity measurements and TSS and nutrient concentrations were highest at Station 1.

Table 8 – Water quality characteristics of Nawiliwili Harbor sampled December 10, 2001, October 30 and October 31, 2003.

	Date	Time	Temp. (°C)	DO (mg/l)	DO Sat. (%)	Sal. (ppt)	pH
Sta. 1	12-10-01		23.8	6.98	98	30	--
"	10-30-03	1000	26.1	4.75	64	17.518	7.8
"	10-30-03	1545	26.6	4.90	68	18.993	8.1
Sta. 2	12-10-01		23.2	7.46	101	25	--
Sta. 3	12-10-01		23.2	7.35	99	25	--
"	10-30-03	1025	25.9	4.44	61	19.771	8.0
"	10-30-03	1535	26.8	4.35	60	18.511	8.1
Sta. 4	12-10-01		23.2	6.81	94	28	--
"	10-30-03	1045	26.3	4.62	66	24.116	8.1
"	10-30-03	1600	26.8	4.75	65	16	8.1
Sta. 4d	10-30-03	1650	26.7	3.85	58	34.621	8.3
Sta. 5d	10-30-03	1450	--	--	--	34.612	8.3

		Turbidity (ntu)	TSS (mg/l)	Ammonia (µg N/l)	Nitrate + nitrite (µg N/l)	Total N (µg N/l)	Total P (µg N/l)	Chl. a (µg /l)
Sta. 1	12-10-01	1.75	10	39	7	248	--	--
"	10-30-03	47.5	52	45	41	428	47	1.36
"	10-30-03	27.3	33	11	31	308	72	2.43
Sta. 2	12-10-01	1.03	7.0	20	24	162	--	--
Sta. 3	12-10-01	1.42	7.4	16	10	243	--	--
"	10-30-03	17.7	23.4	< 1	10	306	40	1.40
"	10-30-03	13.4	16	< 1	< 1	291	42	3.60
Sta. 4	12-10-01	2.11	3.7	10	43	224	--	--
"	10-30-03	15.6	21.6	30	43	289	45	0.92
"	10-30-03	--	--	--	--	--	--	--
Sta. 4d	10-30-03	1.68	14	1	10	146	23	0.95
Sta. 5d	10-30-03	2.06	14	< 1	5	140	22	1.71

Dissolved oxygen (DO) values all indicated water close to saturation for oxygen. Turbidity values were reasonable for a harbor and river mouth (as were TSS). Nutrient values were all reasonable as well, and not indicative of water quality problems, or excessive runoff influences.

5.0 MARINE BIOLOGICAL SURVEY

5.1 Previous Surveys

The only previous marine biological information available for Nawiliwili Harbor is from a survey conducted to evaluate the impact of dredging the small boat harbor in 1973 (Sunn, Low Tom and Hara, 1973). Sampling was conducted on the tidal flat from which the harbor was dredged, and at various locations throughout the harbor, but none in the area of the present study along the harbor's north perimeter. The tidal flats showed low concentrations of infauna, with shells and fragments of mytilid and tellinid bivalve molluscs and occasional live cirratulid polychaetes the major organisms found. Dominant crab species were the white crab *Portunus sanguinolentus*, the red crab *Podophthalmus vigil* and the introduced Samoan crab *Scylla serrata*. The most abundant zooplankton were copepods, which were densest in concentration in the Hule'ia River where the highest concentrations of chlorophyll a also occurred. Throughout the inner harbor only 13 taxa of invertebrates and 16 species of fish were reported, while a steep trench from 70 to 100 feet deep outside the harbor supported abundant coral growth of the species *Porites lobata, Pocillopora meandrina, Montipora capitata* (=*M. verrucosa*) *Leptastrea transversa* (=*L. bottae*) and *Antipathes grandis*.

5.2 Methods

The project area was first surveyed by the biologists on November 26, 2001. Two divers using SCUBA investigated the bottom and water column from the end of Pier 2 to the northwest corner of the inner harbor basin, and one investigator identified dominant macroalgae, invertebrates, and fishes and recorded the organisms observed. Underwater visibility was approximately 3 to 4 m (10 to 12 ft), so only fishes larger than 5 cm (2 in) length were reliably recorded. Special attention was paid to fouling organism growing on pier pilings and cryptic organisms in recessed areas. Dives were made by slowly swimming up and down the pier pilings and rocky bottom from near the water surface down to where the bottom flattened out at 10 to 12 m (30 to 40 ft) depth. Approximately 10 such ascents and descents were made up and down the slope throughout the survey area.

Additional diving surveys were made using SCUBA on 30 October, 2003 in Nawiliwili Harbor for the 2025 Master Plan document. The investigators identified dominant macroalgae, invertebrates and fishes and recorded organisms identifiable on site using underwater paper. Special attention was paid to fouling organisms growing on pier pilings and cryptic organisms in recessed areas. Observations were made while slowly swimming up and down the pier pilings or rocky bottom from near the water surface down to where the bottom flattened out at 35 ft (10.5 m). Species of uncertain identity were collected and preserved for later identification. All identified biota were assigned a status of native, cryptogenic (of uncertain geographic origin), or introduced (Carlton and Eldredge, in prep.; Eldredge and Smith, 2001). Conditions at the time of the survey in Nawiliwili Harbor were difficult because of recent rain and runoff that had formed a turbid surface layer about 0.5 m thick on the east side of the Harbor at the Pier 4 site, and as much as 10 ft (3 m) thick at the

Pier 3 extension site along the jetty that ends at the small boat harbor. However, below this turbid surface layer conditions were better, with visibility of about 6 ft (2 m).

5.3 Biological Survey Results

Organisms noted on the survey are listed in Table 9, which also indicates whether they were found on or near the pier pilings, in the rocky areas, or both. A total of 53 taxa were recorded for the entire survey area, with four algae, 26 invertebrates and 23 fishes identified to genus or species. Of these species, one species of algae, 13 of the invertebrates and two of the fishes are considered to be introduced to Hawaii (that is, non-native or alien species). Two basic benthic environments occurred along the study area: (1) the pier pilings of the docks, which support fouling organisms similar to those that commonly occur in Hawaii's harbors; and (2) the rock and rubble bottom, which has a sparse assemblage of reef biota. Thirty-five species occurred in the former habitat and 31 in the second, with 17 species, mostly fishes, common to both.

Table 9 – Biota Occurring in Nawiliwili Harbor, Pier Expansion Study Area
(November 26, 2001)

Phylum/Class	Order/Family	Genus Species	Author, Date	Pilings	Rocks
Chlorophyta	Bryopsidaceae	*Bryopsis sp*			
Phaeophyta	Dictyotaceae	*Lobophora variegata*	(Lamouroux) Wormsley		
Phaeophyta	Dictyotaceae	*Padina sp.*			
Rhodophyta	Rhodomelaceae	*Acanthophora spicifera*	(Vahl) Boergesen		x
Porifera	Chalinidae	*Sigmadocia caerulea*	Hechtel, 1965	x	
Porifera	Chondrillidae	*Chondrosia chucalla*	de Laubenfels, 1936	x	
Porifera	Desmacellidae	*Biemna fistulosa*	(Topsent, 1897)	x	
Porifera	Mycalidae	*Mycale armata*	Thiele, 1903	x	
Porifera	Mycalidae	*Zygomycale parishii*	(Bowerbank, 1875)	x	
Porifera	Suberitidae	*Suberites zeteki*	de Laubenfels, 1936	x	
Hydrozoa	Pennariidae	*Pennaria disticha*	Goldfuss, 1820	x	
Anthozoa	Aiptasiidae	*Aiptasia sp.*		x	
Anthozoa	Pocilloporidae	*Pocillopora damicornis*	(Linnaeus, 1758)		x
Anthozoa	Acroporidae	*Montipora capitata*	(Dana, 1846)		x
Polychaeta	Chaetopteridae	*Chaetopterus sp.*		x	
Polychaeta	Sabellidae	*Sabellastarte spectabilis*	(Grube, 1878)	x	x
Crustacea	Cirripedia	*Balanus eburneus*	Gould	x	
Crustacea	Cirripedia	*Chthamalus proteus*	Dando & Southward, 1980	x	
Crustacea	Stenopididae	*Stenopus hispidus*	Rathbun, 1907		x
Crustacea	Palinuridae	*Panulirus penicillatus*	Oliver, 1791)		x
Gastropoda	Littorinidae	*Litoraria scabra*	(Linnaeus, 1758)	x	
Bivalvia	Mytilidae	*Brachidontes crebristriatus*	(Conrad, 1837)		x
Cephalopoda	Octopodidae	*Octopus cyanea*	Gray, 1849		x
Ectoprocta	Vesiculariidae	*Amathia distans*	Busk, 1886	x	
Echinoidea	Diadematidae	*Echinothrix diadema*	Linnaeus, 1758		x
Holothuriidea	Holothuriidae	*Actinopyga obesa*	(Selenka, 1867)		x
Urochordata	(Ascidacea)	*Ascidia sydneiensis*	Stimpson, 1855	x	x

Phylum/Class	Order/Family	Genus Species	Author, Date	Pilings	Rocks
Urochordata	(Ascidacea)	*Didemnum* sp.		x	
Urochordata	(Ascidacea)	*Herdmania momus*	(Savigny, 1816)	x	
Urochordata	(Ascidacea)	*Phallusia nigra*	Savigny, 1816	x	x
Osteichthyes	Synodontidae	*Saurida* sp.			
Osteichthyes	Kuhliidae	*Kuhlia sandvicensis*	(Steindachner, 1876)	x	
Osteichthyes	Carangidae	*Carangoides orthogrammus*	(Jordan& Gilbert, 1882)	x	
Osteichthyes	Carangidae	*Seriola dumerili*	(Risso, 1810)	x	
Osteichthyes	Lutjanidae	*Lutjanus fulvus*	(Quoy and Gaimard, 1824)	x	x
Osteichthyes	Mullidae	*Mulloidichthys flavolineatus*	(Lacepede, 1801)	x	x
Osteichthyes	Mullidae	*Mulloidichthys vanicolensis*	(Valenciennes, 1831)	x	x
Osteichthyes	Mullidae	*Parupeneus multifasciatus*	Quoy & Gaimard, 1824	x	x
Osteichthyes	Mullidae	*Parupeneus porphyreus*	Jenkins, 1903	x	x
Osteichthyes	Chaetodontidae	*Chaetodon auriga*	Forsskal, 1775	x	x
Osteichthyes	Chaetodontidae	*Chaetodon lunula*	(Lacepede, 1803)	x	x
Osteichthyes	Pomacentridae	*Abudefduf abdominalis*	(Quoy & Gaimard, 1824)	x	x
Osteichthyes	Pomacentridae	*Stegastes fasciolatus*	(Ogilby, 1889)	x	x
Osteichthyes	Serranidae	*Cephalopholis argus*	Bloch & Schneider, 1801	x	x
Osteichthyes	Labridae	*Thalassoma duperrey*	(Quoy and Gaimard, 1824)		x
Osteichthyes	Scaridae	*Scarus sp. (juv.)*			x
Osteichthyes	Acanthuridae	*Acanthurus blochii*	Valenciennes, 1835	x	x
Osteichthyes	Acanthuridae	*Acanthurus dussumieri*	Cuvier & Valenciennes, 1835	x	x
Osteichthyes	Acanthuridae	*Acanthurus triostegus*	(Linnaeus, 1758)	x	x
Osteichthyes	Acanthuridae	*Ctenochaetus strigosus*	(Bennett, 1828)		x
Osteichthyes	Zanclidae	*Zanclus cornutus*	(Linnaeus, 1758)	x	x
Osteichthyes	Tetraodontidae	*Arothron hispidus*	(Linnaeus, 1758)		x
Osteichthyes	Tetraodontidae	*Canthigaster jactator*	(Jenkins, 1901)		x

The dock pilings were virtually 100% covered with fouling organisms, especially the sponges *Sigmadocia caerulea, Biemna fistulosa, Mycale armata, Zygomycale, parishii, Suberites zeteki,* the stinging hydroid, *Pennaria disticha,* the ascidian sea squirts, *Ascidia sydneiensis* and *Phallusia nigra*, and the bryozoan or "moss animal," *Amathia distans.* At the intertidal line the periwinkle, *Littoraria scabra,* and the small introduced barnacle, *Chthamalus proteus*, were abundant, along with the acorn barnacle, *Balanus eburneus*, occurring a little lower down. The anemone, *Aiptasia* sp., and the tube dwelling polychaete worms, *Sabellastarte spectabilis* and *Chaetopterus* sp., were occasionally found here, as was small areas of the colonial bryozoan, *Didemnum* sp. Fishes commonly seen swimming among the dock pilings were *Abudefduf abdominalis, Kuhlia sandvicensis, Parupeneus multifasciatus,* the introduced jack, *Lutjanus fulvus, Acanthurus blochii, Zanclus cornutus, Chaetodon lunula, Mulloidichthys vanicolensis*, and *Carangoides orthogrammus.* A small school of kahala, *Seriola dumerili,* was observed in the vicinity of Pier 2 at the beginning of the survey dive.

Many of these same organisms occurred on the reef and limestone substratum below and beyond the existing dock areas. At the shallowest depths near the shoreline this environment was dominated to about the 2-m (6-ft) depth by the introduced alga, *Acanthophora spicifera*, which was the alga most commonly seen throughout the survey area. Two species of hermatypic corals occur rarely on the reef: scattered small colonies (< 10-cm or 4-in diameter) of *Pocillopora* damicornis in shallow areas, and a single small patch of *Montipora capitata* occurring at 6 m (20 ft) depth about midway along the study area. The rock mussel, *Brachidontes crebristriatus*, was fairly common at around 2-m (6-ft) depth along with the fanworm, *Sabellastarte spectabilis*. Other invertebrates seen rarely or only once along the rocks and reef were the tube-sponge, *Chondrosia chucalla*, the banded shrimp, *Stenopus hispidus*, the lobster, *Panulirus penicillatus*, the octopus, *Octopus cyanea*, the black urchin, *Echinothrix diadema*, and the sea cucumber, *Actinopyga obesa*. In addition to the more common fishes observed among the pilings, the following additional species were observed: *Mulloidichthys flavolineatus*, *Parupeneus porphyreus*, *Chaetodon auriga*, *Stegastes fasciolatus*, *Thalassoma duperrey*, *Scarus* sp. juveniles, *Acanthurus dussumieri*, *Acanthurus triostegus*, *Ctenochaetus strigosus*, *Arothron hispidus*, *Canthigaster jactator* and a large specimen of the introduced grouper, *Cephalopholis argus*.

Most of the organisms observed were confined to the shallow depths. The biota in the harbor became noticeably sparse below 2 m (6 ft) where rocks were covered with blue-green algae or fine sediment with increasing depth. At the west end of the study area the bottom is apparently more exposed to waves and the substratum consists of scoured boulders on a flat bottom to 1 m (3 ft) depth and coral rubble and sand at depths below 2 m (6 ft).

6.0 ASSESSMENT OF PIER CONSTRUCTION IMPACTS

The water quality results provide basic characterization of harbor waters under conditions that may or may not be typical. However, the results suggest moderately good water quality with obvious influence from the nearby river during periods of substantial run-off in the watershed. The poorest water quality is limited, at least initially, to the surface layer. Presumably, much of this water is removed by outflow and tidal exchange. However, the build-up of sediments on the harbor bottom are an indication that at least some of the brackish, turbid water remains in the harbor long enough to mix into the water column and deposit fine sediments on the bottom of the harbor basin.

TCLP tests on sediment samples found no indications of hazardous chemicals in the bottom sediments. Sediment size-fraction results indicate that only a few of the samples analyzed probably represent recently deposited harbor silts and clays. The shallowest samples from borings BO-9 and BO-10 may be most typical for this location. From these data, there is no way to establish further the age or origin of the material. The borings, located close to the landward limit of the -35 dredge limit, were sited to support engineering considerations for new pier construction, and are typical of the side slopes of the harbor in the project area. They are also located in the area where the maximum amount of sediment will be dredged. The samples are therefore probably representative of the bulk of the sediment to be dredged for this project.

Biologically, the project site is a typical harbor environment, with a high proportion of introduced invertebrates and an almost total lack of reef corals or other sensitive marine organisms that would be adversely impacted by construction related sedimentation and turbidity. Upon completion of pier construction there would follow a period of rapid settlement of new surfaces provided by the pier pilings, resulting in a dense fouling community similar to that which now occurs on the existing pilings. Other bottom substrata such as dredged reef and rock rubble would most likely assume a similar assemblage of benthic organisms as presently occur, with hardy species of corals and other reef organisms in low abundance. The fish community, which is presently quite abundant and diverse, would likely be temporarily disturbed by construction activities but thereafter would recover to its present composition.

Endangered Species — No State of Hawaii or federally protected species (Federal Register, 1999, 2001; DLNR, 1981) are regarded as normally occurring in the project area. The honu or Pacific green sea turtle (*Chelonia mydas agassizi*) is the only listed species that might be observed occasionally within Nawiliwili Harbor, although the project area does not provide even feeding habitat for this threatened species. The honu is protected by both State and Federal endangered species laws: listed as a threatened species by both the Department of Land and Natural Resources (DLNR, 1981) and U.S. Fish and Wildlife Service (CFR, 1999).

Given the lack of contaminants in the sediments, the lack of sensitive marine organisms, and the periodic influx of turbid, brackish waters from the river, the proposed project should have minimal adverse impacts on the local marine environment.

7.0 REFERENCES

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Attachment A

Water and Sediment Quality Testing Results

CLIENT: Sea Engineering, Inc.

ATTENTION:

FILE No.:	990
REPORT DATE:	01/24/02
PAGE:	1 of 2

REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: Corer samples (TCLP extract)
AECOS LOG No.: 14976, 14998, 15011
DATE SAMPLED: 10/25, 11/5, 11/8/01
DATE RECEIVED: 10/25,11/5, 11/8/01

SAMPLE ID ⇨ / ANALYTE ⇩	14976 BO-09	14998 BO-10	15011 BO-11	Method + TCLP 1311	Analysis Date Analyst ID
UNITS	mg/L	mg/L	mg/L		
Barium	<1	<1	<1	3010/6010	12/21-26/01 EMA
Cadmium	<0.5	<0.5	<0.5	3010/6010	12/21-26/01 EMA
Chromium	<1	<1	<1	3010/6010	12/21-26/01 EMA
Lead	<1	<1	<1	3010/6010	12/21-26/01 EMA
Silver	<0.1	<0.1	<0.1	3020/6020	12/21-26/01 EMA
Arsenic	<0.05	<0.05	<0.05	3020/6020	12/21-26/01 EMA
Mercury	<0.001	<0.001	<0.001	7470	12/21-26/01 EMA
Selenium	<0.1	<0.1	<0.1	3020/6020	12/21-26/01 EMA
UNITS	µg/L	µg/L	µg/L		
Benzene	<5	<5	<5	8260	12/18-27/01 EMA
Carbon Tetrachloride	<10.0	<10.0	<10.0	8260	12/18-27/01 EMA
Chlordane	<0.5	<0.5	<0.5	8081	12/18-27/01 EMA
Chlorobenzene	<5.0	<5.0	<5.0	8260	12/18-27/01 EMA
Chloroform	<5.0	<5.0	<5.0	8260	12/18-27/01 EMA
Total Cresols	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
1,4-Dichlorobenzene	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
1,2-Dichlorobenzene	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
1,1-Dichloroethene	<5.0	<5.0	<5.0	8260	12/18-27/01 EMA
2,4-Dinitrotoluene	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
Endrin	<0.1	<0.1	<0.1	8081	12/18-27/01 EMA
Heptachlor	<0.05	<0.05	<0.05	8081	12/18-27/01 EMA
Heptachlor epoxide	<0.05	<0.05	<0.05	8081	12/18-27/01 EMA
Heptachlorobenzene	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
Hexachlor-1,3-butadiene	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA

J. Mello, Laboratory Director

CLIENT: Sea Engineering, Inc.

ATTENTION:

FILE No.:	990
REPORT DATE:	01/24/02
PAGE:	2 of 2

LOG No.: 14976, 14998, 15011

SAMPLE ID ⇨ / ANALYTE ⇩	14976 BO-09	14998 BO-10	15011 BO-11	Method + TCLP 1311	Analysis Date Analyst ID
UNITS	µg/L	µg/L	µg/L		
Hexachloroethane	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
Lindane	<0.05	<0.05	<0.05	8081	12/18-27/01 EMA
Methoxychlor	<0.5	<0.5	<0.5	8081	12/18-27/01 EMA
Methyl Ethyl Ketone	<125	<125	<125	8260	12/18-27/01 EMA
Nitrobenzene	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
Pentachlorophenol	<10.0	<10.0	<10.0	8270	12/18-27/01 EMA
Pyridine	<20	<20	<20	8270	12/18-27/01 EMA
Tetrachloroethene	<5.0	<5.0	<5.0	8260	12/18-27/01 EMA
Toxaphene	<1.0	<1.0	<1.0	8081	12/18-27/01 EMA
Trichloroethene	<5.0	<5.0	<5.0	8260	12/18-27/01 EMA
2,4,5-Trichlorophenol	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
2,4,6-Trichlorophenol	<4.0	<4.0	<4.0	8270	12/18-27/01 EMA
Vinyl Chloride	<10.0	<10.0	<10.0	8260	12/18-27/01 EMA
Size fraction	SEE OTHER REPORT PAGES				

CLIENT: Sea Engineering, Inc.

ATTENTION:

FILE No.:	990
REPORT DATE:	01/24/02
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REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: Corer samples (TCLP extract) *AECOS* LOG No.: 14923
DATE SAMPLED: 10/10/01 DATE RECEIVED: 10/10/01

SAMPLE ID ⇨ / ANALYTE ⇩	BO-08 1	BO-08 2	BO-08 3	Method + TCLP 1311	Analysis Date Analyst ID
UNITS	mg/L	mg/L	mg/L		
Barium	<1	<1	<1	3010/6010	10/23-11/01 EMA
Cadmium	<0.5	<0.5	<0.5	3010/6010	10/23-11/01 EMA
Chromium	<1	<1	<1	3010/6010	10/23-11/01 EMA
Lead	<1	<1	<1	3010/6010	10/23-11/01 EMA
Silver	<0.1	<0.1	<0.1	3020/6020	10/23-11/01 EMA
Arsenic	<0.05	<0.05	<0.05	3020/6020	10/23-11/01 EMA
Mercury	<0.001	<0.001	<0.001	7470	10/23-11/01 EMA
Selenium	<0.1	<0.1	<0.1	3020/6020	10/23-11/01 EMA
UNITS	µg/L	µg/L	µg/L		
Benzene	<5	<5	<5	8260	10/24-29/01 EMA
Carbon Tetrachloride	<10.0	<10.0	<10.0	8260	10/24-29/01 EMA
Chlordane	<0.5	<0.5	<0.5	8081	10/24-29/01 EMA
Chlorobenzene	<5.0	<5.0	<5.0	8260	10/24-29/01 EMA
Chloroform	<5.0	<5.0	<5.0	8260	10/24-29/01 EMA
Total Cresols	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
1,4-Dichlorobenzene	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
1,2-Dichlorobenzene	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
1,1-Dichloroethene	<5.0	<5.0	<5.0	8260	10/24-29/01 EMA
2,4-Dinitrotoluene	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
Endrin	<0.1	<0.1	<0.1	8081	10/24-29/01 EMA
Heptachlor	<0.05	<0.05	<0.05	8081	10/24-29/01 EMA
Heptachlor epoxide	<0.05	<0.05	<0.05	8081	10/24-29/01 EMA
Heptachlorobenzene	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
Hexachlor-1,3-butadiene	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA

J. Mello, Laboratory Director

CLIENT: Sea Engineering, Inc.

ATTENTION:

FILE No.:	990
REPORT DATE:	01/24/02
PAGE:	2 of 2

LOG No.: 14923

SAMPLE ID ⇨ / ANALYTE ⇩	BO-08 1	BO-08 2	BO-08 3	Method + TCLP 1311	Analysis Date Analyst ID
UNITS	µg/L	µg/L	µg/L		
Hexachloroethane	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
Lindane	<0.05	<0.05	<0.05	8081	10/24-29/01 EMA
Methoxychlor	<0.5	<0.5	<0.5	8081	10/24-29/01 EMA
Methyl Ethyl Ketone	<125	<125	<125	8260	10/24-29/01 EMA
Nitrobenzene	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
Pentachlorophenol	<5.0	<5.0	<5.0	8270	10/24-29/01 EMA
Pyridine	<10.0	<10.0	<10.0	8270	10/24-29/01 EMA
Tetrachloroethene	<5.0	<5.0	<5.0	8260	10/24-29/01 EMA
Toxaphene	<1.0	<1.0	<1.0	8081	10/24-29/01 EMA
Trichloroethene	<5.0	<5.0	<5.0	8260	10/24-29/01 EMA
2,4,5-Trichlorophenol	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
2,4,6-Trichlorophenol	<2.0	<2.0	<2.0	8270	10/24-29/01 EMA
Vinyl Chloride	<10.0	<10.0	<10.0	8260	10/24-29/01 EMA
Size fraction	SEE OTHER REPORT PAGES				

CLIENT: Sea Engineering, Inc.

ATTENTION:

FILE No.:	990
REPORT DATE:	03/31/04
PAGE:	1 of 2

REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: Sediment

DATE SAMPLED:

AECOS LOG No.: 18510

DATE RECEIVED:

SAMPLE ID ⇨ / ANALYTE ⇩	B-03	B-04		Method + TCLP 1311	Analysis Date Analyst ID
UNITS	mg/L	mg/L			
Barium	<1.00	<1.00		3010/6010	03/19/04 EMA
Cadmium	<1.00	<1.00		3010/6010	03/19/04 EMA
Chromium	<1.00	<1.00		3010/6010	03/19/04 EMA
Lead	<1.00	<1.00		3010/6010	03/19/04 EMA
Silver	<0.01	<0.01		3020/6020	03/22/04 EMA
Arsenic	<0.05	<0.05		3020/6020	03/22/04 EMA
Mercury	<0.001	<0.001		7470	03/22/04 EMA
Selenium	<0.10	<0.10		3020/6020	03/22/04 EMA
UNITS	µg/L	µg/L			
Benzene	<5.00	<5.00		8260B	03/22/04 EMA
Carbon Tetrachloride	<10.0	<10.0		8260B	03/22/04 EMA
Chlordane	<0.40	<0.40		8081	3/23, 25/04 EMA
Chlorobenzene	<5.00	<5.00		8260B	03/22/04 EMA
Chloroform	<5.00	<5.00		8260B	03/22/04 EMA
Total Cresols	<8.00	<8.00		8270C	03/29/04 EMA
1,4-Dichlorobenzene	<8.00	<8.00		8270C	03/29/04 EMA
1,2-Dichlorobenzene	<8.00	<8.00		8270C	03/29/04 EMA
1,1-Dichloroethene	<5.00	<5.00		8260B	03/22/04 EMA
2,4-Dinitrotoluene	<8.00	<8.00		8270C	03/29/04 EMA
Endrin	<0.40	<0.40		8081	3/23, 25/04 EMA
Heptachlor	<0.20	<0.20		8081	3/23, 25/04 EMA
Heptachlor epoxide	<0.20	<0.20		8081	3/23, 25/04 EMA
Hexachlorobenzene	<8.00	<8.00		8270C	03/29/04 EMA
Hexachlorobutadiene	<8.00	<8.00		8270C	03/29/04 EMA

Nawiliwili

J. Mello, Laboratory Director

CLIENT: Sea Engineering, Inc.

ATTENTION:

FILE No.:	990
REPORT DATE:	03/31/04
PAGE:	2 of 2

LOG No.: 18510

SAMPLE ID ⇨ / ANALYTE ⇩	B3	B4		Method + TCLP 1311	Analysis Date Analyst ID
UNITS	µg/L	µg/L			
Hexachloroethane	<8.00	<8.00		8270C	03/29/04 EMA
Lindane	<0.20	<0.20		8081	03/23,25/04 EMA
Methoxychlor	<2.00	<2.00		8081	03/23,25/04 EMA
Methyl Ethyl Ketone	<125	<125		8260B	03/22/04 EMA
Nitrobenzene	<8.00	<8.00		8270C	03/29/04 EMA
Pentachlorophenol	<20.0	<20.0		8270C	03/29/04 EMA
Pyridine	<40.0	<40.0		8270C	03/29/04 EMA
Tetrachloroethene	<5.00	<5.00		8260B	03/22/04 EMA
Toxaphene	<4.00	<4.00		8081	03/23,25/04 EMA
Trichloroethene	<5.00	<5.00		8260B	03/22/04 EMA
2,4,5-Trichlorophenol	<8.00	<8.00		8270C	03/29/04 EMA
2,4,6-Trichlorophenol	<8.00	<8.00		8270C	03/29/04 EMA
Vinyl Chloride	<10.0	<10.0		8260B	03/22/04 EMA
Size fraction	SEE OTHER REPORT PAGES				

Nawiliwili

CLIENT: Sea Engineering, Inc.

ATTENTION:

FILE No.:	990
REPORT DATE:	01/24/02
PAGE:	1 of 1

REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: Seawater
DATE SAMPLED: 12/10/01

***AECOS* LOG No.:** 15133
DATE RECEIVED: 12/12/01

SAMPLE ID ⇨ / ANALYTE ⇩	Nawiliwili Sta. 1	Nawiliwili Sta. 2	Nawiliwili Sta. 3	Nawiliwili Sta. 4	Analysis Date Analyst ID
Temperature (°C)	23.8	23.2	23.2	23.2	12/10/01 ca
Dissolved Oxygen (mg/L)	6.98	7.46	7.35	6.81	12/10/01 ca
Dissolved Oxygen (% saturation)	98	101	99	94	Calculated
Turbidity (NTU)	1.75	1.03	1.42	2.11	12/10/01 ca
Total Suspended Solids (mg/L)	10	7.0	7.4	3.7	12/13/01 ml
Salinity (ppt)	30	25	25	28	12/10/01 ca
Ammonia (µg N/L)	39	20	16	10	KK
Nitrate+Nitrite (µg N/L)	7	24	10	43	KK
Total Nitrogen (µg N/L)	248	162	243	224	KK
Total Phosphorus (µg P/L)	23	18	9	14	KK
Silicates (ug/L)	1220	2890	2620	2530	KK

Nawiliwili 1 – end of jetty inside harbor
Nawiliwili 2 – East of drill site (about 15 yards)
Nawiliwili 3 – West of drill site (about 15 yards)
Nawiliwili 4 – Small boat harbor, towards drill site.

J. Mello, Laboratory Director

CLIENT: Wil Chee Planning

FILE No.:	1041
REPORT DATE:	12/11/03
PAGE:	1 of 2

ATTENTION:

AECOS REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: seawater
DATE SAMPLED: 10/30-31/03

***AECOS* LOG No.:** 17995
DATE RECEIVED: 11/03/03

ANALYTE (UNITS)	Temp-erature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	pH	Salinilty (ppt)	Turbidity (NTU)
Analysis Date/ Analyst ID ⇨	Field	Field	Calculated	Field	11/06/03 kf	10/30-31/03 field
SAMPLE ID ⇩						
Nawiliwili						
1A	26.1	4.75	64	7.8	17.518	47.5
1B	26.6	4.90	68	8.1	18.993	27.3
3A	25.9	4.44	61	8.0	19.771	17.7
3B	26.8	4.35	60	8.1	18.511	13.4
4A	26.3	4.62	66	8.1	24.116	15.6
4B (surface)	26.8	4.75	65	8.1	16	—
4B (depth)	26.7	3.85	58	8.3	34.621	1.68
5A	—	—	—	8.3	34.612	2.06

Kauai Harbors 2025

J. Mello, Laboratory Director

CLIENT: Wil Chee Planning

ATTENTION:

FILE No.:	1041
REPORT DATE:	12/11/03
PAGE:	2 of 2

AECOS REPORT OF ANALYTICAL RESULTS

SAMPLE TYPE: seawater
DATE SAMPLED: 10/30-31/03

AECOS LOG No.: 17995
DATE RECEIVED: 11/03/03

ANALYTE (UNITS)	Total Suspended Solids (mg/L)	Ammonia (µg N/L)	Nitrate + Nitrite (µg N/L)	Total Nitrogen (µg N/L)	Total Phosphorus (µg P/L)	Chloro-phyll α (µg/L)
Analysis Date/ Analyst ID ⇨	11/05/03 ml	11/15/03 dh	11/13/03 dh	11/14/03 dh	11/13/03 dh	10/30/03, 11/17/03 nv
SAMPLE ID ⇓						
Nawiliwili						
1A	52	45	41	428	47	1.36
1B	33	11	31	308	72	2.43
3A	23.4	<1	10	306	40	1.40
3B	16	<1	<1	291	42	3.60
4A	21.6	30	43	289	45	0.92
4B	14	1	10	146	23	0.95
5A	14	<1	5	140	22	1.71

Kauai Harbors 2025

AECOS, Inc.
970 N. Kalaheo Ave., Suite C311
Kailua, Hawaii 96734 (808)254-5884 fax: (808)254-3029

CLIENT: Sea Engineering
Makai Research Pier
Waimanalo HI 96795

ATTN:

File No:	990
Report Date:	1/24/2002
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GRAIN SIZE ANALYSIS RESULTS

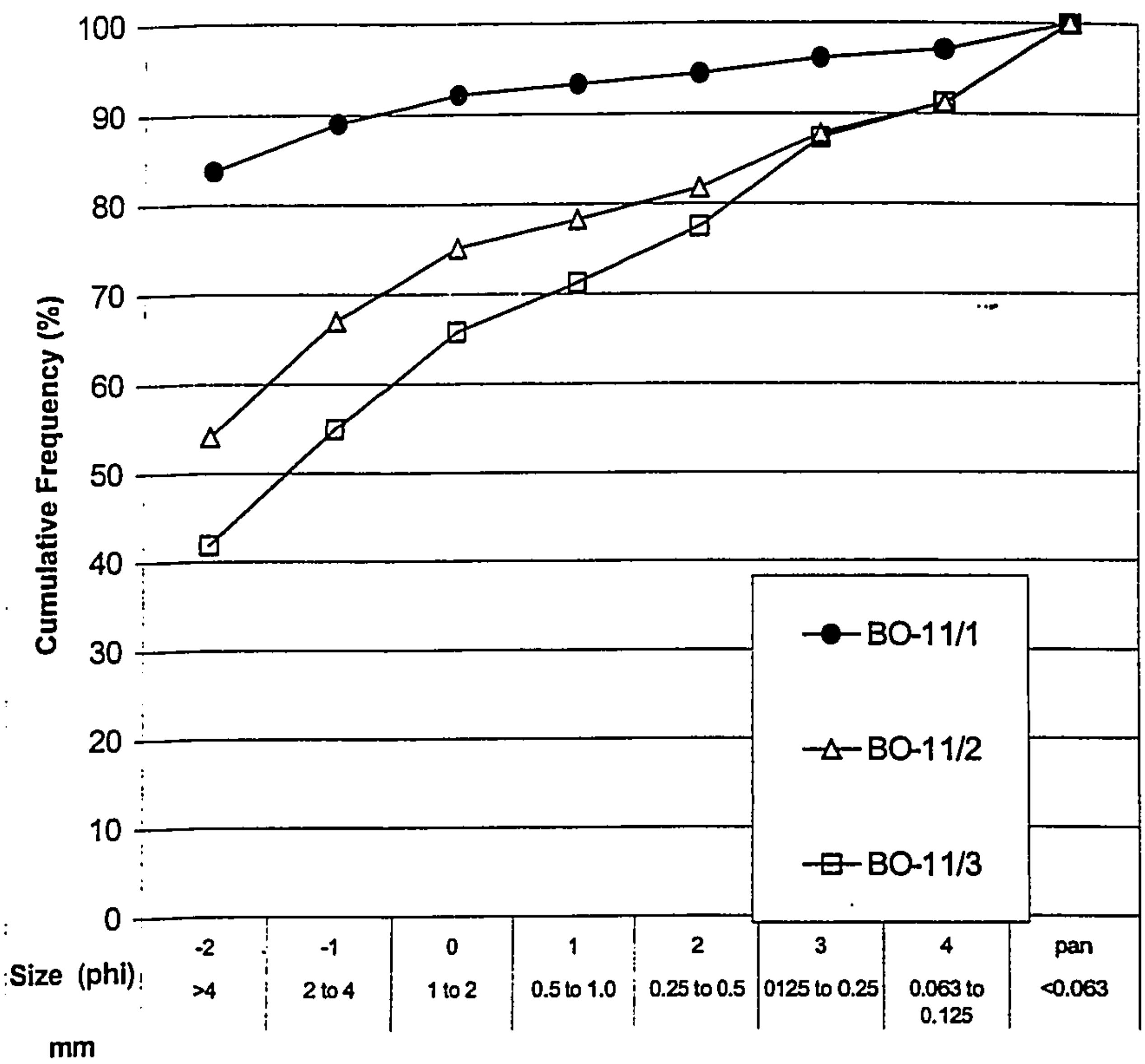
Sample Type: sediments BO-11 — *AECOS* Log No.: **15011**
Date Sampled: 11/8/2001 — Date Received: 11/8/2001

Fraction dry weight (mg)

size (mm)	>4	2 to 4	1 to 2	0.5 to 1.0	0.25 to 0.5	0125 to 0.25	0.063 to 0.125	<0.063	TOTAL
phi	-2	-1	0	1	2	3	4	pan	
BO-11/1	242.5	15.3	9.1	3.4	3.2	4.9	2.70	8.40	289.5
BO-11/2	93.9	22.4	14.0	5.5	6	10.5	5.9	15.3	173.5
BO-11/3	76.1	23.8	19.7	9.9	11.3	18.0	7.1	15.9	181.8
Fraction Percent (%)									
BO-11/1	83.77	5.28	3.14	1.17	1.11	1.69	0.93	2.90	100
BO-11/2	54.12	12.91	8.07	3.17	3.46	6.05	3.40	8.82	100
BO-11/3	41.86	13.09	10.84	5.45	6.22	9.90	3.91	8.75	100
Fraction Cumulative Percent (%)									
BO-11/1	83.8	89.1	92.2	93.4	94.5	96.2	97.1	100.0	
BO-11/2	54.1	67.0	75.1	78.3	81.7	87.8	91.2	100.0	
BO-11/3	41.9	55.0	65.8	71.2	77.4	87.3	91.3	100.0	

15011 - #1 had 1 large rock weighing 144.6 grams

Laboratory Manager


100
90
80
70
60
50
40
30
20
10
0
Cumulative Frequency (%)
BO-11/1
BO-11/2
BO-11/3
Size (phi)
-2
-1
0
1
2
3
4
pan
mm
>4
2 to 4
1 to 2
0.5 to 1.0
0.25 to 0.5
0125 to 0.25
0.063 to 0.125
<0.063

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Makai Research Pier
Waimanalo HI 96795
ATTN:

File No:	990
Report Date:	1/24/2002
Page:	1 of 2

GRAIN SIZE ANALYSIS RESULTS

Sample Type: sediments BO-10 — *AECOS* Log No.: 14998
Date Sampled: 11/5/2001 — Date Received: 11/5/2001

Fraction dry weight (mg)

size (mm)	>4	2 to 4	1 to 2	0.5 to 1.0	0.25 to 0.5	0125 to 0.25	0.063 to 0.125	<0.063	TOTAL
phi	-2	-1	0	1	2	3	4	pan	
BO-10/1	0.0	0.0	0.1	0.1	0.4	1.7	3.30	21.60	27.2
BO-10/2	0.9	1.0	1.3	2.1	3.9	5.4	5.6	13.7	33.9
BO-10/3	14.9	1.9	2.1	1.9	3.5	7.7	7.8	24.7	64.5

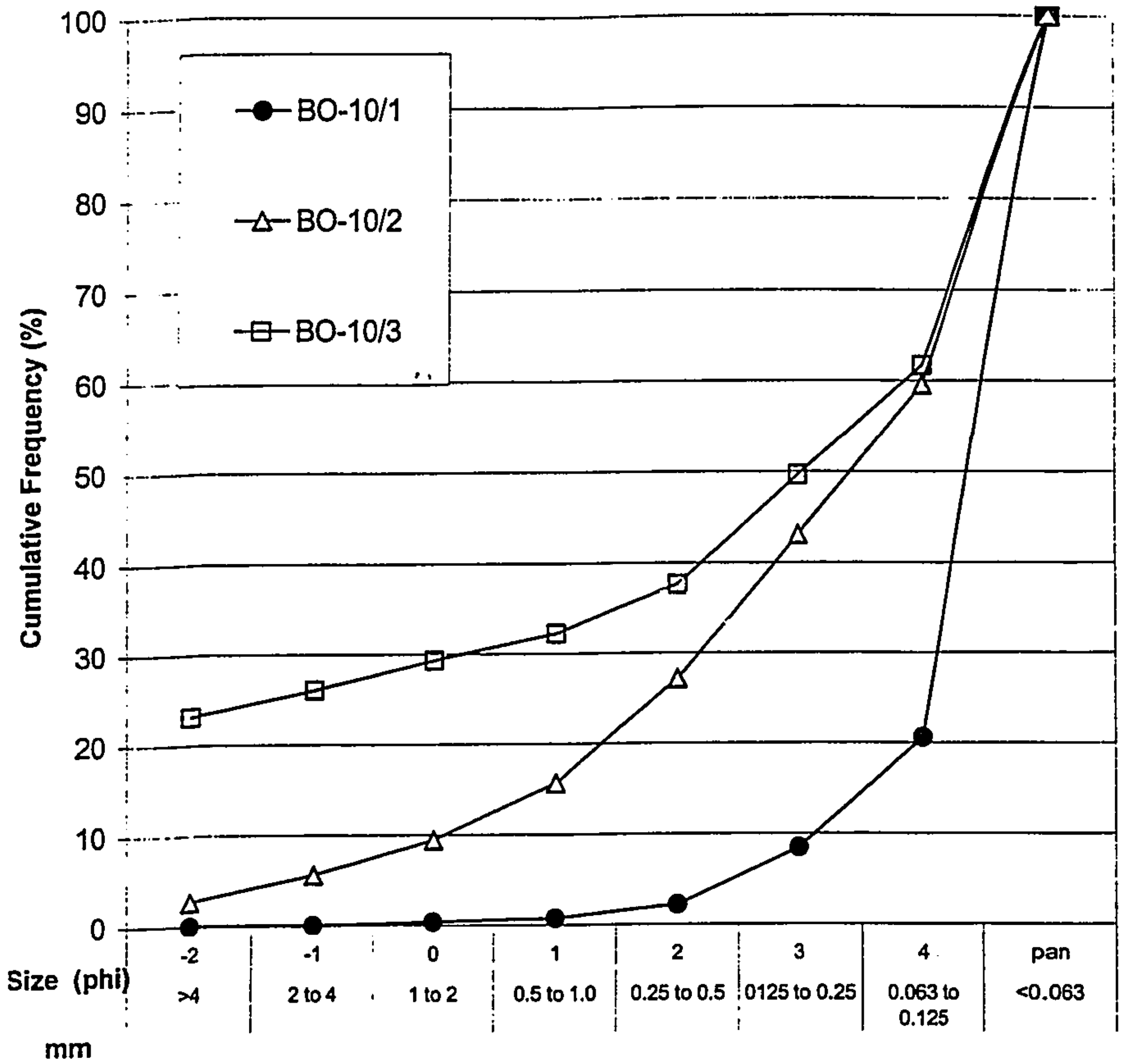
Fraction Percent (%)

BO-10/1	0.00	0.00	0.37	0.37	1.47	6.25	12.13	79.41	100
BO-10/2	2.65	2.95	3.83	6.19	11.50	15.93	16.52	40.41	100
BO-10/3	23.10	2.95	3.26	2.95	5.43	11.94	12.09	38.29	100

Fraction Cumulative Percent (%)

BO-10/1	0.0	0.0	0.4	0.7	2.2	8.5	20.6	100.0
BO-10/2	2.7	5.6	9.4	15.6	27.1	43.1	59.6	100.0
BO-10/3	23.1	26.0	29.3	32.2	37.7	49.6	61.7	100.0

Laboratory Manager



100
90
80
70
60
50
40
30
20
10
0
Cumulative Frequency (%)
BO-10/1
BO-10/2
BO-10/3
Size (phi)
mm
-2
-1
0
1
2
3
4
pan
>4
2 to 4
1 to 2
0.5 to 1.0
0.25 to 0.5
0125 to 0.25
0.063 to 0.125
<0.063

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ATTN:

File No:	990
Report Date:	1/24/2002
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GRAIN SIZE ANALYSIS RESULTS

Sample Type: sediments BO-09
Date Sampled: 10/25/2001

AECOS Log No.: 14976
Date Received: 10/25/2001

Fraction dry weight (mg)

size (mm)	>4	2 to 4	1 to 2	0.5 to 1.0	0.25 to 0.5	0125 to 0.25	0.063 to 0.125	<0.063	TOTAL
phi	-2	-1	0	1	2	3	4	pan	
BO-09/1	0.0	0.1	0.1	0.3	0.4	1.5	2.70	9.40	14.5
BO-09/2	3.0	0.4	0.5	1.3	2.5	5.7	6.7	14.0	34.1
BO-09/3	3.3	0.2	0.5	1.1	2.6	7.8	9.0	15.1	39.6

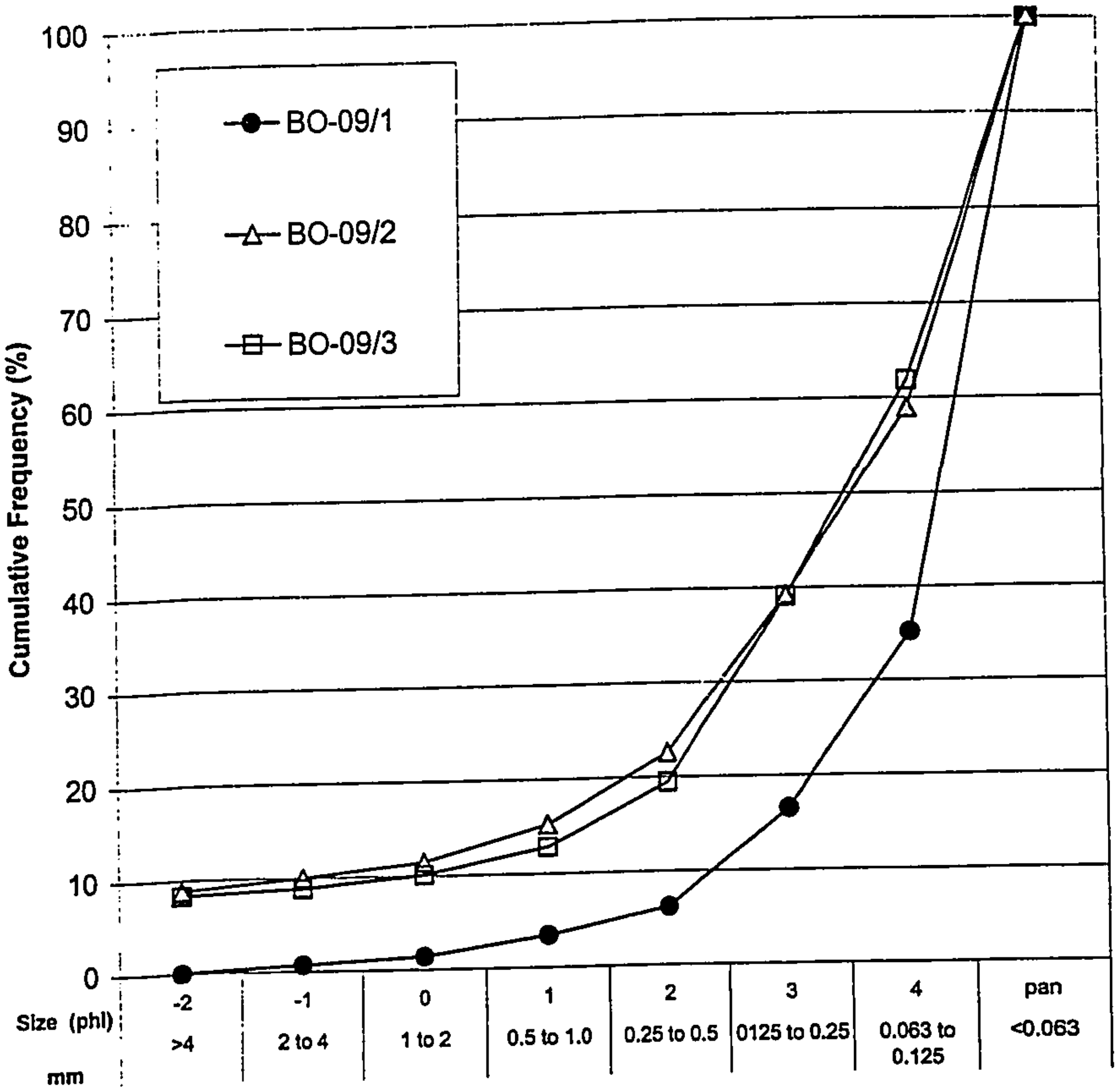
Fraction Percent (%)

BO-09/1	0.00	0.69	0.69	2.07	2.76	10.34	18.62	64.83	100
BO-09/2	8.80	1.17	1.47	3.81	7.33	16.72	19.65	41.06	100
BO-09/3	8.33	0.51	1.26	2.78	6.57	19.70	22.73	38.13	100

Fraction Cumulative Percent (%)

BO-09/1	0.0	0.7	1.4	3.4	6.2	16.6	35.2	100.0
BO-09/2	8.8	10.0	11.4	15.2	22.6	39.3	58.9	100.0
BO-09/3	8.3	8.8	10.1	12.9	19.4	39.1	61.9	100.0

Laboratory Manager


BO-09/1
BO-09/2
BO-09/3
Cumulative Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
Size (phi)
mm
-2
-1
0
1
2
3
4
pan
>4
2 to 4
1 to 2
0.5 to 1.0
0.25 to 0.5
0125 to 0.25
0.063 to 0.125
<0.063

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File No:	990
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ATTN:

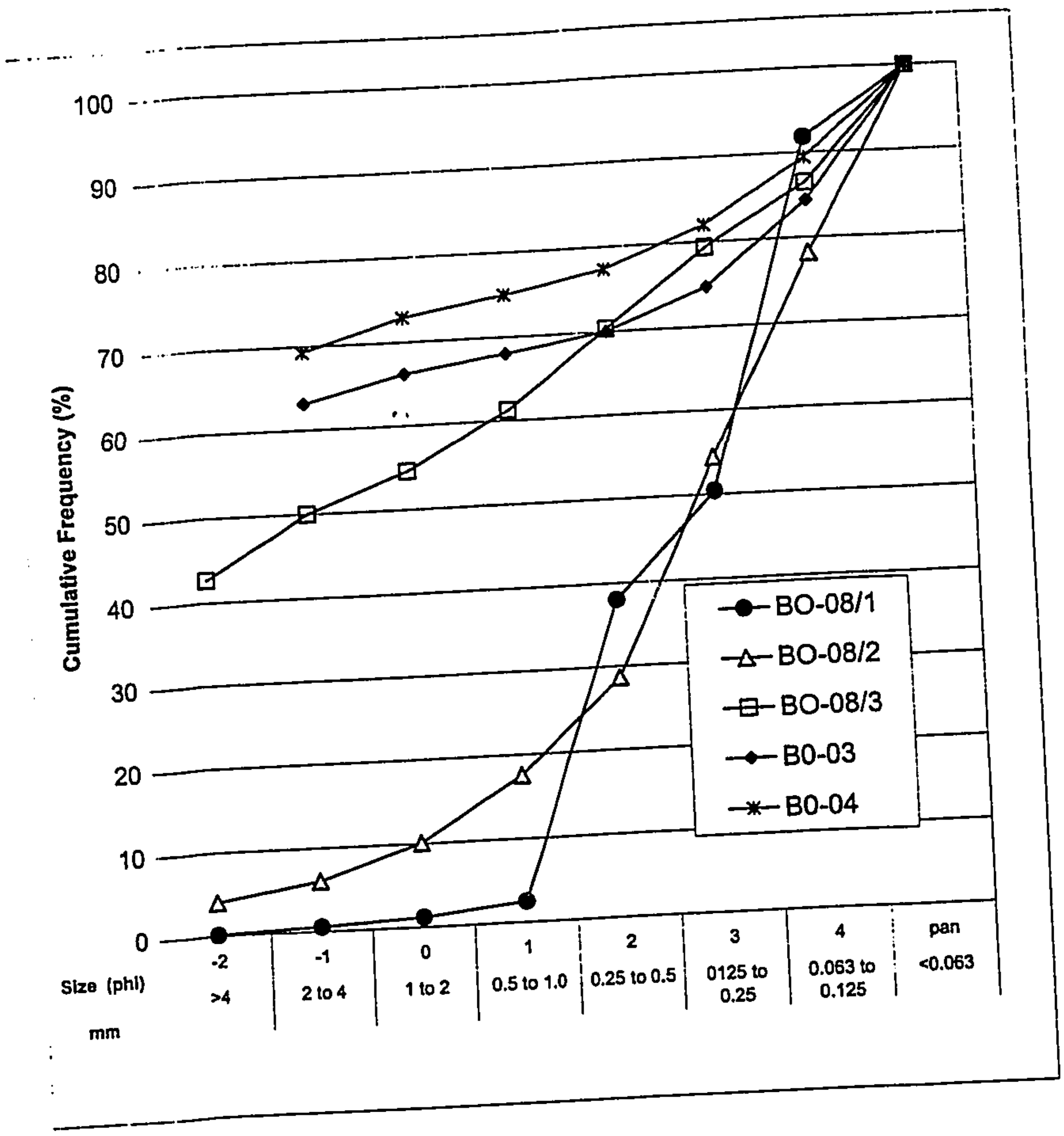
GRAIN SIZE ANALYSIS RESULTS

Sample: sediments I BO-08
Date Sampled: 10/10/2001

AECOS Log No.: 14923
Date Received: 10/10/2001

Fraction dry weight (mg)									
BO-08/1	0.2	0.7	1	2.1	57.3	20	66.70	13.20	161.2
BO-08/2	2.0	1.0	2.0	3.7	5.5	12.8	11.8	10.8	49.6
BO-08/3	72.0	12.3	7.7	11.2	15.4	15.2	12.0	22.8	168.6
Fraction Percent (%)									
BO-08/1	0.12	0.43	0.62	1.30	35.55	12.41	41.38	8.19	100
BO-08/2	4.03	2.02	4.03	7.46	11.09	25.81	23.79	21.77	100
BO-08/3	42.70	7.30	4.57	6.64	9.13	9.02	7.12	13.52	100
Fraction Cumulative Percent (%)									
BO-08/1	0.1	0.6	1.2	2.5	38.0	50.4	91.8	100.0	
BO-08/2	4.0	6.0	10.1	17.5	28.6	54.4	78.2	100.0	
BO-08/3	42.7	50.0	54.6	61.2	70.3	79.4	86.5	100.0	
B0-03		63.1	66.2	68.0	70.0	74.7	84.4	100.0	
B0-04		69.3	72.9	75.0	77.4	82.0	89.4	100.0	

Laboratory Manager


Cumulative Frequency (%)
100
90
80
70
60
50
40
30
20
10
0
Size (phi)
mm
-2
>4
-1
2 to 4
0
1 to 2
1
0.5 to 1.0
2
0.25 to 0.5
3
0125 to 0.25
4
0.063 to 0.125
pan
<0.063
BO-08/1
BO-08/2
BO-08/3
B0-03
B0-04

APPENDIX C
SOILS INVESTIGATION

ERNEST K.
HIRATA & ASSOCIATES, INC.

99-1433 Koaha Place
Aiea, Hawaii 96701
Ph: 808-486-0787 Fax: 808-486-0870
Email: eha@hawaii.rr.com

April 25, 2004
W.O. 03-3877

Mr. George Nishimura
Nishimura, Katayama & Oki, Inc.
826 Kaheka Street, Suite 302
Honolulu, Hawaii 96814

Dear Mr. Nishimura:

Our report, "Soils Investigation, Segmented Pier 3 Improvements at Nawiliwili Harbor, Kauai, Hawaii," dated April 25, 2004, our Work Order 03-3877 is enclosed. This investigation was conducted in general conformance with the scope of work presented in our proposal dated December 22, 2003.

Exploratory borings drilled at the proposed segmented pier site encountered weathered basalt at relatively shallow depths ranging from about 1 to 10 feet below harbor bottom. The basalt stratum extended down to the maximum depths drilled, and varied from a dense and highly weathered condition, to a hard and slightly weathered condition. Overlying the basalt was gray sandy silt in a soft to medium stiff condition. Our boring drilled over land, at the catwalk abutment site, encountered basalt at a depth of about 11 feet. Overlying the basalt was a surface layer of medium dense, tan silty sand, and a layer of dense cobbles and boulders in a silty sand matrix.

Based on our borings, the proposed segmented pier and catwalk may be supported on 24-inch octagonal precast, prestressed, concrete piles and 5-foot diameter drilled shafts. To facilitate pile driving operations, we recommend that all pile locations be predrilled. Predrilling should extend to a minimum depth of 10 feet in basalt for piles located in water, and to a minimum depth of 2 feet into the basalt stratum at pile locations over land.

Additional geotechnical recommendations for design of the pile and drilled shafts foundations are presented in this report. We appreciate this opportunity to be of service. Should you have any questions concerning this report, please feel free to call on us.

Very truly yours,

ERNEST K. HIRATA & ASSOCIATES, INC.

Paul S. Morimoto

Paul S. Morimoto Vice President

PSM:CCT:ph

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APPENDICES

SOILS INVESTIGATION
SEGMENTED PIER 3 IMPROVEMENTS AT
NAWILIWILI HARBOR, KAUAI, HAWAII

INTRODUCTION

This report presents the results of our soils investigation performed for the proposed Segmented Pier 3 Improvements at Nawiliwili Harbor in Kauai, Hawaii. Our work scope for this study included the following:

- A visual reconnaissance of the site and its vicinity to observe existing conditions which may affect the project. The general location of the project site is shown on the enclosed Location Map, Plate A2.1.
- A review of available in-house soils information pertinent to the site and the proposed project.
- Drilling and sampling 1 exploratory boring over land, to a depth of about 23 feet, and 5 borings over water, to depths ranging from about 43 to 52 feet, measured from harbor bottom. A description of our field investigation is summarized on Plates A1.1 and A1.2. The approximate exploratory boring locations are shown on the enclosed Boring Location Plan, Plate A2.2, and the soils encountered in the borings are described on the Boring Logs, Plates A4.1 through A4.11. For information, logs of our previous borings drilled in the vicinity of the project site are also included, on Plates A4.12 through A4.53. The approximate location of these previous borings are also shown on Plate A2.2.
- Laboratory testing of selected soil samples. Testing procedures are presented in Appendix B, Description of Laboratory Testing, Plate B1.1.
- Engineering analyses of the field and laboratory data.
- Preparation of this report presenting geotechnical recommendations for design of the proposed segmented pier and catwalk, new mooring bollard, and dredging.

PROJECT CONSIDERATIONS

The proposed project will include improvements to the area north of existing Pier 3 in Nawiliwili Harbor, for accommodation of 850 foot long cruise ships docking at Pier 3. Improvements will include (1) construction of a segmented pier, (2) a new mooring bollard (mooring bitt) at the north end of the site, and (3) dredging in the area fronting the proposed segmented pier, and in the areas further north and northeast.

The proposed segmented pier will be located in line with and about 100 feet north of the existing Pier 3. The segmented pier will be about 52 feet wide and 97 feet in length, and supported on a system of 24-inch octagonal precast prestressed concrete piles and 5-foot diameter drilled shafts. Vertical loads will be supported primarily by the concrete piles, while lateral loads will be resisted primarily by four drilled shafts. The following is a summary of design loads for the concrete piles and drilled shafts.

5-Foot Diameter Drilled Shafts
Axial Load = 410 kips
Lateral Load = 145 kips for each pair of shafts, one in front and one in back

24-Inch Octagonal Precast Prestressed Concrete Piles
Axial Load = 300 kips
Lateral Load = N.A.

The segmented pier will be connected to land by a catwalk from the north shoreline. The catwalk will be about 15 wide and 41 feet in length. 24-inch octagonal concrete piles will be used to support the catwalk. The piles will support an axial load of about 145 kips and a lateral load of about 6 kips.

The area fronting the segmented pier, as well as areas to the north and northeast of the segmented pier, will be dredged to elevation -35. In order to provide more maneuvering room for the 850 foot long cruise ship, a strip of land north of the segmented pier, with approximate plan dimensions of about 40 by 120 feet, will also be dredged out, and an existing small concrete pier located in that area will be demolished.

SITE CONDITIONS

The depth of water at the segmented pier site varies from about 8 to 32 feet. Based on the topographic survey map, the harbor bottom within the segmented pier area slopes steeply downward in an easterly direction. Within a distance of about 40 feet, the harbor bottom elevation drops from about -10 to -30.

The proposed site for the catwalk abutment is situated in the area northwest of the new segmented pier. The site is presently vacant of structures, with areas covered by a thin layer of concrete.

SOIL CONDITIONS

Borings B1 through B5, drilled in the harbor, encountered weathered basalt at depths ranging from about 1 to 10 feet below harbor bottom. The basalt extended down to the maximum depths drilled and varied from a dense and highly weathered, to hard and slightly weathered condition. Overlying the basalt was gray sandy silt in a soft to medium stiff condition.

Boring B6, drilled over land, encountered weathered basalt at a depth about 11 feet below existing grade. The basalt was in a medium hard condition and extended down to the maximum depth drilled. Overlying the basalt was medium dense, tan silty sand, and dense cobbles and boulders in a silty sand matrix. Groundwater was encountered in boring B6 at a depth of about 4.3 feet.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our exploratory fieldwork, laboratory testing, and engineering analyses, the proposed segmented pier and catwalk may be supported on 24-inch octagonal prestressed concrete piles and 5-foot diameter drilled shafts.

The piles will derive most of their pile bearing capacity in end-bearing on the weathered basalt encountered at shallow depths below the harbor bottom. Based on our test borings, the basalt layer within the project area appears to slope steeply downward in an easterly direction. In order to prevent piles from moving laterally during the pile driving operations after their initial contact with the rock surface, we recommend that all piles be socketed at least 10 feet into the basalt layer by predrilling all pile locations to a depth at least 10 feet into the basalt layer.

Predrilling is also recommended for the landside piles supporting the catwalk abutment to facilitate the pile driving operations. For those piles, the predrilling should extend through the layer of cobbles and boulders and at least 2 feet into the underlying basalt stratum.

Drilled shafts will require sufficient embedment into the basalt layer, in order to resist the relatively large design lateral loads at the top of the shafts. In addition, permanent casing will be required for that portion of drilled shaft extending from above seawater level down to at least 3 to 5 feet into the basalt layer.

Pile Foundations

24-inch octagonal concrete piles may be used to support the proposed segmented pier and catwalk. Piles founded directly on the weathered basalt may be designed to support an allowable pile bearing load of 150 tons (300 kips).

Piles should be spaced a minimum three pile diameters center to center, and driven with a hammer delivering approximately 54,000 foot-pounds of energy per blow. The minimum driving resistance required will depend on the type of hammer and pile driving equipment used. Final determination can be specified after test driving piles.

A preliminary wave equation analysis was performed to provide an estimate of the minimum driving resistance expected. Based on the use of a Delmag D36-32, a minimum driving resistence of about 6 blows per inch for 3 consecutive inches was computed.

As indicated earlier, all pile locations should be predrilled to facilitate the pile driving operations. The predrilling should extend to a minimum depth of 10 feet into the basalt layer for piles located in the water and a minimum depth of 2 feet into the basalt for piles located on land. The diameter of the predrilled holes should be only slightly larger than the diameter of the pile. Rock drilling and coring equipment, as well as tools necessary for the removal cored material, will be required for the predrilling operations.

The predrilled holes should be relatively clean and the piles should be placed into the predrilled holes as soon as practical to avoid materials sloughing into the predrilled holes. Pile which cannot reach the bottom of the predrilled hole should be removed and the predrilled hole should be cleaned again.

We expect that most piles will attain the required driving resistance directly below the predrilled depths. As a result, we recommend that preliminary cost estimates be based on pile lengths extending about 10 feet into the basalt formation. For cost estimating purposes, the approximate elevation of basalt presented on the table below may be used to estimate pile tip elevations. A better estimate of pile lengths required for production driving can be provided after the test driving and load testing programs.

Boring No.	Approximate Elevation of Rock
B1	-37
B2	-36
B3	-13
B4	-29
B5	-18
B6	-7.5

The design pile bearing load indicated above is for the total of dead and frequently applied live loads, and may be increased by one-third for short duration loading which includes the effect of wind and seismic forces.

Based on the design axial and lateral loads for piles supporting the catwalk structure, the computed maximum bending moment in the piles will be about 62 foot-kips.

Test Piles

Indicator test piles should be driven along the proposed segmented pier length to help determine production pile lengths and pile driving criteria. Based on the preliminary pile layout plan, we recommend that approximately 6 test piles be driven during the indicator test pile driving operations.

Indicator test piles should be at least 10 feet longer than that estimated for production piles and be driven with the same hammer which will be used for production pile driving. The test driving operations should be monitored by an engineer from our staff. Our office should be notified of any unexpected conditions encountered during the test driving operations, so any necessary changes can be reviewed by us..

A static load test on one of the indicator test piles is recommended. The pile should be load tested to 200 percent of the design pile bearing load and the test should be conducted in general accordance with ASTM D 1143.

Drilled Shaft Foundations

Recommendations are presented based on the use of 5-foot diameter drilled shafts. Based on the design axial load of 410 kips per shaft and design lateral load of 145 kips per pair of shafts (one in front and one in back), the drilled shafts should be embedded at least 35 feet into the weathered basalt. For preliminary cost estimating purposes, drilled shaft tip elevations of -72 and -57 may be used for shafts located in the front and back, respectively.

Permanent casing will be required for that portion of the drilled shaft extending from above seawater level down into the basalt layer. The casing should be embedded at least 3 to 5 feet into the basalt formation and properly sealed in order to reduce the intrusion or extrusion of water or other material into or from the shaft excavation.

Temporary casing is not expected to be necessary for drilled shaft excavations extending into the weathered basalt. Rock drilling and coring equipment, as well as tools necessary for the removal cored material, will be required for drilled shaft excavations extending into the basalt formation.

Concrete should be placed as soon as practical upon completion of drilled shaft excavations. Concrete should be tremied through a pipe discharging below the surface of fresh concrete. Each shaft should be poured in one continuous lift, and construction of cold joints should not be allowed.

The load bearing capacities of the drilled shafts indicated above are for the total of dead and frequently applied live loads, and may be increased by one-third for short duration loading which includes the effect of wind and seismic forces. Based on an axial load of 410 kips and a lateral load of 145 kips for two shafts, the computed maximum bending moment in the drilled shafts will be about 1,092 foot-kips for shafts located in the front and 2,075 foot-kips for shafts located in the back.

Mooring Bollard

A mat foundation may be used to support the proposed mooring bollard (mooring bitt). Depending on the final location of the proposed mooring bollard, foundation excavation for the mooring bollard is expected to expose either medium dense silty sand, or dense cobbles and boulders in silty sand matrix. The mat foundation, founded on either the silty sand or cobbles and boulders in silty sand matrix, may be designed for an allowable bearing value of 2,500 pounds per square foot. The recommended allowable bearing value is for the total of dead and frequently applied live loads, and may be increased by one-third for short duration loading which includes the effect of wind and seismic forces.

Resistance to lateral loading may be provided by friction acting at the base of foundation and by passive earth pressure acting on the buried portions of the foundation. An allowable coefficient of friction of 0.4 may be used with the dead load forces to compute the friction acting at the base of the foundation. Passive earth pressure may be computed as an equivalent fluid having a density of 300 pounds per cubic foot. Unless covered by pavement or concrete slabs, the upper 12 inches of soil should not be considered in computing lateral resistance. The bottom edge of the foundation should be located a minimum horizontal distance of 15 feet from the shoreline.

The mooring bollard foundation excavation is expected to extend below groundwater level. As a result, temporary dewatering may be required during placement of concrete. Excavations into the silty sand and/or cobble and boulder layer below groundwater may require shoring or bracing. It should be the Contractor's responsibility to conform to all OSHA safety standards for excavations.

Seismic Design

Based on the 1997 Uniform Building Code, the site is located within Seismic Zone 1. Within this zone, a seismic zone factor (Z) equal to 0.075 is recommended (97 U.C. Table 16-I) for calculation of shearing and lateral loads imparted on structures during an earthquake. Based on the borings drilled as part of this study and our knowledge of the deep soil conditions in the area, the subsurface soils can be characterized as a hard rock profile. Therefore, soil profile type S_A is recommended for this site.

Dredging

Based on our borings drilled for this project, as well as previous borings drilled in the harbor area, dredging in the area fronting the new segmented pier can expect to encounter sandy silt material and basalt formation, while dredging in the area north and northeast of the new segmented pier can expect to encounter cobble and boulder material as well as the basalt formation. To avoid instability of the dredged slope, the dredge slopes should not be graded steeper than a 1.5:1 (horizontal to vertical) slope gradient.

ADDITIONAL SERVICES

We recommend that we perform a general review of the final design plans and specifications. This will allow us to verify that the foundation design recommendations have been properly interpreted and implemented in the design plans and construction specifications.

For continuity, we recommend that we be retained during construction to (1) observe all pile driving operations, including the predrilling and test pile driving, (2) observe all drilled shaft construction operations, including the shaft excavations and concrete placement, and (3) provide geotechnical consultation as required. Our services during construction will allow us to verify that our recommendations are properly interpreted and included in construction, and if necessary, to make modifications to those recommendations, thereby reducing construction delays in the event subsurface conditions differ from those anticipated.

LIMITATIONS

The boring logs indicate the approximate subsurface soil conditions encountered only at those times and locations where our borings were made, and may not represent conditions at other times and locations.

This report was prepared specifically for Nishimura, Katayama & Oki, Inc., and their sub-consultants for design of the proposed Segmented Pier 3 Improvements at Nawiliwili Harbor, Kauai. The boring logs, laboratory test results, and recommendations presented in this report are for design purposes only, and are not intended for use in developing cost estimates by the contractor.

During construction, should subsurface conditions differ from those encountered in our borings, we should be advised immediately in order to re-evaluate our recommendations, and to revise or verify them in writing before proceeding with construction.

Our recommendations and conclusions are based upon the site materials observed, the preliminary design information made available, the data obtained from our site exploration, our engineering analyses, and our experience and engineering judgement. The conclusions and recommendations are professional opinions which we have strived to develop in a manner consistent with that level of care, skill, and competence ordinarily exercised by members of the profession in good standing, currently practicing under similar conditions. No warranty is made regarding the services to be performed under this agreement, either express or implied.

Respectfully submitted,

ERNEST K. HIRATA & ASSOCIATES, INC.

Con C. Truong, P.E.

Paul S. Morimoto, Project Manager

PAUL S. MORIMOTO
LICENSED PROFESSIONAL ENGINEER
No. 6299-C
HAWAII, U.S.A.

This work was prepared by me or under my supervision

APPENDIX A

FIELD INVESTIGATION

DESCRIPTION OF FIELD INVESTIGATION

GENERAL

The site was explored between January 26 and March 18, 2004, by performing a visual site reconnaissance and drilling 6 exploratory test borings. Five of the borings were drilled over water with portable drilling equipment mounted on a temporary barge, while one boring was drilled over land with a truck mounted Acker drill rig. The borings drilled over water extended to depths ranging from about 43 to 52 feet below the harbor bottom. The landside boring extended to a depth of about 23 feet below existing ground.

During drilling operations, the soils were continuously logged by our field engineer and classified by visual examination in accordance with the Unified Soil Classification System. The boring logs indicate the depths at which the soils or their characteristics change, although the change could actually be gradual. If the change occurred between sample locations, the depth was interpreted based on field observations. Classifications and sampling intervals are shown on the boring logs. A Boring Log Legend is presented on Plate A3.1; the Unified Soil Classification and Rock Weathering Classification Systems are shown on Plates A3.2 and A3.3, respectively. The soils encountered are logged on Plates A4.1 through A4.11.

Boring locations were located in the field by measuring/taping offsets from existing site features shown on the plans. The boring locations should therefore be considered approximate, in accordance with the field method used. The ground elevation as well as harbor bottom elevations at boring locations were estimated using the topographic survey map prepared by Engineers Surveyors Hawaii, Inc., dated November 2001.

SOIL SAMPLING

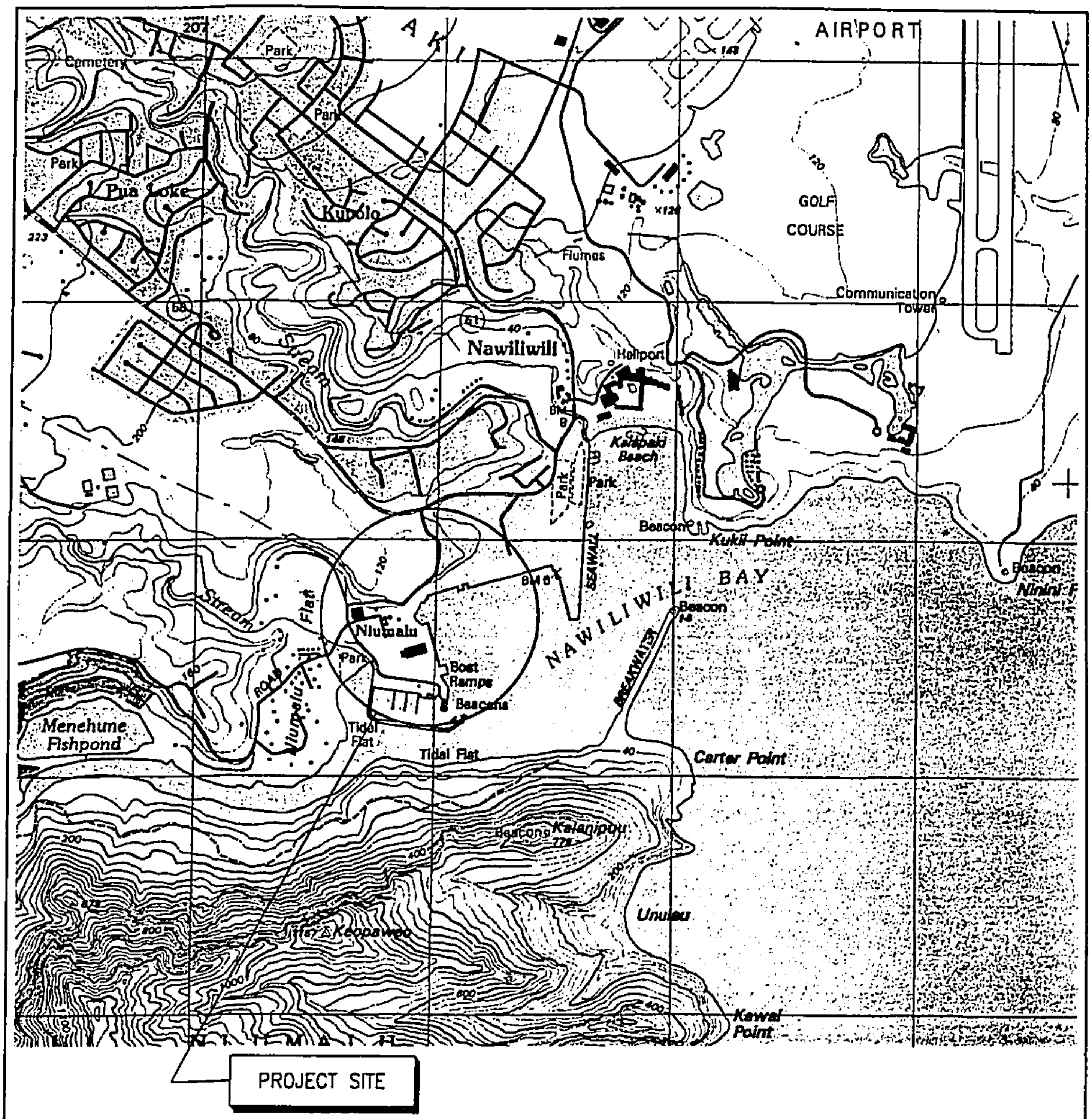
Representative soil samples and core samples of basalt were recovered from the borings for selected laboratory testing and analyses. Representative samples were recovered by driving a 3-inch O.D. split tube sampler a total of 18 inches with a 140-pound hammer dropped from a height of 30 inches. The number of blows required to drive the sampler the final 12 inches are recorded at the appropriate depths on the boring logs, unless noted otherwise.

Core samples were obtained by drilling with an NX core barrel having an inside diameter of 2.1 inches. The depths and recovery percentages for each core run are shown on the enclosed Boring Logs. The rock quality designation (RQD) for each core run is also shown on the Boring Logs. This is a modified core recovery percentage which takes into account the number of fractures observed in the core samples. Only pieces of core 4 inches in length or longer, as measured along the centerline, were included in the determination of this modified core recovery percentage. Fractures caused by drilling or handling were ignored.

The following is a general correlation between RQD percentages and rock quality.

RQD (%)	Description of Rock Quality
0 - 25	Very Poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Reference: Tunnel Engineering Handbook, Second Edition, edited by J.O. Bickel, T.R. Kuesel, and E.H. King, 1996.

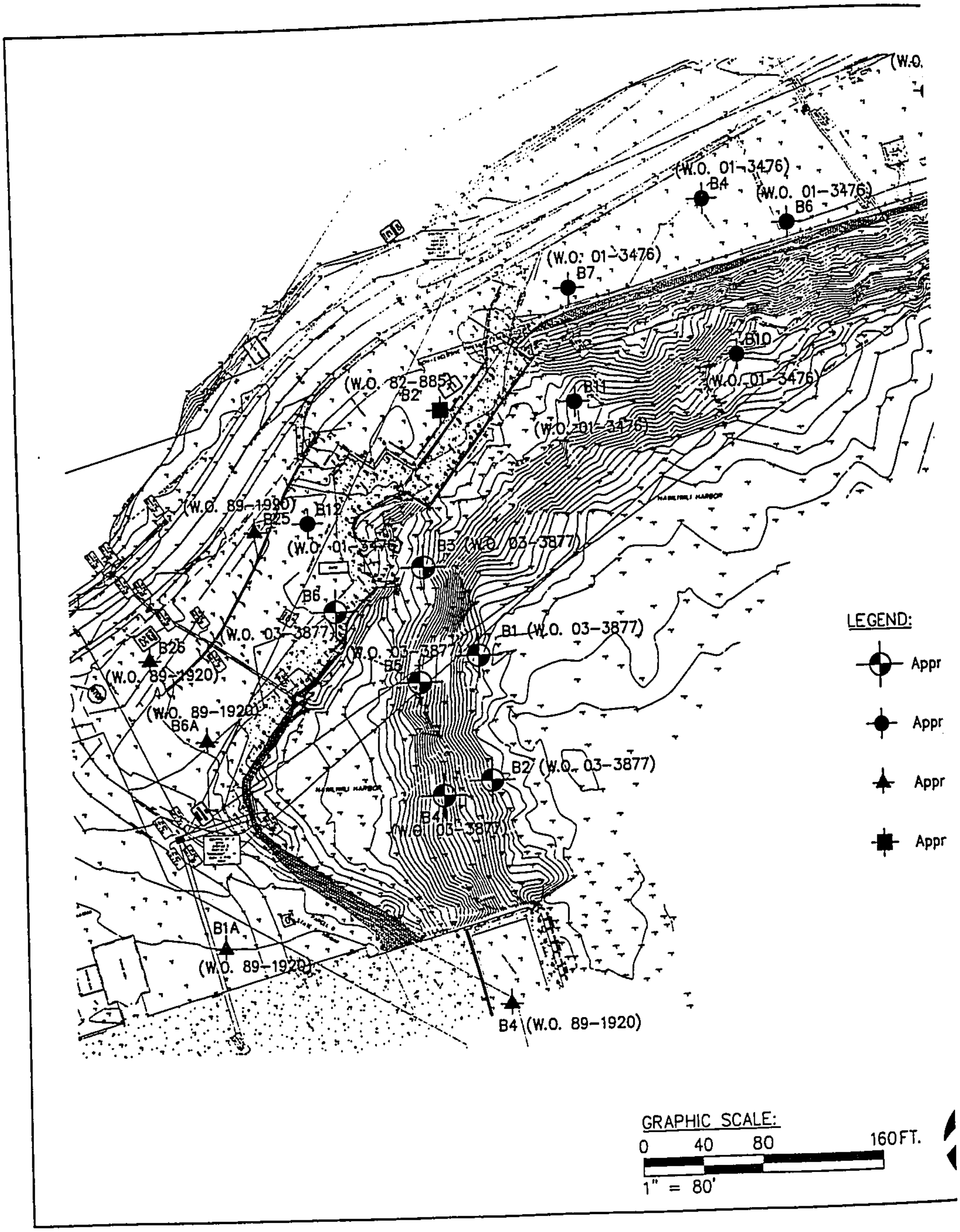


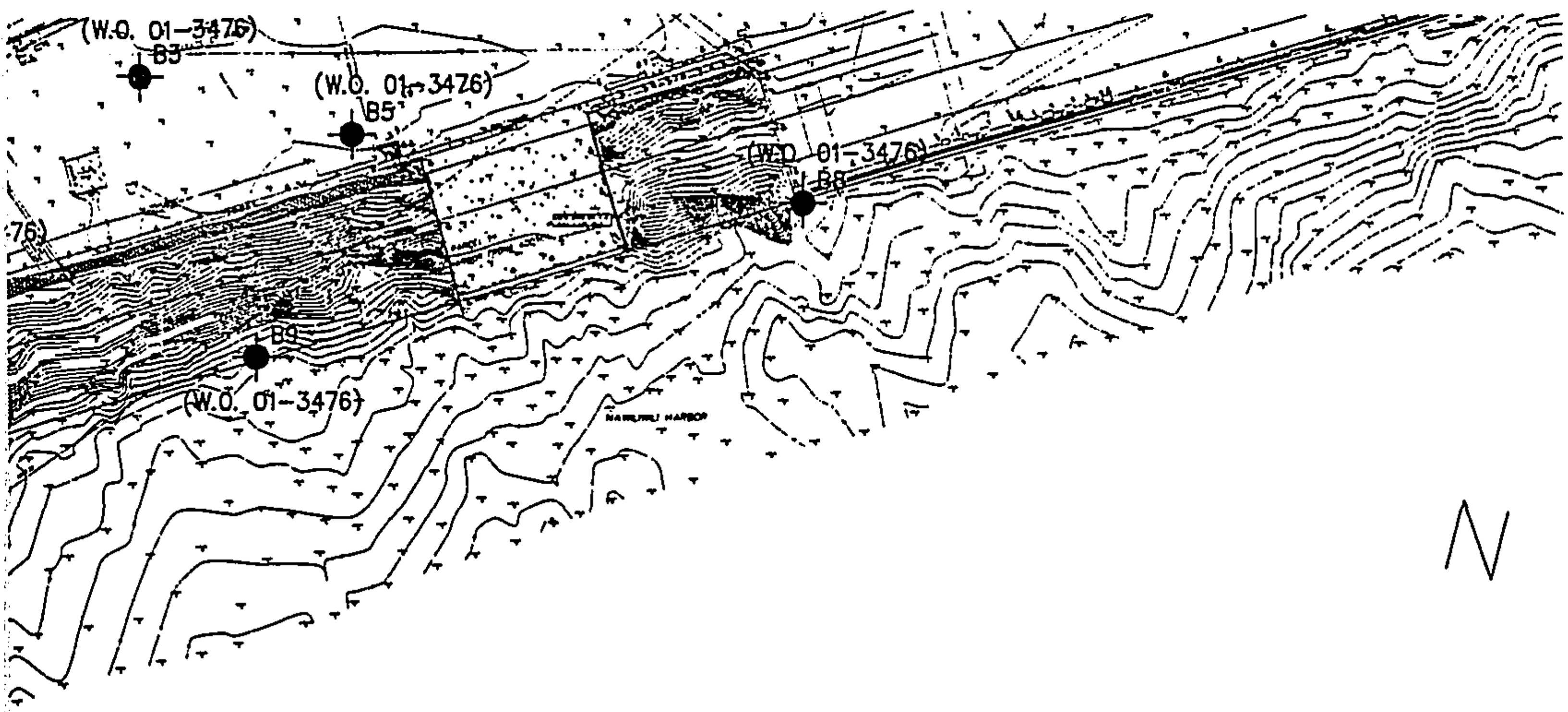
2000 1000 0 2000 FT.

GRAPHIC SCALE

Reference: Topographic quadrangle map prepared by the United States Department of the Interior Geologic Survey Lihue Quadrangle, Kauai County, Hawaii. 1996.

W.O. 03-3877	Segmented Pier 3 Improvements, Nawiliwili Harbor, Kauai
Ernest K. Hirata & Associates, Inc.	LOCATION MAP Plate A2.1


(W.O. 01-3476)
B4
(W.O. 01-3476)
B6
(W.O. 01-3476)
B7
B10
(W.O. 01-3476)
(W.O. 82-885)
B2
B11
(W.O. 01-3476)
(W.O. 89-1920)
B25
B12
(W.O. 01-3476)
B3 (W.O. 03-3877)
B6
(W.O. 03-3877)
B26
(W.O. 89-1920)
B1 (W.O. 03-3877)
(W.O. 03-3877)
B5
(W.O. 89-1920)
B6A
B2 (W.O. 03-3877)
B4
(W.O. 03-3877)
B1A
(W.O. 89-1920)
B4 (W.O. 89-1920)
LEGEND:
Appr
Appr
Appr
Appr
GRAPHIC SCALE:
0
40
80
160FT.
1" = 80'



EGEND:

Approximate location of borings (W.O. 03-3877)

Approximate location of previous borings (W.O. 01-3476)

Approximate location of previous borings (W.O. 89-1920)

Approximate location of previous boring (W.O. 82-885)

Reference: Topographic Survey Map prepared by Engineers Surveyors Hawaii, Inc., dated November 13, 2001.

160FT.

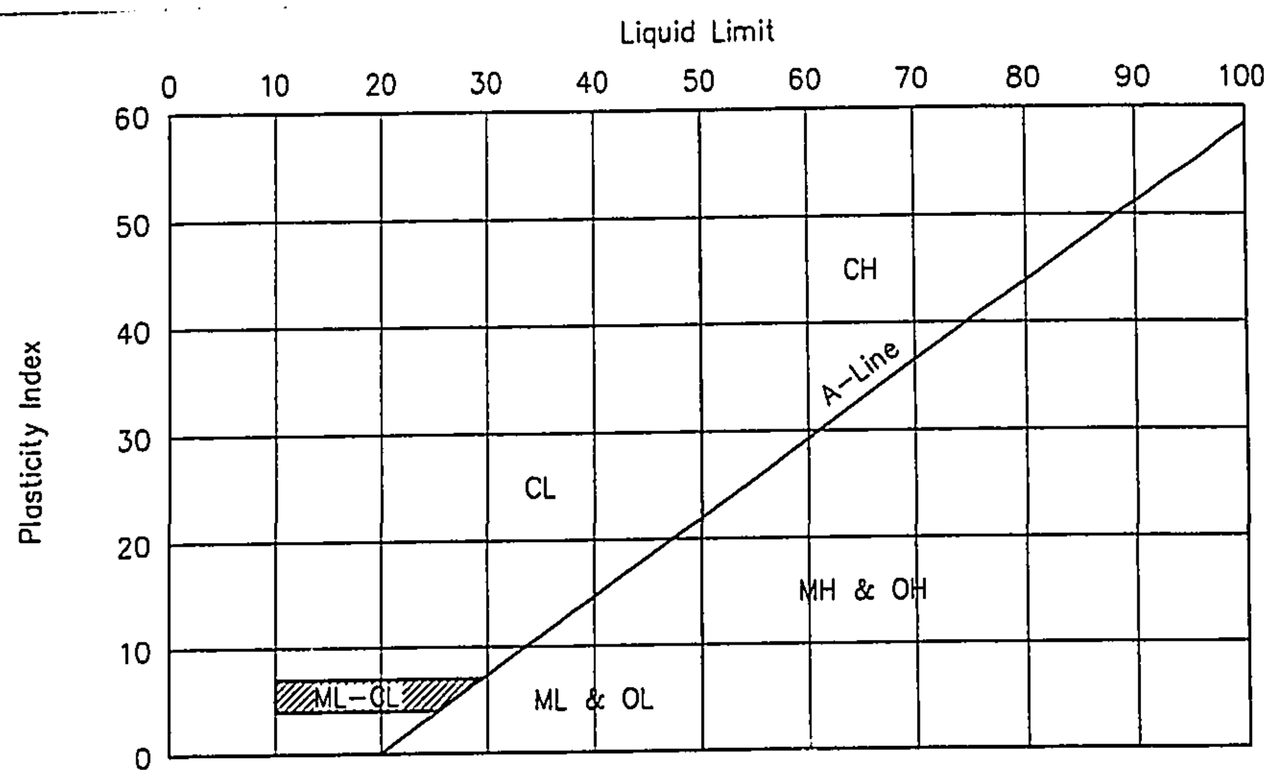
W.O. 03-3877	Segmented Pier 3 Improvements, Nawiliwil Harbor, Kauai
Ernest K. Hirata & Associates, Inc.	BORING LOCATION PLAN Plate A2.2

MAJOR DIVISIONS			GROUP SYMBOLS		TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of the material is LARGER than No. 200 sieve size.)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines.)		GW	Well graded gravels, gravel-sand mixtures, little or no fines.
				GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines.)		GM	Silty gravels, gravel-sand-silt mixtures.
				GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size.)	CLEAN SANDS (Little or no fines.)		SW	Well graded sands, gravelly sands, little or no fines.
				SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines.)		SM	Silty sands, sand-silt mixtures.
				SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of the material is SMALLER than No. 200 sieve size.)	SILTS AND CLAYS (Liquid limit LESS than 50.)			ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
				OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50.)			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
				CH	Inorganic clays of high plasticity, fat clays.
				OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS				PT	Peat and other highly organic soils.
				FRESH TO MODERATELY WEATHERED BASALT	
				VOLCANIC TUFF / HIGHLY TO COMPLETELY WEATHERED BASALT	
				CORAL	

SAMPLE DEFINITION		
2" O.D. Standard Split Spoon Sampler	Shelby Tube	RQD Rock Quality Designation
3" O.D. Split Tube Sampler	NX / 4" Coring	Water Level

W.O. 03-3877	Segmented Pier 3 Improvements, Nawiliwili Harbor, Kauai
Ernest K. Hirata & Associates, Inc.	BORING LOG LEGEND Plate A3.1

PLASTICITY CHART



GRADATION CHART

COMPONENT DEFINITIONS BY GRADATION	
COMPONENT	**SIZE RANGE**
Boulders	Above 12 in.
Cobbles	3 in. to 12 in.
Gravel	3 in. to No. 4 (4.76 mm)
Coarse gravel	3 in. to 3/4 in.
Fine gravel	3/4 in. to No. 4 (4.76 mm)
Sand	No. 4 (4.76 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.76 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and clay	Smaller than No. 200 (0.074 mm)

W.O. 03-3877	Segmented Pier 3 Improvements, Nawiliwili Harbor, Kauai
Ernest K. Hirata & Associates, Inc.	UNIFIED SOIL CLASSIFICATION SYSTEM Plate A3.2

Grade	Symbol	Description
Fresh	F	No visible signs of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	WS	Slight discoloration inwards from open fractures, otherwise similar to F.
Moderately Weathered	WM	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped by knife. Texture preserved.
Highly Weathered	WH	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	WC	Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	RS	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Reference: Soils Mechanics, NAVFAC DM-7.1, Department of the Navy, Naval Facilities Engineering Command, September, 1986.

W.O. 03-3877	Segmented Pier 3 Improvements, Nawiliwili Harbor, Kauai
Ernest K. Hirata & Associates, Inc.	ROCK WEATHERING CLASSIFICATION SYSTEM Plate A3.3

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BORING LOG

W.O. 03-3877

BORING NO. B1 DRIVING WT. 140 lb. START DATE 1/26/04

SURFACE ELEV. -31±* DROP 30 in. END DATE 2/4/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Sandy SILT (ML) - Gray, soft.
5			28	79	35	WEATHERED BASALT (WH-WC) - Mottled reddish brown, medium stiff to stiff, highly to completely weathered.
10						BASALT (WM) - Mottled gray, medium hard, moderately weathered, highly fractured. Begin NX coring at 8 feet. 80% Recovery from 8 to 13 feet. RQD = 0% 40% Recovery from 13 to 18 feet. RQD = 0%
15						WEATHERED BASALT (WM-WH) - Grayish brown, dense to medium hard, moderately to highly weathered, highly fractured. 30% Recovery from 18 to 23 feet. RQD = 0%
20			56/6" 15/No Penetration			0% Recovery from 23 to 28 feet. RQD = 0%
25			25/2" 10/No Penetration			22% Recovery from 28 to 33 feet. RQD = 0%
30						

Plate A4.1

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BORING LOG

W.O. 03-3877

BORING NO. B1 (continued) DRIVING WT. 140 lb. START DATE 1/26/04

SURFACE ELEV. -31± DROP 30 in. END DATE 2/4/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
			57/4" 15/No Penetration			100% Recovery from 33 to 38 feet. RQD = 13%
35						
						100% Recovery from 38 to 43 feet. RQD = 0%
40						
						End boring at 43 feet.
45						Depth of water at 34 feet at 6:53 a.m. on 1/26/04.
						* Elevation based on Topographic Survey Map prepared by Engineers Surveyors Hawaii, Inc. dated October 2001.
50						
55						
60						

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BORING LOG

W.O. 03-3877

BORING NO. B2 DRIVING WT. 140 lb. START DATE 2/5/04

SURFACE ELEV. -31± DROP 30 in. END DATE 2/27/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Sandy SILT (ML) – Gray, soft.
						Medium stiff from 2 feet.
			35	No Recovery		
5						BASALT (WM) – Gray, medium hard, moderately weathered, highly fractured.
			25/4"			
			15/No Penetration			
			15/No Penetration			Begin NX coring at 8 feet. 90% Recovery from 8 to 13 feet. RQD = 22%
10						
						68% Recovery from 13 to 18 feet. RQD = 7%
15						
						WEATHERED BASALT (WM-WH) – Brown, dense to medium hard, moderately to highly weathered, highly fractured. 67% Recovery from 18 to 21 feet. RQD = 0% 68% Recovery from 21 to 26 feet. RQD = 0%
20						
25						
						100% Recovery from 26 to 31 feet. RQD = 8%
30						

Plate A4.3

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BORING LOG

W.O. 03-3877

BORING NO. B2 (continued) DRIVING WT. 140 lb. START DATE 2/5/04

SURFACE ELEV. -31± DROP 30 in. END DATE 2/27/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
						100% Recovery from 31 to 36 feet. RQD = 0%
35						
						77% Recovery from 36 to 41 feet. RQD = 42%
40						
						End NX coring at 41 feet.
						Begin NX coring at 42 feet. 55% Recovery from 42 to 47 feet. RQD = 0%
45						
						40% Recovery from 47 to 52 feet. RQD = 0%
50						
						End boring at 52 feet.
55						Depth of water at 31 feet at 9:26 a.m. on 2/5/04.
60						

Plate A4.4

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BORING LOG

W.O. 03-3877

BORING NO. B3 | DRIVING WT. 140 lb. | START DATE 3/4/04

SURFACE ELEV. -12± | DROP 30 in. | END DATE 3/5/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Sandy SILT (ML) – Gray, soft.
						BASALT (WS-WM) – Gray, medium hard to hard, slight to moderately weathered, highly fractured. Begin NX coring at 1 foot. 33% Recovery from 1 to 2 feet. RQD = 0% End NX coring at 2 feet.
5						Begin NX coring at 5 feet. 100% Recovery from 5 to 10 feet. RQD = 32%
10						Moderately weathered from 10 feet. 30% Recovery from 10 to 15 feet. RQD = 0% Highly weathered at 11 feet.
						Void at 13.5 feet.
15						30% Recovery from 15 to 20 feet. RQD = 0%
20						Hard, slightly weathered from 20 feet. 100% Recovery from 20 to 25 feet. RQD = 40%
25						100% Recovery from 25 to 30 feet. RQD = 47%
30						

Plate A4.5

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BORING LOG

W.O. 03-3877

BORING NO. B3 (continued) DRIVING WT. 140 lb. START DATE 3/3/04
SURFACE ELEV. -12± DROP 30 in. END DATE 3/5/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						80% Recovery from 30 to 35 feet. RQD = 40%
35						End boring at 35 feet. Depth of water at 13 feet at 9:00 a.m. on 3/3/04.
40						
45						
50						
55						
60						

Plate A4.6

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BORING LOG

W.O. 03-3877

BORING NO. B4 DRIVING WT. 140 lb. START DATE 3/5/04
SURFACE ELEV. -19± DROP 30 in. END DATE 3/9/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Sandy SILT (ML) - Gray, soft, slightly clayey.
5			8	No Recovery		
			11/6" 30/6"	No Recovery		
10						BASALT (WS-WM) - Gray, medium hard to hard, slight to moderately weathered, highly fractured.
						Begin NX coring at 13 feet. 100% Recovery from 13 to 18 feet. RQD = 20%
15						
						Hard, slightly weathered from 18 feet. 100% Recovery from 18 to 23 feet. RQD = 30%
20						
						100% Recovery from 23 to 28 feet. RQD = 40%
25						
						100% Recovery from 28 to 33 feet. RQD = 46
30						

Plate A4.7

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BORING LOG

W.O. 03-3877

BORING NO. B4 (continued) | DRIVING WT. 140 lb. | START DATE 3/5/04

SURFACE ELEV. -19± | DROP 30 in. | END DATE 3/9/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
33–48						WEATHERED BASALT (WM-WH) - Brown, medium hard to dense, moderately to highly weathered. 80% Recovery from 33 to 38 feet. RQD = 0% 100% Recovery from 38 to 43 feet. RQD = 23% Medium hard from 38 feet. 100% Recovery from 43 to 48 feet. RQD = 0%
48–60						End boring at 48 feet. Depth of water at 19 feet at 10:00 a.m. on 3/5/04.

Plate A4.8

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BORING LOG

W.O. 03-3877

BORING NO. B5 DRIVING WT. 140 lb. START DATE 3/10/04

SURFACE ELEV. -16± DROP 30 in. END DATE 3/12/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Sandy SILT (ML) - Gray, soft, slightly clayey.
			31	No Recovery		
						BASALT (WS-WM) - Gray, medium hard to hard, slight to moderately weathered, highly fractured. Begin NX coring at 2 feet. 100% Recovery from 2 to 7 feet. RQD = 0%
5						
						90% Recovery from 7 to 12 feet. RQD = 40%
10						
						100% Recovery from 12 to 17 feet. RQD = 32%
15						
						90% Recovery from 17 to 22 feet. RQD = 12%
20						
						100% Recovery from 22 to 27 feet. RQD = 20%
25						
						100% Recovery from 27 to 32 feet. RQD = 17%
30						

Plate A4.9

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BORING LOG

W.O. 03-3877

BORING NO. B5 (continued) DRIVING WT. 140 lb. START DATE 3/10/04
SURFACE ELEV. -16± DROP 30 in. END DATE 3/12/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
35						WEATHERED BASALT (WM-WH) - Grayish brown, dense to medium hard, moderately to highly weathered, highly fractured. 25% recovery from 32 to 37 feet. RQD = 4%
40						85% Recovery from 37 to 42 feet. RQD = 23%
45						100% Recovery from 42 to 48 feet. RQD = 0%
50						End boring at 48 feet. Depth of water at 18 feet at 1:00 p.m. on 3/10/04.
55						
60						

Plate A4.10

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Geotechnical Engineering

BORING LOG

W.O. 03-3877

BORING NO. B6 | DRIVING WT. 140 lb. | START DATE 3/17/04

SURFACE ELEV. +3.5± | DROP 30 in. | END DATE 3/18/04

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty SAND (SM) – Tan, medium dense, with gravel.
						COBBLES AND BOULDERS – Gray, dense, in a tan silty sand matrix. Begin NX coring at 3 feet. 65% recovery from 3 to 8 feet.
5						
						45% recovery from 8 to 13 feet.
10						
						BASALT (WS–WM) – Mottled gray, medium hard, slight to moderately weathered, fractured. 48% Recovery from 13 to 18 feet. RQD = 40%
15						Hard, slightly weathered from 16 feet.
						100% Recovery from 18 to 23 feet. RQD = 7%
20						
						End boring at 23 feet.
25						Groundwater encountered at 4.3 feet at 8:00 a.m. on 3/17/04.
30						

Plate A4.11

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BORING LOG

W.O. 82-885

BORING NO. B2 DRIVING WT. 140 lb. START DATE 6/15/82
SURFACE ELEV. 100.3±** DROP 30 in. WATER LEVEL 4.5 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Clayey SILT (ML) - Brown, moist, medium stiff, with sand, gravel, and concrete fragments. Covered by 4 inches of concrete slab.
			21	106	14	
5						COBBLES AND BOULDERS - Gray, loose.
10						Grading with gray clayey silt from 9 feet.
						Grading to brown color from 13 feet.
15						Begin NX coring at 14.5 feet. 60% Recovery from 14.5 to 16.5 feet.
						BASALT - Mottled brown, dense, weathered, with clay seams. 95% Recovery from 16.5 to 18.5 feet. End NX coring at 18.5 feet.
20						Begin NX coring at 20.5 feet. 47% Recovery from 20.5 to 22 feet. End NX coring at 22 feet.
			55/7"	Tip Recovery		
25						
30			45/3"	No Recovery		

Plate A4.12

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Geotechnical Engineering

BORING LOG

W.O. 82-885

BORING NO. B2 (continued) DRIVING WT. 140 lb. START DATE 6/17/82
SURFACE ELEV. 100.3± DROP 30 in. WATER LEVEL 4.5 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
		☐	73/8.5"	70	55	
		☐	45/2.5"	Tip Recovery		
35						Begin NX coring at 35 feet. 71% Recovery from 35 to 39.5 feet. Dense to medium hard, slightly weathered.
40						100% Recovery from 39.5 to 45 feet.
45						100% Recovery from 45 to 48.5 feet.
						End boring at 48.5 feet.
50						** See Site Plan in Soils Report (W.O. 82-885) for reference benchmark elevation.
55						
60						

Plate A4.13

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B1A — DRIVING WT. 140 lb. — START DATE 2/20/90
SURFACE ELEV. 10± — DROP 30 in. — WATER LEVEL 8.4 ft.

DEPTH	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0				Clayey SILT (ML) – Brown, moist, stiff, with sand.
	29	87	14	Silty SAND (SM) – Mottled tan, medium dense, with coral fragments.
5	22	76	25	
10	45	98	26	
15	17	94	23	
				Sandy SILT (SM) – Mottled light gray, firm to medium stiff, with coral fragments.
20	12	82	41	
25	14	87	41	
30	14	79	46	

Plate A4.14

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B1A (continued) DRIVING WT. 140 lb. START DATE 2/20/90
SURFACE ELEV. 10± DROP 30 in. WATER LEVEL 8.4 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
35		☐	3	77	50	Grading to grayish brown color and loose from 34 feet.
40		☐	3	73	50	
45						
50		☐	3	81	43	
55						
60		☐	2	60	31	

Plate A4.15

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 89–1920

BORING NO. B1A (continued)   DRIVING WT. 140 lb.   START DATE 2/20/90

SURFACE ELEV. 10±   DROP 30 in.   WATER LEVEL 8.4 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60						
65						
		☐	3	80	44	
70						
75						
		☐	3	72	49	
80						
85						
		☐	3	79	44	Plate A4.16
90						

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B1A (continued) DRIVING WT. 140 lb. START DATE 2/20/90
SURFACE ELEV. 10± DROP 30 in. WATER LEVEL 8.4 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
90						
95						
100		☐	4	80	44	
105						
110		☐	5	85	40	Grading clayey from 110 feet.
115						
120		☐	6	80	41	

Plate A4.17

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B1A (continued) DRIVING WT. 140 lb. START DATE 2/20/90

SURFACE ELEV. 10± DROP 30 in. WATER LEVEL 8.4 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
120						
125						
130		☐	4	78	46	Grading to dark brown color from 130 feet.
135						
140		☐	6	65	63	
145						
150		☐	65	117	6	Clayey SILT (MH) – Mottled dark brown, stiff, with cobbles and gravel.

Plate A4.18

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B1A (continued) DRIVING WT. 140 lb. START DATE 2/20/90
SURFACE ELEV. 10± DROP 30 in. WATER LEVEL 8.4 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
150						
155			91/8"	No Recovery		
160			20	83	39	
165			36	No Recovery		
170						BASALT – Mottled gray, medium hard, with weathered seams. Begin NX coring from 169 feet. 92% Recovery from 169 to 174 feet. RQD = 50%
175						100% Recovery from 174 to 176 feet. RQD = 40% 90% Recovery from 176 to 181 feet. RQD = 36%
180						

Plate A4.19

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B1A (continued) DRIVING WT. 140 lb. START DATE 2/20/90

SURFACE ELEV. 10± DROP 30 in. WATER LEVEL 8.4 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
180						100% Recovery from 181 to 184.5 feet. RQD = 42%
185						End boring at 184.5 feet.
190						
195						
200						
205						
210						

Plate A4.20

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B4
SURFACE ELEV. -5±
DRIVING WT. 140 lb.
DROP 30 in.
START DATE 1/11/90
WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Sandy SILT (SM) - Mottled gray, soft.
		☐	Wt. of rods	No Recovery		
		☐	Wt. of rods	58	70	
5						
		☐	21	93	34	Grading sandier from 8 feet, with shell and coral fragments.
10						
		☐	18	80	44	
15						
		☐	12	81	44	
20						
		☐	8	71	49	
25						
		☐	2	70	55	
30						

Plate A4.21

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B4 (continued) DRIVING WT. 140 lb. START DATE 1/11/90

SURFACE ELEV. -5± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
35		☐	3	69	58	
40		☐	5	No Recovery		
45		☐	4	74	48	Grading to light gray color from 44 feet.
50		☐	5	73	50	
55		☐	6	76	39	
60		☐	8	76	46	

Plate A4.22

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B4 (continued) DRIVING WT. 140 lb. START DATE 1/17/90
SURFACE ELEV. -5± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60						
		☐	5	76	45	
65						
		☐	12	80	45	Coral fragments at 69 feet.
70						
		☐	4	76	45	
75						
		☐	5	83	39	
80						
		☐	8	No Recovery		
85						
		☐	1	81	37	
90						

Plate A4.23

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B4 (continued) DRIVING WT. 140 lb. START DATE 1/17/90

SURFACE ELEV. -5± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
90						
95		☐	13	No Recovery		
100		☐	8	78	49	
105		☐	24	79	45	
110		☐	8	79	37	
115		☐	14	77	43	Grading to dark gray color and clayey from 114 feet.
120		☐	11	73	57	

Plate A4.24

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B4 (continued) DRIVING WT. 140 lb. START DATE 1/22/90
SURFACE ELEV. -5± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
120						
124		☐	24	67	51	Grading medium stiff from 124 feet.
125						
129		☐	23	61	61	
130						
134		☐	21	56	70	
135						
139		☐	20	78	37	
140						
144		☐	24	74	53	
145						
149						Cobble at 149 feet.
150		☐	90	No Recovery		End boring at 150.5 feet.

Plate A4.25

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B6A — DRIVING WT. 140 lb. — START DATE 3/5/90

SURFACE ELEV. 6± — DROP 30 in. — WATER LEVEL 5.5 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty SAND (SM) - Mottled tan, medium dense, with coral fragments. Boulders in upper 5 feet.
5			7	Tip Recovery		Sandy SILT (SM) - Mottled gray, medium stiff, with coral and basalt fragments.
10			50/3"	No Recovery		Grading with cobbles from 10 feet.
15			50/4"	No Recovery		
20						BASALT - Mottled gray, dense to medium hard, fractured, with weathered seams. Begin NX coring from 19 feet. 95% Recovery from 19 to 24 feet. RQD = 40%
25						100% Recovery from 24 to 29 feet. RQD = 54% Grading to weathered basalt from 27.5 feet. 80% Recovery from 29 to 34 feet. RQD = 0%
30						

Plate A4.26

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B6A (continued) DRIVING WT. 140 lb. START DATE 3/7/90

SURFACE ELEV. 6± DROP 30 in. WATER LEVEL 5.5 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
						End boring at 34 feet.
35						
40						
45						
50						
55						
60						

Plate A4.27

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B25 DRIVING WT. 140 lb. START DATE 6/27/90
SURFACE ELEV. 5± DROP 30 in. WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty SAND (SM) - Light orange brown, moist, medium dense.
		☐	6/6" 36/6"	90	16	
5						BASALT - Gray, medium hard.
						End boring at 6 feet.
10						
15						
20						
25						
30						

Plate A4.28

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 89-1920

BORING NO. B26
SURFACE ELEV. 7±
DRIVING WT. 140 lb.
DROP 30 in.
START DATE 6/26/90
WATER LEVEL None

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty SAND (SM) – Brown, moist, loose to medium dense.
		▭	19	88	8	Grading to mottled reddish brown color from 2.5 feet.
5		▭	50/6"	92	16	
						BASALT – Gray, medium hard.
						End boring at 7.5 feet.
10						
15						
20						
25						
30						

Plate A4.29

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B3 DRIVING WT. 140 lb. DATE OF DRILLING 9/6/01

SURFACE ELEV. 6.8± DROP 30 in. WATER LEVEL 8.5 feet

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			97	80	34	Silty CLAY (MH) – Mottled reddish brown, moist, medium stiff, with sand and gravel. Covered by 2 inches of asphaltic concrete over 14 inches of base course.
			20/No Penetration			COBBLES AND BOULDERS – Gray, dense, in a silty sand matrix.
5			45	No Recovery		
			25/No Penetration			Begin NX coring at 9 feet. 51% Recovery from 9 to 14 feet.
10						
						67% Recovery from 14 to 19 feet.
15						
20						End boring at 19 feet.
25						
30						

Plate A4.30

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B4 | DRIVING WT. 140 lb. | DATE OF DRILLING 9/10/01

SURFACE ELEV. 6.9± | DROP 30 in. | WATER LEVEL 9.1 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			55	79	12	Silty CLAY (MH) – Mottled reddish brown, moist, medium stiff, with sand. Covered by a thin layer of gravel.
						COBBLES AND BOULDERS – Gray, dense, in a silty sand matrix.
5			35/No Penetration			
			11/6" 29/4" 10/No Penetration	89	34	
10			4/6" 4/6" 30/No Penetration	96	32	
15						Begin NX coring at 14 feet. 61% Recovery from 14 to 19 feet.
20						End boring at 19 feet.
25						
30						

Plate A4.31

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B5 DRIVING WT. 140 lb. DATE OF DRILLING 9/18/01

SURFACE ELEV. 6.1± DROP 30 in. WATER LEVEL 6 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty SAND (SM) – Tan, moist, medium dense. Covered by 1 inch of asphaltic concrete.
			17	82	20	
			5	82	39	Silty SAND (SM) – Gray, moist, loose, with coral fragments.
5						
			5	94	34	
10						
			16	95	35	
15						
			6	81	44	
20						
			20/No Penetration			COBBLES AND BOULDERS – Gray, dense, in a silty sand matrix. Begin NX coring at 23 feet. 32% Recovery from 23 to 28 feet.
25						
						5% Recovery from 28 to 33 feet. Grading to gravel and cobbles with occasional boulders from 28 feet.
30						

Plate A4.32

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B5 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 9/19/01

SURFACE ELEV. 6.1± DROP 30 in. WATER LEVEL 6 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
						63% Recovery from 33 to 38 feet.
35						
						58% Recovery from 38 to 43 feet.
40						
						0% Recovery from 43 to 48 feet.
45						
			30/No Penetration			18% Recovery from 48 to 53 feet.
50						
			30/No Penetration			25% Recovery from 53 to 58 feet.
55						
			63/6" 74/2"		41	6% Recovery from 59 to 64 feet
60						

Plate A4.33

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B5 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 9/21/01
SURFACE ELEV. 6.1± DROP 30 in. WATER LEVEL 6 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60						
65						55% Recovery from 64 to 69 feet
70						BASALT (WM) – Mottled brown, medium hard to hard, moderately weathered, highly fractured. 50% Recovery from 69 to 74 feet. RQD = 0%
75						100% Recovery from 74 to 79 feet. RQD = 18%
80						100% Recovery from 79 to 84 feet. RQD = 13%
85						End boring at 84 feet.
90						

Plate A4.34

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B6 | DRIVING WT. 140 lb. | DATE OF DRILLING 9/28/01
SURFACE ELEV. 6.4± | DROP 30 in. | WATER LEVEL 6.3 ft.

DEPTH	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0				Silty SAND (SM) – Tan, slightly moist, medium dense.
	18	87	14	
				COBBLES AND BOULDERS – Gray, dense, in a silty sand matrix.
5	30/No Penetration			
	30/No Penetration			Gravel and cobbles from 8.5 feet.
10	30/No Penetration			
	25/No Penetration			
15	35/No Penetration			
	35/4"		34	
20				Begin NX coring at 19 feet. 51% Recovery from 19 to 24 feet.
25				85% Recovery from 24 to 29 feet.
30				63% Recovery from 29 to 34 feet.

Plate A4.35

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B6 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 9/27/01

SURFACE ELEV. 6.4± DROP 30 in. WATER LEVEL 6.3 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
35						BASALT (WS-WM) - Gray, hard, slightly to moderately weathered. 93% Recovery from 34 to 39 feet. RQD = 76%
40						100% Recovery from 39 to 44 feet. RQD = 65%
45						100% Recovery from 44 to 49 feet. RQD = 75%
50						62% Recovery from 49 to 51 feet. RQD = 29%
						End boring at 51 feet.
55						
60						

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B7	DRIVING WT. 140 lb.	DATE OF DRILLING 9/27/01
SURFACE ELEV. 7.4±	DROP 30 in.	WATER LEVEL 6.5 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty SAND (SM) – Tan, slightly moist, medium dense, with gravel and cobbles.
			50/8" 10/No Penetration			COBBLES AND BOULDERS – Gray, dense, in a silty sand matrix.
			24	84	18	Loose to medium dense from 4 feet.
5						
			8	99	31	
10						
						Gravel and cobbles from 12 feet.
			30/No Penetration			
15						
			30/No Penetration			
						Begin NX coring at 18 feet. 43% Recovery from 18 to 23 feet.
20						
						43% Recovery from 23 to 28 feet.
25						
						26% Recovery from 28 to 33 feet.
30						

Plate A4.37

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B7 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 10/1/01

SURFACE ELEV. 7.4± DROP 30 in. WATER LEVEL 6.5 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
						40% Recovery from 33 to 38 feet.
35						
						70% Recovery from 38 to 43 feet.
40						
						30% Recovery from 43 to 48 feet. Grading to more cobbles and less boulders from 43 feet.
45						
						6% Recovery from 48 to 49 feet.
						29% Recovery from 49 to 54 feet.
50						
						45% Recovery from 54 to 59 feet.
55						
						BASALT (WS-WM) – Gray, hard, slightly to moderately weathered. 86% Recovery from 59 to 64 feet. RQD = 53%
60						

Plate A4.38

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B7 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 10/5/01
SURFACE ELEV. 7.4± DROP 30 in. WATER LEVEL 6.5 ft.

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60						
65						90% Recovery from 64 to 69 feet. RQD = 80%
70						95% Recovery from 69 to 74 feet. RQD = 81%
75						End boring at 74 feet.
80						
85						
90						

Plate A4.39

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B8 DRIVING WT. 140 lb. DATE OF DRILLING 9/11/01

SURFACE ELEV. −37± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0		☐	8			Silty SAND (SM) – Tan, loose to medium dense, with coral fragments. Covered by approximately 3 feet of sediment.
		☐	10			
		☐	27	97	17	
5						
		☐	30	67	27	
10						
		☐	22	53	27	
15						
		☐	16	84	39	Gray color from 18 feet.
20						
		☐	47	72	34	
25						
		☐	15	80	29	
30						Plate A4.40

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B8 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 9/12/01

SURFACE ELEV. -37± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
		☐	14	91	26	
35						
		☐	16	94	26	
40						
		☐	17	93	25	
45						
		☐	11	82	37	
50						
		☐	9	84	33	
55						
		☐	15	81	37	
60						

Plate A4.41

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B8 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 9/13/01

SURFACE ELEV. -37± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60						
		☐	15	68	51	Increase in sand content from 63 feet.
65						
		☐	34	77	37	Grading with cobbles from 69 feet.
70						
						WEATHERED ROCK (WM-WH) — Mottled gray, dense to medium hard, moderately to highly weathered. Begin NX coring at 73 feet. 51% Recovery from 73 to 78 feet. RQD = 0%
75						
						81% Recovery from 78 to 83 feet. RQD = 18%
80						
						35% Recovery from 83 to 88 feet. RQD = 6%
85						
						35% Recovery from 88 to 93 feet. RQD = 0%
90						

Plate A4.42

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B8 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 9/13/01
SURFACE ELEV. -37± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
90–98						65% Recovery from 93 to 98 feet. RQD = 0%
98–120						End boring at 98 feet.

Plate A4.43

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B9 DRIVING WT. 140 lb. DATE OF DRILLING 11/1/01

SURFACE ELEV. −31± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			Wt. of Rods			Sandy SILT (SM) − Gray, loose, with coral fragments.
5			4/6" 11/6"	56	42	
			63/9"	No Recovery		Sandier at 9 feet.
10						Silty SAND (SM) − Brown, dense, with clay and gravel.
15			110	77	41	
20			98	72	50	
25			100/6"	87	17	
30			75/No Penetration			BASALT (WM) − Mottled red and gray, medium hard, moderately weathered.

Plate A4.44

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B9 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 11-6-01

SURFACE ELEV. -31± DROP 30 in. WATER LEVEL N/A

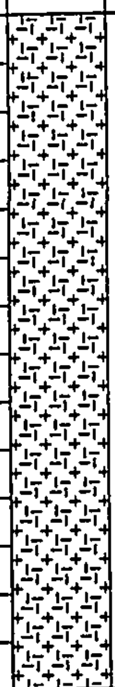
DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
35						100% Recovery from 34 to 39 feet. RQD = 78%
40						100% Recovery from 39 to 44 feet. RQD = 76%
45						End boring at 44 feet.
50						
55						
60						

Plate A4.45

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B10 DRIVING WT. 140 lb. DATE OF DRILLING 10/24/01

SURFACE ELEV. -24.5± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0		☐	Wt. of Rods			Sandy SILT (SM) - Gray, loose.
10		☐	Wt. of Hammer	69	59	With shell and coral fragments from 10 feet. (Torvane at 10 ft. = 200 psf)
15		☐	7	87	30	Silty sand at 15 feet.
20		☐	15	48	60	
23						Silty SAND (SM) - Brown, medium dense to dense, with weathered gravel and cobbles.
25		☐	96	No Recovery		
30						

Plate A4.46

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B10 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 10/25/01

SURFACE ELEV. -24.5 ± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30		☐	129	No Recovery		
35		☐	28	68	43	
40		☐	52	75	49	Increase in cobble contents from 40 to 43 feet.
45		☐	28	72	51	Reddish brown color from 45 feet, with clay.
50		☐	22	74	58	
						Increase in cobble content from 53 to 57 feet.
55		☐	46/6" 50/2"	66	56	
60						

Plate A4.47

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B10 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 10/30/01
SURFACE ELEV. -24.5± DROP 30 in. WATER LEVEL N/A

DEPTH	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60	42	110	25	
65	25	42	111	
				Boulders at 68 feet.
70				Begin NX coring at 70 feet. 50% Recovery from 70 to 73 feet.
				100% Recovery from 73 to 75 feet.
75				BASALT (WM) – Mottled red and gray, medium hard, moderately weathered. 100% Recovery from 75 to 80 feet. RQD = 18%
80				100% Recovery from 80 to 85 feet. RQD = 48%
85				End boring at 85 feet.
90				

Plate A4.48

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B11 — DRIVING WT. 140 lb. — DATE OF DRILLING 10/9/01
SURFACE ELEV. −16± — DROP 30 in. — WATER LEVEL N/A

DEPTH	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0	Wt. of Rods			Sandy SILT (SM) – Gray, loose.
	Wt. of Rods	68	55	(Torvane at 4 ft. = 200 psf)
5				
	Wt. of Rods	61	67	(Torvane at 9 ft. = 300 psf)
10				
	5	68	52	With coral fragments at 14 feet.
15				
				Medium dense from 18 feet.
	76	94	24	
20				
				With cobbles from 23 feet.
	44	83	34	
25				
	40	No Recovery		
30				

Plate A4.49

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B11 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 10/15/01

SURFACE ELEV. -16± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
35		☐	60	67	42	
40		☐	38	82	42	Reddish brown silty clay at 39 feet.
45		☐	61	98	39	
50		☐	52	88	37	
55		☐	84	113	26	
60						

Plate A4.50

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B11 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 10/15/01
SURFACE ELEV. -16± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60			100	98	28	
65			50/No Penetration			Grading with numerous cobbles and occasional boulders from 65 feet.
70			114	117	19	
75			54		30	
80			70	68	70	
85			30	50	80	
90						

Plate A4.51

ERNEST K. HIRATA & ASSOCIATES, INC.
Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B11 (continued) DRIVING WT. 140 lb. DATE OF DRILLING 10/19/01
SURFACE ELEV. −16± DROP 30 in. WATER LEVEL N/A

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
90			24	48	91	
95			91	69	48	WEATHERED ROCK (WH−WC) − Mottled reddish brown, dense, highly to completely weathered. Dense to medium hard from 98 feet.
100			122	85	45	
						BASALT (WM) − Grayish brown, medium hard, moderately weathered.
105						Begin NX coring at 105 feet. 86% Recovery from 105 to 110 feet. RQD =35%
110						70% Recovery from 110 to 115 feet. RQD = 8%
115						End boring at 115 feet.
120						

Plate A4.52

ERNEST K. HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 01-3476

BORING NO. B12 | DRIVING WT. 140 lb. | DATE OF DRILLING 9/5/01

SURFACE ELEV. 4.1± | DROP 30 in. | WATER LEVEL 2.5 ft.

DEPTH	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0				Silty CLAY (MH) – Mottled reddish brown, moist, medium stiff, with sand and gravel. Covered by 1 inch of asphaltic concrete.
	21/6" 35/2" 10/No Penetration			COBBLES AND BOULDERS – Gray, dense, in a silty sand and clay matrix.
5	25/No Penetration			
	37/4" 10/No Penetration			
10				Begin NX coring at 10 feet.
				BASALT (WS–WM) – Gray, medium hard to hard, slightly to moderately weathered. 88% Recovery from 10 to 15 feet. RQD = 25%
15				100% Recovery from 15 to 20 feet. RQD = 53%
20				100% Recovery from 20 to 25 feet. RQD = 51%
25				63% Recovery from 25 to 30 feet. RQD = 13%
30				End boring at 30 feet.

Plate A4.53

APPENDIX B

LABORATORY TESTING

DESCRIPTION OF LABORATORY TESTING

CLASSIFICATION

Field classification was verified in the laboratory in accordance with the Unified Soil Classification System. Laboratory classification was determined by visual examination. The final classifications are shown at the appropriate locations on the Boring Logs, Plates A4.1through A4.11.

MOISTURE-DENSITY

Representative samples were tested for insitu moisture content and dry unit weight. The dry unit weight was determined in pounds per cubic foot while the moisture content was determined as a percentage of dry weight. Samples were obtained using a 3-inch O.D. split tube sampler. Test results are shown at the appropriate depths on the Boring Logs, Plates A4.1 through A4.11.

APPENDIX D
HISTORICAL AND CULTURAL ASSESSMENT

HISTORICAL AND CULTURAL ASSESSMENT FOR THE PROPOSED IMPROVEMENT PROJECT AT NĀWILIWILI HARBOR, NĀWILIWILI *AHUPUA'A*, ISLAND OF KAUA'I

by

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Prepared for

W.Y. Thompson, P.E.

by

Cultural Surveys Hawai'i, Inc.

April 2004

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I. INTRODUCTION

At the request of W.Y. Thompson, P.E., Cultural Surveys Hawai'i Inc. has prepared an historical and cultural assessment for a proposed Pier 3 renovation project at Nāwiliwili Harbor, Nāwiliwili *ahupua'a*, on the island of Kaua'i (Figures 1 & 2).The Pier 3 renovation is proposed to facilitate accommodation of ships upto 965 feet in length. The proposed renovation work includes:

1) removal and extension of a portion of the existing Pier 3;
2) dredging of the harbor bottom;
3) provision of a breasting dolphin served by a walkway; and
4) other improvements to handle passenger loading and unloading, parking facilities.

The scope of work for this archaeological/historical and cultural assessment includes:

1) Examination of historical documents, Land Commission Awards, historic maps, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal and other resources or agricultural pursuits as may be indicated in the historic record.
2) A review of the existing archaeological information pertaining to any sites on the property as they may allow us to reconstruct traditional land use activities and identify and describe the cultural resources, practices and beliefs associated with the parcel and identify present uses, if appropriate.
3) Contact persons knowledgeable about the historic and traditional practices in the project area and region by letter and telephone.
4) Preparation of a report on items 1-3 summarizing the information gathered related to traditional practices and land use. The report will assess the impact of the proposed action on the cultural practices and features identified.

Background research for this study included: review of archeological reports in the library of the State Historic Preservation Division; study of documents at the Hawai'i State Archives; review of historic maps at the Survey Office of the Department of Accounting and General Services; and review of historic photographs at the Bishop Museum Archives. Personnel at the State Historic Preservation Division and Kaua'i community members were consulted to identify individuals knowledgeable about Nāwiliwili and cultural practices in the harbor area.

II. ARCHAEOLOGICAL/HISTORICAL DOCUMENTATION OF NĀWILIWILI *AHUPUA'A* AND NĀWILIWILI HARBOR

The Nāwiliwili Harbor Pier 3 project area is located in the Puna District (the modern Līhue District) of Kaua'i island in the traditional land division (*ahupua'a*) of Nāwiliwili. This *ahupua'a* encompasses most of the Nāwiliwili Stream drainage which empties into Nāwiliwili Bay. Nāwiliwili *ahupua'a* is relatively small in size – about five square miles – extending inland to Kilohana Crater from the shoreline at Nāwiliwili Bay. It is sandwiched between the ahupua'a of Kalapaki to the north and Niumalu to the south.

A. Pre-Contact Period

Nāwiliwili *ahupua'a* apparently took its name from the blossoms of the wiliwili trees which grew in great numbers on the rocky slopes above the bay (Damon, 1931: 389).

In prehistoric times the valley floor through which Nāwiliwili Stream coursed, particularly in its broader lower reaches, would have been ideal for the cultivation of wetland taro. The bay into which the stream empties would have been an ideal canoe landing and fishing grounds. Up to the present, the south end of the bay at the mouth of the Hulēia River is well-known as a rich fishing place.

Because of modern developments in and around the harbor, little or no archaeological vestiges survive of what must have been a well-populated area. The coast of Nāwiliwili, because of its natural harbor, was the focus of commercial activity from an early date. Most of the development surrounding Nāwiliwili Bay took place before archaeological surveys were a common practice. However, some Nāwiliwili lore has survived.

Ethel Damon mentions nearby Kilohana Crater as a famous nesting place for the chiefly delicacy, the uwa'u, the dark-rumped petrel (Pterodroma phaeopygia sandwichensis). Also nearby, at the top of Mauna Kahili, the peak to the west of Kilohana, was the sacred burial place of Hawaiian chiefs. Damon also tells of a heiau which once stood on a hill above the south side of the valley. (The heiau apparently survived into the mid-19th century, as it is mentioned in an 1851 land deed to Lihue Plantation.) On the bluff overlooking Nāwiliwili Bay, where Kaua'i High School now stands:

> ...was once the large paved heiau called Kuhiau, extending over about four acres of ground. It was in its day the largest and most far-famed temple on the island. Below it, in the bay, is still the rock called Paukini, which was said to be its companion or sister heiau, and was probably also the home of the kahuna, or priest, of Kuhiau. In ancient times this rock was connected with the shore near the site of the former boat landing. All the dredging and filling in for the modern wharves have not yet touched this old rock of Paukini, the sole remnant of the famous heiaus of Nawiliwili Bay. For almost no traces even of the great Kuhiau temple, are now to be found; and of the three small heiaus in the neighboring ahupuaa of Kalapaki, those of Ninini, Ahukini and Pohako-eleele, little more than the names survive. (Damon, 1931: 398)

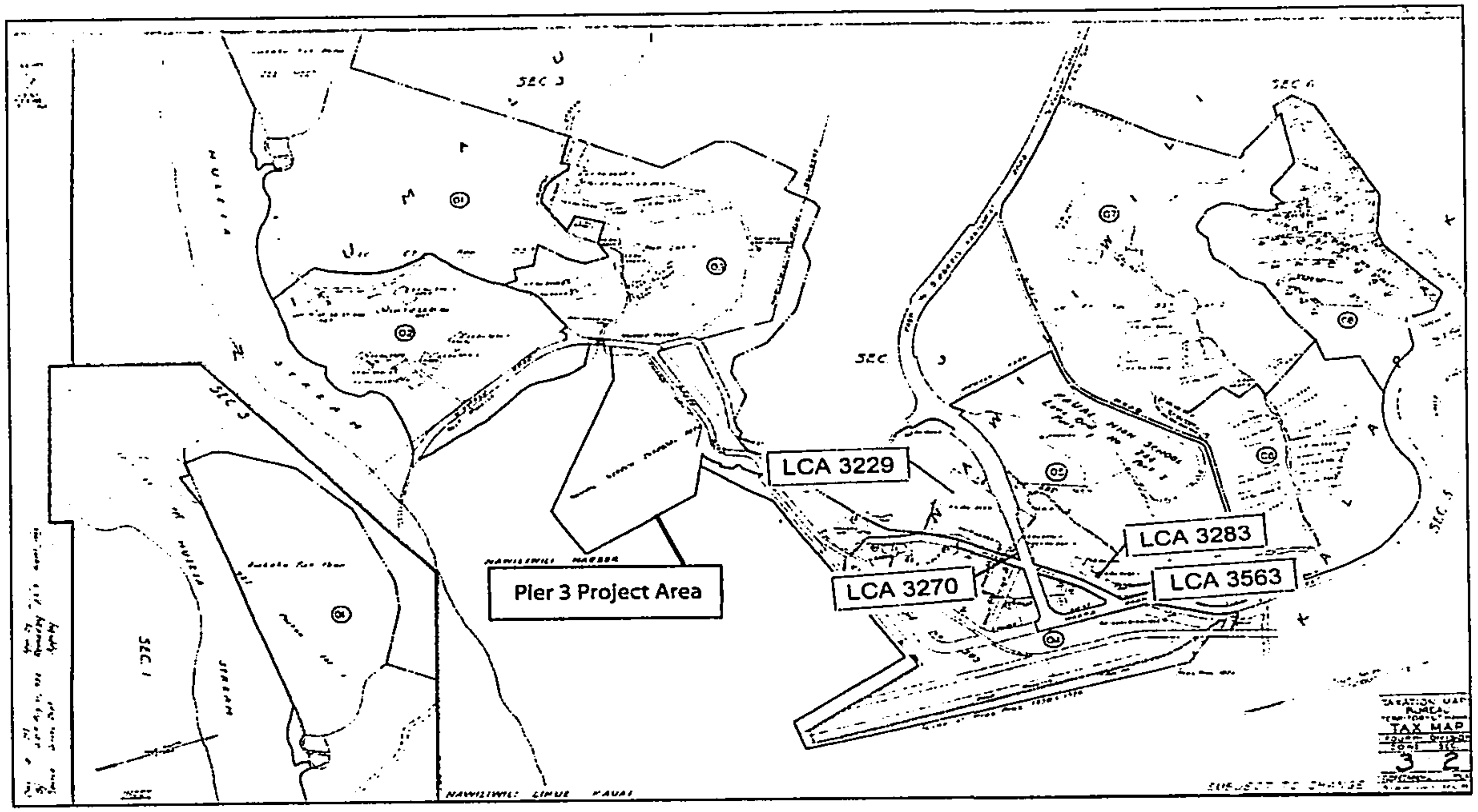

Figure 2. Tax map (TMK 3-2) showing Nāwiliwili Harbor, with Land Commission Awards (LCAs) in the vicinity identified

The menehune were known to live in the Nāwiliwili area:

> It was one of the favorite playgrounds of the tribe of Menehune, the little brown work-people who played as hard as they worked. And again it is William Hyde Rice, who, more than any other teller of stories, has kept for us old tales of this happy playground...
>
> One of their favorite play places was the little hill of Po-po-pii, Rounded-for climbing-up. This they had themselves built on the top of Kilohana and never were they more delighted than when they could climb it over and over again for the sheer fun of rolling down its sides, frolicking and laughing as they rolled. It was such a sport that their gleeful shouts carried clear across the Kauai channel to the southeast and startled birds at Kahuku on the island of Oahu.
>
> Once, a Menehune called Ka-uki-uki, The-man-of-wrath, boasted that he could climb to the top of this hill at Kilohana and snare the legs of the moon. Ridiculed by his fellow tribesmen, he valiantly attempted to make good his boast, and was turned into a stone when he failed of achievement. For many years this stone was recognized by Hawaiians as a kupua, or demigod, and offerings of lehua-blossoms and fragrant maile leaves were laid upon it in passing, that rain and fog might not hinder the errand which carried the people into the mountains. (Ibid.: 395, 396)

B. Early Historic Activities

Nāwiliwili Bay was early recognized as virtually the only natural harbor for sailing ships on Kaua'i. Waimea Bay and Kōloa, however, were actually preferred anchorages because Nāwiliwili opened directly to the tradewinds. Gales were known to blow ships onto the rocks. During the whaling era, Kōloa was the preferred anchorage because of the ready supply of nearby food stuff for resupply of the ships. Kōloa also took an early start in the production of sugar cane.

During the 1830s, Kaikioewa, Governor of Kaua'i, established a village at Nāwiliwili that developed into Līhu'e. By 1830, the sandalwood trade had waned and the whaling industry was just beginning. At the same time, commercial agriculture was being established on Kaua'i. When the first crop of sugar cane was harvested at Kōloa, the king himself commanded that portions of his private land be planted in cane and so Kaikioewa began farming the slopes of Nāwiliwili Bay where there was more rain than at Kōloa. He built a house and church in the ahupua'a of Nāwiliwili and named the area Līhu'e.

An account of the United States Exploring Expedition, which passed through Līhu'e in 1840, notes:

> The principal village is Nawiliwili, ten miles east of Koloa. This district contains about forty square miles, being twenty miles long by two broad. The soil is rich: it produces sugar-cane, taro, sweet-potatoes, beans, etc. The only market is that of Koloa. The cane suffers somewhat from the high winds on the plains.
>
> The temperature of Lihui has much the same range as that of Koloa, and the climate is pleasant: the trade-winds sweep over it uninterruptedly, and sufficient rain falls to keep the vegetation green throughout the year. No cattle are to be seen, although the pasturage is good. (in Damon, 1931:405)

The exact location of the "village of Nawiliwili" mentioned in the above account is uncertain. It may refer to a community along the shoreline of the Nāwiliwili Bay. The references to Nāwiliwili and Līhu'e during this period are somewhat confusing. The name Līhu'e is not used consistently until the establishment of the sugar plantation.

With the death of Kaikioewa, governorship of Kaua'i was transferred for a brief period to his widow Keaweamahi. Then followed the brief tenure of Chiefess Kekauonohi and her husband Kealiiahonui (son of King Kaumuali'i) after which the governorship passed to Paulo Kanoa in 1848. Kanoa had two houses overlooking Nāwiliwili Bay: one on the bluff south of Nāwiliwili Stream (the present site of Kaua'i High School) and another at Papalinahoa, north of the bay (Damon, 1931).

C. Land Commission Awards

Toward the mid-19th century, the Organic Acts of 1845 and 1846 initiated the process of the Māhele — the division of Hawaiian lands — which introduced private property into Hawaiian society. In 1848 the crown, the *Hawaiian government*, and the *ali'i* (royalty) received their land titles. Subsequently in the Māhele, kuleana awards were given to commoners and others who could prove residency on and use of the parcels they claimed.

Victoria Kamāmalu was awarded over two thousand acres of Nāwiliwili ahupua'a (LCA 7713), along with much of Niumalu, Haiku and Kipu, as well as Kalapaki to the northeast.

Kuleana Awards in the Vicinity of the Present Study Area

Information in Mahele records may provide clues to traditional Hawaiian subsistence and cultural activities, in or near the present study area, that continued to be practiced into the mid-19th century. According to the current tax map, six kuleana parcels for Land Commission Awards (LCAs) were located in the vicinity of the study area: LCA 3229, LCA 3270, LCA 3651, LCA 10506, LCA 3283, and LCA 3563 (see Figure 2 above). A review of Mahele records at the Hawai'i State Archives produced documentation for four of the awards.

LCA 3229 was awarded to Eke Opunui who also claimed and was awarded parcels in Huleia and Koloa ahupua'a. The parcel in Nāwiliwili ahupua'a is described as four taro lo'i which are bounded:

Mauka by the pali of Waiohuli

Wailua by ili of Pakalana

Makai by sea beach, house lots

Koloa by pali of Waiohuli. (Foreign Testimony, vol. 13: 10-11)

LCA 3270 was awarded to Luka. The tax map identifies Luka's land near the present study area as parcel 1, which is documented in the Mahele records as lying "in thei ili of Kawailoa & [consisting] of two lois cultivated and several not cultivated" (Native Register vol 9: 24).

LCA 3283 was awarded to Waikahu. The tax map identifies Waikahu's land in the vicinity of the present study area as parcel 1. However, based on the Mahele documents, it may in fact be parcel 2 which is described as a "house lot on the shore in Nawiliwili", bounded:

West by pali

North by kula

East by seashore

South by kula of Konohiki, (Foreign Testimony, vol. 13: 190)

LCA 3563 was awarded to Keliihananui. The tax map identifies Keliihananui's land in the vicinity of the present study area as parcel 2 which is described in the Mahele documents as a "house lot near the shore in the ili of Papalinahoa", bounded:

Mauka by auwai of Papalinahoa

Koolau by Konohiki's kula

Makai by sea shore

Kona by Konohiki's land. (Foreign Testimony, vol. 13: 141)

The Mahele documents indicate that, until the mid-19th century, the Nāwiliwili lands in the vicinity of the present harbor study area were utilized for agriculture – taro cultivation – and habitation sites. The documents further suggest that the alignment of the parcels shown on the tax map delineates the shoreline of Nāwiliwili Bay before the construction of the harbor in the 20th century.

D. Līhu'e Plantation

The establishment of Līhu'e Plantation set a process in motion that would lead, in the 20th century, to the development of the modern Nāwiliwili Harbor facility.

In 1849, during the tenure of Governor Kanoa, H.A. Pierce visited Kaua'i and observed the fertility of the uplands around Nāwiliwili. He entered into a partnership with Judge W.L. Lee and Charles Bishop that evolved into the Līhu'e Plantation. The first land acquired

> was 1,870 acres in Hulēia (an old district name) which had originally been granted to Victoria Kamāmalu. Excluded from use were the governor's taro patches and small kuleana holdings. Also, Kamehameha III retained his rights for aina bipi (pasturage). Nāwiliwili Stream was the southern boundary of this large purchase (Damon, 1931: 413).

Added to this land, a small parcel fronting Nāwiliwili Bay was acquired to gain access to a shipping area.

In 1851 an additional 500 acres was incorporated into the plantation lands. In the same year, the plantation sold to the government four acres in Nāwiliwili for construction of a harbor and road.

Līhu'e Plantation continued to grow throughout the remainder of the 19th century, expanding both northward and southward. However, the lower portions of Nāwiliwili Valley were probably never planted in cane, being more suitable for wetland crops (although coffee trees were later planted in the drier portions of the valley floor).

In 1851, an additional 500 acres was added to the original purchase and in the same year the plantation sold four acres in Nāwiliwili to the government for construction of a harbor and road.

E. Taro and Rice Cultivation

The Mahele records indicate that taro continued to be cultivated in the Nāwiliwili Valley alluvial plain through the mid-19th century. However, later in that century, much of the taro lands in Nāwiliwili, as in other wetland regions of the Hawaiian Islands, were converted to rice cultivation. This shift was impelled by changes in the ethnic make-up of the islands' population and economic demands. Little is known of the rice industry in Nāwiliwili. However, an 1881 map of Nāwiliwili Bay shows the entire makai portion of Nāwiliwili Valley under rice cultivation. Early 20th century photographs in the Bishop Museum Archives show large rice terraces within the valley. Rice was also grown in the flatland makai of the pali of Kuhiau.

A remnant of taro cultivation continued in Nāwiliwili Valley well into the 20th century, as noted in E.S. Craighill Handy's account of 1935 which also mentions cotton and garden plots:

> For 3 miles inland from the sea the Nāwiliwili River twists(wiliwili) through a flat valley bottom which was formerly all in terraces. Inland, just above the bay, three Hawaiian taro planters cultivate wet taro in a few small terraces. Most of the land is in pasture. There are one small cotton plantation and several small garden plots. For about a half mile below and a half mile above the mill the valley is mostly filled with plantation camp and other structures, with many small clumps of bananas, some garden plots, a few old breadfruit trees. The old terrace area extended half a mile up into the small valley that opens out northwest just above the mill. Approximately the last mile of flat valley bottom, before the river bed becomes a narrow gulch, used to be in terraces but is now pasture and ranch land. (Handy and Handy, 1972: 67)

F. The Development of Nāwiliwili Harbor

The River and Harbor Act of March 2, 1919 authorized the construction of a modern harbor at Nāwiliwili. The selection of Nāwiliwili as Kaua'i's Federal harbor had been preceded by year's of debate between advocates of Hanapepe and Nāwiliwili for the harbor site. The specifications for the harbor included support from local government and business interests:

> Upon completion of a rubble-mound breakwater 2,450 feet long along the reef dividing the inner and outer harbors, the entrance channel would be dredged to a depth of 35 feet, a minimum width of 400 feet, and a length of 2,400 feet. Also included in the estimated cost of $1,086,000 was a harbor basin 35 feet deep, 1,025 feet wide, and averaging 2,000 feet in length. The same act provided an initial appropriation of $250,000 for construction of the harbor. Local interests were to assure eventual railroad connections between Nawiliwili and the southern part of the island 'in reasonable time,' while the Territory of Hawaii or the County of Kauai was to give the Secretary of War $200,000 toward the project. (von Hoften, 1970: 12)

The dredged material would be used as fill for the proposed wharf areas.

Construction of the breakwater, the initial phase of the harbor project, began in October 1921. By 1924, a total of 1,454 feet of breakwater had been set in place. However, dredging within the now semi-protected bay could not begin until the Territorial Legislature appropriated the $200,000 promised to the project. Action by the legislature was delayed when the sugar companies on west Kaua'i – continuing to press for Port Allen at Hanapepe as the island's major harbor facility – threatened to boycott the Nāwiliwili harbor after its completion. The Legislature finally approved it's share of the funding in 1925 and the breakwater was completed in March 1926. Development of the harbor continued apace as

> ...the Territory took over the Federal camp and equipment and began construction of a concrete wharf. As soon as the Government dredge A. Mackenzie finished [dredge work] at Hilo she began work at Nawiliwili in fiscal year 1929, and dredging was completed in July 1930. The official opening of the $1.3 million harbor on 12 July inaugurated an entrance channel 600 feet wide, 2,400 feet long, and 35 feet deep, a harbor basin 1,100 feet wide, 2,000 feet long, and 35 feet deep; and a rubblemound breakwater 2,150 feet long. (Ibid.: 18-19)

Construction of the wharf facilities continued throughout the 1930s.

Historic maps and photographs document Nāwiliwili Bay before and after the construction of the harbor. A USGS map of 1910 shows the original configuration of the shoreline at Nāwiliwili Bay before the construction of the harbor (Figure 3). That configuration is further documented in an aerial photograph taken on July 4, 1924 (Figure 4). The end of the newly constructed breakwater is visible in the left central portion of the photograph. Construction of the harbor facility on the north side of the bay has not yet begun. Just as indicated on the 1910 map, the contour of the northwest side of the bay (where the facilities will be built) follows more closely the base of the surrounding cliff.

A ca. 1930 aerial photograph shows how extensively the harbor facility is a man-made construct (Figure 5). Behind the constructed jetty, the harbor is fill land that has been imported into the bay, extending from the surrounding cliffside. At the time the photograph was taken, the filling-in for the harbor had not been completed. The area where the present pier facility is located is still open water.

A 1963 USGS map shows the harbor facility, three decades following its completion (Figure 6). When compared with the 1910 map, it reveals that the pier project area is located entirely upon a 20th century landfill construct.

Figure 3. 1910 USGS topographic map showing Nāwiliwili Bay

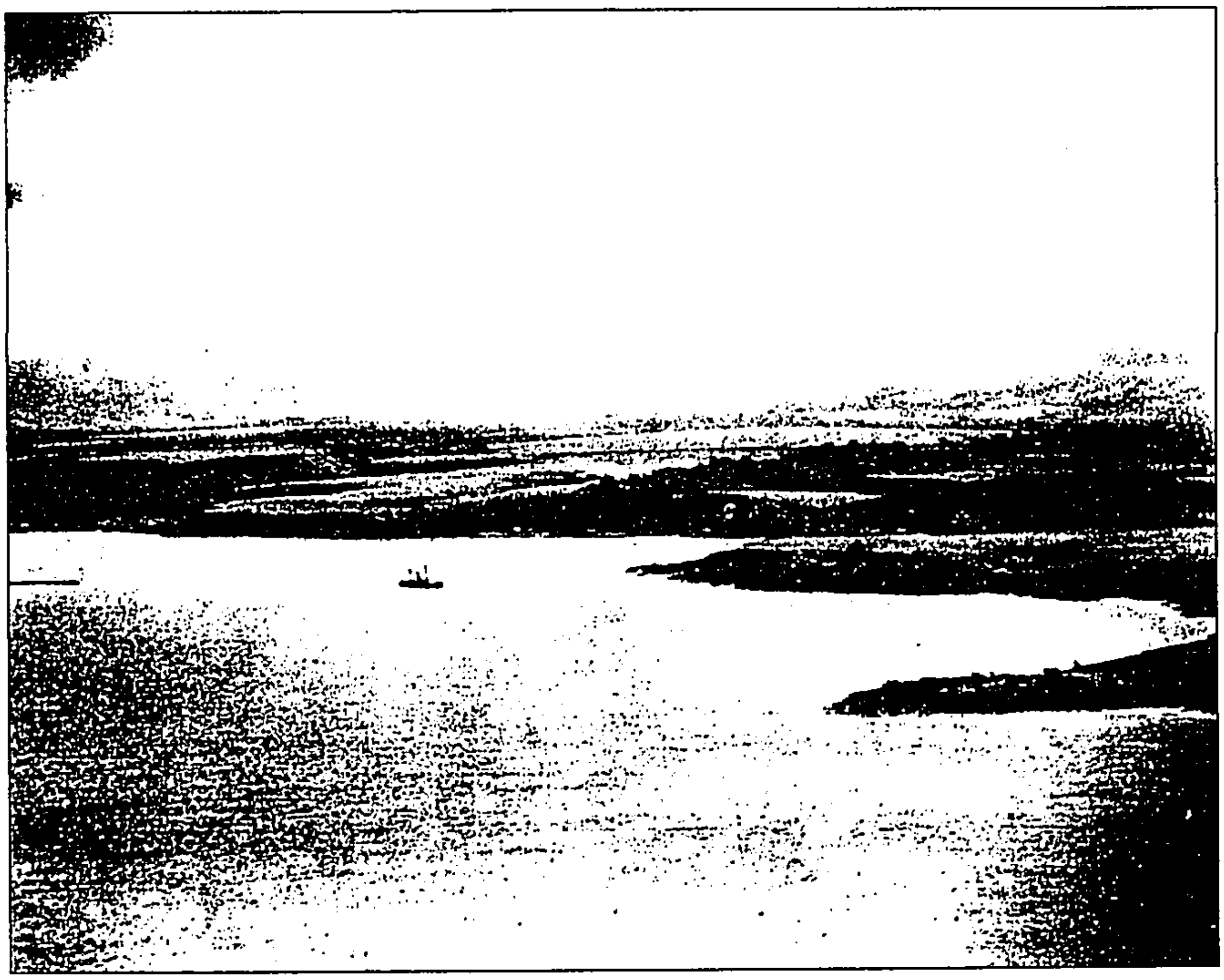

Figure 4. 1924 photograph showing Nāwiliwili Bay before construction of the harbor facility on the north side of the bay (Bishop Museum Archives)

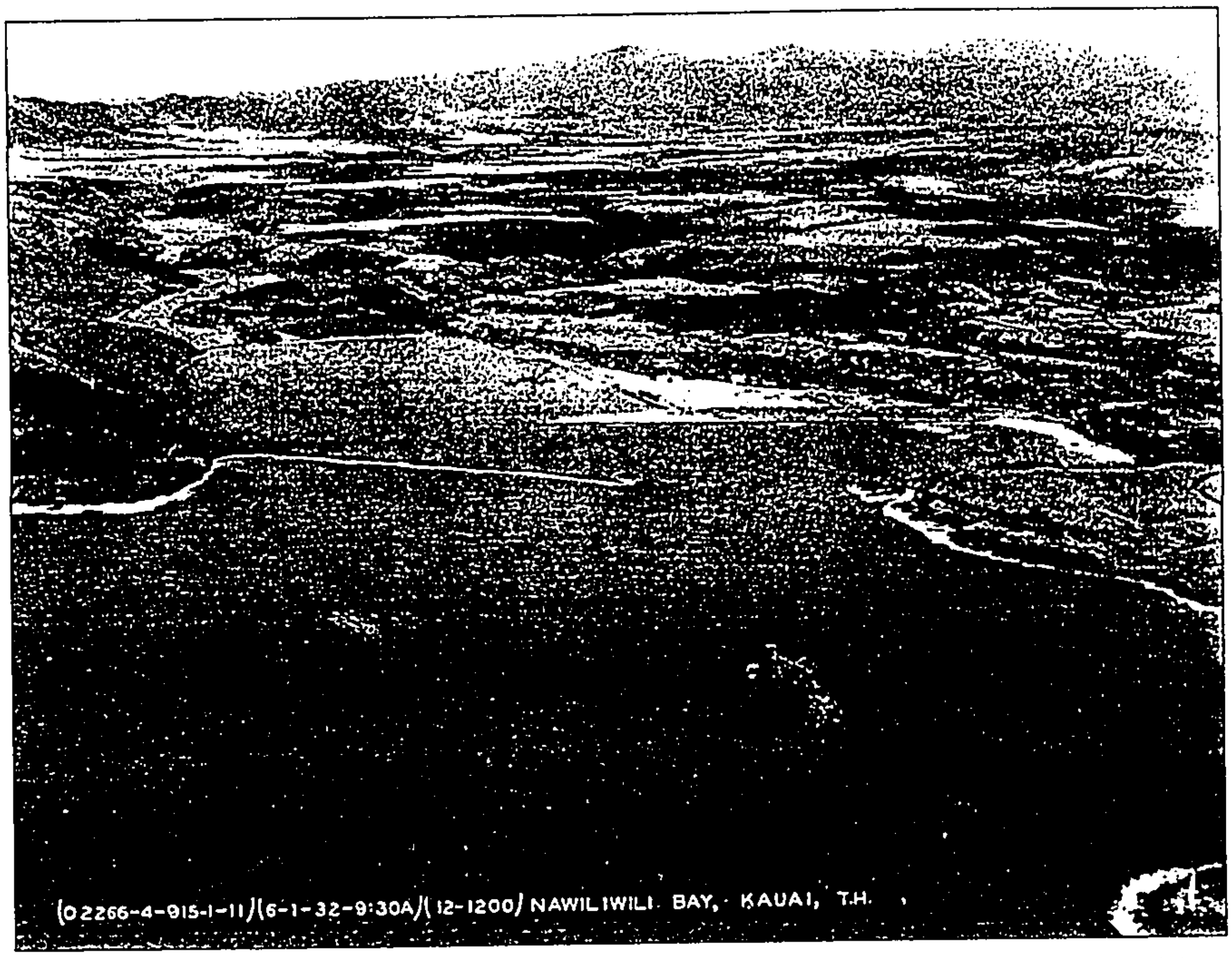

Figure 5. Ca. 1930 photograph showing Nāwiliwili Harbor under construction (Bishop Museum Archives)

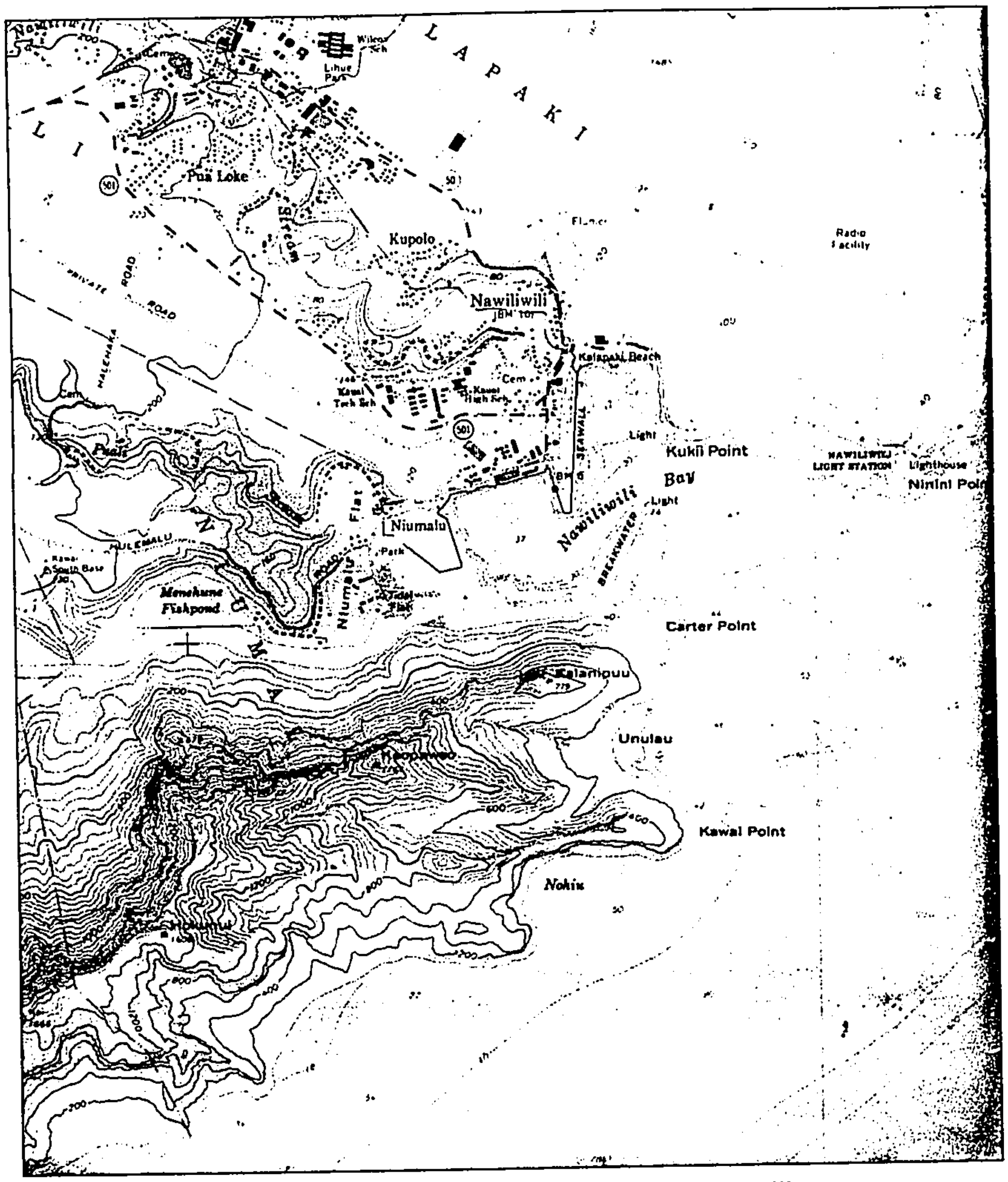

Figure 6. 1963 USGS map showing completed Nāwiliwili Harbor facility

III. HAWAIIAN SETTLEMENT AND TRADITIONAL CULTURAL PRACTICES IN NĀWILIWILI *AHUPUA'A* AND THE PROJECT AREA

Reviewing the information provided by the elements of this assessment – historical documentation, 19th-century land records, and archaeological research – there emerges a more detailed picture of the traditional landscape of Nāwiliwili *ahupua'a* and the current project area at Nāwiliwili Bay.

The narrow but fertile alluvial plain of Nāwiliwili valley was used almost exclusively for wetland taro cultivation with three to four *lo'i* per family. A small portion of the alluvial plain was reserved for *kula* (pasture land) that appear to have been an essential part of the management of the subsistence farming.

There were a few scattered habitation sites in the higher portions of the valley floor and along the lower slopes bordering the *lo'i* and *kula*. However, most of the habitation sites appear to be along the shoreline with a pattern of clustering in villages. This is a typical settlement pattern for Hawaiian valleys. The valley floor in Nāwiliwili narrows considerably *mauka* of the present alluvial plain to a width of a few hundred feet. The *lo'i* almost certainly continued upstream to occupy even small areas of level valley floor.

The establishment of an anchorage at Nāwiliwili, and of a Protestant Mission Station and the sugar plantation in Līhu'e all served to reinforce clustered settlement of the shoreline of the bay and of the upper reaches of the drainage at Līhu'e. The lower portion of the valley today is totally surrounded by urban Līhue residential tracts but survives as a remnant of the former Hawaiian cultural environment.

Based on the above documentation, traditional cultural practices and sites associated with Nāwiliwili Bay and the current project area would include, on shore, habitation sites, fishing camps with associated activity areas, canoe landing activities, and possible human interment in jaucus sand dunes; and, offshore, fishing.

IV. RESULTS OF COMMUNITY CONTACT PROCESS

Throughout the course of this assessment, an effort was made to contact and consult with representatives of cultural organizations and government agencies, and individuals who might have knowledge and/or concerns about traditional cultural resources, practices and beliefs specifically related to the Nāwiliwili Harbor project area.

Cultural Surveys Hawai'i solicited information – through formal interviews and extended e-mail communications – from four individuals – James Burgess, Robert Crowell, William Kikuchi, and Cheryl Lovell-Obatake – with knowledge of possible traditional cultural activities and historic/cultural sites in the vicinity of the Nāwiliwili Harbor pier project area. These individuals had been identified as having long-term personal and professional backgrounds in Nāwiliwili that might offer unique, knowledgeable perspectives. Additionally, informal contact was made via telephone conversations with four individuals – Roy Takatsuki, Raymond Chow, Lester Matsushima, and Pepe Trask – who are active in recreational fishing and canoeing focused at Nāwiliwili Bay.

A. Extended Interviews and E-mail Communication

1. James Burgess

Mr. James Burgess was born in Niumalu in 1924. He is a life-long Kaua'i resident and is a respected elder in the Royal Order of Kamehameha, Kaumuali'i Chapter. He spent his childhood in Niumalu/Nāwiliwili and has continued to visit and participate in activities in the area up to the present. Mr. Burgess (JB) was interviewed by Cultural Surveys Hawai'i (CSH) at the Niumalu Pavilion on October 11, 2001.

Mr. Burgess was shown the historic photos of the Nawiliwili bay and harbor (see Figures 4 & 5 above).

JB: When they were building this breakwater, they had a bridge going across here. This was the Niumalu River, the stream. We call it Niumalu River but it's actually a stream. Like I said they had a bridge going across here for transporting men and everything else to build this breakwater. I was born in June of 1924. We left here when I was about six years old. When we left Niumalu here and went to the west side. My dad got a job as a judge on the west side.

CSH: Where in Niumalu did you live?

JB: This road here. Maybe about a hundred yards in, there's a big green house over there. That's where us children were born in that house. Like I said, when I was five or six years old we moved to the west side. My dad got a job as a judge in Waimea. Then we came back here in 1938.

CSH: So you were about fourteen at the time you came back.

JB: Yeah. 1938 we came back here and at that time of course all of this was wide open ocean. Ocean all the way out to the piers now. But like I said I was very familiar with this area. And then we left here in 1942. I graduated from Kaua'i High School, which is right up here. This place is all different [now].

CSH: Maybe you can describe what it was like when you were growing up here. What did the people who were living here do in the bay? What kind of activities?

JB: Everybody fished. Hawaiians did a lot of fishing. I did a lot of throw net, trolling, and stuff like that. Like I said this was all open – just like paradise. And the development that has happened, in my growing up even, was fantastic. They had homes over here for the people that were working on the breakwater. Bungalows. They had quite a number of bungalows over here. Like I said, all this was wide open. Crabbing – samoan crab, white kūhonu crab. We did just about everything. And then of course there was the river. And the river: mullet was konohiki; they had konohiki on mullet. Life has changed drastically, in my mind – doesn't make it comfortable. You see so much progress, so many people coming in. They don't know what they're doing anyway. And of course governmental agencies attempt to make things better. But better or not – hard to say.

CSH: So when you noticed people using the bay, it was mostly for subsistence, to eat? Not for sport?

JB: Very little sport. Lot of it was for subsistence. Like we used to have – Mike Coney, who had the konohiki for the mullet. In fact he had konihiki in this area. They had hukilau nets. They used to hukilau here for akule. Make a surround and then put the nets on the boat, bring 'em down here. And then the people take out the fish from the nets. And then everybody gets share. Everybody that works gets share. Used to have turtles in the bay. We used to go out and harpoon turtle. You go out and catch one turtle. That's enough for the family. And share with the guys on the boat. So like I said my recollection of this area is all dreams now. [Laughs.]

CSH: In the 1930s, could you guess how big the population was down here? How many families?

JB: Well, there were quite a number of families because in this area you would be considering going toward the hill, in the valley. And then going up this side. Families, I would say a hundred, maybe little over a hundred families. And then you had families on this side too. And on this side maybe you had six or eight homes, on the right side, going down. Of course, now I don't know how many there are. But I would say better than a hundred, between a hundred and two hundred families in this particular area.

CSH: All Hawaiian?

JB: No. Chinese, Japanese, Filipino, Hawaiians. So not all Hawaiians.

CSH: When you were growing up in the '30s, there was just the original harbor construction [as shown in the 19** photograph]? With the breakwater here, the jetty on this side, the pier over here.

JB: They even had a factory, a fish factory. Right around the bend where the end of the – Commercial fishermen used to bring in fish and they would process it at that factory over there. Right at the bend over here. Shannon, the guy's name was

Shannon, if I remember correctly. Right close to the bank there was a fish factory. So commercial fishermen who had fished out in the ocean would bring in marlin and big fish would process it at that factory.

CSH: But in this area where you folks lived, it was all open? There was no development of the harbor?

JB: Oh, yeah. Nothing, no development. Like I say, only the bridge that came across here. Other than that, the fish factory was only in this area, and this is Kalapaki side.

CSH: Would other people from outside Niumalu come down here to go fishing –

JB: Oh, yeah. Like I said, this was a place that everybody came. From Kapa`a, from the west side. We had friends that used to come down here. And of course this was the pavilion all the time. This area. This pavilion – I think this concrete is the original. Of course with [Hurricane] Iniki and everything else, they've expanded. But people used to come down. In fact, we had built us an eighteen-foot long flat bottom boat. So people used to come down, camp. I had a motor that I used to take kids out, lay crab nets, go up the river.

CSH: Did many people have boats?

JB: Oh, yeah. You would find maybe about. – anchored out in this ocean – because from these trees out was wide open – you would find maybe like about nine, ten boats anchored out here. People would anchor their boat rather than take 'em home. I used to take my motor, carry 'em on my back, go back to the house. So that buggah no disappear.

CSH: So you folks came back to the same house?

JB: Yeah, we were born there. Then we left. Then we were fortunate enough to get the same house back again. So I used to walk up here to go to Kaua'i High School.

CSH: Is the house still there?

JB: The house is still there. Every so often I come down and take a ride, go up to the Menehune Fishpond. Even that Menehune Fishpond – I don't know if you've been up to see it yet. It takes this road and goes up on the hill. Not too far. And my recollection of those days, they had nothing on the wall. Now it's all mangrove and that's a project I think the state or somebody should try to look at and restore. Not necessarily all the rocks, but at least to clean it up to see what the value is. Beautify the place so people can understand what it's all about.

CSH: So we're up to the '40s.

JB: The war broke out in '41, December '41. In fact, that morning I was on my way out to go fishing.

CSH: You folks were living here then.

JB: Yeah, we were still living here. And then we left in 1942, after the war started. We had property up in Wailua Houselots where I live now. It was sad because the war broke out but it's one of the things that happens.

CSH: So that's when you moved away again, in '42?

JB: Yeah, in '42 we left here to go on our own property. Up to that point my parents were renting this house here. For four years we lived here. I went to Kaua'i High School. And then we left in '42. At that time I was working in the U.S. Army Engineers in Manā.

CSH: In the '40s, you still came back here occasionally?

JB: Oh, yes. In the '40s, yes.

CSH: Maybe we can take it by decades, the changes you've seen. In the '40s, say after '42, when you'd come down here was it still pretty much the same? Just the harbor out here [as shown in the ca. 1930 photograph]?

JB: Yeah, the harbor and then the pier. Yeah. Of course, the jetty in the '40s was built. The jetty was built. And they even had a nightclub over here on the jetty. They used to call it the "Jetty Club". The Ouye's put up a nightclub over here. Of course [the jetty] is all developed now. Had nothing over here except for the Jetty Club. And of course the pier. The pier was over here.

CSH: In the '40s you were still fishing and –

JB: Oh, yeah. I used to come down here, go throw net, go across the breakwater. You could walk across on a sandbar with your throw net. And of course we had a boat that we could bring down but – I live in Wailua, see. It was no sense to bring it from Wailua, to come down here. So I used to take my throw net and my fish bag and walk across. I got to learn all the spots where the fish used to come.

CSH: Were there still a lot of regular people fishing? The same people you'd see every time you'd come down.

JB: Yeah, because the local people that still lived here – There was a Chinese family, the Chows. One of the boys just passed away recently. But they lived up in the valley. Like I said, for food. A big family – the Chows must have had about eight or nine children. And of course offspring after that comes.

CSH: So we're still talking about people coming for subsistence fishing, netting?

JB: Yes. Those days, whatever fish we could catch, you didn't have to go buy.

CSH: So basically in the '40s it was still pretty much like what you remember from the '30s. Let's try to figure out when you started feeling something was different. Were the fish still plentiful?

JB: Plenty. And this big open space. Now not too much space because everything is all built in: the boat harbor, the development over there. I guess the development was necessary due to the transporting or bringing in of equipment and material.

CSH: You're talking about the development of the harbor?

JB: Yeah. But this used to be like paradise. There were times in the late '40s, early '50s that I used to transport my boat down here and then go out and cast, go trolling. All the way to Kalapaki, around this bend. Times that I'll never forget and I only can dream about here now.

CSH: What about in the '50s, '60s? Any changes?

JB: Yeah, it started to develop. They added a pier. Used to be only one pier – to take inter-island barges that came in. And the boats: the Hualalai, the Waialeale, inter-island boats.

CSH: That was the original use of the harbor, for the inter-island –

JB: Yeah, the inter-island barges and the inter-island transportation.

CSH: So back in the '50s, '60s, fishing was still okay?

JB: Oh, yeah. As I can recollect up to the '60s the fishing in this area was still good. I still used to go, like I say, surround net for akule in the harbor, in the harbor. In this area over here. In fact, sometimes in this area down here. There used to be a guy that used to go up on that mountain. He went daily. In the '30s, the '40s. This old man that lived down here, George Kanehiwa. He used to climb this mountain daily to go spot fish. I'd be in school and when he spotted fish I used to run home, come down home, take off. [Laughs.] In the '40s. Because I graduated high school in 1942. The war came in '41 and I graduated in '42. He'd climb up the mountain and when he spotted the fish and if they were in the right area, then he would – He had one red flag that he would raise up. The guys on the boat they would watch him and he'd direct them with the flag. Just like paradise. Then later on they started to use the planes. Progress.

CSH: At that time, there was no canoeing yet?

JB: Canoeing started in the early '50s. In fact, I belong to an organization, the Royal Order of Kamehameha – Up to that point I don't recollect any local canoes, Hawaiian canoes. You're talking about the Hawaiian canoe, right? I don't remember any of those till – Our organization, we were fortunate enough to get two canoes from O'ahu. I can't recollect who it was from, right now. But we brought in these two canoes and we had to refurbish them. Because they all were in a state of disrepair.

CSH: Those were koa canoes? Not fiberglass?

JB: No, not fiberglass. That was the original koa, six-man canoes. So we brought 'em over here.

CSH: Do you remember what year that was?

JB: That was in 1952 or '53. After we brought these canoes in, we used to train from over here. After we refurbished them we used to train over here. That's how started the Kaua'i Canoe Club. At that time, I don't recollect anybody else that had canoes. So we used to used share with people that were interested in canoeing. And that was a process to get members into our organization, too.

CSH: On all the island this was the only place –

JB: That I know of on Kaua'i. I don't know about the other islands but on Kaua'i that was the beginning of the Kaua'i Canoe Association. And then the other groups started to develop, start making their own canoes.

CSH: Did you work on the canoes or did you paddle?

JB: I paddled. I refurbished. I paddled, trained. In this area, Niumalu-Nāwiliwili. And then, from my recollection, there were other canoes that were located and brought in to the island by different organizations.

CSH: But you folks were the first –

JB: The first, as far as I can recollect.

CSH: What was it like, paddling out here?

JB: Hard work. [Laughs}

CSH: We're getting closer to present time – the '70s, '80s, and '90s. Can you summarize your feelings about how the harbor has changed the way people do things like fishing.

JB: I believe that the build-up in Nāwiliwili, Niumalu has gone to more commercial than anything else. We never had people living on the boats. If they came in with a boat, they would park their boat and come on land with their tents. So the whole life system is different. In my personal opinion, it's a big waste.

CSH: How about the people living here? Has that changed?

JB: I don't know. All I can tell you is that those people that knew each other a long time ago, they don't forget. But the opportunity, I guess, to go out and see old friends – And with the amount of traffic that we have on the island today – The traffic on the island is terrible. There's so much roadwork, construction that's going on. Everything that is being done today [at Nāwiliwili/Niumalu], it looks like its for people to associate in some kind sport or picnicking.

CSH: Based on what I've described of the pier project, any final thoughts on the project's impact to cultural practices in the harbor area?

JB: Well, my personal comment would be that I don't think that it would have any kind of cultural impact. It's the same like extending this industrial development that they have done here, expanding the area for commercial activity. So I cannot definitely say that I would consider what is being planned here to [accommodate] another boat there other than that you're just going to get more people coming, more often. But what do you do? What industry do we have that can sustain the economy of the island? I hate to see it develop any more than we can handle but how do you stop it? You cannot even stop immigrants from coming into the islands. Or into the United States. Live and let live. [Laughs.] So I cannot say any adverse conditions on extending the pier so they can put in another boat. Maybe one of these days they gonna line up four or five, you know.

CSH: Do you think it's already been changed so much that you cannot go back –

JB: You cannot go back. Yeah. They cannot – It never happen that they could restore the area to a comfortable situation. Because I'm sure like – even in the sailboats here – people are are living there. Why? Because they have their boat. They got free sewage system. Like us we build house, we gotta put sewage, yeah. [Laughs.] Sometimes, I used to go up this road here to see the fishpond. And there's one spot up there that can overlook this area. Sometimes I cry. But it's for people that need subsistence to work. More people that means – supposed to be more people spend money.

2. **Robert Crowell**

Mr. Robert Crowell has been the harbormaster at Nāwiliwili Harbor since 1994. Mr. Crowell (identified as RC in the transcript below) was interviewed by Cultural Surveys Hawai'i (CSH) at Nāwiliwili Harbor on October 11, 2001. Mr. Crowell began by discussing fishing practices inside at harbor and the impact of the terrorist attacks of September 11, 2001 on harbor security procedures.

RC: Basically, my take on this, when I first came up here, being from Honolulu, there's very limited fishing off of piers in Honolulu because of commercial activity. Here [at Nāwiliwili Harbor] because it was a lot slower we continued to let people fish on the piers. And that's the biggest thing I think.

CSH: So there's never been any restrictions until now [before the emergency measures put into place following the terrorist bombings of September 11, 2001]?

RC: No. The only restrictions we have is because, in the early '90s, we fenced off the whole compound, the whole harbors division area of the property. So, basically, people can only come in through walk-through gates. There's no vehicular traffic allowed on the piers after hours. So there are a number of fishermen that were still doing that, prior to September 11th. They would come, bring their baskets, roll them on in, and then go fishing. For halalū, menpachi or whatever they had. Like I said, when I came on board I continued the practice. I didn't have any objections to that practice. And we still allow people to fish off of the jetty road, our interior seawall out here which is on harbors division property. They still go fishing there. We also still allow commercial net fishing within the harbor. We never did have a ban on that. And in recent days, recent years I should say, there has been a conflict between recreational and commercial fishermen. The akule fishermen, especially. I think the Department of Land and Natural Resources, the aquatics division, is taking an active step towards trying to resolve the conflict there. Other than that, we still allow canoe races to happen within the harbor. There again they enter the harbor through the area at the end of our jetty here. They jump in their canoes there and use the harbor as their racing grounds. I think they have a six-lane quarter-mile course that they use.

CSH: Are they allowed also to practice inside of the harbor.

RC: They would be allowed to practice. However we don't have that many that do. Our only rule is to stay out of commercial traffic. And that also goes for commercial, recreational fishing. Commercial fishermen, canoeing, kayaking, sailing. If you're going to do it in the harbor, just stay out of the commercial traffic way. Because they'll lose that battle every time. And it's basically for their safety so it would behoove them to stand clear of the commercial traffic. And I must say, on this island, I don't have any complaints with anyone. For the most part, they have stayed out of the way. I think at any time that we had a problem, if we had a problem, it was probably not a local. It was probably a stray from the hotel. That was in a kayak that was in the way of a ship. She gotta blow her horns and – But I don't recall but one complaint in the time I've been here, since '94, of any traffic crossing commercial traffic.

CSH: So, as far as something that we'd identify as traditional Hawaiian activity, besides canoeing and fishing, have you noticed anything else going on in the harbor that might relate to that kind of traditional practice?

RC: Not really. That's about it. As I say, we have fenced off the area where we work containers, where we have developed container yards, where we've developed a cruise terminal. So people don't have that kind of ready access to the area. Whether they would want [access] to this huge – acre of concrete – I'm not sure. But they don't have readily available access to our pier areas.

CSH: So the fishing: is it restricted to shoreline fishing or are people allowed to fish from small boats in the harbor?

RC: People can fish from boats. It's not restricted to the shoreline:

CSH: Would you guess at the number of fishing people who might be considered regulars.

RC: I understand there are [regulars]. Who they are I'm not sure. My guy who does know who they are isn't here today. He's on vacation. I know he has a contact – or someone contacts him all of the time to ask about the fishing. And once he gives the word to this one individual, usually everybody who's out there knows. I think it has impacted them since we have locked the pedestrian gates because of September 11th. But, this island being the way they are, they're very understanding as to what the reasons were and the reasons why we have restricted the access. We have opened up the jetty road, where at one point in time we had it locked down. So I think they're grateful for that, that they're able to go down there. Still can fish down there.

CSH: Without estimating the number of people, since '94, you do see certain regulars [fishing in the harbor]?

RC: Right. I couldn't give you a number off-hand.

CSH: Now, you know the extent of this [renovation] project. Do you have any thoughts on the impact that project might have on any of these activities – canoeing, fishing. Do you see any direct or indirect impact on either of those?

RC: The canoeing side, no. I don't see that being impacted because, basically, they stay water-borne. They don't come from land side. And the area that we're looking at as expanding doesn't really get into their lanes or the area that they have used in the past. Fishing, I'm not sure. If ever lift the security threat that we're in and allow fishing once again, I'm not sure how many people would be impacted. Because along that area where we're looking at expanding, we do have some people, a handful of regulars, that do out to the dock in the corner. That like to just do some pole fishing. Some recreational stuff. But the majority of the people fish off of Pier 2 presently where it doesn't look like we'll be touching, as far as this project. We do have some guys that do whip along that area of the proposed expansion but how it will affect them, I'm not really sure. I don't know how it would affect the fishing grounds. But I think if we still do allow them back in and fish, I'm not sure if they will be impacted because the areas will still be there. Where they can still whip off of, after the project is completed. I don't think it impacts that many people.

CSH: Just as a side note, because of this emergency, a lot of things are up in the air in terms of future decisions about public access to the harbor area?

RC: That's correct. The Coast Guard tells us that the threat level that we're in will be around for a while. And a lot of these changes may be permanent. It won't go back.

CSH: So, irrespective of this project, there might be changes anyway [regarding public access and activities within the harbor]?

RC: Correct.

CSH: To summarize, you've been here since '94?

RC: Yes.

CSH: Has it been basically a good relationship between the local community and the harbors division?

RC: I think so. I think this community is very understanding. They've understood reasons why we've had to close down areas. They understand why we've had to expand.

CSH: Have you had any complaints expressed to you? Or concerns expressed to you by any of the local folks?

RC: Very minor-type complaints. Like: "Can you open the bathrooms at night because we fish at night?" And: "Us men don't need it but we're thinking about the women out there." And stuff like that. And we accommodate. Like I said, the people here are very understanding. They're very concerned about areas. And the fishermen in general, the regulars as we would call them, are very conscientious. I don't have people trashing our place. They use the facility. We leave the bathrooms open for them. They treat it with respect and don't abuse. I don't have any problems with them on the pier. And I don't think they have – Other than because we locked it – they don't like that idea, I'm sure. But they understand. I don't get a call everyday, kind of thing.

CSH: Would you discuss the conflict between the commercial and recreational akule fishermen?

RC: It has to do with commercial akule fishermen who are netters, who net the schools of akule versus the recreational akule fishermen off of boats that basically hand-line or pole fish for the akule. And the conflict is that on occasion the commercial fishermen would come in to a harbor area, a calm area, where there may be a school of akule and the recreational guys who are in smaller boats would be over there fishing the akule. And then once they depart, the school is still there but the commercial guys will come in and surround, net up all of that akule and now the recreational guys no longer have that school to work off of. So I think [the aquatics division] is in the process, like I said, of trying to resolve that conflict. And drawing areas or boundaries where, limits where commercial can come only so far and surround only so much in, I guess, a calm area. Versus where the recreational guys can fish within that boundary for the school. I don't know how often it happens because the complaints don't come to me. Very rarely the complaints were coming to me. There would be a couple of complaints about the commercial guys coming in and wiping out a school. But I had no jurisdiction over that because they weren't really abusing or disobeying our laws, our rules. The commercial guys, if they came in, if they did surround akule schools it would be on the off-hours, anyway, and didn't impede commercial traffic.

CSH: Do you know how long this conflict has been going on?

RC: I imagine it was going on probably even before I came.

CSH: So all the time you've been here it's been a problem?

RC: Yes. But you see even that hasn't been that great where anybody has really done anything about it. I guess there is this abundance of akule on this island so I guess everybody felt that there was enough. It's not only within Nāwiliwili Harbor either. The problem lies at Hanamaulu Bay, Port Allen, Hanapēpē Bay. I think even in Hanalei there's the same problem. So I think it's come to a head in recent years because some guys have taken it to their legislators.

CSH: Do you think this harbor project will have any impact on that situation?

RC: No. As a matter of fact, I don't know how aquatics has drawn their line but I think the harbor expansion is out of the area that they're concerned about.

[Mr. Crowell was asked to comment on previous harbor expansion projects during his tenure as harbormaster.]

RC: Actually, Pier 3 opened in late '94. And that sits on the far end. And that's where Young Brothers operates off of now. And then what we did – There wasn't really any more expansion. What we did was demolish Pier 1 and cut down our pier shed that was on Pier 1 that was formerly Young Brothers. And we rebuilt that pier. So, basically, Nāwiliwili is pretty much ahead of its time right now. We have two brand-new piers, as far as pier strength. We have a lot of working area, working cargo area. Expanding Pier 2 would enable us to use the area – more of an area for passenger ships. So, like I said, '94 was the opening of the Pier 3 area where Young Brothers is. And then it took us a couple of years and Pier 1 was redeveloped.

CSH: And, as best you remember, at those times were there any concerns raised about the impact on traditional practices?

RC: As far as I can remember, no. None at all.

3. **William Kikuchi**

Dr. William Kikuchi, who died in 2003, was for many years a professor of archaeology at Kaua`i Community College until his retirement in 2000. He was a leading expert on Hawaiian fishponds. William Kikuchi (WK) was interviewed by Cultural Surveys Hawai`i (CSH) by telephone on December 11, 2001.

CSH: Would you discuss where information on traditional Hawaiian culture and cultural practices in the Nāwiliwili/Niumalu area can be found?

WK: ...Material that was published, especially the Kaua'i Historical Society material about the stories of Niumalu and all that. Another place you can get some stuff on that is the environmental impact statement about the Nāwiliwili Community Association or the Niumalu Community Association, when they were working on trying to evict those people. That was a big long study, and, in that, I thought a lot of stuff came out because where [the Nāwiliwili pier] expansion is going to be, that area, as far as I know, was all swamp. And the most interesting site, I thought was Niumalu, that area, because of these stories. And if you go west, there are a whole bunch of fishponds, and they're still there, I think. But that's out of your area.

CSH: Our research indicates that the pier area is landfill created in the 1920s and 1930s.

WK: That's right. I wasn't too concerned because it was all filled up. And they had to tear down that side of the mountain. That's where they had that interesting rock formation and fill that for the harbor. And the only other one that I was concerned for was Papalinahoa. So, everything else I know of that area was simply – not through archaeological stuff – because when we came it was fill so all we did was cursory historical, cultural things like that.

CSH: When you say "when we came" what year was that?

WK: 1972. We kind of got involved with the Nāwiliwili Community Association or the Niumalu one. And if you take material from that – I don't think it was published in any kind of form. But that was interesting because they would bring out roughly the same kinds of concerns I think you're going to receive up there [for the pier renovation project]. But your area may be easier because it's all filled in.

CSH: What Hawaiian cultural practices have you observed taking place in Nāwiliwili Harbor over the years?

WK: Just fishing and the canoes. Canoe landing. That's about all I've ever observed.

CSH: What impact do you think the pier [renovation] project will have on these practices?

WK: Well, I think most of it has gone into the river now. It looks like it went into Huleia River. So I don't think the expansion will have too much of an impact.

CSH: Are there any important cultural sites that you know of in the harbor that would be affected by the project?

WK: No. I wish I did. I wish I had information but, like I said, all the stuff I saw was actually in Kalapaki Bay. And the rest of the stuff was on land.

CSH: Are there any other cultural concerns that you would have about the pier project?

WK: I think just that it be sensitive to the people involved. Access, improve the water quality. Fishing off the pier.

CSH: Thank you.

4. **Cheryl Lovell-Obatake**

Ms. Cheryl Lovell-Obatake is a Hawaiian cultural specialist and community activist. Cultural Surveys Hawai'i prepared a list of questions for Ms. Lovell-Obatake and she kindly responded by e-mail on October 14, 2001.

Ms. Lovell-Obatake was asked to describe her background in Nāwiliwili and Niumalu:

> I was born in the Kona District, Waimea, Kaua'i, which is where my mother is from. I was raised in Kalapaki, Nawiliwili and Niumalu, which is where my father is from. My paternal grandfather (Lovell) was born 1893 and raised in Nawiliwili his entire life. His father was also born (1861) and raised in Nawiliwili. My 3rd great-grandparents were also raised in Nawiliwili.
>
> My ohana are one of the few Hawaiians that still retain possession of kuleana lands (L.C.A.) in Nawiliwili, Niumalu & Kalapaki. My ohana were known fishermen and surfers.
>
> I was the community monitor for Nawiliwili Cemetery (presently known as Kalapaki Memorial Gardens which Cultural Survey of Hawaii was hired for archaeological testing and disinterment and re-interment of na iwi kupuna around 1989, 1990s or so...
>
> Who am I? What am I? I am the hawk in the community...How old am I? Only 47.
>
> I did a lot of fishing in my younger days until I left to college in 1972. My father, my mother, my uncle taught me how to fish.
>
> My uncle & I often visited the pohaku site which Papalinahoa Stream discharges under pier 2 at the harbor. There is a pohaku which the moi would rub their belly or feed on certain nutrients during certain seasons. Besides moi, ahole hole, palani, papio, oama, weke, menpachi, aweo weo, akule, halalu were caught by pole fishing under and off the pier.

> Although there exists the name of a fish (mo'i), a fish eaten by royalty, there is another Mo'i (kahuna), name of a kahuna and yet a ranking individual (mo'i) that had certain responsibilities to fulfill in the area, such for the villagers and royalties of ancient times. This pohaku could well be a selected place where rituals took place (Makahiki) as I was told. There are twin reefs that extend from the County park @ Nawiliwili to Union 76. That was all filled in. The reef was a natural habitat area for marine life, such as fish, shellfish, octopus, sharks, turtles etc. 1860-1890's, I was told that a woman from the area fed the sharks along the shorelines going to Niumalu. There also was a ancient heiau site near by the sugar bulk, above or below? Although destroyed, or leveled, the site is considered sacred. The sacredness [of the] spot was determined by elements in the sky. (stars, moon, etc.)
>
> Kuhiau heiau the largest on the island is about four acres [and] is located @ Kauai High School (puuhonua type). Paukini is located on the reef @ Kalapaki by the seawall. She is the sister rock of Kuhiau heiau. Another rock located in the middle of Kalapaki Beach is Mokuweo. This is another ancient site which there existed another kahuna that fed the fish and the sharks. There were plenty fish in the area. My grandmother (born 4/12/1892) told me of her experiences catching a fish with her holumu (long dress). The story is written in Ainakumuwai "You Like Fish?"

Ms. Lovell-Obatake was as asked to describe Hawaiian cultural practices that she had observed taking place in Nāwiliwili Bay over the years:

> Fishing still exists in Nawiliwili. Shoreline fishing (on the pier) by the jetty, across the breakwater, Niumalu (small boat harbor), etc. Also net fishing (surround). DLNR, State politicians are presently reviewing a HB restricting certain areas for (surround) net fishing. There has been no resolution thus far and no bill was passed.
>
> As I recall the County (Keith Nitta) who attended the 2025 Harbor Master Plan informational meetings indicated that the County along with the State are considering closing the bottom road (near pier 2) which may also eliminate fishing access to the pier and along that area where people fish.
>
> I am concerned about Native Hawaiian Fishing Rights. PASH Kohanaiki Supreme Court Ruling. Check with Davianna McGregor, Jon Matsuoka, Luciano Minerbi who were assigned by State Office of Planning to implement the law.

Ms. Lovell-Obatake was asked to comment on the impact of the pier project on Hawaiian cultural practices:

> The State system has in the past inadvertently over expanded on the submerged lands that exist. Proper control was overlooked, therefore cultural practitioners and other ethnic origins have a small wiggle area to fish at Nawiliwili. Many of us have our own favorite spots to fish. Pier 2 is one shared by many for fishing.
>
> I have witnessed (observed) more modern commercial economic practices encroaching on cultural practices. Politics!

Ms. Lovell-Obatake was asked if she knew of any important cultural sites in the harbor that would be affected by the pier project. She was also asked if there were other cultural concerns she had in regard to the project. Ms. Lovell-Obatake declined to respond to these questions. She explained:

Within the perimeters of the project? Its tax map key and boundaries? I have a hard time staying within boundaries. Cultural sites (wahi pana) have connections. If I were to comment on another cultural site nearby, not within the boundaries of this project I would be irrelevant in the eyes and ears of the accepting authority. You have not provided me with a map TMK of where you are specifically covering.

B. Informal Contacts

1. Roy Takatsuki, Kapa`a resident and fisherman

Roy Takatsuki was contacted by telephone on March 9, 2004. He owns a trailered boat and often launches from Nāwiliwili. He did not know of any cultural resources, practices, and beliefs that would be affected by the pier renovation project. Mr. Takatsuki did not see the project as creating any problems. He thinks it's a good idea that will allow additional boats into the harbor.

2. Raymond Chow, fisherman

Raymond Chow was contacted by telephone on March 9, 2004. He owns a boat which is currently docked at Nāwiliwili Harbor. He did not know of any cultural resources, practices, and beliefs that would be affected by the pier renovation project.

3. Lester Matsushima, Hanamalu resident and fisherman

Lester Mastsushima was contacted by telephone on March 10, 2004. He owns a trailered boat and launches at Nāwiliwili. He also spends a lot a time at the harbor with other fisherman. He has no concerns regarding the new work being done at the harbor.

4. Pepe Trask, Kaiola Canoe Club

Pepe Trask has been with Kaiola Canoe Club for ten years. He believes the pier renovation project would have a negative impact on the canoe culture. He believes the pier renovation will affect canoe training and races between different canoe clubs that are held every week. The impact will be the increased in the number and size of ships, and the turbulence they will cause.

V. SUMMARY OF FINDINGS

The historic documentation reviewed in this study indicates that, in pre-contact Hawaiian times, the physical landscape of Nāwiliwili ahupua'a – especially in its broader *makai* lands – provided an ideal location for the cultivation of wetland taro. Nāwiliwili Stream, which provided water for the *lo'i* emptied into Nāwiliwili Bay, which provided an ideal canoe landing and fishing grounds. Heiau and other sacred sites identified in Nāwiliwili and the adjacent ahupua'a further indicate the significance of the area in Hawaiian culture.

Mahele documents record that taro lo'i and habitation sites continued to be present in the vicinity of the present harbor study area up to the mid-19th century. Taro cultivation diminished during the remainder of the 19th century as commercial agriculture – rice and sugar – increased within Nāwiliwili. The growth of Līhu'e Town and the sugar plantation further distorted traditional settlement patterns as people moved to these focuses of the developing economy.

At Nāwiliwili Bay itself, the economic forces impelled the construction of a modern harbor facility in the 1920s and 1930s. As documented in historic photographs and maps, the present Pier 3 project area comprises landfill that includes material dredged from the bay during the harbor's development in the 1920s.

As identified by the informants queried for this study, within the Nāwiliwili harbor, fishing and canoeing comprise the principal activities which continue traditional Hawaiian cultural practices into the present. Robert Crowell, the harbormaster at Nāwiliwili, indicated that the Pier 3 project is unlikely to affect the canoeing activities. Regarding fishing, Mr. Crowell noted that security issues following the terrorist attacks of September 11, 2001 may have a more long-term impact on public access – for fishing and other recreational activities – to the harbor facility, irrespective of the pier improvement project. However, concerns on the impact of the Pier 3 project to fishing and canoeing should be resolved through consultation and coordination with the local community.

Cheryl Lovell-Obatake stressed how rich the area is in mythology and legend, much of it focused on the abundance of fish and ritual practices related to Hawaiian fishing. Ms. Lovell-Obatake identified a culturally significant pohaku (stone) in the Pier 2 area:

> My uncle & I often visited the pohaku site which Papalinahoa Stream discharges under pier 2 at the harbor. There is a pohaku which the moi would rub their belly or feed on certain nutrients during certain seasons. Besides moi, ahole hole, palani, papio, oama, weke, menpachi, aweo weo, akule, halalu were caught by pole fishing under and off the pier.

Further investigation of the location and nature of this *pohaku* site may have to be undertaken to determine how it may be impacted by the Pier 3 project.

VI. REFERENCES

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Handy, E.S. Craighill and Elizabeth G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment,* Bishop Museum Bulletin 233. Honolulu.

van Hoften, Ellen
1970 *History of the Honolulu Engineer District 1905-1965.* U.S. Army Engineer District, Honolulu: Honolulu.

APPENDIX E
AIR QUALITY ASSESSEMENT
AND TRAFFIC STUDY

B.D. NEAL & ASSOCIATES
*Applied Meteorology * Air Quality * Computer Science*
P.O. BOX 1808 * KAILUA-KONA, HAWAII 96745 * TELEPHONE (808) 329-1627 * FAX (808) 331-8428
EMAIL: bdneal@kona.net

August 15, 2002

Mr. W. Y. Thompson, P.E.
98-1051 Kahapili Street
Aiea, Hawaii 96701

Subject: Nawiliwili Harbor Pier 2 Extension Project
Air Quality Impacts

Dear Bill:

In accordance with your request, we have reviewed the subject project with respect to potential air quality impacts. Potential issues include direct impacts on air quality from ship emissions and indirect impacts from project-related motor vehicle traffic on nearby roadways.

As you are obviously aware, the proposed project has been scaled back from its original plans. Originally, the proposed Pier 2 extension at Nawiliwili Harbor was expected to increase the number and size of ships visiting the harbor. Now, since the project has been reduced in scope, it is expected that the proposed new facilities will not increase the size or number of ships using the facilities.

A traffic assessment prepared for the revised project indicates that ship-related motor vehicle traffic on nearby roadways during peak traffic hours is minimal. Further, it is anticipated that this will not change in the foreseeable future, with or without the proposed project. Therefore, any project-related air quality impacts due to motor vehicle traffic on nearby roadways should be nil.

While it is conceivable that there may be some existing as well as future impacts on air quality from ship emissions at Nawiliwili Harbor, if the proposed project will not affect the volume of ship traffic or the size of ships visiting the facility, then the project will have no impact on air quality.

After reviewing the proposed project, it has been concluded that the project will have virtually no impacts on air quality.

Please contact me if you have any questions concerning the potential air quality impacts of this project and the conclusions stated herein.

Very truly yours,

Barry D. Neal

Barry D. Neal
Certified Consulting
Meteorologist

Julian Ng, Incorporated
Transportation Engineering Consultant
P. O. Box 816
Kaneohe, Hawaii 96744-0816

phone: (808) 236-4325
fax: (808) 235-8869
email: jngpc@lava.net

May 17, 2002 DRAFT

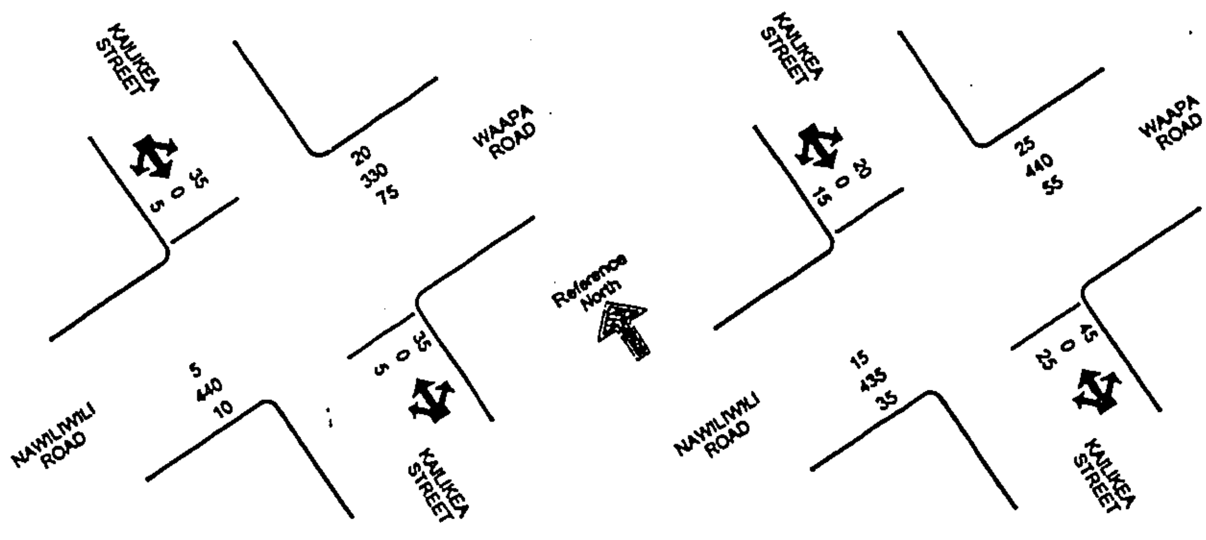
Mr. Corey H. Kogasaka, P.E.
Okahara & Associates, Inc.
677 Ala Moana Boulevard, Suite 703
Honolulu, Hawaii 96813

Subject: Analysis of Peak Hour Conditions at Intersection of
Nawiliwili Road, Waapa Road, and Kailikea Street
Nawailili, Kauai, Hawaii

Dear Mr. Kogasaka:

The traffic counts taken by the State Highways Division in 2001 at Station 5-BB were used to develop traffic estimates that were used in intersection analyses for existing and future (2022) weekday peak hours at the intersection of Nawiliwili Road, Waapa Road, and Kailikea Street at Nawiliwili, Kauai. Traffic counts at the nearby intersection of Nawiliwili Road and Wilcox Road (Station 5-C) are incomplete and traffic assignments at that intersection were not done.

The counts included only approach and departure volumes for each leg of the intersection, recorded in 15-minute intervals. From this data, we have made the following estimates of the AM Peak Hour and a PM Peak Hour volumes in year 2001:

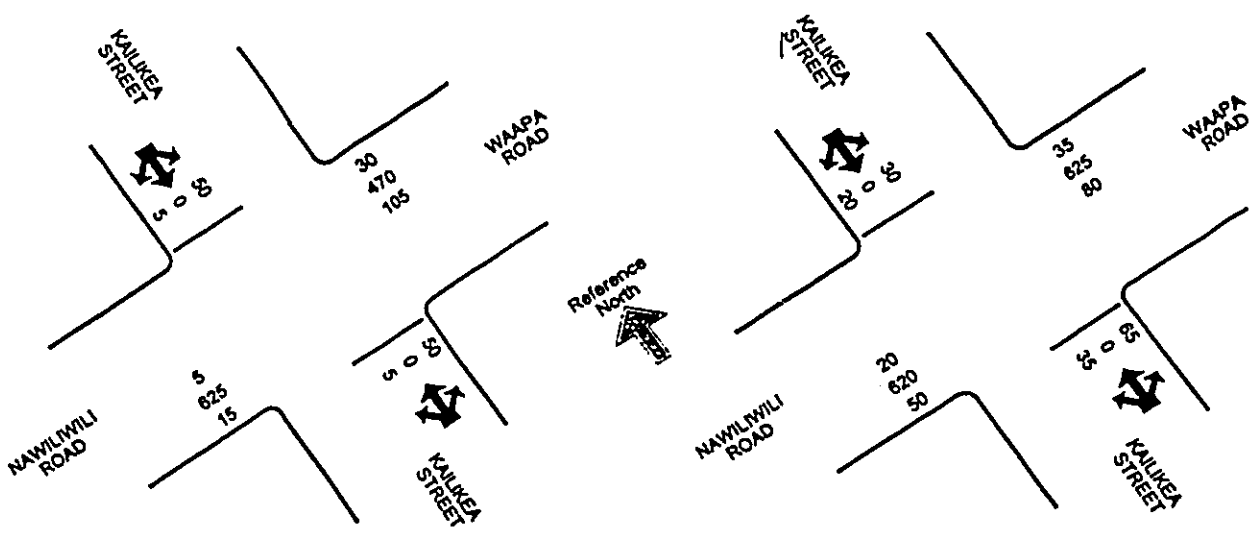


2001 AM Peak Hour

2001 PM Peak Hour

Mr. Corey H. Kogasaka, P.E.
May 17, 2002 DRAFT

The State Highways Division has estimated that the average daily traffic on Waapa Road east of the intersection was 10,210 vehicles per day in 1991 and 11,657 vehicles per day in 1999. This increase averaged 1.67% per year; using this growth rate over 21 years produced an increase of 42%. This 42% increase was applied to the year 2001 volumes to produce an estimate of year 2022 peak hour volumes:



2022 AM Peak Hour

2022 PM Peak Hour

Capacity analyses for the unsignalized intersection were done using the procedure described in the Highway Capacity Manual 2000. In this analyses, levels of service are identified based on computed delays for the controlled approaches at the unsignalized intersection (i.e. those that stop or yield to oncoming traffic). The results of the analyses are:

	AM Peak Hour		PM Peak Hour	
	Year 2001	Year 2022	Year 2001	Year 2022
Southbound approach (stopped)	26.8 D	96.9 F	24.0 C	74.9 F
Eastbound left turn (yield)	8.1 A	8.5 A	8.4 A	9.1 A
Westbound left turn (yield)	8.6 A	9.5 A	8.6 A	9.5 A
Northbound approach (stopped)	13.2 B	19.0 C	20.0 C	61.9 F

Despite the poor levels of service in the future, the peak hour volumes are less than the minimum volumes needed to satisfy the warrant (minimum requirements) for traffic signals. The analyses showed that the volume/capacity ratios of each controlled movement are:

	AM Peak Hour		PM Peak Hour	
	Year 2001	Year 2022	Year 2001	Year 2022
Southbound approach (stopped)	0.20	0.64	0.16	0.52
Eastbound left turn (yield)	0.00	0.01	0.01	0.02
Westbound left turn (yield)	0.07	0.12	0.05	0.09
Northbound approach (stopped)	0.09	0.19	0.23	0.65

While the delays to stopped traffic approaching on Kailikea Street may be long, the volumes will not exceed capacities of the intersection.

Copies of the capacity analyses are attached for your use. Should you have any questions, please contact me as noted above.

Sincerely,

JULIAN NG, INCORPORATED

Julian Ng, P.E., P.T.O.E.
President

Attachments (4 sheets of computations)

NAWILIWILI.DOC

Two-Way Stop Control

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JN	Intersection	
Agency/Co.	Julian Ng, Inc.	Jurisdiction	
Date Performed	5/16/02	Analysis Year	2001
Analysis Time Period	AM Peak Hour		

Project Description: Nawiliwili Harbor Pier 2 Extension
East/West Street: Nawiliwili Road/Waapa Road
North/South Street: Kailikea Street
Intersection Orientation: East-West
Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	5	440	10	75	330	20
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR	5	463	10	78	347	21
Percent Heavy Vehicles	5	--	--	5	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	5	0	35	35	0	5
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR	5	0	36	36	0	5
Percent Heavy Vehicles	5	5	5	5	5	5
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (vph)	5	78		41			41	
C (m) (vph)	1174	1073		478			206	
v/c	0.00	0.07		0.09			0.20	
95% queue length	0.01	0.23		0.28			0.72	
Control Delay	8.1	8.6		13.2			26.8	
LOS	A	A		B			D	
Approach Delay	--	--	13.2			26.8		
Approach LOS	--	--	B			D		

HCS2000™ Version 4.1b

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JN	Intersection	
Agency/Co.	Julian Ng, Inc.	Jurisdiction	
Date Performed	5/16/02	Analysis Year	2001
Analysis Time Period	PM Peak Hour		

Project Description Nawiliwili Harbor Pier 2 Extension
East/West Street: Nawiliwili Road/Waapa Road | North/South Street: Kailikea Street
Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	15	435	35	55	440	25
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR	15	457	36	57	463	26
Percent Heavy Vehicles	4	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	25	0	45	20	0	15
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR	26	0	47	21	0	15
Percent Heavy Vehicles	4	4	4	4	4	4
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (vph)	15	57		73			36	
C (m) (vph)	1064	1060		312			225	
v/c	0.01	0.05		0.23			0.16	
95% queue length	0.04	0.17		0.89			0.56	
Control Delay	8.4	8.6		20.0			24.0	
LOS	A	A		C			C	
Approach Delay	--	--	20.0			24.0		
Approach LOS	--	--	C			C		

HCS2000™ Version 4.1b

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JN	Intersection	
Agency/Co.	Julian Ng, Inc.	Jurisdiction	
Date Performed	5/16/02	Analysis Year	2022 (2001*1.42)
Analysis Time Period	AM Peak Hour		
Project Description	Nawiliwili Harbor Pier 2 Extension		
East/West Street:	Nawiliwili Road/Waapa Road	North/South Street:	Kailikea Street
Intersection Orientation:	East-West	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	7	625	14	107	469	28
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR	7	657	14	112	493	29
Percent Heavy Vehicles	5	--	--	5	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	
Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	7	0	50	50	0	7
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR	7	0	52	52	0	7
Percent Heavy Vehicles	5	5	5	5	5	5
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (vph)	7	112		59			59	
C (m) (vph)	1029	905		315			92	
v/c	0.01	0.12		0.19			0.64	
95% queue length	0.02	0.42		0.68			3.07	
Control Delay	8.5	9.5		19.0			96.9	
LOS	A	A		C			F	
Approach Delay	--	--	19.0			96.9		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	JN
Agency/Co.	Julian Ng, Inc.
Date Performed	5/16/02
Analysis Time Period	PM Peak Hour

Site Information

Intersection	
Jurisdiction	
Analysis Year	2022 (2001*1.42)

Project Description *Nawiliwili Harbor Pier 2 Extension*

East/West Street: *Nawiliwili Road/Waapa Road* — North/South Street: *Kailikea Street*

Intersection Orientation: *East-West* — Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	21	618	50	78	625	35
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR	22	650	52	82	657	36
Percent Heavy Vehicles	4	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	35	0	64	28	0	21
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Hourly Flow Rate, HFR	36	0	67	29	0	22
Percent Heavy Vehicles	4	4	4	4	4	4
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (vph)	22	82		103			51	
C (m) (vph)	893	886		159			99	
v/c	0.02	0.09		0.65			0.52	
95% queue length	0.08	0.31		3.63			2.30	
Control Delay	9.1	9.5		61.9			74.9	
LOS	A	A		F			F	
Approach Delay	--	--	61.9			74.9		
Approach LOS	--	--	F			F		

APPENDIX F
NOISE AND VIBRATION STUDY

Y. Ebisu & Associates
Acoustical and Electronic Engineers

1126 12th Ave., Room 305
Honolulu, Hawaii 96816
Ph. (808) 735-1634 – Fax (808) 732-0409
e-mail: ebisuyassoc@aol.com

YEA Job #39-055
November 7, 2003

W. Y. Thompson, P.E.
98-1051 Kahapili Street
Aiea, Hawaii 96701

Subject: Results of Noise/Vibration Study; Nawiliwili Pier 2 & 3 Extensions; Lihue, Kauai

Dear Mr. Thompson:

Purpose. The following letter report describes my predictions and evaluations regarding potential noise and vibration impacts resulting from dredging and pile driving operations during the Nawiliwili Harbor, Pier 2 and Pier 3 Extension work. Figure 1 depicts the relationships of the north and south work areas of the pier extension project site to the communities of Nawiliwili and Nuimalu which are closest to the project site. Work in the north work area will include dredging and pier construction to extend Pier 2 toward the west, and the addition of a Breasting Dolphin and walkway for Pier 3. Work in the south work area will include removal of a 50 foot section of existing pier and the extension of Pier 3 by 50 feet toward the south. Pile driving of pre-cast, reinforced concrete piles is expected to generate the highest noise and vibration levels during work in the north and south work areas shown in Figure 1. Pre-drilling will be required by the project specifications, and should reduce the number of blows required to drive a pile to refusal. But pre-drilling is not expected to significantly reduce the worst case noise or vibration levels of the pile driver, particularly during the final stages of hard driving at refusal.

Existing Background Ambient Noise Levels. Existing background ambient noise measurements were obtained during the morning of October 4, 2001 at five locations around the project site. The results of these measurements are depicted in histogram format in Figures 2 through 6 for Locations "A" through "E", respectively. The noise measurement locations are shown in Figure 1. In the histograms of measured ambient noise levels, the Lmax, Leq, and Lmin values represent the maximum, average, and minimum sound levels, respectively, which were recorded at the measurement location. The L50 and L10 values represent the statistical median (level exceeded fifty percent of the time), and the level exceeded ten percent of the time, respectively.

Measured background ambient noise levels were controlled by motor vehicle traffic, equipment within the Young Brothers Pier area, tour helicopters, jet aircraft departing Lihue Airport, birds, roosters, and mechanical equipment. In the areas removed from roadways, such as at Locations A, B, and E, background ambient noise levels were relatively low, and typically ranged between 43 and 68 dBA. In the areas near roadways, such as at Locations C and D, motor vehicle traffic noise controlled the background ambient noise levels, which typically ranged between 43 and 72 dBA.

Predicted Noise Levels During Dredging. Harbor dredging operations are expected to be performed by floating cranes operating in the north work area, and dredged materials may be transported by heavy trucks and earth moving equipment. Typical noise levels of these heavy equipment at a reference distance of 50 feet are shown in Figure 7. The floating crane dredges with proper mufflers can be relatively quiet at 75 to 88 dBA. The large earth moving equipment (trucks, front end loaders, etc.), which may be used to transport the dredged materials away from the harbor area, can range from 85 to 96 dBA.

Figure 8 can be used to estimate the range of noise levels during dredging operations at various distances from the dredge site in the north work area shown in Figure 1. The dredge site is located at 1,500 feet or more from the closest residence on shore, and approximately 1,000 feet from the Nawiliwili Small Boat Harbor. Noise from dredging operations are not expected to exceed 60 dBA at the closest residences and 65 dBA at the Small Boat Harbor. The predicted noise levels from dredging operations are comparable to the measured background ambient noise levels at Locations A, B, and C (see Figures 2, 3, and 4), and the noise from dredging operations at the closest residences to the project site should not cause adverse noise impacts.

Heavy dump trucks or haul trucks may transport the dredge materials from the harbor to inland areas along Wa`apa Road or Nawiliwili Road. The noise levels from heavy truck traffic will intermittently exceed 85 dBA at 50 feet from the roadways' centerlines. Figure 8 may also be used to estimate the maximum noise levels during a heavy truck passby event vs. CPA (closest-point-of-approach) distances between the heavy truck and the existing communities near the truck routes. Short term disturbances from heavy truck traffic may occur during the project's construction period, and are considered to be unavoidable.

Pile Driving Noise. Typical maximum (or Lmax) noise levels of impact pile drivers are expected to range between 98 dB at 100 feet distance to 78 dB at 1,000 feet distance. Typical median (L50, or noise level exceeded 50 percent of the time) noise levels during impact pile driving activities are expected to range between 93 dB at 100 feet distance to 71 dB at 1,000 feet distance.

The predicted outdoor noise levels during pile driving activities at various locations around the Nawiliwili Pier 2 and Pier 3 Extension work areas are shown in

Figures 9A and 9B for pile driving in the north and south work areas, respectively. Maximum noise levels in the residential areas toward Niumalu are expected to range between 72 and 79 dBA. Indoors, typical levels of pile driving noise within naturally ventilated and air conditioned structures are approximately 10 and 22 dBA less, respectively, than the outdoor levels shown in Figures 9A and 9B. Lower levels of 56 to 65 dBA are expected at Kauai High School and residences in Nawiliwili due to the shielding effects from the fuel tank farm and 80 foot high bluffs north of the pier and Wa`apa Road. The predicted noise levels from pile driving activities are moderately high at the Niumalu residences closest to the pier, and can interfere with sleep and speech communication. In the noise sensitive areas of Nawiliwili north of the pier, the predicted noise levels from pile driving are relatively low, and less than 70 dBA.

Mitigation of impact pile driving noise to inaudible levels will not be practical due to the intensity of the noise sources (98 dBA at 100 FT distance), and due to the exterior nature of the work. There are no noise limits placed on pile driving activities, except for the mandatory curfew periods shown in Figure 10. These curfew periods are administered by the State Department of Health (DOH) and are applicable on the island of Kauai under "Title 11, Administrative Rules, Chapter 46, Community Noise Control;" Hawaii State Department of Health; September 23, 1996. As indicated in Figure 10, noisy construction activities are not allowed on holidays or Sundays, during the early morning, and during the late evening periods under the DOH permit procedures.

It is recommended that the State advise the community of the probable period of pile driving activities prior to award of the contract due to the potentially disruptive nature of the work. Prior to scheduling of the pile driving work, a mutually acceptable work schedule should be arranged between the community and the Contractor. Because of the resorts within the area surrounding the project site, a later start time of 9:00 AM instead of 7:00 AM is recommended for pile driving activities. This later start time should be incorporated into the project specifications.

Vibration from Pile Driving. Induced ground vibrations from impact pile driving operations have the potential to cause architectural and structural damage to structures, and to create discomfort to those exposed to high levels of vibration.

Ground vibrations generated during pile driving operations are generally described in terms of peak particle (or ground) velocity in units of inches/second. The human being is very sensitive to ground vibrations, which are perceptible at relatively low particle velocities of 0.01 to 0.04 inches/second. Damage to structures, however, occurs at even higher levels of vibration as indicated in Table 1. The most commonly used damage criteria for structures is the 2.0 inches/second limit derived from work by the U.S. Bureau of Mines and a value of 0.5 inches/second used by Dames and Moore

(August 28, 1992 letter to Walter Leong & Associates). Use of the more conservative limits of 0.2 to 0.5 inches per second does not seem necessary on this project because of the lack of older, lightweight structures within 500 feet of the project work areas.

Based on measured vibration levels during pile driving operations under various soil conditions and at various distances, estimates of ground vibration levels vs. distance from the pile driver have been made for various soil conditions and for various energy ratings of the pile drivers. Figure 11, which was extracted from "Damage Effects of Pile Driving Vibration;" Highway Research Record, Number 155, may be used to predict vibration levels for the soil conditions indicated. When coral layers must be penetrated, vibration levels can be expected to be higher than those shown in Figure 11, particularly if the adjacent structures are supported by the common coral layer. Predrilling should eliminate this concern. From Figure 11, and for wet sand or clay soil conditions, the 2.0 inches/second vibration damage criteria will be exceeded at a scaled energy distance factor of approximately 7.0. The scaled energy distance factor is equal to the square root of the energy (in foot-pounds) per blow of the hammer divided by the distance (in feet) between the pile tip and the monitoring location. For a 30,000 foot-pound pile driver, a scaled energy distance of 7.0 equates to a separation distance of 25 feet. For a 50,000 foot-pound pile driver, a scaled energy distance of 7.0 equates to a separation distance of 32 feet. Figures 12A and 12B depict the predicted vibration levels from a 50,000 foot-pound pile driver operating in the north and south work areas, respectively. The predictions were made using the wet sand (worst case) curve of Figure 11, and are less than 0.2 inches per second in the Niumalu residential area.

Predictions of peak ground vibration levels vs. scaled energy distance factor from the driven pile are not precise, with initial uncertainty factor for a given location in the order of 10:1. For this reason, it is standard practice to employ seismograph monitoring of ground vibrations during pile driving operations with a 3-axis geophone or accelerometer. Since pile drivers of approximately 30,000 to 50,000 foot-pounds ratings will probably be specified for use on the job site, the initial vibration predictions indicate that there is relatively low risk of exceeding the 2.0 inches/second vibration damage criteria at the closest structures to the north and south work areas (see Figures 12A and 12B). Monitoring during the initial phase of pile driving operations may still be warranted because of the relatively large uncertainty factor when predicting vibration levels during pile driving. Monitoring alone, however, may not be a practical mitigation measure unless there are alternative pile driving methods or foundation plans which can be employed if the damage criteria is exceeded. Nevertheless, the following mitigation measures are recommended for implementation during the design and construction phases of the project:

- In addition to the normal planning and design concerns regarding potential damage due to settling and heaving during construction, consideration should also be given to risks of damage due to vibration from pile driving. A damage criteria of 2.0 inches/second is suggested in conjunction with the vibration prediction method of Figure 11 to identify the potential damage risk distances to the driven piles. Because of the possible over-prediction of vibration levels using Figure 11, the requirement for initial 3-axis geophone monitoring at the fuel storage tanks across Wa`apa Road (which are as close as 180 feet to the pile driver) should be added to the project specifications. If measured vibration levels are significantly less than 2.0 inches/per second at the closest fuel storage tank, the vibration monitoring program may be discontinued.

- If measured vibration levels at the fuel storage tanks from test piles indicate that 2.0 inches/second will be exceeded, the geophone monitoring program should be continued, and alternate pile driving methods or foundation plans should be investigated.

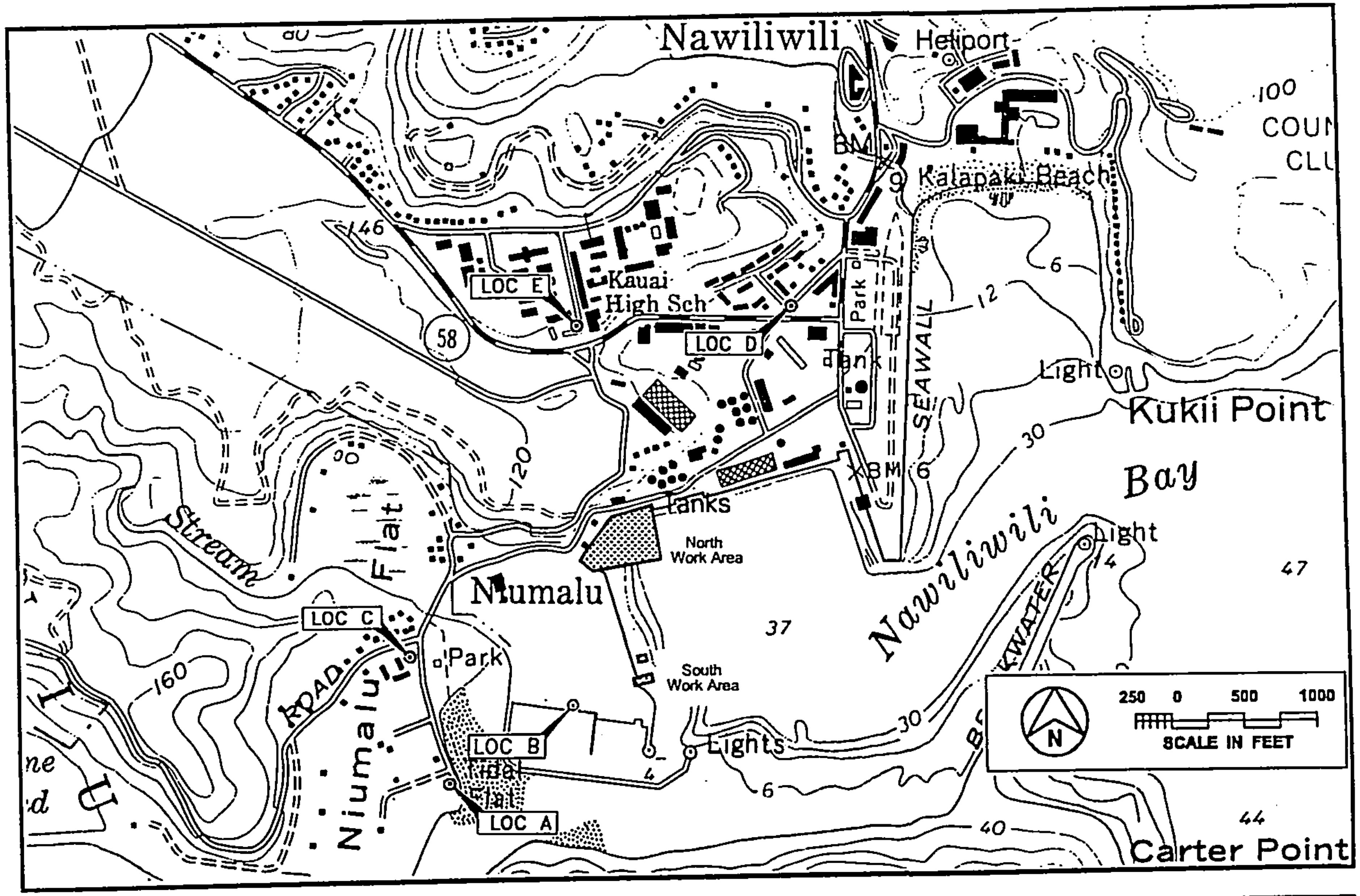
Summary. To summarize, the airborne noise impacts from the dredging and pile driving activities are not expected to be serious due to the relatively large distances (1,000 to 1,500 feet) to the nearest noise sensitive structures. Risks of adverse noise impacts are greatest at the Niumalu residences west of the north and south work areas. Noise impacts are not expected in the Nawiliwili area due to noise shielding effects from the natural terrain and the large man-made structures north and northeast of the project work areas.

Risks of architectural or structural damage to the closest structures (fuel storage tanks) are expected to be very low due to their relatively large separation distance from the project site, and the heavy materials which were used in constructing the structures. Nevertheless, initial vibration monitoring is recommended for empirically confirming that vibration levels at the storage tanks will be less than 2.0 inches per second during pile driving activities.

Sincerely,

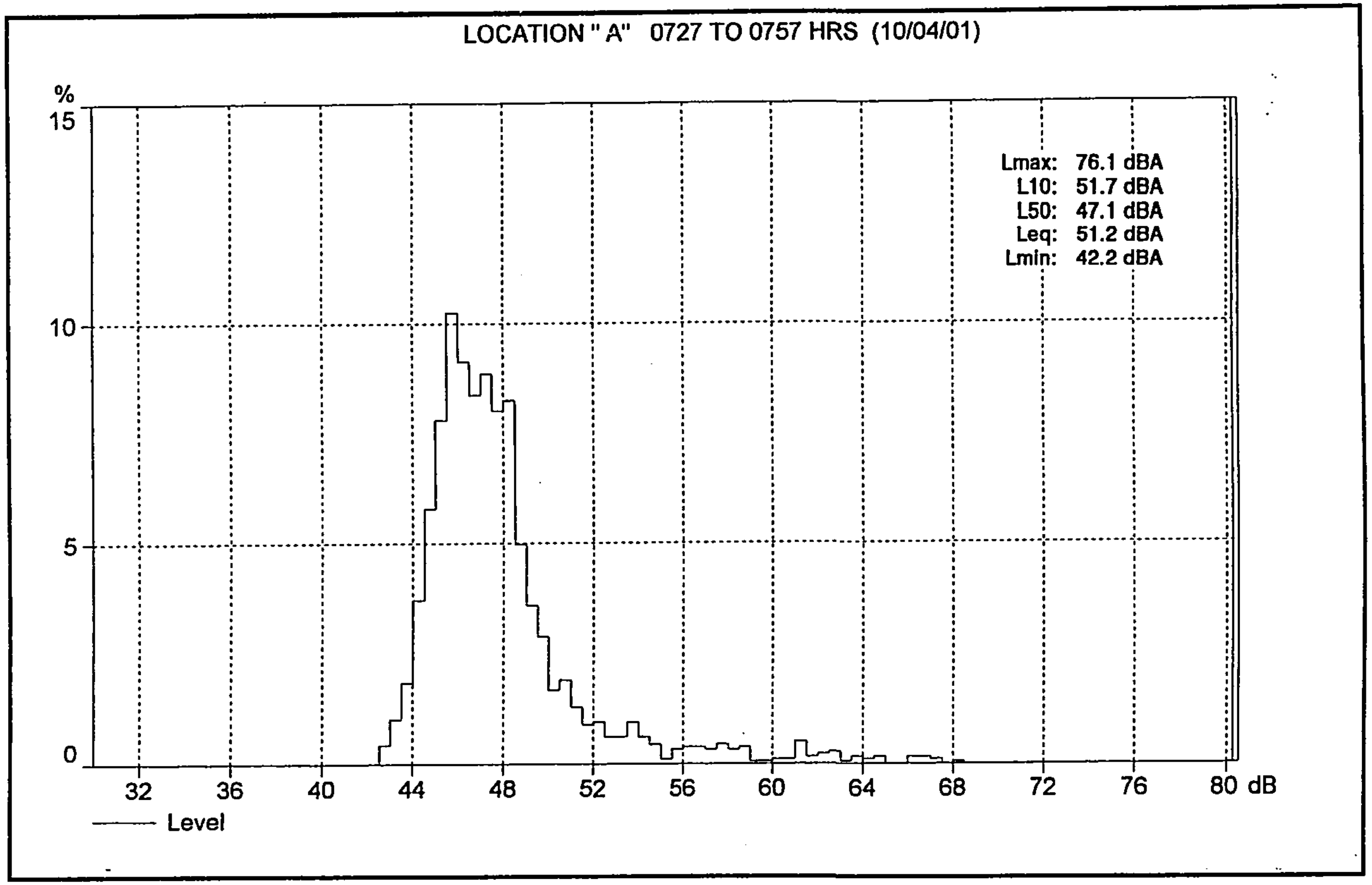
Yoichi Ebisu, P.E.

encl.



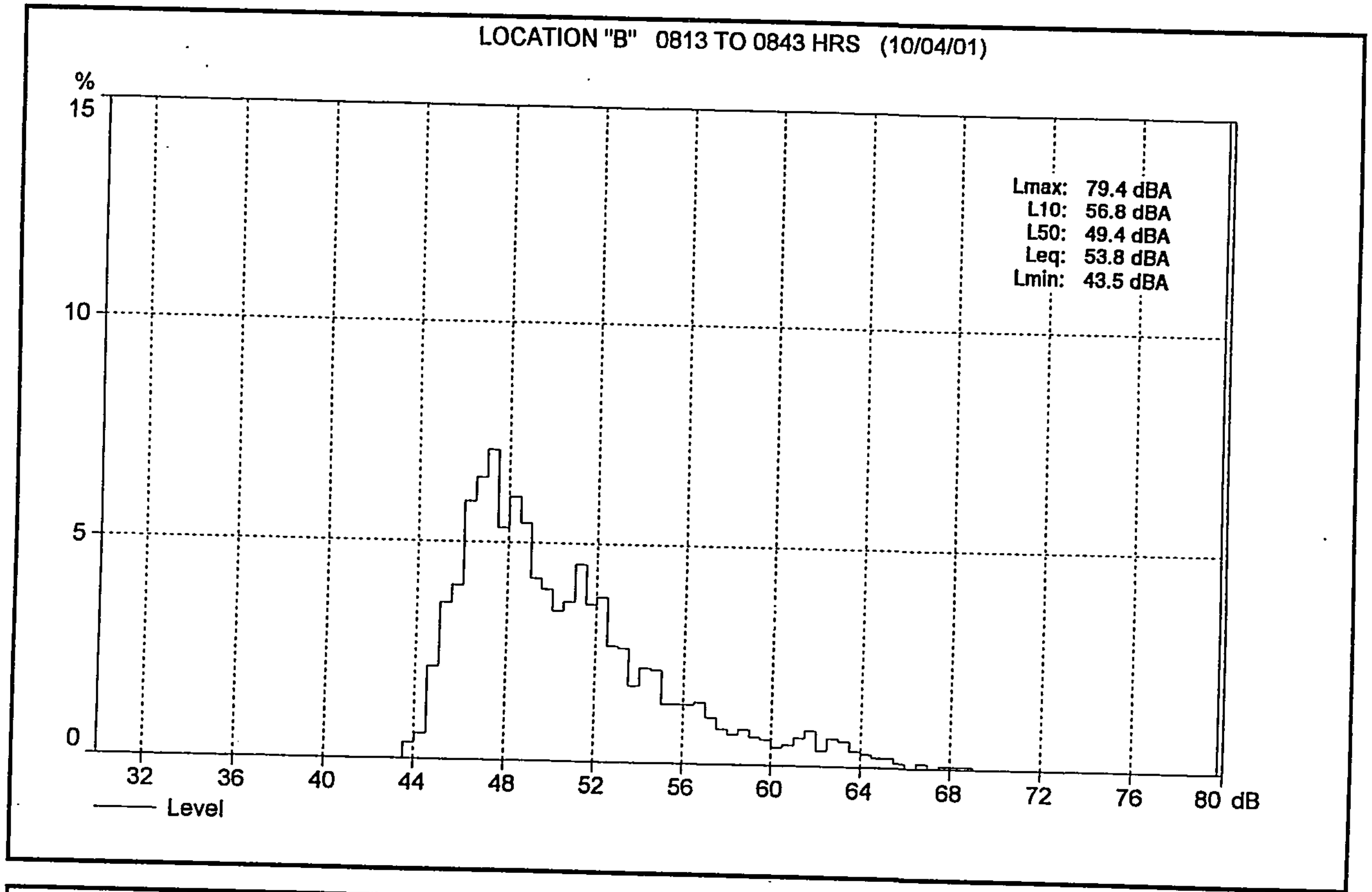
PROJECT SITE AND LOCATIONS OF
BACKGROUND AMBIENT NOISE MEASUREMENTS

FIGURE
1



HISTOGRAM OF MEASURED BACKGROUND AMBIENT NOISE LEVELS AT LOCATION "A" (10/4/01)

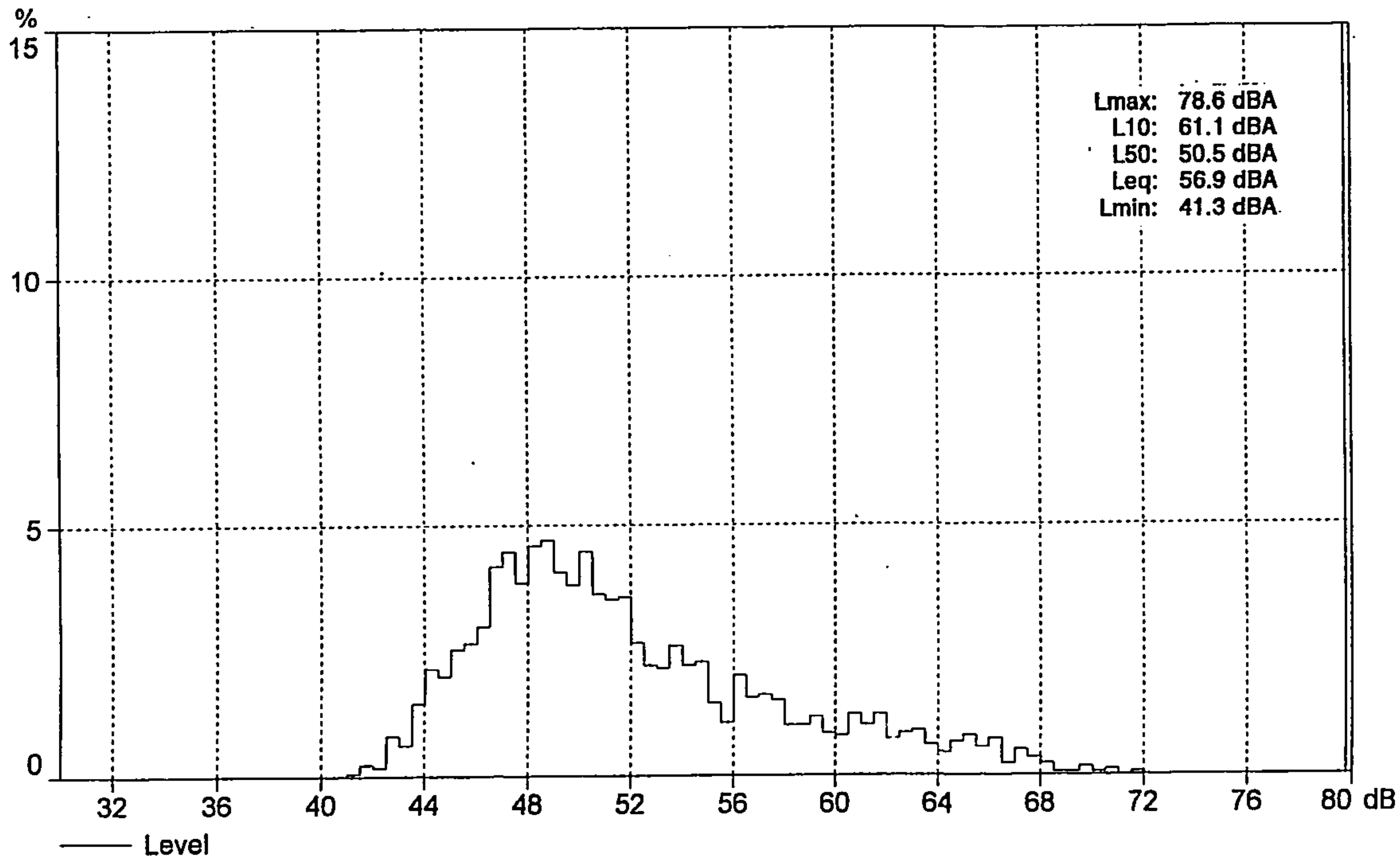
FIGURE 2



HISTOGRAM OF MEASURED BACKGROUND AMBIENT NOISE LEVELS AT LOCATION "B" (10/4/01)

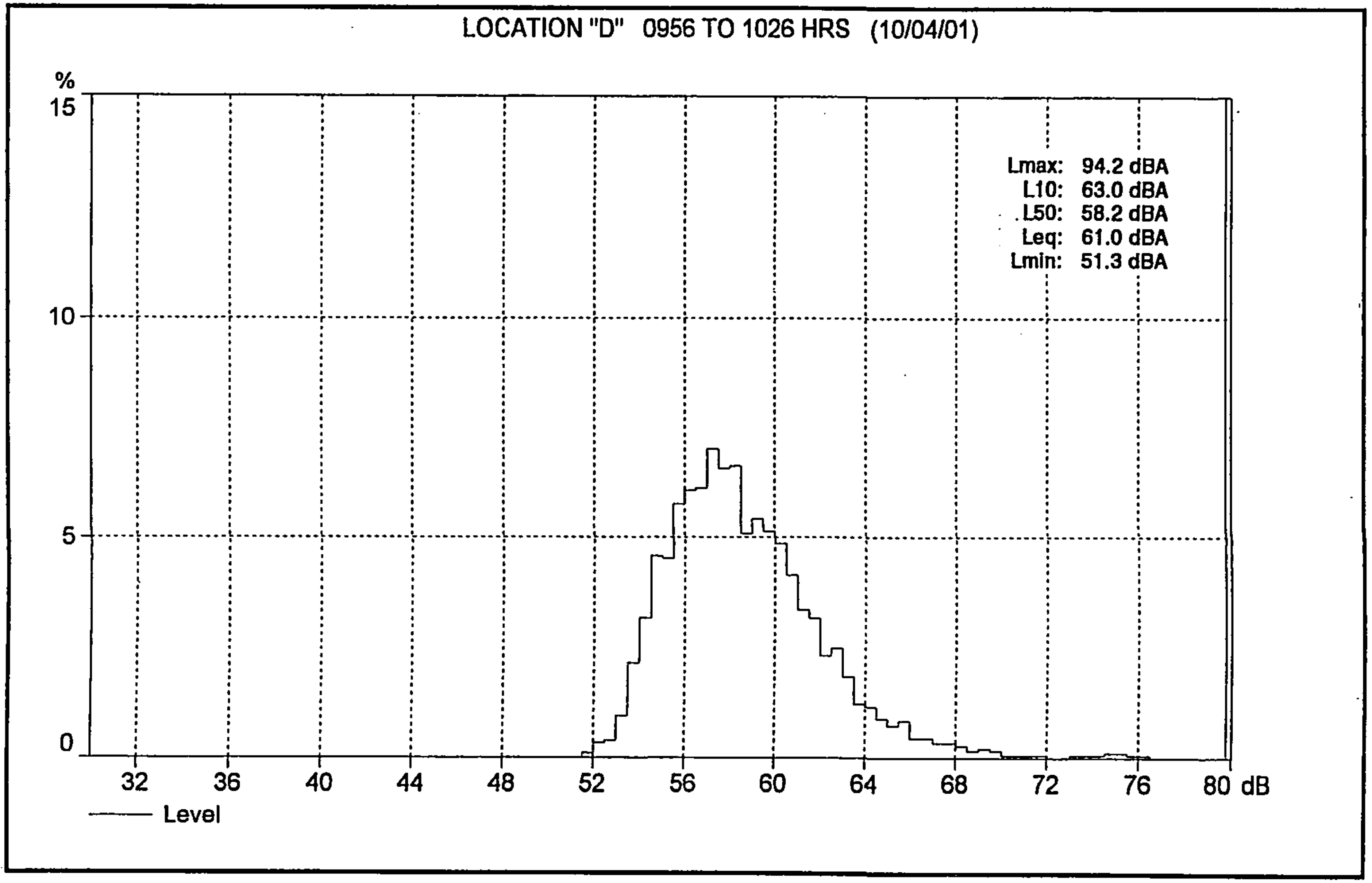
FIGURE 3

LOCATION "C" 0853 TO 0923 HRS (10/04/01)



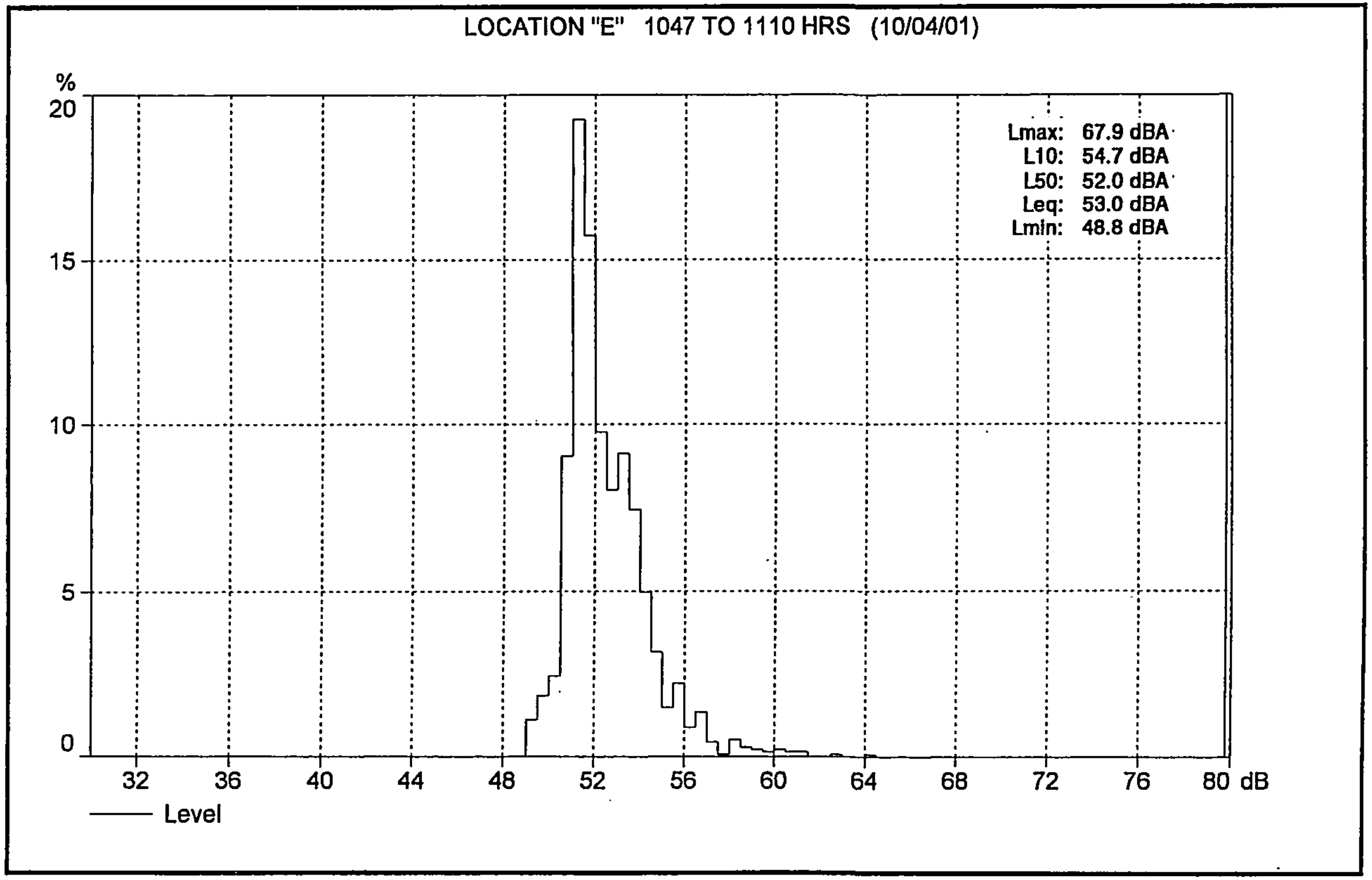
HISTOGRAM OF MEASURED BACKGROUND AMBIENT NOISE LEVELS AT LOCATION "C" (10/4/01)

FIGURE 4



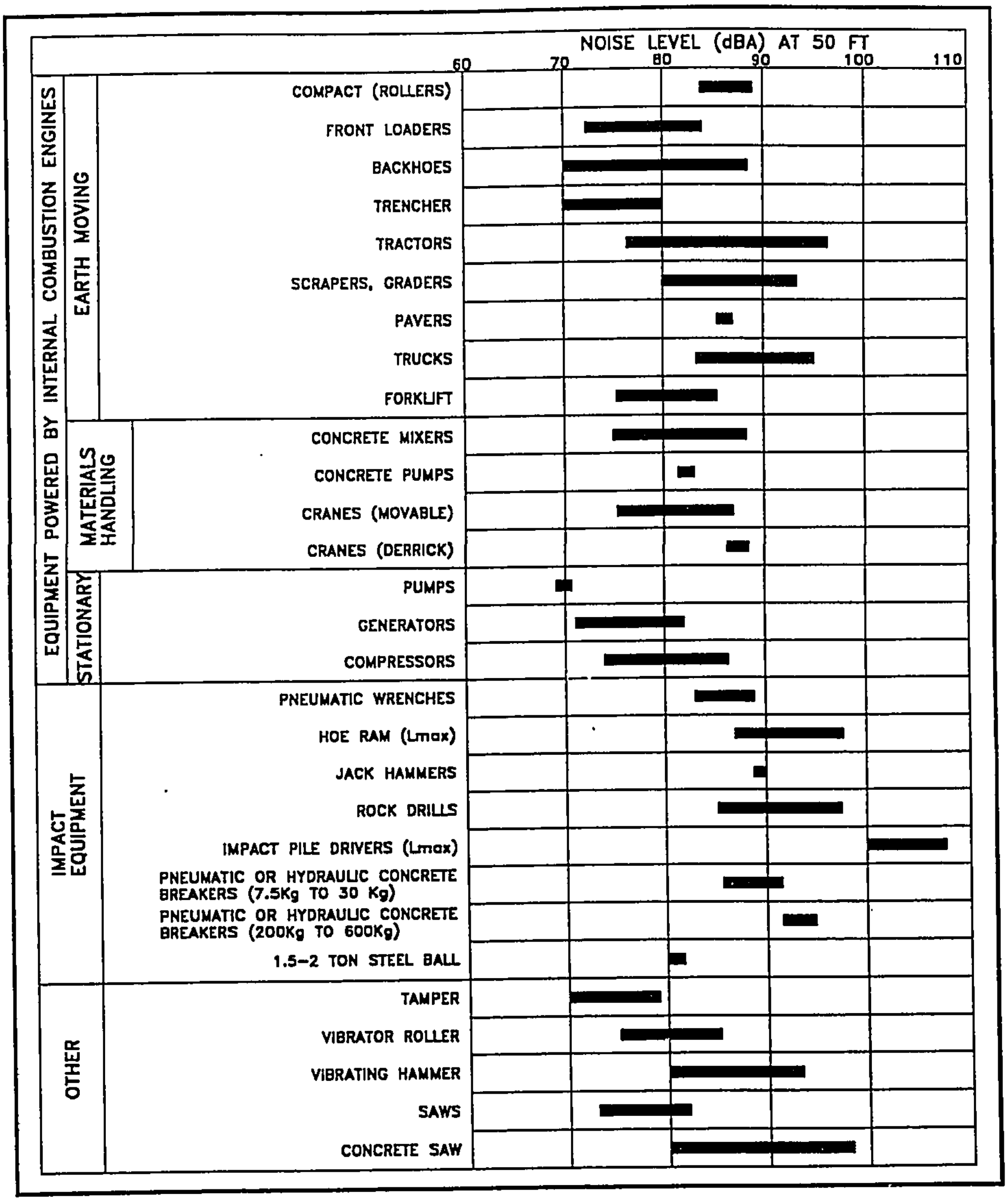
HISTOGRAM OF MEASURED BACKGROUND AMBIENT NOISE LEVELS AT LOCATION "D" (10/4/01)

FIGURE 5



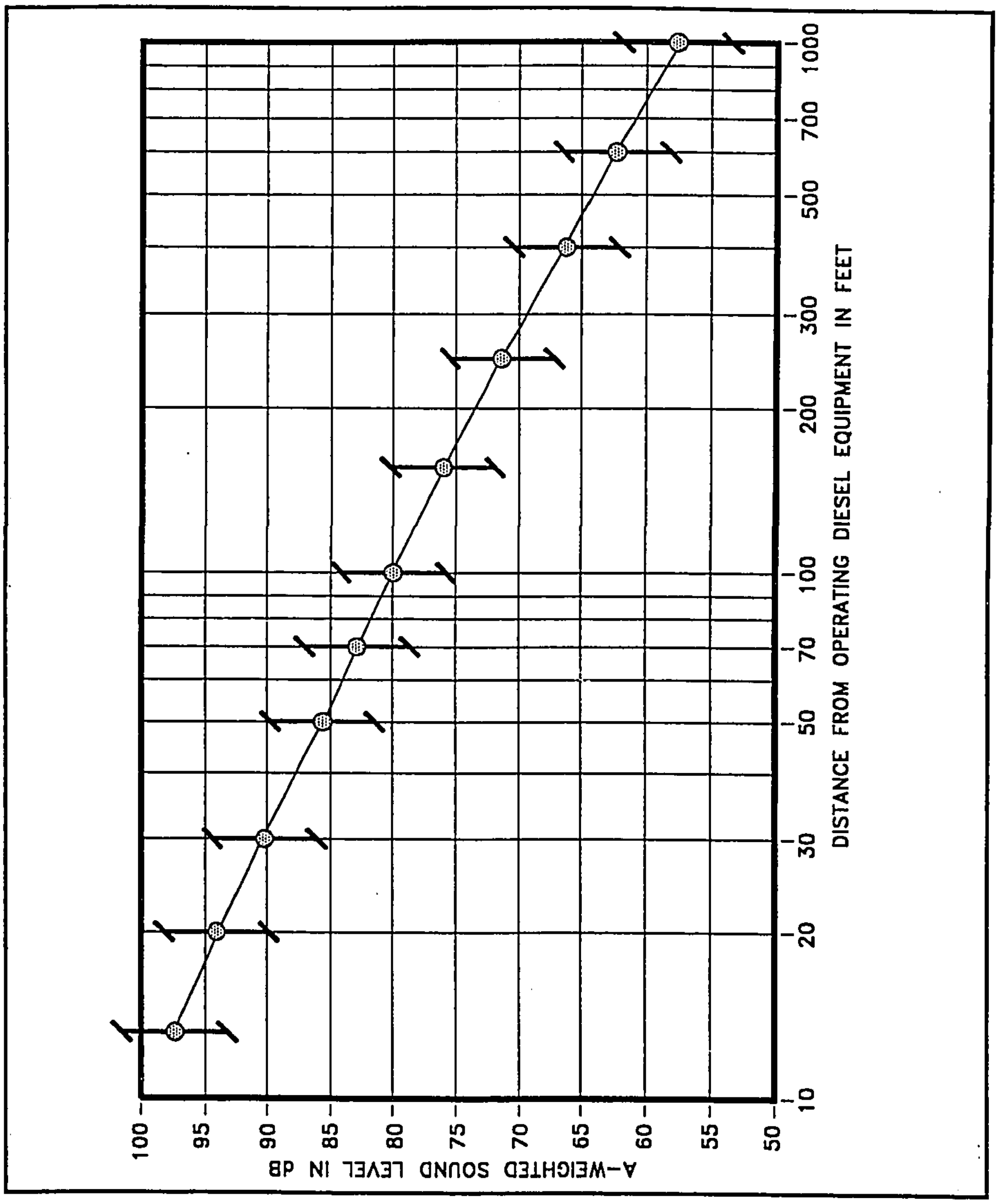
HISTOGRAM OF MEASURED BACKGROUND AMBIENT NOISE LEVELS AT LOCATION "E" (10/4/01)

FIGURE 6



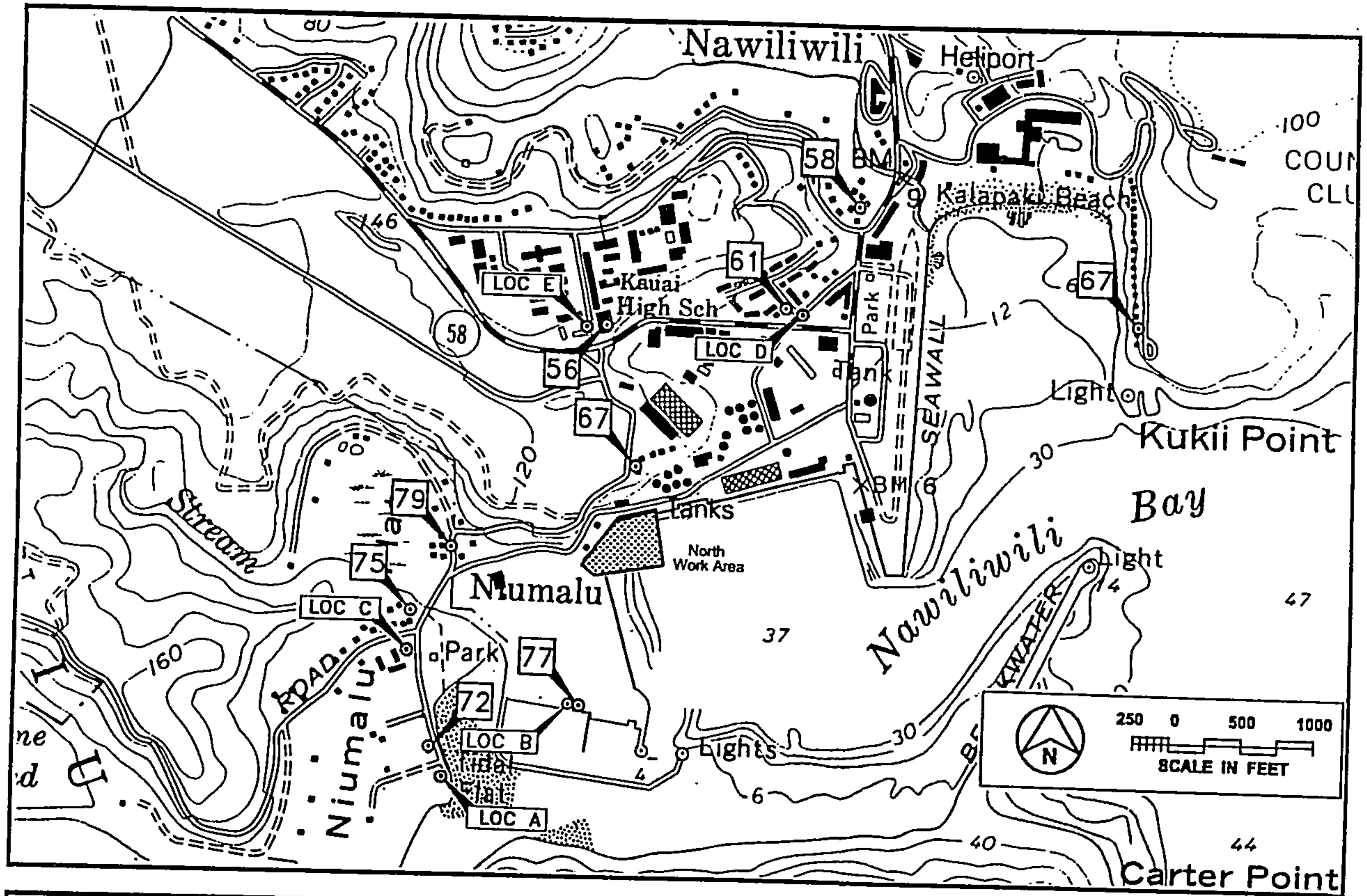
RANGES OF CONSTRUCTION EQUIPMENT NOISE LEVELS

FIGURE 7



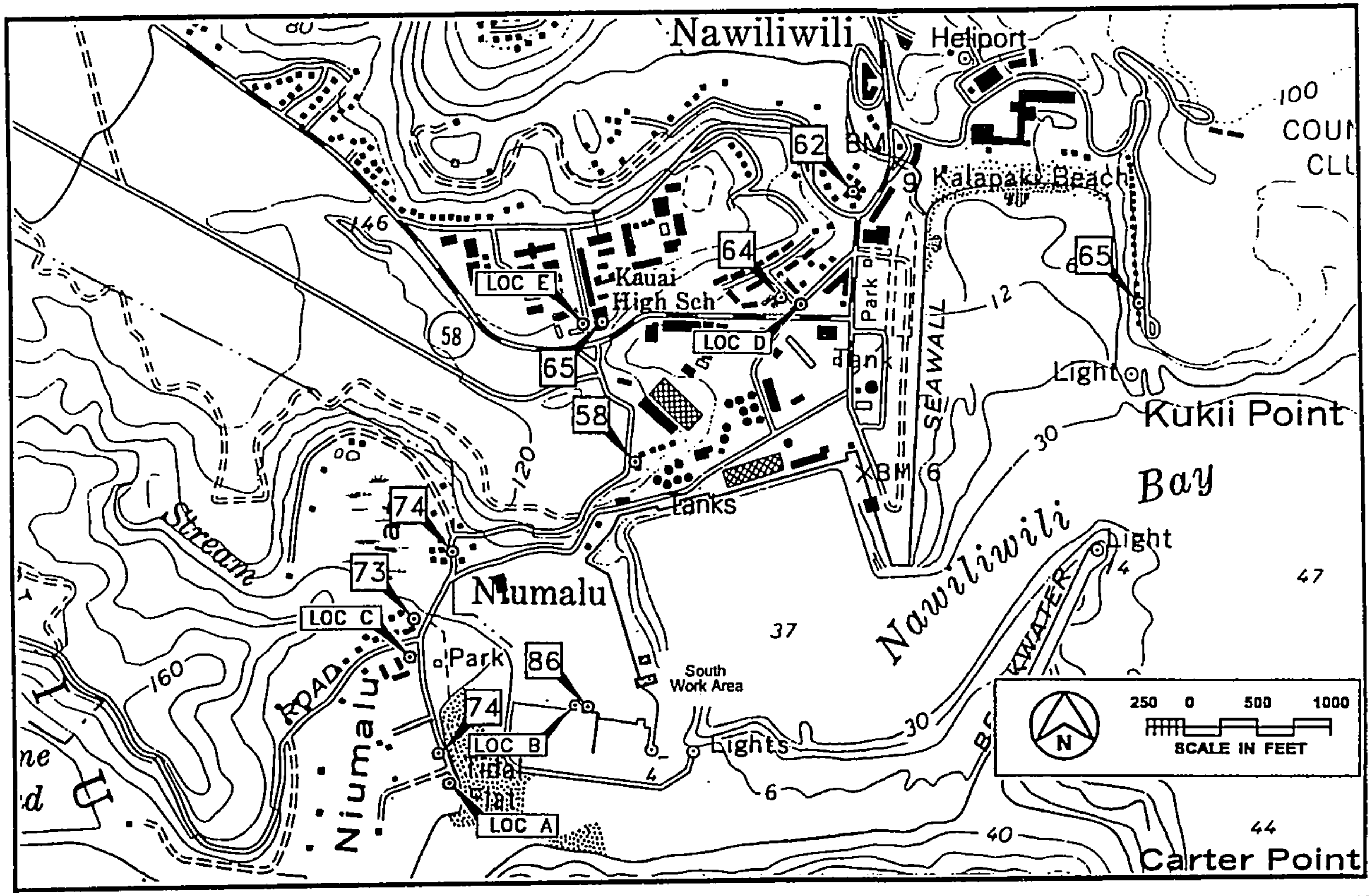
ANTICIPATED RANGE OF CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 8



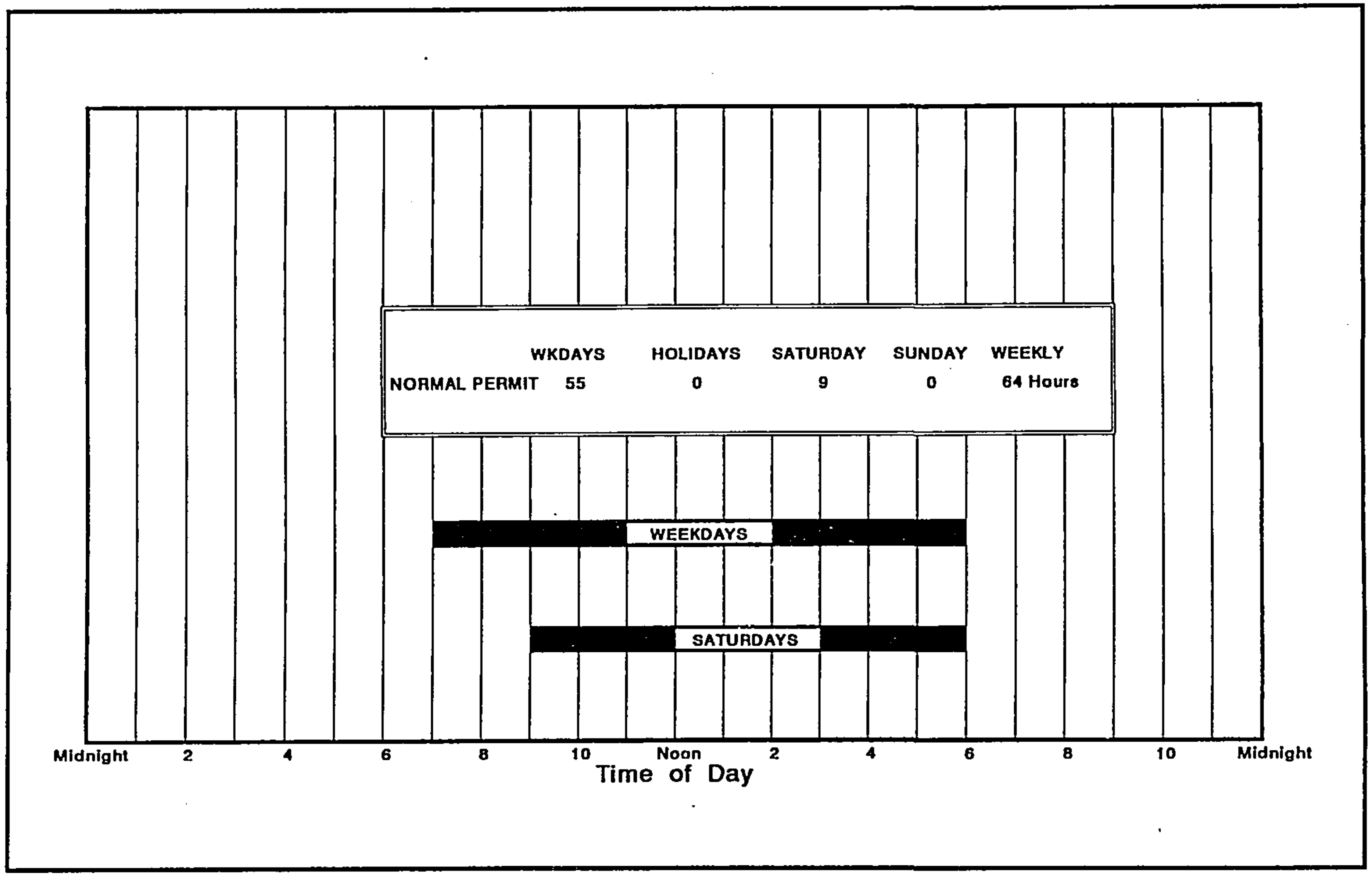
MAXIMUM NOISED LEVELS (IN dBA) DURING
PILE DRIVING WITHIN THE NORTH WORK AREA

FIGURE
9A



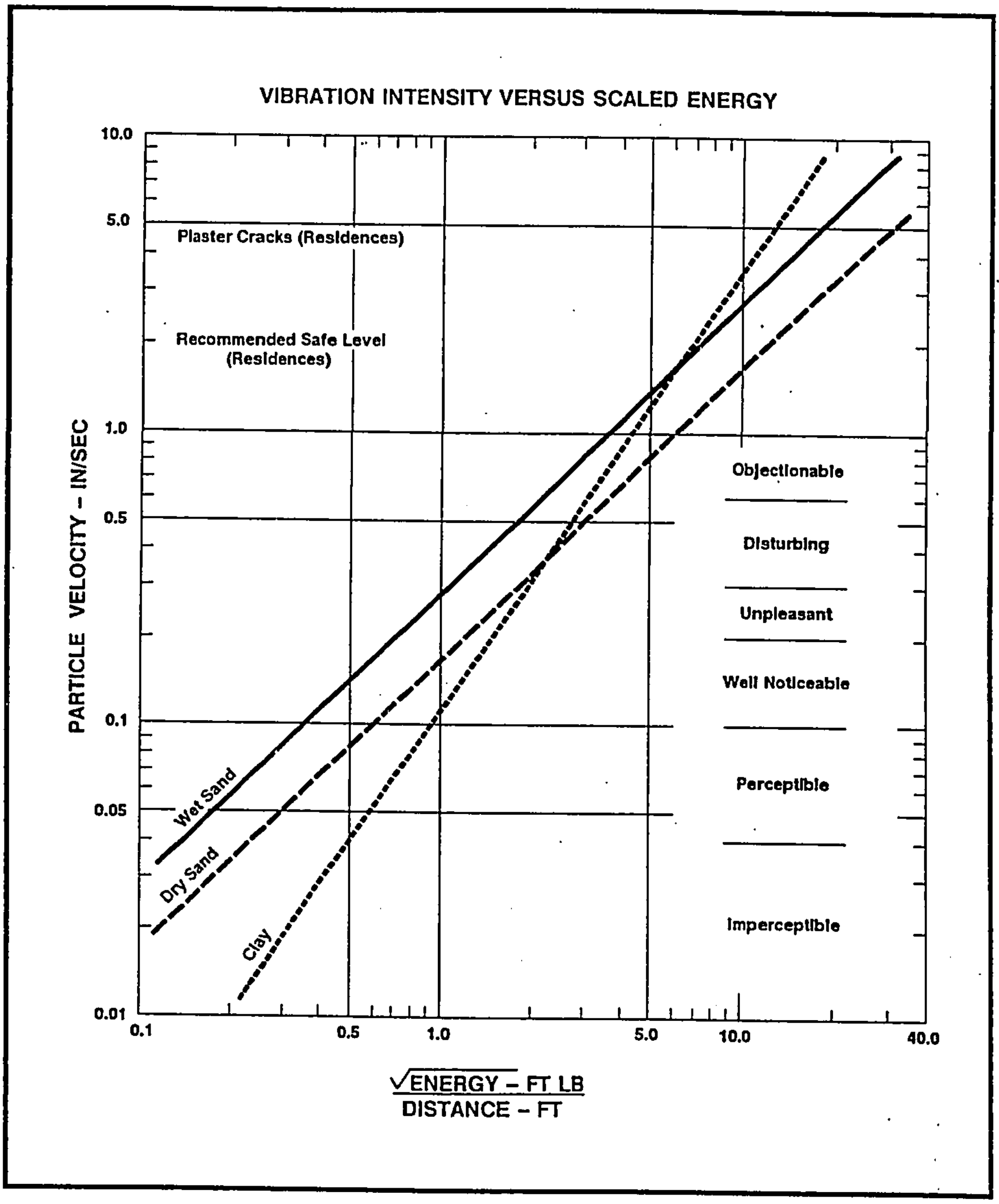
MAXIMUM NOISE LEVELS (IN dBA) DURING PILE DRIVING WITHIN THE SOUTH WORK AREA

FIGURE 9B



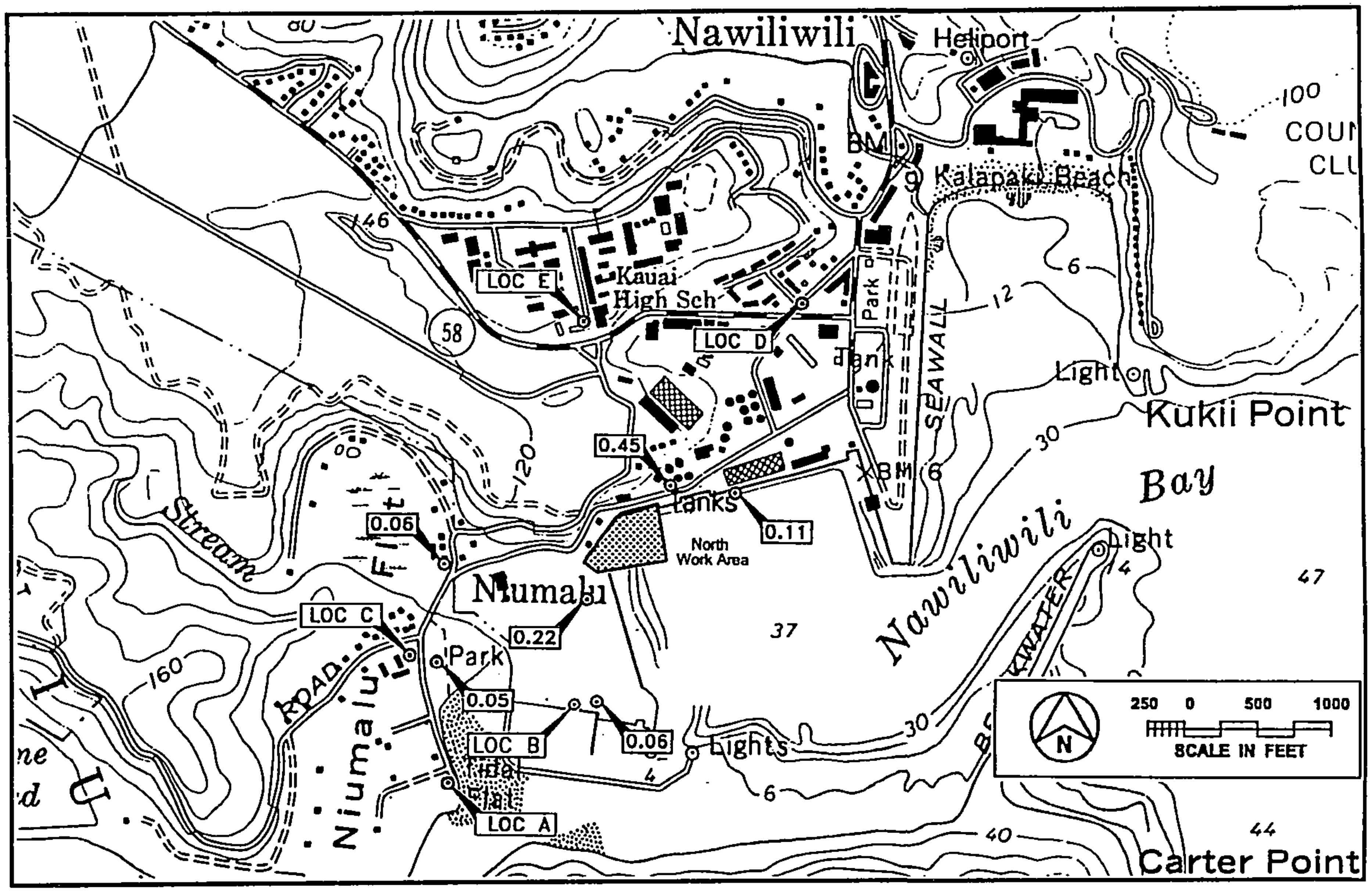
AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

FIGURE 10



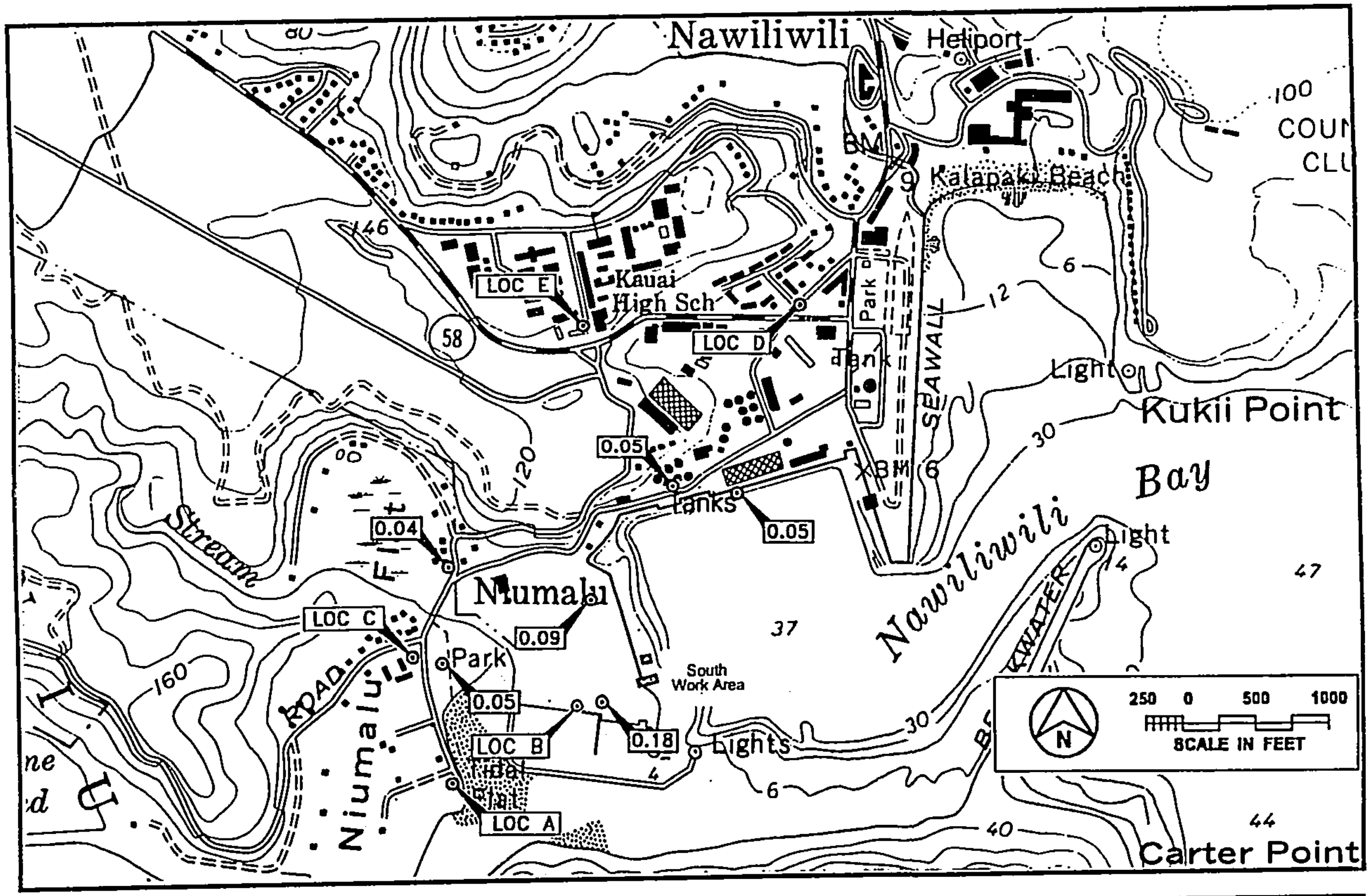
MINIMUM VIBRATION INTENSITIES EXPECTED FROM PILE DRIVING

FIGURE 11



PEAK VIBRATION LEVELS (IN INCHES / SEC.)
DURING PILE DRIVING WITHIN THE NORTH WORK AREA

FIGURE
12A



PEAK VIBRATION LEVELS (IN INCHES / SEC.)
DURING PILE DRIVING WITHIN THE SOUTH WORK AREA

FIGURE
12B

TABLE 1

SUMMARY OF BUILDING DAMAGE CRITERIA

PEAK GROUND VELOCITY (mm/sec)	PEAK GROUND VELOCITY (in/sec)	COMMENT
193.04	7.6	Major damage to buildings (mean of data).
137.72	5.4	Minor damage to buildings (mean of data).
101.16	4.0	'Engineer structures' safe from damage.
50.8	2.0	Safe from damage limit (probability of damage <5%).
		No structural damage.
33.02	1.3	Threshold of risk of 'architectural' damage for houses.
25.4	1.0	No data showing damage to structures for vibration <1 in./sec.
15.24	0.6	No risk of 'architectural' damage to normal buildings.
10.16	0.4	Threshold of damage in older homes.
5.08	0.2	Statistically significant percentage of structures may experience minor damage (including earthquake, nuclear event, and blast data for old and new structures).
		No 'architectural' damage.
3.81	0.5 to 0.15	Upper limits for ruins and ancient monuments.
1.0	0.04	Vertical vibration clearly perceptible to humans.
0.32	0.01	Vertical vibration just perceptible to humans.

Source: 'State-of-the-Art Review: Prediction and Control of Groundborne Noise and Vibration from Rail Transit Trains'; U.S. Department of Transportation; December 1983.

APPENDIX G
SHIP SCHEDULE

● ● ● ● 2004 ● ● ● ●
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

01/06/04

AHC - AMERICAN HI CRUISES
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP
Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
W	01/05/04 MON	LEGENDS OF THE SEAS	0700	1800	2	867
W	01/11/04 SUN	LEGENDS OF THE SEAS	0700	1800	2	867
NL	01/25/04 SUN	CRYSTAL HARMONY	0800	1700	2	781
W	02/04/04 WED	CRYSTAL HARMONY	0800	1700	2	781
TNC	02/13/04 FRI	REGAL PRINCESS	0700	1700	2	804
W	02/22/04 SUN	CRYSTAL HARMONY	0700	1700	2	781
TNC	02/27/04 FRI	REGAL PRINCESS	0700	1800	2	804
Q	03/02/04 TUE	STATENDAM	0700	1400	2	720
TNC	03/14/04 SUN	REGAL PRINCESS	0700	1700	2	804
INCH	03/18/04 THUR	MV DISCOVERY	0700	1800	2	554
L	03/19/04 FRI	MAXIM GORKY	0700	1800	2	639
W	03/22/04 MON	LEGENDS OF THE SEAS	0700	1800	2	867

01/06/04

2004
PASSENGER SHIP SCHEDULE
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Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	03/27/04 SAT	STATENDAM	0700	1400	3	720
W	03/28/04 SUN	LEGENDS OF THE SEAS	0700	1800	2	867
TNC	03/29/04 MON	REGAL PRINCESS	0700	1700	2	804
INCH	04/06/04 TUE	SEVEN SEAS VOYAGER	0700	1700	2	679
Q	04/11/04 SUN	STATENDAM	0700	1400	2	720
W	04/12/04 MON	LEGENDS OF THE SEAS	0700	1800	2	867
TNC	04/13/04 TUE	MV REGAL PRINCESS	0700	1700	2	904
W	04/20/04 TUE	LEGEND OF THE SEAS	0630	1800	2	867
Q	04/26/04 MON	STATENDAM	0700	1400	2	720
TNC	04/27/04 TUE	MV REGAL PRINCESS	0700	1700	2	804
W	04/28/04 WED	CARNIVAL SPIRIT	0700	1800	2	954
Q	04/29/04 THUR	AMSTERDAM	0700	1630	2	781
W	05/02/04 SUN	CARNIVAL SPIRIT	0700	1800	2	954
Q	05/03/04 MON	NORWEGIAN STAR	0800	1830	2	965
W	05/04/04 TUE	LEGEND OF THE SEAS	0630	1800	2	867

01/06/04

2004
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

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Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
W	05/9/04 SUN	LEGEND OF THE SEAS	0630	1800	2	867
W	05/16/04 SUN	SERENADE OF THE SEAS	0700	1800	2	963
TNC	5/16/04 SUN	MV PACIFIC PRINCESS	0730	1700	3	554
W	05/17/04 MON	MV INFINITY	0630	1800	2	965
Q	5/18/04 TUE	NORWEGIAN WIND	0800	1700	2	754
W	05/19/04 WED	MV INFINITY	0630	1800	2	965
W	05/20/04 THUR	SERENADE OF THE SEAS	0700	1800	2	963
Q	5/26/04 WED	NORWEGIAN WIND	0800	1700	2	754
Q	6/2/04 WED	NORWEGIAN WIND	0800	1700	2	754
Q	6/16/04 WED	NORWEGIAN WIND	0800	1700	2	754
Q	6/23/04 WED	NORWEGIAN WIND	0800	1700	2	754
Q	6/30/04 WED	PRIDE OF AMERICA	0700	LO	2	965
	7/1/04 THUR	PRIDE OF AMERICA	LO	1300	2	
Q	7/5/04 MON	PRIDE OF AMERICA	0700	LO	2	965
	7/6/04 TUE	PRIDE OF AMERICA	LO	1300	2	
Q	7/7/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	7/12/04 MON	PRIDE OF AMERICA	0700	LO	2	965
	7/13/04 TUE	PRIDE OF AMERICA	LO	1300	2	

2004 01/06/04
PASSENGER SHIP SCHEDULE
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TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP
Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	7/14/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	7/19/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	7/20/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	7/26/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	7/27/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	7/28/04 WED	NORWEGIAN WIND	0700	1700	2	754
	8/3/04 TUE	PRIDE OF AMERICA	0700	1600	2	
Q	8/4/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	8/10/04 TUE	PRIDE OF AMERICA	0700	1600	2	
Q	8/16/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	8/17/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	8/18/04 WED	NORWEGIAN WIND	0700	1700	2	754
TNC	8/18/04 WED	MV PACIFIC PRINCESS	0730	1700	3	554
Q	8/23/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	8/24/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	8/25/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	8/30/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	8/31/04 TUE	PRIDE OF AMERICA	LO	1600	2	

01/06/04

2004
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

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TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP
Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	9/6/04 MON 9/7/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	9/8/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	9/13/04 MON 9/14/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	9/15/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	9/20/04 MON 9/21/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
W	09/25/04 SAT	VISIONS OF THE SEAS	0700	1800	2	915
Q	9/27/04 MON 9/28/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	9/29/04 WED	NORWEGIAN WIND	0700	1700	3	754
TNC	9/29/04 WED	ISLAND PRINCESS	0700	1800	2	965
W	09/30/04 THUR	VISION OF THE SEAS	0700	1800	2	915
W	10/01/04 FRI	CARNIVAL SPIRIT	0700	1800	2	954
Q	10/3/04 SUN	VEENDAM	0730	1730	3	720
W	10/3/04 SUN	INFINITY	0700	1800	2	965
W	10/04/04 MON	RADIANCE OF THE SEAS	0700	1800	2	965

2004 01/06/04

PASSENGER SHIP SCHEDULE

NAWILIWILI HARBOR, KAUAI

AHC - AMERICAN HI CRUISES
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP
Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	10/05/03 TUES	PRIDE OF AMERICA	0700	1600	2	965
Q	10/06/04 WED	NORWEGIAN WIND	0800	1700	3	754
W	10/06/04 WED	CARNIVAL SPIRIT	0700	1800	2	954
Q	10/07/04 THUR	STATENDAM	0700	1400	3	720
Q	10/7/04 THUR	NORWEGIAN SKY	0900	1700	2	853
W	10/08/04 FRI	SERENADE OF THE SEAS	0700	1800	2	963
W	10/10/04 SUN	MV INFINITY	0700	1800	2	965
Q	10/11/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	10/12/04 TUE	PRIDE OF AMERICA	LO	1600	2	
TNC	10/13/04 WED	ISLAND PRINCESS	0700	1700	2	965
Q	10/14/04 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	10/18/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	10/19/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	10/20/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	10/21/04 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	10/25/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	10/26/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	10/27/04 WED	NORWEGIAN WIND	0700	1700	2	754

2004
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

01/06/04

AHC - AMERICAN HI CRUISES
L - LAVINO SHIPPING
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NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP
Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	9/6/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	9/7/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	9/8/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	9/13/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	9/14/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	9/15/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	9/20/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	9/21/04 TUE	PRIDE OF AMERICA	LO	1600	2	
W	09/25/04 SAT	VISIONS OF THE SEAS	0700	1800	2	915
Q	9/27/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	9/28/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	9/29/04 WED	NORWEGIAN WIND	0700	1700	3	754
TNC	9/29/04 WED	ISLAND PRINCESS	0700	1800	2	965
W	09/30/04 THUR	VISION OF THE SEAS	0700	1800	2	915
W	10/01/04 FRI	CARNIVAL SPIRIT	0700	1800	2	954
Q	10/3/04 SUN	VEENDAM	0730	1730	3	720
W	10/3/04 SUN	INFINITY	0700	1800	2	965
W	10/04/04 MON	RADIANCE OF THE SEAS	0700	1800	2	965

2004
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

01/06/04

AHC - AMERICAN HI CRUISES
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W - WALDRON STEAMSHIP
Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	10/05/03 TUES	PRIDE OF AMERICA	0700	1600	2	965
Q	10/06/04 WED	NORWEGIAN WIND	0800	1700	3	754
W	10/06/04 WED	CARNIVAL SPIRIT	0700	1800	2	954
Q	10/07/04 THUR	STATENDAM	0700	1400	3	720
Q	10/7/04 THUR	NORWEGIAN SKY	0900	1700	2	853
W	10/08/04 FRI	SERENADE OF THE SEAS	0700	1800	2	963
W	10/10/04 SUN	MV INFINITY	0700	1800	2	965
Q	10/11/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	10/12/04 TUE	PRIDE OF AMERICA	LO	1600	2	
TNC	10/13/04 WED	ISLAND PRINCESS	0700	1700	2	965
Q	10/14/04 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	10/18/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	10/19/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	10/20/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	10/21/04 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	10/25/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	10/26/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	10/27/04 WED	NORWEGIAN WIND	0700	1700	2	754

2004
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

01/06/04

AHC - AMERICAN HI CRUISES
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Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
INCH	10/27/04 WED	SEVEN SEAS MARINER	0700	1800	3	712
Q	10/28/04 THUR	NORWEGIAN SKY	0900	1700	2	853
TNC	10/29/04 FRI	ISLAND PRINCESS	0700	1700	2	965
Q	11/1/04 MON 11/2/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	11/4/04 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	11/8/04 MON 11/9/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	11/10/04 WED	NORWEGIAN WIND	0700	1700	3	754
W	11/10/04 WED	LEGEND OF THE SEAS	0700	1800	2	867
Q	11/11/04 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	11/12/04 FRI	STATENDAM	0700	1400	2	720
TNC	11/14/04 SUN	ISLAND PRINCESS	0700	1700	2	965
Q	11/15/04 MON 11/16/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	11/17/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	11/18/04 THUR	NORWEGIAN SKY	0900	1700	2	853
W	11/21/04 SUN	MV INFINITY	0630	1800	2	964

01/06/04

2004
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

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W - WALDRON STEAMSHIP
Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	11/22/04 MON 11/23/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	11/25/04 THUR	NORWEGIAN SKY	0900	1700	2	853
W	11/26/04 FRI	MV INFINITY	0630	1800	2	964
Q	11/28/04 SUN	STATENDAM	0700	1400	3	720
TNC	11/28/04 SUN	ISLAND PRINCESS	0700	1700	2	965
Q	11/29/04 MON 11/30/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	12/1/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	12/2/04 THUR	NORWEGIAN SKY	0900	1700	2	853
W	12/03/04 FRI	LEGEND OF THE SEAS	0700	1800	2	867
Q	12/6/04 MON 12/7/04 TUE	PRIDE OF AMERICA PRIDE OF AMERICA	1100 LO	LO 1600	2 2	965
Q	12/8/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	12/9/04 THUR	NORWEGIAN SKY	0900	1700	2	853
W	12/10/04 FRI	MV INFINITY	0630	1800	2	964
TNC	12/12/04 SUN	ISLAND PRINCESS	0700	1700	2	965

01/06/04

2004
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

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W - WALDRON STEAMSHIP
Q - QUAY

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
YB	TUE/FRI	KAMALUHIA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
Q	SAT	NORWEGIAN STAR (TILL 5-1-04)	0700	1600	2	965
Q	THUR/SAT	NORWEGIAN SKY (FR. 10-2-04)	0700	1700	2	853
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	12/13/04 MON	STATENDAM	0700	1400	3	720
Q	12/13/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	12/14/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	12/16/004 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	12/20/04 MON	PRIDE OF AMERICA	1100	LO	2	965
	12/21/04 TUE	PRIDE OF AMERICA	LO	1600	2	
Q	12/22/04 WED	NORWEGIAN WIND	0700	1700	2	754
Q	12/23/04 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	12/27/04 MON	PRIDE OF AMERICA	0700	1700	2	965
Q	12/28/04 TUE	STATENDAM	0700	1400	2	720
Q	12/29/04 WED	NORWEGIAN WIND	0700	1700	3	754
TNC	12/29/04 WED	ISLAND PRINCESS	0700	1700	2	965
Q	12/30/04 THUR	NORWEGIAN SKY	0900	1700	2	853

*SCHEDULE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

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PASSENGER SHIP SCHEDULE

NAWILIWILI HARBOR, KAUAI

01/21/04

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	1/1/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	1/6/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	1/8/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	1/12/05 WED	NORWEGIAN WIND	0700	1700	3	754
TNC	1/12/05 WED	ISLAND PRINCESS	0700	1700	2	965
Q	1/13/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	1/13/05 THUR	STATENDAM			3	720
Q	1/15/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	1/19/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	1/20/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	1/22/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	1/26/05 WED	PRIDE OF ALOHA	0900	1800	2	853
TNC	1/27/05 THUR	ISLAND PRINCESS	0700	1700	2	965
Q	1/27/05 THUR	STATENDAM	0700	1400	3	720
Q	1/29/05 SAT	NORWEGIAN SKY	0700	1700	2	853

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01/21/04

2005
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
W	1/31/05	MS EUROPA	0730	1600	3	649
Q	2/2/05 WED	NORWEGIAN WIND	0800	1700	2	754

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2005 PASSENGER SHIP SCHEDULE NAWILIWILI HARBOR, KAUAI — 01/21/04

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	2/3/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	2/5/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	2/9/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	2/10/05 THUR	NORWEGIAN SKY	0900	1700	2	853
TNC	2/11/05 FRI	ISLAND PRINCESS	0700	1700	2	965
Q	2/12/05 SAT	STATENDAM			3	720
Q	2/12/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	2/17/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	2/19/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	2/23/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	2/24/05 THUR	NORWEGIAN SKY	0900	1700	2	853
TNC	2/26/05 SAT	ISLAND PRINCESS	0700	1700	2	965
Q	2/26/05 SAT	STATENDAM	0700	1400	3	720
Q	3/2/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	3/3/05 THUR	NORWEGIAN SKY	0900	1700	2	853

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01/21/04

2005
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	3/5/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	3/10/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	3/12/05 SAT	NORWEGIAN SKY	0700	1700	2	853
TNC	3/13/05 SUN	ISLAND PRINCESS	0700	1700	2	965
Q	3/14/05 MON	STATENDAM	0730	1400	3	720
Q	3/16/05 WED	NORWEGIAN WIND	0800	1700	3	754
W	3/16/05 WED	LEGENDS OF THE SEAS	0630	1800	2	867
Q	3/17/05 THUR	NORWEGIAN SKY	0900	1700	2	853
W	3/18/05 FRI	LEGENDS OF THE SEAS	0630	1800	2	867
Q	3/19/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	3/23/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	3/24/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	3/26/05 SAT	NORWEGIAN SKY	0700	1700	2	853
TNC	3/27/05 SUN	ISLAND PRINCESS	0630	1730	2	965

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2005
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

01/21/04

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
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TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	3/28/05 MON	STATENDAM	0700	1400	3	720
Q	3/31/05 THUR	NORWEGIAN SKY	0900	1700	2	853
W	4/1/05 FRI	MV INFINITY	0630	1800	2	964
Q	4/2/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	4/6/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	4/7/05 THUR	NORWEGIAN SKY	0900	1700	2	853
W	4/8/05 FRI	MV INFINITY	0630	1800	2	964
Q	4/9/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	4/13/05 WED	NORWEGIAN WIND	0800	1700	3	754
TNC	4/13/05 WED	ISLAND PRINCESS	0700	1730	2	965
Q	4/14/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	4/16/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	4/21/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	4/23/05 SAT	NORWEGIAN SKY	0700	1700	2	853

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01/21/04

2005
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

Q - QUAY CRUISE AGENCY
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M - MATSON
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TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
TNC	4/23/05 SAT	TAHITIAN PRINCESS	0700	1800	3	592
W	4/24/05 SUN	MV CARNIVAL SPIRIT	0630	1800	2	959
Q	4/27/05 WED	NORWEGIAN WIND	0700	1700	3	754
TNC	4/27/05 WED	ISLAND PRINCESS	0630	1730	2	965
Q	4/28/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	4/30/05 SAT	NORWEGIAN SKY	0700	1700	2	853
W	5/1/05 SUN	CARNIVAL SPIRIT	0630	1800	2	959
Q	5/4/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	5/5/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	5/7/05 SAT	NORWEGIAN SKY	0700	1700	2	853
W	5/8/05 SUN	LEGEND OF THE SEAS	0630	1800	2	867
Q	5/12/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	5/14/05 SAT	NORWEGIAN SKY	0700	1700	2	853
W	5/15/05 SUN	LEGEND OF THE SEAS	0630	1800	2	867

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2005
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

01/21/04

Q - QUAY CRUISE AGENCY
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NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	5/18/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	5/19/05 THUR	NORWEGIAN SKY	0900	1700	2	853
W	5/20/05 FRI	MV INFINITY	0630	1800	2	964
Q	5/21/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	5/25/05 WED	NORWEGIAN WIND	0800	1700	2	754
INCH	5/25/05 WED	PACIFIC VENUS	0800	1800	3	602
Q	5/26/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	5/28/05 SAT	NORWEGIAN SKY	0700	1700	2	853
W	5/29/05 SUN	MV INFINITY	0630	1800	2	964
Q	6/2/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	6/4/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	6/8/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	6/9/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	6/11/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	6/15/05 WED	NORWEGIAN WIND	0800	1700	2	754

*SCHEDULE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

2005
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

01/21/04

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	6/16/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	6/18/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	6/23/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	6/25/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	6/29/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	6/30/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	7/2/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	7/6/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	7/7/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	7/9/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	7/14/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	7/16/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	7/20/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	7/21/05 THUR	NORWEGIAN SKY	0900	1700	2	853

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2005 01/21/04

PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	7/23/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	7/27/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	7/28/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	7/30/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	8/4/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	8/6/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	8/10/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	8/11/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	8/13/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	8/17/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	8/18/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	8/20/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	8/25/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	8/27/05 SAT	NORWEGIAN SKY	0700	1700	2	853

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01/21/04

2005
PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	8/31/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	9/1/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	9/3/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	9/7/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	9/8/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	9/10/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	9/15/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	9/17/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	9/21/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	9/22/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	9/24/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	9/25/05 SUN	STATENDAM	0700	1400	2	720
Q	9/28/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	9/29/05 THUR	NORWEGIAN SKY	0900	1700	2	853
W	9/30/05 FRI	CARNIVAL SPIRIT	0630	1800	2	959

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2005 01/21/04

PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
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TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	10/1/05 SAT	NORWEGIAN SKY	0700	1700	2	853
W	10/5/05 WED	CARNIVAL SPIRIT	0630	1800	2	959
Q	10/6/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	10/8/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	10/10/05 MON	STATENDAM	0700	1400	3	720
Q	10/12/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	10/13/05 THUR	NORWEGIAN SKY	0900	1700	2	853
W	10/14/05 FRI	INFINITY	0700	1800	2	964
Q	10/15/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	10/19/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	10/20/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	10/22/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	10/26/05 WED	STATENDAM			2	720
Q	10/27/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	10/29/05 SAT	NORWEGIAN SKY	0700	1700	2	853

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PASSENGER SHIP SCHEDULE
NAWILIWILI HARBOR, KAUAI

01/21/04

Q - QUAY CRUISE AGENCY
L - LAVINO SHIPPING
M - MATSON
NL - NORTON LILLY
TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	11/2/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	11/3/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	11/5/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	11/9/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	11/9/05 WED	STATENDAM	0700	1400	3	720
Q	11/10/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	11/12/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	11/17/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	11/19/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	11/23/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	11/24/05 THUR	NORWEGIAN SKY	0900	1700	2	853
W	11/25/05 FRI	INFINITY	0700	1800	2	964
Q	11/26/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	11/30/05 WED	NORWEGIAN WIND	0800	1700	3	754
Q	12/1/05 THUR	NORWEGIAN SKY	0900	1700	2	853

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TNC - TRANSMARINE NAVIGATION CORP.
W - WALDRON STEAMSHIP

AGENT	DATE	VESSEL	ETA	ETD	PIER	LENGTH
Q	MON	PROJECT AMERICA #1	1100	LO	2	
Q	TUE	PROJECT AMERICA #1	LO	1600	2	
YB	TUE/FRI	KAKELA	0530	1700	3	285
M	SAT	HALEAKALA/MAUNA LOA	0700	1800	1	350
	-ABOVE VESSELS CALL AT NAWILIWILI HARBOR ON A WEEKLY SCHEDULE					
Q	12/3/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	12/8/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	12/10/05 SAT	NORWEGIAN SKY	0700	1700	2	853
INCH	12/11/05 SUN	QUEEN VICTORIA	0700	1800	2	951
Q	12/14/05 WED	NORWEGIAN WIND	0800	1700	3	754
Q	12/15/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	12/17/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	12/21/05 WED	NORWEGIAN WIND	0800	1700	2	754
Q	12/22/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	12/24/05 SAT	NORWEGIAN SKY	0700	1700	2	853
Q	12/29/05 THUR	NORWEGIAN SKY	0900	1700	2	853
Q	12/30/05 FRI	AMSTERDAM	0700	1700	2	781
Q	12/31/05 SAT	NORWEGIAN SKY	0700	1700	2	853

APPENDIX H
SUBSURFACE INVESTIGATION OF PIER 2 AND NORTH PIER 3

Final Report

Subsurface Investigation of the Pier 2 and North Pier 3 Improvement Project (H.C. 7275) Area

Job H.C. 7248

Nawiliwili Harbor, Lihue, Kauai, Hawaii

Prepared for:

State of Hawaii, Department of Transportation
Harbors Division
79 S. Nimitz Highway
Honolulu, Hawaii 96813

Prepared by

Earth Tech, Inc.
841 Bishop Street, Suite 500
Honolulu, Hawaii 96813-3920

June 2004

EXECUTIVE SUMMARY

This report summarizes the results of a subsurface investigation of the Pier 2 and North Pier 3 improvement project (H.C. 7275) area at Nawiliwili Harbor, Lihue, Kauai, Hawaii. Fieldwork was completed during April 20, 2004 to April 22, 2004. The Pier 2 and North Pier 3 project (H.C. 7275) area is located on the northwest shore of Nawiliwili Bay, immediately south of Waapa Road. Construction contractors for the State of Hawaii, Department of Transportation-Harbors Division will improve the Pier 2 and North Pier 3 area under Job H.C. 7275 by placing additional dolphins for mooring, installing lighting and sidewalks along the road, and building a comfort station in the northwest corner of the Pier 2 shed.

The objectives of the investigation were: 1) Collect analytical data representing chemical concentrations in subsurface soil for screening against a) Hawaii Department of Health Tier 1 Action Levels for Soil, Rainfall Less Than or Equal to 200 centimeters per year, Drinking Water Source Not Threatened; and b) United States Environmental Protection Agency (EPA) Region IX Preliminary Remediation Goals for industrial soil. 2) Identify areas of contaminated soil based on the screening evaluation so the improvement contractor can handle and/or dispose of soil from these areas without delaying construction.

A total of seven borings were advanced: three borings (SB-1, SB-2, and SB-3) in the North Pier 3 Area, two borings (SB-4 and SB-5) west of the Pier 2 Shed along Waapa Road, and two borings (SB-6 and SB-7) in the Pier 2 Shed area. *Eleven field soil samples* and two co-located duplicate soil samples were collected from the borings. Deviations from the soil boring depths proposed in the project planning documents were as follows: soil borings SB-1, SB-2, and SB-3 were to be drilled to depths of 12 feet below ground surface (bgs), 28 feet bgs, and 13 feet bgs, respectively, but were terminated at the groundwater interface or slightly below (approximately 8.5 – 9 feet bgs). Total depths of borings SB-4, SB-5, SB-6, and SB-7 deviated slightly from the depths proposed in the planning documents to investigate soil discoloration or potential contamination just above the groundwater interface.

Several field observations of soil staining and elevated organic vapor concentrations (based on photoionization detector readings) were documented in soil from the Pier 2 borings (SB-4, SB-5, SB-6, and SB-7). Soil samples collected from the Pier 2 borings were analyzed for total petroleum hydrocarbons (TPH) as gasoline, diesel, and oil/grease; benzene, toluene, ethylbenzene, and xylenes; methyl tertiary-butyl ether; polynuclear aromatic hydrocarbons; lead, chromium, and cadmium. North Pier 3 area samples were tested for the Pier 2 area constituents, as well as chlorinated solvents, polychlorinated biphenyls, organotin, and additional metals related to ship maintenance activities.

Laboratory results indicated that the majority of detections in the soil samples were only slightly above the practical quantitation limits of the project laboratory and below regulatory action levels. TPH as diesel and arsenic were detected in soil samples at concentrations above the Tier 1 soil action level for Sites where the Drinking Water Source Is Not Threatened and EPA Region IX PRG for industrial soil, respectively.

The field screening and laboratory analytical results indicate that the construction contractor should be prepared to handle petroleum- and arsenic- contaminated soil that will likely be encountered in excavations in the Pier 2 area. Recommendations for soil handling, disposal, and health and safety are presented in Section 4.

CONTENTS

ACRONYMS AND ABBREVIATIONS

1,1 DCE	1,1 dichloroethylene
1,1,1 TCA	1,1,1 trichloroethane
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylenes
CFR	Code of Federal Regulations
COPC	chemical of potential concern
DLNR	Department of Land and Natural Resources
DOH	Department of Health, State of Hawaii
DOT-HAR	State of Hawaii, Department of Transportation-Harbors Division
EPA	Environmental Protection Agency, United States
GASCO	The Gas Company
HEER	Hazard Evaluation and Emergency Response Office
IDW	investigation-derived waste
mg/kg	milligram per kilogram
MRL	method reporting limit
msl	mean sea level
MTBE	methyl tertiary-butyl ether
MW	monitoring well
PAH	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	perchloroethylene
PID	photoionization detector
PPE	personal protective equipment
ppm	part per million
PRGs	preliminary remediation goals
PW	product well
RW	recovery well
SAL	soil action level
TCE	trichloroethylene
TPH	total petroleum hydrocarbons
U.S. DOT	Department of Transportation, United States
U.S.	United States
VC	vinyl chloride
WP	work plan

1.0 INTRODUCTION

This report documents the methodology and results of an environmental investigation of subsurface soil in the Pier 2 and North Pier 3 improvement project (H.C. 7275) area at Nawiliwili Harbor, Lihue, Kauai, Hawaii. As shown in Figure 1, Nawiliwili Harbor is located on Nawiliwili Bay, on the southwest coast of Kauai. As shown in Figure 2, the Pier 2 and North Pier 3 project (H.C. 7275) area lies south of Waapa Road, adjacent to the Lihue Plantation-AMFAC terminal, the Shell/Equilon terminal and the AMFAC molasses storage areas, and north of the Young Brothers facility at Pier 3. Construction contractors for the State of Hawaii, Department of Transportation-Harbors Division (DOT-HAR) will improve the Pier 2 and North Pier 3 (H.C. 7275) area by placing additional dolphins for mooring, installing lighting and sidewalks along the road, and building a comfort station in the northwest corner of the Pier 2 shed. This construction work may involve excavation and the placement of subsurface tieback support structures up to 60-feet inland of the seawalls, as well as excavation for subsurface utilities associated with the light fixtures and comfort station. The principal objective of this investigation was to identify subsurface soil contamination prior to excavation in the construction areas.

1.1 PHYSICAL ENVIRONMENT

Topography. The study area is generally flat, and is located approximately 10 feet above mean sea level (msl) (Figure 1). Two benchmarks exist at Nawiliwili Harbor (USGS 1996). A benchmark at 6 feet above msl exists near the boundary between Piers 1 and 0. At the north end of Pier 0 near Nawiliwili Stream, a benchmark exists at 9 feet msl. The topography of the study area slopes gently toward the bay. As shown in Figure 2, a steep cliff exists behind Piers 1 and 2. The cliff area is not part of the DOT-HAR property; however, surface water runoff can flow down the cliff face to the DOT-HAR properties below.

Geology. Bedrock in the Nawiliwili Harbor area is formed by basalt flows of the Koloa volcanic series. The Koloa basalt flows dip away from their probable origin, the Lihue Depression. Approximately 11,000 years ago, as the last ice age receded, a rapid rise of sea level flooded the mouth of Nawiliwili Valley to create Nawiliwili Bay (Hazlett et. al 1996).

Soil at Nawiliwili Harbor is part of the Lihue-Puhi Association; typically deep, nearly level to steep, well drained soils, with very fine to moderately textured subsoil. Soil at the project site includes the following (USDA SCS 1972):

- (Mr) Mokuleiea fine sandy loam, nearly level, with moderate permeability in the surface and high permeability in the subsurface. Erosion hazard is slight.
- (rRR) rough, broken land.

The pier areas at the harbor were developed by placing dredged fill material over the shallow reef structures in the harbor.

Water. The study area, which overlies the coastal plain sediment and rock, contains basal groundwater. Due to its proximity to the ocean, the groundwater is brackish and is not a potential drinking water source. The groundwater table is slightly above sea level, and ranges from approximately 1 to 9 feet below ground surface (bgs) across the site. The groundwater is tidally influenced and generally flows towards the bay.

Surface water near the site includes Nawiliwili Harbor, Puali Stream (discharging to the harbor from the northwest), Nawiliwili Stream (northeast of Pier 0), and the Huleia River (west of Pier 3).

Flora and Fauna. The near-shore area of Nawiliwili Harbor is highly developed with industrial sites and extensive surface pavement; however, a few areas contain landscaped plants. Fauna in the harbor include typical near-shore fish of Hawaii.

1.2 POPULATION AND LAND USE

Nawiliwili Harbor is used for storing, staging, and transporting goods for the island of Kauai, in addition to cruise ship passenger terminal services. Goods handled at the harbor include general merchandise, bulk petroleum, bulk cement, bulk sugar, molasses, lumber and other miscellaneous products. Descriptions of the tenants and operations from west to east at Nawiliwili Harbor are as follows:

- *Pier 3.* Used by Young Brothers for inter-island cargo handling. The Department of Land and Natural Resources (DLNR) property adjacent to Young Brothers is the site of the Gas Company (GASCO) liquid petroleum gas storage area. Pier 3 is also used to load and unload cruise vessels.
- *Pier 2.* Uses include cruise ship passenger loading and unloading, bulk petroleum storage, and bulk sugar storage (for Lihue Plantation-AMFAC, Shell Oil/Equilon, Kauai Petroleum).
- *Pier 1.* Primary use is inter-island container operations by Matson/McCabe, Hamilton & Renny.
- *Pier 0.* Used for general berthing and cargo.

Adjacent property uses include the following:

- *Pier 3.* The southern boundary adjacent to Pier 3 is formed by the DLNR Small Boat Harbor.
- *Pier 3.* The northern boundary of Pier 3 is formed by the GASCO facility.
- *Pier 2.* The Lihue Plantation-AMFAC sugar storage warehouse is located above the cliff north of the bulk petroleum storage facilities at Pier 2.
- *Pier 2 and Pier 1.* Hale Kauai, a lumber treating, storage, and concrete products facility, is located north of Kauai Petroleum and east of the Lihue Plantation-AMFAC sugar processing facility at Pier 2.
- *Pier 1.* A condominium complex is located north of Nawiliwili Road and Pier 1.
- *Pier 0.* The northern boundary of Pier 0 is formed by a Kauai County park, DLNR land with a warehouse complex housing a flooring company, and the Kauai Food bank property.
- Haupu Ridge (open, undeveloped land) is located across Nawiliwili Bay, southwest of the project area. The Kauai Marriott Resort and Beach Club is located east of the site, on Kalapaki Bay.

1.3 PAST USES

A detailed description of past land uses is presented in *Environmental Site Assessment, Nawiliwili Harbor, Lihue Kauai, Final, Volume I* (Earth Tech 2002). A summary of past land uses is presented below:

Nawiliwili Harbor was initially used by native Hawaiians. A heiau existed on a cliff east of the harbor entrance. In the late 1800's, the harbor was used to move goods such as sugar and cattle from wharves to small boats, then to large ships with deeper moorings. In the 1930's, the harbor was dredged and the basic shape of the Pier 0, 1, and 2 areas was created. Initial tenants included the Lihue Plantation-AMFAC fuel terminal, the Shell Oil terminal, Kauai Sugar storage tanks and shop, and the United States (U.S.) Government fuel terminal. The Pier 1 and Pier 2 buildings were also present during the 1930's. A railroad extended along Pier 2 to Pier 1, and tracks may have extended down Pier 0. Land use included bulk fuel storage and distribution, bulk sugar storage and distribution, as well as storage and distribution of other goods for the island of Kauai. As shown on Figure 3, a tuna cannery, ice plant, shop, shop/office, gas station, and a small boat machine shop were located in the Pier 2 and North Pier 3 areas.

In the 1940's, significant changes in land use included the sale of the U.S. government fuel terminal to Kauai Petroleum. Additionally, the Nawiliwili Harbor Subdivision began taking on small industrial-shop type tenants. Between the 1940's and the 1950's, dredged material was used to begin construction of the Pier 3 area, which remained undeveloped. The cannery, icehouse, and boat machine shop were removed. Lihue Plantation-AMFAC and Shell upgraded their bulk fuel tanks to larger sizes. By the late 1970's, Nawiliwili Harbor experienced growth and congestion. Container movement over shallow-buried pipelines caused pipelines to be damaged, abandoned, and replaced. In the 1980's, the Nawiliwili Subdivision tenant leases were not renewed to make space for more bulk-container operations. By the mid-1990's, the Pier 1 building was removed, and Pier 3 was developed for use of inter-island bulk containers by Young Brothers. The bulk petroleum and sugar operations at Pier 2 remained the same. Cruise ships now utilize the Pier 2 area for passenger loading and unloading.

1.4 ENVIRONMENTAL INFORMATION

Available lists and summaries of environmental information pertaining to Nawiliwili Harbor records searches, industrial accidents, and environmental assessments are presented in *Environmental Site Assessment, Nawiliwili Harbor, Lihue, Kauai, Final, Volume I* (Earth Tech 2002). The most significant environmental information for the Pier 2 area describes releases at the Shell (now Shell/Equilon) terminal and pipeline leaks and/or poor housekeeping practices at the Lihue Plantation-AMFAC facility. This information is summarized below:

Shell. Three known releases reportedly occurred at the Shell Oil site; two are documented in a Law Engineering report, one in a Hawaii Department of Health (DOH), Hazard Evaluation and Emergency Response Office (HEER) report. The Law Engineering report indicated "About 6,000 gallons of Jet-A fuel was released in 1978 due to an underground pipeline leak between the site and the dock." The second release is not described; however, the report indicates the presence of petroleum hydrocarbons in monitoring wells (MW) at the Shell Nawiliwili terminal (MW-2, MW-3). A third release, involving an unknown amount of gasoline released from underground piping near a valve chamber, occurred in October 1993. The incident report noted that strong gasoline odors had been noticed from October 3, 1993 to October 5, 1993, when the hazardous materials notification was made. Line testing on October 7–9, 1993 indicated that the "Plus" gasoline line and pump-back line failed.

During the period from January 19 through October 19, 1994, 335 gallons of separate phase hydrocarbons were removed from three recovery wells (RW). This reduced the hydrocarbon layer thickness from a maximum of approximately 1 foot for wells RW-1 and MW-2 to 0.03 and 0.08 feet, respectively. The hydrocarbon layer thickness for RW-2 was reduced from a maximum of 0.65 feet to droplets in October 1994. Passive skimmers were removed in 1997, and pneumatic skimmers were removed from RW-1, RW-2 and MW-2 in August 2000.

Groundwater monitoring results indicated the following as of November 2000: 1) Separate-phase product has thinned to an immeasurable thickness near the monitoring wells. 2) Groundwater in the southeast area of the site is still contaminated with benzene and ethylbenzene at concentrations above DOH Tier 1 guidelines. 3) Total petroleum hydrocarbons (TPH) as gasoline and diesel are present at low concentrations across the site, except at the eastern and western site boundaries. 4) Methyl tertiary butyl ether (MTBE) is present in low concentrations at wells MW-2, product well (PW)-1, and PW-2, suggesting that Shell products may have contained MTBE at the time of the 1993 release. 5) MW-5 and MW-6 do not contain detectable levels of petroleum constituents, indicating that neighboring property activities are not impacting the Shell/Equilon site.

Other correspondence regarding the Shell/Equilon facility indicates that pipelines and tanks may have leaked (an Inter-Island Environmental Services letter dated February 26, 1998 states that Tank 1 [used for gasoline storage] was out of service due to a "leaking bottom") (Earth Tech 2002).

Lihue Plantation-AMFAC. In 1988, Lihue Plantation-AMFAC requested permission to install a new pipeline to replace badly deteriorated lines under Pier 2. By April of 1988, a leak had occurred from the pipeline in the Pier 2 area; the quantity of the release was unknown. DOT-HAR required Lihue Plantation-AMFAC to include removal of oil and oil-saturated soil with the installation of the new pipeline and to complete disposal within all applicable regulations, rules and guidelines. The U.S. Coast Guard requested to have a representative onsite for the removal action.

Lihue Plantation-AMFAC then lined the existing 6-inch fuel oil pipeline with high-density polyethylene lining material. Lihue Plantation-AMFAC stated the following regarding oil leakage:

> "Regarding the concern involving oil leaking from the pipeline; please be advised that the pipeline was drained immediately after testing and that it remains empty at this time. Also, water was used in one test, not oil, and that too was immediately removed after testing."
>
> "Be advised also, that the bulkhead area was checked daily for any evidence of oil and that none was ever seen."

HEER Release Database: 199607181110 (DOT-HAR). On July 18, 1996, DOT-HAR contractors found a two-inch layer of oil in a 10- by 20-yard trench approximately 380 feet west of the Pier 2 building. Although some of the oil moved out into the ocean via tidal action, most of the oil was contained by an in-place silt curtain. DOT-HAR subsequently ordered the contractor to backfill the area and terminate work. Most of the oil was apparently released from a tank owned by Kauai Sugar Storage Co. (analysis of the spilled oil correlated it to diesel fuel samples collected from the Kauai Sugar Storage Co. tanks). The DOH decided to perform an investigation/response action and notified Kauai Sugar Storage Co. that they were considered a potentially responsible party (Earth Tech 2002).

1.5 PROJECT OBJECTIVES AND SCOPE OF WORK

The objectives of the investigation were: 1) Collect analytical data representing chemical concentrations in subsurface soil for screening against the criteria listed in Table 1: DOH Tier 1 Action Levels for Soil, Rainfall Less Than or Equal to 200 centimeters per year (cm/year), Drinking Water Source Not Threatened (DOH 2000); and U.S. Environmental Protection Agency (EPA) Region IX Preliminary Remediation Goals (PRGs) for industrial soil (EPA 2002). 2) Identify areas of contaminated soil based on the screening evaluation so the improvement contractor can handle and/or dispose of soil from these areas without delaying construction.

The Pier 2 area contains bulk petroleum storage tanks and pipelines. Over time, tenants operating these facilities have reported releases and leaks from petroleum pipelines and tanks. Additionally, petroleum contamination has been encountered during previous construction in the Pier 2 area. Chemicals of potential concern (COPCs) for the Pier 2 area are related to potential petroleum product contamination: TPH as gasoline, diesel, and oil/grease; benzene, toluene, ethylbenzene, and xylenes (BTEX); MTBE; polynuclear aromatic hydrocarbons (PAHs); lead, chromium, and cadmium.

Available information for the North Pier 3 area indicates that facilities including a boathouse, machine shop, shop/office, gas station, icehouse, and tuna factory existed in this area from the 1930's through the 1950's. No data exists for these former facilities; however, petroleum, solvents, and paint constituents (metals, polychlorinated biphenyls [PCBs] and organotin) may have been released at these locations. COPCs for the Pier 3 area include the petroleum-related COPCs (listed above for the Pier 2 area), as well as chlorinated solvents, PCBs, organotin, and all metals listed in Table 1.

Table 1: Tier 1 Action Levels for Soil: Rainfall Less Than or Equal to 200 cm/year, Drinking Water Source Not Threatened, and US EPA Region IX Industrial Soil PRGs

Constituent	Concentration (ppm)
Benzene	1.7
Toluene	34
Ethylbenzene	0.5
Xylene	23
MTBE	20
Benzo(a)pyrene	1.0 DE
Acenaphthylene	18 SAT
Fluoranthene	11 SAT
Naphthalene	41 SAT
Lead (total)	400 DE
Cadmium (total)	38 DE
TPH gasoline	2,000
TPH diesel/oil	5,000
Perchloroethylene (PCE)	5
1,1 Dichloroethylene (1,1 DCE)	0.47
Vinyl Chloride (VC)	0.18
Trichloroethylene (TCE)	1.5
1,1,1 trichloroethane (1,1,1 TCA)	3.0
PCBs (all)	1
Organotin*	180
Lead	400
Chromium	38
Cadmium*	4.5E+02
Nickel*	2.0E+04
Arsenic*	1.6E+00
Antimony*	4.1E+02
Magnesium*	1.9E+04
Silver*	5.1E+03
Copper*	4.1E+04
Zinc*	1.0E+05
Aluminum*	1.0E+05
Iron*	1.0E+05

Sources: State of Hawaii, Department of Health, Technical Guidance Manual For Underground Storage Tank Closure and Release Response, March 2000, and * EPA Region IX industrial soil PRGs

ppm parts per million
DE Direct-exposure concerns dominate.
SAT Saturation concentration, groundwater-protection concerns dominate.

The scope of work for the subsurface investigation included planning, mobilization to the site, utility clearance, drilling, subsurface soil sampling, field sample screening, surveying, chemical analysis of samples, data evaluation, and report production.

2.0 METHODOLOGY

Unless otherwise noted, all investigation activities were conducted in accordance with the project planning documents: 1) Work Plan (WP) (Earth Tech 2004a), 2) Field Sampling Plan (Earth Tech

2004b), 3) Quality Assurance Project Plan (Earth Tech 2004c), and 4) Health and Safety Plan (Earth Tech 2004d).

2.1 UTILITY SURVEY/SITE CLEARANCE

A geophysical survey was performed at each of the proposed boring locations prior to the initiation of drilling activities. Local utility companies were also notified and queried to identify utility locations. The survey utilized an electromagnetic pipe/cable locator consisting of a signal generator and receiver to identify buried utilities that could potentially be impacted by drilling activities. Ground penetrating radar was used to detect non-metallic features. All buried lines and cables identified during the survey were marked on the ground and noted on maps. Drilling locations were adjusted in the field if necessary based on the results of the utility surveys.

2.2 DRILLING AND SOIL SAMPLING

Borings were advanced at seven locations to collect subsurface soil samples from the proposed excavation areas. The boring locations are shown on Figure 4. Boring depths and analytical sampling intervals are listed in Table 2.

Table 2: Boring Depths and Sampling Intervals

Boring Identifier	Total Depth of Boring (feet bgs)	Soil Sampling Intervals (feet bgs)[a]
SB-1	9.0	2.0 & 3.0
SB-2	8.5	2.0 & 4.0[b]
SB-3	8.5	2.0 & 4.0
SB-4	4.0	4.0
SB-5	5.0	4.5
SB-6	6.0	1.5, 5.5 & 6.0[b]
SB-7	4.5	4.0

[a] Samples submitted to the analytical laboratory for chemical analysis
[b] Duplicate sample collected at this depth

2.2.1 Drilling

The borings were advanced through soil with eight-inch diameter hollow stem augers. Upon encountering competent rock, the augers were disconnected, and a connection collar was placed in the boring to allow downhole placement of the core barrel and direct effluent air and drill cuttings to a collection system. Data were recorded on boring logs (presented in Appendix A). Soil and rock cuttings generated during drilling were containerized in 55-gallon DOT-approved drums as described in Section 2.6.

2.2.2 Sampling

Soil and rock core samples were collected from the borings to investigate the subsurface geology, perform headspace screening for organic vapors, and for analysis of the COPCs identified in Section 1.5. Soil samples were collected with a split spoon sampler. Rock core samples were collected with an air-driven core barrel. Each boring was sampled continuously starting from approximately ground surface or one foot bgs to the total depth. Soil sampling was performed in accordance with American Society for Testing and Materials (ASTM) 1586 (Standard Penetration Test). Rock coring was performed in accordance with ASTM Method D2113 (Practice for Diamond Core Drilling for Site Investigations). Samples were logged in conformance with the Visual Classification of Soils by the Unified Soil Classification System.

2.2.3 Decontamination

Prior to drilling at each location, the hollow stem augers, core barrels, and rods were steam cleaned in a lined decontamination pit to reduce the potential for cross contamination. Other non-disposable sampling equipment was washed in an Alconox solution, rinsed with potable water, and rinsed again with distilled water. Water generated during equipment decontamination was contained and transferred to properly labeled, 55-gallon, U.S. Department of Transportation (DOT)-approved drums as described in Section 2.6.

2.3 HEADSPACE VAPOR SCREENING

Headspace vapor screening was performed to acquire preliminary information indicating the presence or absence of petroleum hydrocarbons in the subsurface samples. Portions of the samples were removed from the liners, placed into single-use zip-lock bags, and sealed. The sample headspace was then allowed to equilibrate for approximately 10 minutes. The headspace vapor was then analyzed by inserting the probe of a photoionization detector (PID) into the sealed bag and recording the maximum reading. Methane readings collected during Health and Safety monitoring at each boring were also recorded on each boring log.

2.4 LABORATORY ANALYSIS

Thirteen subsurface soil and rock samples were submitted to the laboratory for chemical analysis. Two analytical samples were collected from each of the deep borings (SB-1, SB-2, SB-3, and SB-6). The upper sample was collected from the depth with the strongest indication of contamination (i.e., odor, staining, or high PID readings), and the lower sample was collected at the groundwater interface or final depth of the boring. Analytical samples from the shallow borings (SB-4, SB-5, and SB-7) were collected at the final depths of the borings. Duplicate soil samples were collected from SB-2 and SB-6. The samples were placed in laboratory-supplied containers, packed in coolers with ice, and shipped to the laboratory for analysis. Encore samplers were used to collect soil aliquots for BTEX, MTBE, and TPH-gasoline analyses where the sampler could penetrate the soils. Four-ounce jars were used for BTEX/MTBE/TPH-gasoline samples collected at the gravel/rock sampling locations. Sampling data were recorded on boring logs (Appendix A) and chain-of-custody forms (Appendix C). The laboratory analytical program is summarized in Table 3.

Table 3: Laboratory Analytical Program

Analytical Method	Reporting Unit	Matrix	Number of Analyses	Analyte Type
SW-846 8015B	ppm	Soil	15[a]	TPH-diesel
SW-846 8015B	ppm	Soil	15[a]	TPH-oil
SW-846 SW 8021B	ppm	Soil	15[a]	BTEX, MTBE, TPH-gasoline
SW-846 SW 8270C	ppm	Soil	15[a]	PAHs
SW-846 SW 8260B	ppm	Soil	7[b]	Chlorinated Solvents[c]
SW-846 SW 8082	ppm	Soil	7[b]	PCBs
SW-846 SW 8323	ppm	Soil	6	Organotin
SW-846 SW 6000/7000 Series	ppm	Soil	6[d] 7[e]	Total Metals (Lead, Chromium, Nickel, Cadmium, Arsenic, Antimony, Magnesium, Silver, Copper, Zinc, Aluminum, Iron, Calcium)

ppm parts per million
[a] 11 primary samples, 2 duplicates, 1 field blank, and 1 equipment rinsate (Pier 2 and North Pier 3 borings).
[b] 6 primary samples and 1 duplicate (North Pier 3 borings).
[c] Chlorinated solvents: PCE, 1,1 DCE, VC, TCE, 1,1,1 TCA
[d] 5 primary samples and 1 duplicate, analyzed for lead, chromium and cadmium only (Pier 2 borings).
[e] 6 primary samples and 1 duplicate, analyzed for all listed metals (North Pier 3 borings).

2.5 SAMPLING LOCATION SURVEY

A licensed surveyor performed a precision survey of the boring locations (northings and eastings) and elevations (+/- 0.01 foot). The data were used to establish the boring locations depicted on Figure 4.

2.6 INVESTIGATION-DERIVED WASTE MANAGEMENT

Investigation-derived waste (IDW) was segregated for proper disposal as described below:

- IDW generated during sampling (gloves, plastic, etc.) was cleaned, collected, double bagged, and disposed of as municipal waste
- Decontamination fluids from the sampling equipment were collected and containerized in U.S. DOT-approved drums
- Soil and rock cuttings from drilling were collected and containerized in DOT-approved drums

All drums were labeled (with a permanent label on one area of the drum and paint marker on a second area of the drum) with the following information:

- Source points of the IDW (e.g., soil cuttings from SB-02 in the North Pier 3 area at Nawiliwili Harbor)
- Date of generation
- Generator of the IDW (i.e., DOT-HAR Contact)
- Consultant contact and phone number
- Suspected hazardous or non-hazardous contaminants. It is anticipated that the contaminants will be non-hazardous and require non-hazardous labeling.

The IDW drums were staged on pallets in a secured, DOT-HAR designated area. The IDW evaluation will consist of a preliminary screening of chemical analytical data from the sources (soil from the borings) to establish the approximate levels of contamination. The waste disposal subcontractor will then be notified and the preliminary information will be provided. After the disposal subcontractor assesses the preliminary analytical data from the sources, IDW characterization sampling and analyses will be performed if necessary. The analyses will characterize the waste to identify an appropriate disposal facility. Soil and water composite samples will be collected if required for IDW characterization and analyzed for total recoverable hydrocarbons, eight Resource Conservation and Recovery Act (RCRA) metals, and flash point. The data will be provided to the disposal contractor for incorporation into the waste profile for disposal. It is anticipated that the IDW will require non-hazardous disposal.

After the disposal facility accepts the waste profile, DOT-HAR will be notified by letter of the results and the disposal facility. IDW disposal manifests will be signed by the generator. The waste disposal subcontractor will then transport the IDW to the accepting facility for disposal. Receipts/manifests will be provided to the generator and Earth Tech. IDW disposal will be documented in a letter to DOT-HAR with the appended receipts/manifests.

2.7 DEVIATIONS FROM THE PLANNING DOCUMENTS

The WP (Earth Tech 2004d) specified that the three North Pier 3 borings (SB-1, SB-2, and SB-3) were to be drilled to depths of 12, 28, and 13 feet bgs, respectively; however, a field decision was made to terminate the borings at the groundwater interface, or slightly below. Water levels observed from wet soil samples were approximately 3.5 feet bgs at SB-1 and 7.0 feet bgs at SB-2 and SB-3. Attempts were made to drill through the large boulders and sediments below the water table in the North Pier 3 subsurface using NX coring as specified in FSP; however, little soil or rock recovery was achieved. It appeared to the field geologist that a combination of hard basalt boulder fragments and silty marine sediments washed out of the core barrel during advancement and sample withdrawal; no evidence of contamination was observed in these materials. The lack of sample recovery in the North Pier 3 area was discussed during a phone conference with the Honolulu offices of Earth Tech and DOT-HAR on April 21, 2004. The discussion concluded that contamination from the suspected sources, i.e., surface spillage, was unlikely to migrate below the water table into the boulders and surrounding marine sediments. Therefore, the North Pier 3 borings were terminated at 8.5 – 9 feet bgs. Soil samples from these borings were collected in the fill soils beneath the asphalt pavement to approximately 4 feet bgs. If contamination is observed during pier construction, then appropriate protective measures will be taken (e.g., worker air monitoring and impacted soils segregation, testing, storage and disposal).

Total depths of borings SB-4, SB-5, SB-6 and SB-7 deviated slightly from the planning documents as follows:

- SB-4 total depth was advanced to 4 feet bgs instead of the proposed 3 feet bgs to further observe soil discoloration.
- SB-5 total depth was advanced to 5 feet bgs instead of the proposed 3 feet bgs to further observe soil discoloration and suspect odors in soil.
- SB-6 total depth was terminated at 6 feet bgs instead of the proposed 7 feet bgs due to encountered groundwater at 5.5 feet bgs.
- SB-7 total depth was advanced to 4.5 feet bgs instead of the proposed 3 feet bgs to further observe soil discoloration.

3.0 INVESTIGATION RESULTS

The investigation results, i.e., field observations, field screening test results, and laboratory analytical results are presented in this section.

3.1 SITE SOILS AND GEOLOGY

Soil observed during the subsurface investigation appeared to be introduced from harbor dredging activities or emplaced from inland sources of processed rock and fill material. Hollow stem auger drilling and sampling in the North Pier 3 area encountered hard, blue gray basalt boulders and cobbles in fine marine sediments. At the elevated loading dock locations (SB-2 and SB-3), a silty gravel fill with some clay was encountered from ground surface to about sea level (~6 feet bgs) where basalt boulders were again encountered. The North Pier 3 area soils are typical of bulkhead and dockside construction adjacent to a hand-laid riprap harbor boundary.

At the sidewalk boring locations (SB-4 and SB-5) near Waapa Road, soil samples collected from ground surface to approximately 5 feet bgs represented typical imported sandy coral sand and gravel fill material with some lenses of clayey material. The soil in this parking lot area is mechanically compacted and acts as a base course.

The Pier 2 comfort station borings (SB-6 and SB-7) encountered sandy fill soils. The sandy fill in the SB-6 location is a loose fine sand of light brown to pink color down to approximately 3 feet bgs, where it grades into gravelly sand with some silty clay. The silty clay has some remnant saprolitic structure (e.g., rock fractures and vesicles). The SB-7 boring was advanced within the Pier 2 Shed at the site of the future comfort station to a total depth of approximately 4.5 feet bgs (see Photo #7 in Appendix B). Soil encountered in the SB-7 boring was fine-grained fill sand, which was noticeably darkened/discolored from approximately 3.5 feet to 4.5 feet bgs. Hydrocarbon odor was discernable in the soils recovered from SB-6 and SB-7.

3.2 ANALYTICAL RESULTS

Results of the field screening tests and laboratory analysis of the subsurface soil samples collected from the Pier 2 and North Pier 3 borings are presented in this section.

3.2.1 Headspace Vapor Screening Results

Soil samples were collected in a zip lock baggie and allowed to off gas as described in Section 2.3. A MineRAE Plus PID was used to measure headspace vapors in soil samples collected for laboratory testing as well as the general lithologic samples. At each of the seven borings, detectable petroleum hydrocarbon gases were indicated by the PID headspace testing. PID readings representing the laboratory and lithologic samples are summarized in Table 4. The PID was also used to perform periodic air sampling in the drilling work zone for health and safety monitoring. Additional air monitoring was performed with a Gastech GT402 gas monitoring instrument to measure methane and oxygen in and around the drilling workspace during the subsurface investigation. All health and safety monitoring with the PID and GT402 indicated nondetectable readings of hazardous gases, and safe levels of oxygen near the drilling work space.

The SB-6 boring (near the comfort station leach field and former petroleum pipeline activity), exhibited drill cuttings that appeared to be impacted by some type of petroleum hydrocarbon release. Boring SB-7 had darkly discolored soils; however, the laboratory data do not confirm petroleum constituents at SB-7. Similarly, soils from SB-4 and SB-5 contained discoloration and odoriferous characteristics typical of petroleum impacts, but the laboratory data generally do not support those observations.

Table 4: PID Readings for Headspace Vapors in Soil Samples

Sample ID	Boring ID	Depth (feet bgs)	PID Reading (ppm)
NH-NB-SB01-S2.0	SB-1	2	3
NH-NB-SB02-S2.0	SB-2	2	3
NH-NB-SB02-S4.0	SB-2	4	150
NH-NB-SB03-S2.0	SB-3	2	22
NH-NB-SB03-S4.0	SB-3	4	17
Grab sample	SB-4	2	46
NH-SW-SB04-S4.5	SB-4	4.5	53
Grab sample	SB-5	1.5	70
Grab sample	SB-5	4.0	43
NH-SW-SB05-S4.5	SB-5	4.5	61
NH-RR-SB06-S1.5	SB-6	1.5	3
Grab sample	SB-6	4.5	160
NH-RR-SB06-D6.0	SB-6	6	70
Grab sample	SB-7	2	57
NH-RR-SB07-S4.0	SB-7	4	63

ppm parts per million

3.2.2 Laboratory Analytical Results

Eleven field soil samples and two duplicate soil samples were submitted to ESN Pacific laboratory of Honolulu and APCL Laboratory of Chino, California for analysis of the project COPCs. Laboratory results indicated that the majority of detections were only slightly above the practical quantitation limits of the project laboratories and below regulatory action levels.

TPH-diesel and arsenic were detected in soil samples at concentrations above the DOH Tier 1 soil action level (SAL) for Sites where the Drinking Water Source Is Not Threatened and EPA Region IX PRG for industrial soil, respectively. Chemical concentrations detected in the subsurface soil samples collected from the Pier 2 and North Pier 3 borings are presented in Table 5 and discussed below. Where a normal field sample and co-located duplicate were collected, the higher concentration value is reported. The laboratory data forms are presented in Appendix C.

TPH. Two TPH detections were reported by the laboratory as follows:

1. The sample from 4.5 feet bgs in soil boring SB-5 contained 82 parts per million (ppm) TPH-oil; well below the 5,000 ppm DOH Tier 1 SAL.

2. The sample from 5.5 feet bgs in soil boring SB-6 contained 5,800 ppm TPH-diesel; exceeding the 5,000 ppm DOH Tier I SAL.

Chlorinated Solvents. No detections of chlorinated solvents were reported for any of the samples.

BTEX and MTBE. Detections of BTEX (0.19 ppm of benzene and 0.07 ppm of toluene) were reported. These concentrations are well below the DOH Tier I SALs for benzene and toluene (1.7 and 34 ppm respectively).

PAHs. Two minor PAH detections were reported: acenaphthene (0.14 ppm) and fluoranthene (0.11 ppm). These concentrations are well below the DOH Tier I SALs for acenaphthene and fluoranthene (18 and 11 ppm respectively).

PCBs. No detections of PCBs were reported for any of the samples analyzed. Detection limits ranged from 0.05 ppm to 0.020 ppm (well below the 1.0 ppm DOH Tier I SAL for PCBs).

Metals. Results for petroleum-related metals (lead, cadmium, and chromium) are as follows:

- Lead was detected at concentrations ranging from 9.2 ppm to 110 ppm. The DOH Tier I SAL for lead is 400 ppm.
- Chromium was detected at concentrations ranging from 21 ppm to 140 ppm. The EPA Region IX industrial PRG for chromium is 450 ppm.
- No cadmium was detected in any of the samples. The detection limit (1.0 ppm) was well below the 38 ppm DOH Tier I SAL for cadmium.

Table 5: Summary of April 2004 Soil Analyses, Nawiliwili Harbor-DOT Kauai

Soil Boring ID No.	SB-1		SB-2		SB-3		SB-4	SB-5	SB-6		SB-7	Regulatory Action Levels [1]
Sampling Depth	2.0 ft bgs	3.0 ft bgs	2.0 ft bgs	4.0 ft bgs	2.0 ft bgs	4.0 ft bgs	4.0 ft bgs	4.5 ft bgs	1.5 ft bgs	5.5 ft bgs	4.0 ft bgs	
Sampling Date	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	
Sample ID	NH-NP-SB01-S2.0	NH-NP-SB01-S3.0	NH-NP-SB02-S2.0	NH-NP-SB02-S4.0	NH-NP-SB03-S2.0	NH-NP-SB03-S4.0	NH-SW-SB04-S4.0	NH-SW-SB05-S4.5	NH-RR-SB06-S1.5	NH-RR-SB06-S5.5	NH-RR-SB07-S4.0	
TPH-diesel	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	***5,800***	ND(20)	5,000
TPH-gasoline	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	2,000
TPH-oil	ND(40)	ND(40)	ND(40)	ND(40)	ND(40)	ND(40)	ND(40)	82	ND(40)	ND(40)	ND(40)	5,000
Vinyl Chloride	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	0.18
1,1 dichloroethylene	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	0.47
1,1,1 trichloroethane	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	3.0
Trichloroethylene	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	1.5
Tetrachloroethane	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	5.0
Benzene	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	0.19	ND(0.02)	ND(0.02)	ND(0.02)	1.7
Toluene	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	0.07	ND(0.05)	ND(0.05)	ND(0.05)	34
Ethylbenzene	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	0.50
Xylenes	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	23
MTBE	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	20
Acenaphthene	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.14	ND(0.10)	18
Benzo(a)pyrene	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	1
Fluoranthene	0.11	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	11
Naphthalene	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	41
PCBs	ND[2]	ND[2]	ND[2]	ND[2]	ND[2]	ND[2]	NT	NT	NT	NT	NT	1.0
Lead	21	37	ND(5.0)	ND(5.0)	110	70	49	ND(5.0)	ND(5.0)	ND(5.0)	9.2	400
Cadmium	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	38
Chromium	22	32	97	140	63	80	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	4.5E+02*
Nickel	1,200	1,000	950	1,200	970	1,200	NT	NT	NT	NT	NT	2.0E+04*
Arsenic	***53***	***84***	ND(5)	***80***	***64***	***93***	NT	NT	NT	NT	NT	1.6E+00*
Antimony	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	NT	NT	NT	NT	NT	4.1E+02*
Magnesium	***24,200***	15,800	1,040	2,270	4,070	6,110	NT	NT	NT	NT	NT	1.9E+04*
Silver	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	NT	NT	NT	NT	NT	5.1E+03*
Copper	210	150	200	130	120	130	NT	NT	NT	NT	NT	4.1E+04*
Zinc	47	93	33	36	39	42	NT	NT	NT	NT	NT	1.0E+05*
Aluminum	23,500	19,800	48,600	32,100	37,000	31,200	NT	NT	NT	NT	NT	1.0E+05*
Iron	630	620	700	640	650	600	NT	NT	NT	NT	NT	1.0E+05*
Organotin	ND(0.011)	ND(0.011)	ND(0.014)	ND(0.014)	ND(0.013)	ND(0.012)	NT	NT	NT	NT	NT	1.8E+02*

All concentrations in parts per million (ppm)
Bold Italics denotes detected value exceeds the DOH Tier 1 Soil Action Level or EPA Region IX industrial soil PRG
ft. bgs feet below ground surface
ND not detected above method reporting limit (MRL). The MRL is listed in parentheses.
NT analyte not tested
[1] Sources: State of Hawaii, Department of Health, Technical Guidance Manual For Underground Storage Tank Closure and Release Response, March 2000, and * EPA Region IX industrial soil PRGs
[2] Seven PCB Aroclors (1016, 1221, 1232, 1242, 1248, 1254, 1260), MRLs ranging from 0.05 to 0.20 ppm.

Additional metals (magnesium and aluminum) and heavy metals (nickel, arsenic, antimony, silver, copper, zinc, and iron) were detected among the North Pier 3 soil samples:

- Nickel was detected at concentrations ranging from 950 ppm to 1,200 ppm. The EPA Region IX PRG for nickel is 20,000 ppm.
- Copper was detected at concentrations ranging from 120 ppm to 210 ppm. The EPA Region IX PRG for copper is 41,000 ppm.
- Zinc was detected at concentrations ranging from 33 ppm to 93ppm. The EPA Region IX PRG for zinc is 100,000 ppm.
- Aluminum was detected at concentrations ranging from 19,800 ppm to 48,600 ppm. The EPA Region IX PRG for aluminum is 100,000 ppm.
- Iron was detected at concentrations ranging from 600 ppm to 700 ppm. The EPA Region IX PRG for iron is 100,000 ppm.
- No antimony or silver were detected in any of the samples.
- Magnesium was detected at concentrations ranging from 1,040 ppm to 24,200 ppm. The magnesium concentration detected in a sample from SB-1 slightly exceeded the EPA *Region IX PRG for magnesium: 19,000 ppm.*
- Arsenic was detected at concentrations ranging from 53 ppm to 93 ppm. All detected arsenic concentrations exceeded the EPA Region IX PRG for arsenic: 1.6 ppm.

Organotin. No organotin compounds were detected in any of the samples. The detection limits (0.011 ppm to 0.014 ppm) are well below the 180 ppm EPA Region IX PRG for organotin compounds.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Evidence of petroleum contamination (e.g., staining, odor) was observed in soil samples examined during the field investigation. However, results of the laboratory analysis indicate that, with the exception of TPH-diesel in one sample from a Pier 2 area boring (SB-6) and arsenic in samples from the North Pier 3 area borings, chemical concentrations in soil encountered in the borings are generally within acceptable levels.

In the Pier 2 area, evidence of petroleum contamination was observed in borings SB-4, SB-5, SB-6, and SB-7. The analytical data indicate the contamination consists of heavy molecular weight hydrocarbons that have low solubility in water and tend to sorb strongly to soil particles. The detected petroleum constituents are therefore likely to remain relatively immobile in subsurface soil at the site.

Although Hawaiian soils are known to contain relatively high levels (typically 5 to 20 ppm) of naturally occurring arsenic, the concentrations reported by the analytical laboratory (53 to 93 ppm) exceed levels commonly observed in natural "background" soils. The background concentration range for arsenic in natural soils in the Nawiliwili Harbor area has not been documented. The detected arsenic concentrations are also well above the EPA Region IX PRG for industrial soil (1.6 ppm). The arsenic detected in the North Pier 3 soil samples is not correlated with elevated concentrations of other COPCs (i.e., chemicals suspected to have been used at the North Pier 3 site). Therefore, the arsenic does not appear to be associated with a chemical release that occurred at the site, but may be associated with dredged sediments from the harbor or other fill placed at the North Pier 3 location during former construction. Arsenic is likely to be relatively immobile in subsurface soil at the site due to sorption to silt and clay, which were encountered in the North Pier 3 borings.

Although arsenic concentrations detected in the soil samples exceed levels commonly observed in natural soils, no action that could delay the construction planned for Project H.C. 7275 is recommended to address arsenic in soil. As noted in Section 4.2, the arsenic concentrations are not high enough to present an exposure hazard during excavation activities. At some point in the future (after Project H.C. 7275 is completed), further investigation may be necessary to confirm the elevated arsenic concentrations, evaluate the extent of arsenic contamination at the site, and assess potential risks to human and ecological receptors (particularly if site use changes in the future). However, the North Pier 3 area is an industrial site; therefore, significant human exposure to arsenic-impacted soil is not expected (particularly after Project H.C. 7275 is completed); therefore, further investigation may not be warranted. If further investigation is performed, data should be collected from outside the areas suspected to be impacted by chemicals released at the site or present in fill placed at the site. This would allow investigators to perform a background analysis to estimate the site-specific background concentration range for arsenic, and evaluate the extent of the arsenic-impacted area. It should be noted, however, that because above-background arsenic concentrations are likely to be associated with fill material dredged from the harbor, arsenic may occur at elevated concentrations in fill throughout the Nawiliwili area.

4.1 Soil Handling and Disposal Recommendations

The construction contractor should be prepared to handle petroleum and arsenic impacted soils that will likely be encountered during excavation work in the Pier 2 and North Pier 3 project (H.C. 7275) area. Workers should take the health and safety precautions described in Section 4.2. Construction planning documents should address proper worker safety and protection. An environmental specialist trained and certified in hazardous waste operations (minimum 40 hour training in 29 Code of Federal Regulations [CFR] 1910 and 29 CFR 1910.120) should oversee and direct soil excavations, particularly in the areas near SB-4, SB-5, SB-6, and SB-7 at Pier 2, where petroleum-impacted soils are likely to be encountered in the subsurface. If possible, excavation pit liners should be installed after excavations have reached their total depths to mark the extent of excavation in case of future intrusive activities. Liners should consist of a layer of five millimeter thick (or heavier) plastic sheeting laid against the excavation walls and floor before backfilling.

4.1.1 Petroleum Impacted Soils

All excavated soils should be field screened with a PID and inspected for staining and odor to identify soils likely to be impacted by petroleum constituents. Soils identified as potentially petroleum-impacted should be properly segregated, stockpiled onsite, and tested to quantify TPH levels prior to placement back into the excavation or off-site disposal. The PID readings and analytical results acquired during the investigation indicate that soils with PID readings greater than 150 ppm should be considered potentially petroleum-impacted. Soils with heavy petroleum staining or odor should also be considered potentially petroleum-impacted. Representative samples of soils identified as potentially petroleum-impacted should be tested for TPH by EPA SW-846 Method 8015B. Soils with TPH concentrations less than DOH Tier I SALs (2,000 ppm for TPH-gasoline, and 5,000 ppm for TPH-diesel and TPH-oil) can be placed back into the excavations from which they were removed. Soils with TPH concentrations greater than the DOH Tier I SALs should be disposed of off-site at a facility approved to accept petroleum-contaminated soil (note, however, that the analytical data indicate that TPH levels above the DOH Tier 1 SALs are likely to be encountered only in the vicinity of Pier 2 boring SB-6).

4.1.2 Arsenic Impacted Soils

The construction contractor should assume that the excavated soil is arsenic-impacted. Therefore, wherever possible, the construction contractor should replace non-petroleum impacted soil in the same excavation, at approximately the same depth from which it was removed. For example, soil removed from the bottom of the excavation should be replaced first, and soil removed near the surface should be replaced last. This will result in no significant changes in current conditions with respect to risk associated with arsenic in soil. For example, soil with higher arsenic concentrations that may exist well below the surface would be replaced at approximately the same depth, thus avoiding exposure at the surface where it could increase the level of risk at the site.

If soil cannot be replaced in the same excavation from which it was removed, the soil should be stockpiled on-site, covered with protective sheeting (e.g., plastic tarps), and clearly marked. The construction contractor should consult DOT-HAR to identify a suitable area to stockpile the soil. The following alternatives should be considered for disposal or re-use of the soil:

Municipal solid waste landfill. The analytical results indicate that soil in the construction area does not qualify as hazardous waste under RCRA, and therefore can be disposed of as non-hazardous waste in a municipal solid waste landfill. In order to be considered hazardous waste under the RCRA toxicity characteristic (the only potentially applicable characteristic for the soil), extract from the RCRA Toxicity Characteristic Leaching Procedure (TCLP) would have to contain an arsenic concentration equal to or greater than 5 ppm (40 CFR 261.24). According to the TCLP (Method 1311, published in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846), the weight of extract fluid to be used in the TCLP should be 20 times the weight of the sample of solid waste. Therefore, even if the entire mass of a chemical is leached from the solid waste sample, the concentration in the TCLP extract can be no higher than 1/20 of the concentration in the sample (i.e., dilution by a factor of 20). For example, if the arsenic concentration in a soil sample is 100 ppm, and the TCLP extracts all of the arsenic from the sample, the concentration in the extract would be 100 ppm/20, or 5 ppm. Arsenic concentrations detected in the North Pier 3 soil samples ranged from 53 to 93 ppm. Therefore, even if all the arsenic were extracted from the soil samples, which is unlikely due to constraints imposed by solubility and sorption to the solid matrix, the corresponding TCLP extract could contain no more than 93 ppm/20, or 4.65 ppm (less than the 5 ppm toxicity characteristic criterion for arsenic). If excess soil requires disposal, the analytical results acquired during this investigation (or subsequent testing, if available) should be presented to the local municipal solid waste landfill in order to obtain approval for landfill disposal.

Onsite burial. As an alternative to landfill disposal, excess soil that cannot be replaced in the excavation from which it was removed could be buried on-site and covered with a minimum 2-foot-thick layer of clean soil. This alternative may be appropriate if fill is needed in certain areas of the site.

4.2 SAFETY CONSIDERATIONS DURING EXCAVATION

Soils in the proposed excavation areas contain heavy molecular weight petroleum hydrocarbons and arsenic. Workers could be exposed to these chemicals via inhalation and/or skin contact while excavating, entering excavations/access pits, or collecting soil samples. Protection should be provided using personal protective equipment (PPE) and direct-reading monitoring procedures (e.g., PID instruments). PPE requirements are as follows:

- Hard hats
- Safety glasses
- Hearing protection
- Reflective safety vests
- Leather/work gloves (where required)
- Short/long-sleeved shirt
- Long pants
- Safety-toe boots

In addition to the PPE required for this work, nitrile gloves are recommended during collection and handling of contaminated soil.

Although elevated arsenic concentrations (approximately 50 to 90 ppm) were detected in soil samples collected during the investigation, the levels are not high enough to present an exposure hazard during excavation. If inhalation exposure is an issue (e.g., dusty conditions), respiratory protection is recommended using a full-face air-purifying respirator with P100/Organic vapor cartridges in accordance with 29 CFR Part 1910, Occupational Safety and Health Standards (with specific attention to Section 120, Hazardous Waste Operations and Emergency Response). If skin exposure is likely, chemical-resistant coveralls and boots are recommended.

Open excavations can pose potential slip/fall hazards to workers. Open excavations/pits should not be left unattended, and all permitted entries and exits should be accomplished using portable ladders in accordance with 29 CFR Part 1910. The following factors should be evaluated by a competent person and discussed before commencing excavation operations:

Soil Structure. Excavations in wet soil, sandy soil, or backfilled areas are relatively unstable and must be supported or sloped if employees are to enter the excavation.

Weather Conditions. Changing weather conditions greatly affect safety in and around excavations. Excess water from rain or other sources will loosen the soil, increasing the chance of a cave-in. Excavations should be diked, pumped, or covered to prevent excessive water accumulation.

Superimposed Loads. Loads near excavation walls increase the probability of a cave-in. Heavy equipment and materials should be kept back as far as possible from the edge of an excavation. Heavy equipment should be placed on wooden mats or planking to spread the weight more evenly. Considerations must also be taken when buildings, curbs, trees, utility poles, and other structures surround the excavation. Excavated soil must be stored well away from the edge of the excavation.

Shoring. OSHA requires that all excavations more than 5 feet deep that will be entered by employees must be shored, sheeted, braced, or supported.

In addition, use of a front-end loader, excavator, or backhoe during excavation introduces significant hazards associated with operating heavy equipment. Operation of this equipment must meet the following requirements:

- Operators shall have all appropriate local, state, and federal licenses and training to operate a designated piece of heavy equipment. Operators shall be knowledgeable and competent in the operation of heavy equipment.
- All heavy equipment shall be inspected and if necessary, repaired prior to use. Operators shall not operate heavy equipment that has not been cleared for use. All machinery and mechanized equipment must be certified to be in safe operating condition.
- Ground personnel shall always yield to heavy equipment.
- To maintain visibility, it is recommended that personnel wear reflective safety vests and maintain eye contact with equipment operators at all times while in the field.

5.0 REFERENCES

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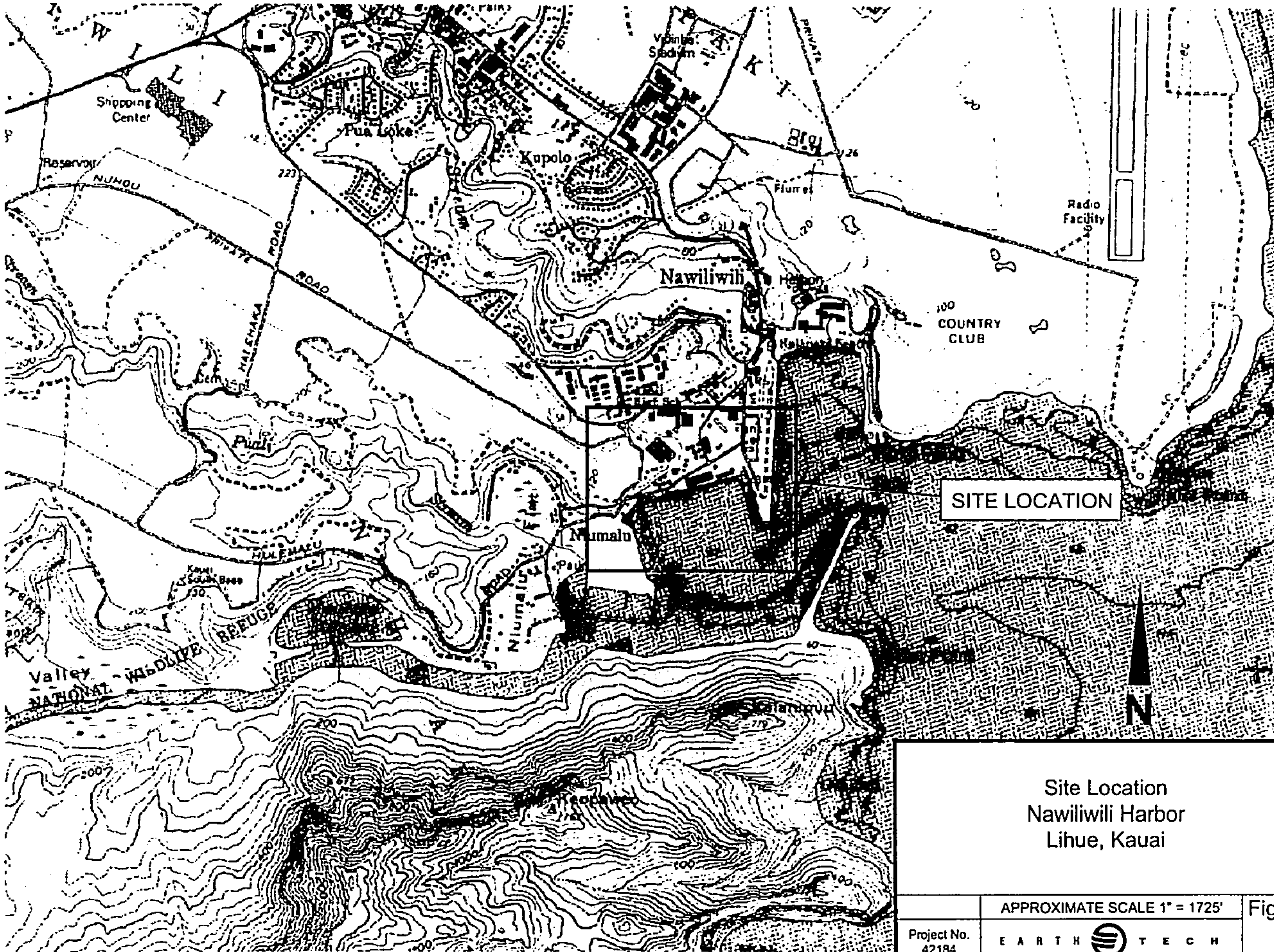

Site Location
Nawiliwili Harbor
Lihue, Kauai

Project No. 42184	APPROXIMATE SCALE 1" = 1725' EARTH TECH	Figure 1

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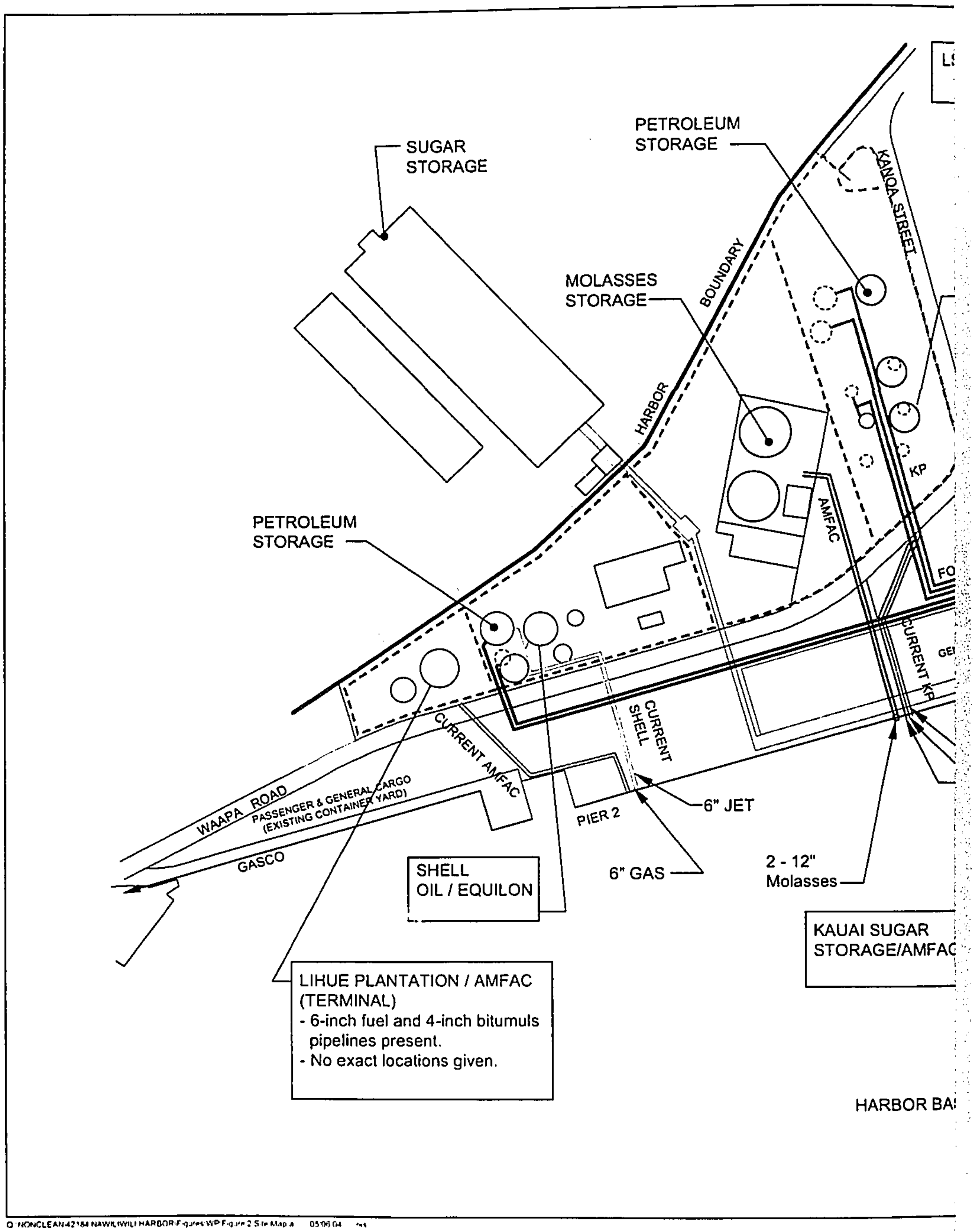
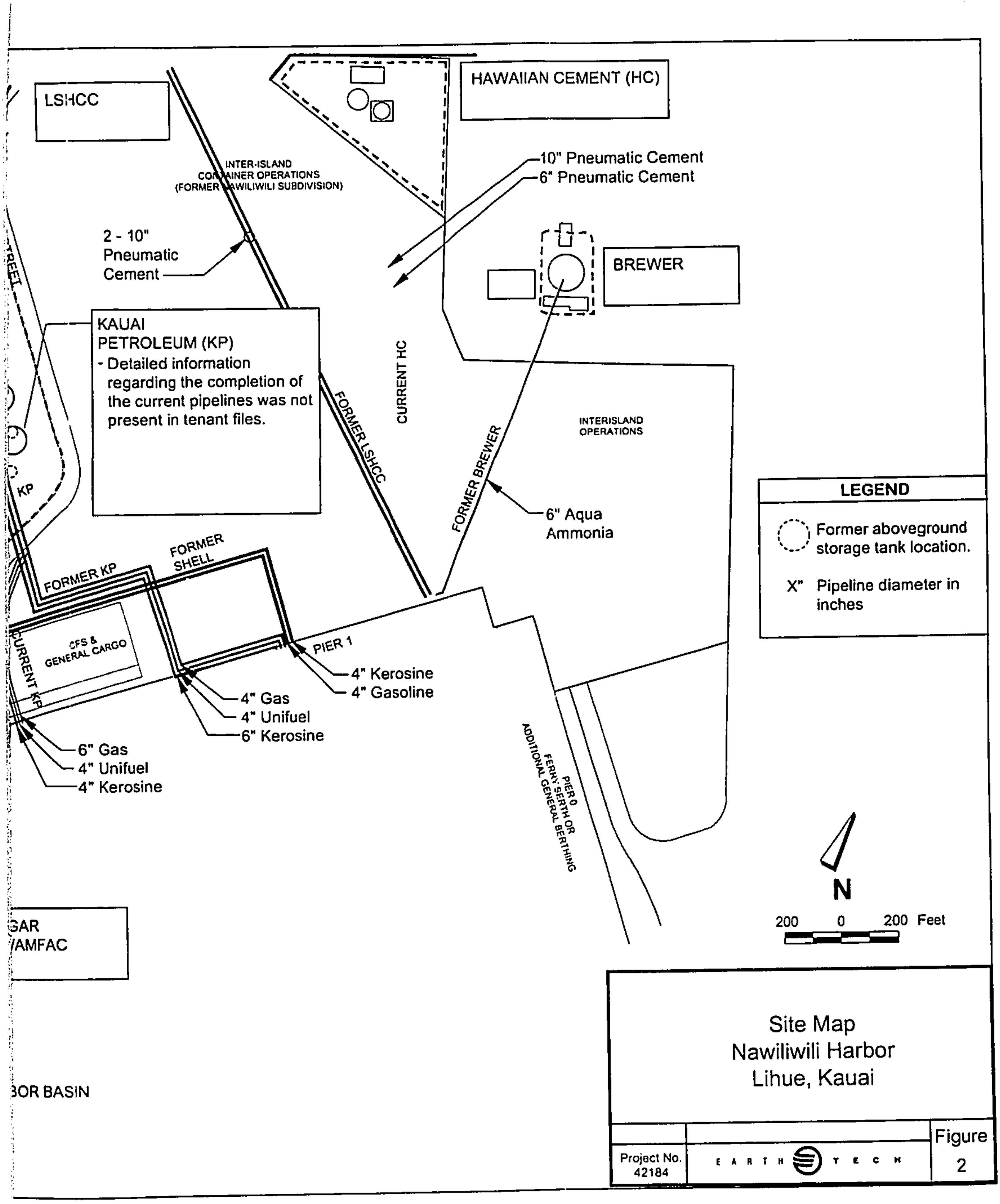


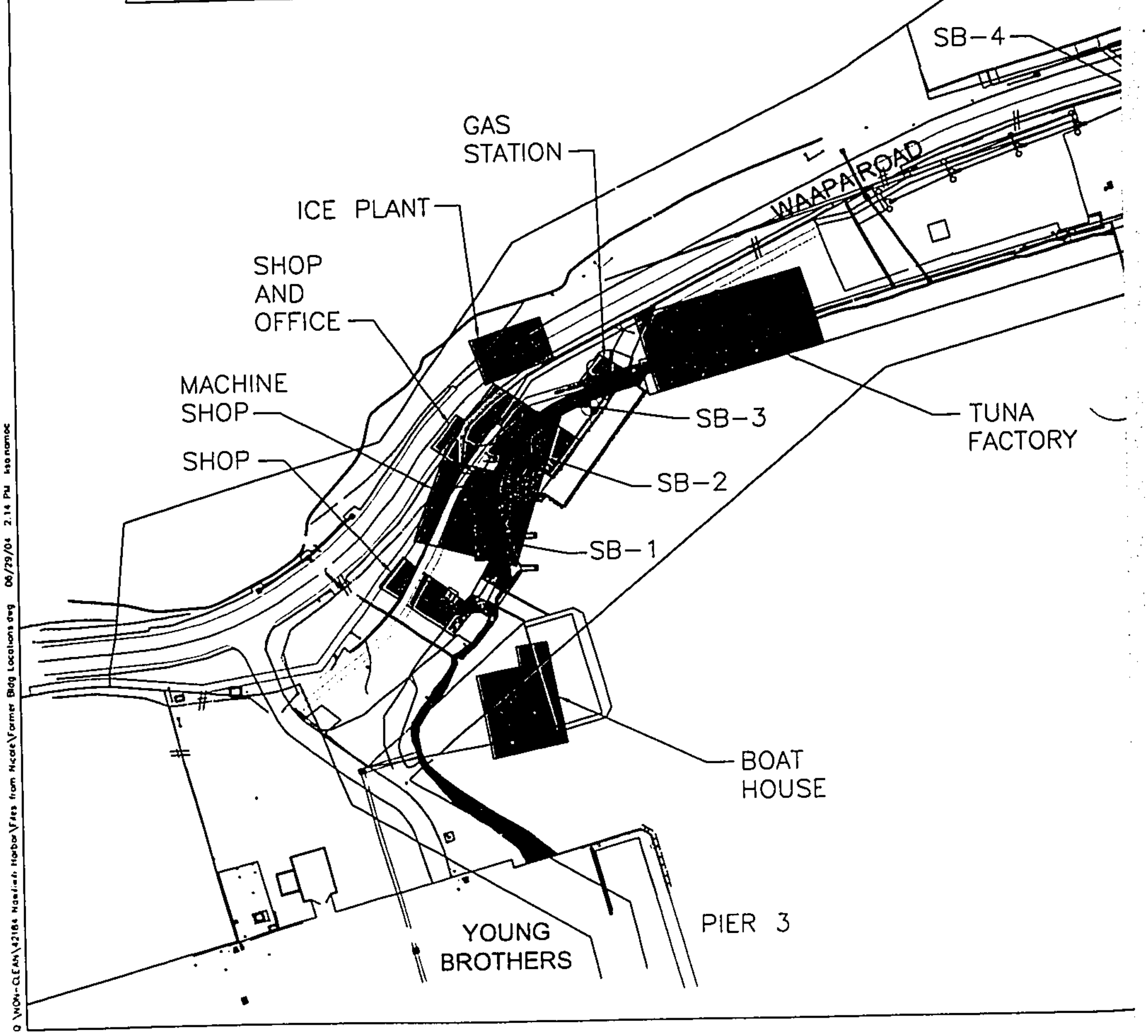
SUGAR STORAGE
PETROLEUM STORAGE
KANOA STREET
MOLASSES STORAGE
HARBOR BOUNDARY
KP
AMFAC
PETROLEUM STORAGE
CURRENT KP
CURRENT SHELL
CURRENT AMFAC
WAAPA ROAD
PASSENGER & GENERAL CARGO (EXISTING CONTAINER YARD)
GASCO
PIER 2
6" JET
6" GAS
2 - 12" Molasses
SHELL OIL / EQUILON
KAUAI SUGAR STORAGE/AMFAC
LIHUE PLANTATION / AMFAC (TERMINAL)
- 6-inch fuel and 4-inch bitumuls pipelines present.
- No exact locations given.
HARBOR BA

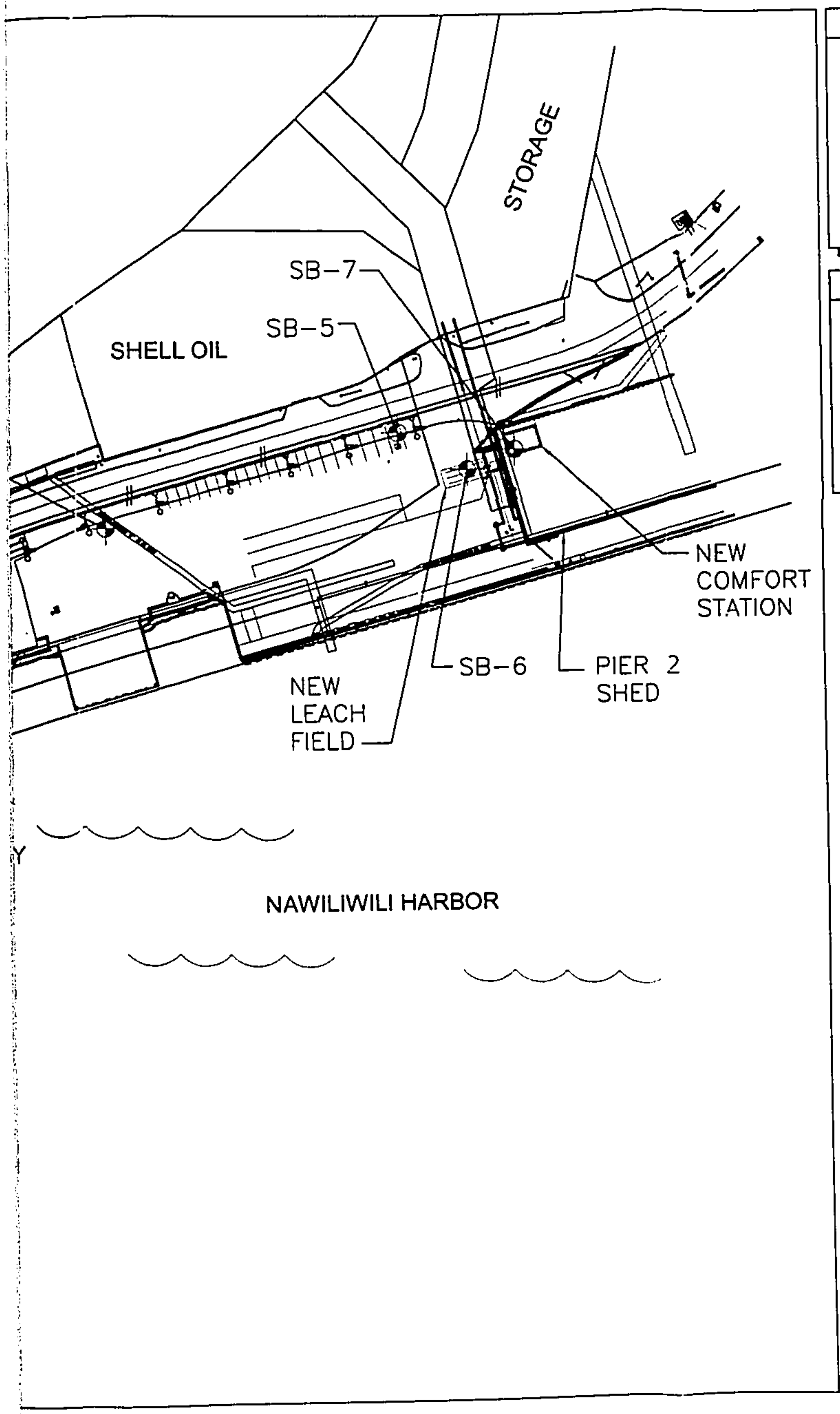


Site Map
Nawiliwili Harbor
Lihue, Kauai

Project No. 42184	EARTH TECH	Figure 2

SOIL BORING ELEVATIONS AND COORDINATES			
Boring No.	**Elevation**	**Northing**	**Easting**
SB-1	3.51	44815.78	546810.60
SB-2	8.04	44887.74	546858.28
SB-3	7.76	44925.54	546908.84
SB-4	8.01	45172.40	547390.16
SB-5	7.55	45253.11	547642.46
SB-6	7.51	45220.67	547701.98
SB-7	7.84	45237.89	547742.92





LEGEND

SB-4 EARTH TECH SOIL BORING LOCATIONS

FORMER BUILDING LOCATIONS CIRCA 1938

FORMER BUILDING LOCATIONS CIRCA 1954

NOTES

1. COORDINATES ARE REFERRED TO GOVERNMENT TRIANGULATION STATION "NAWILIWILI"
2. ELEVATIONS ARE REFERRED TO USCOE BRASS DISK – 8, ELEVATION=7.89 MILLW

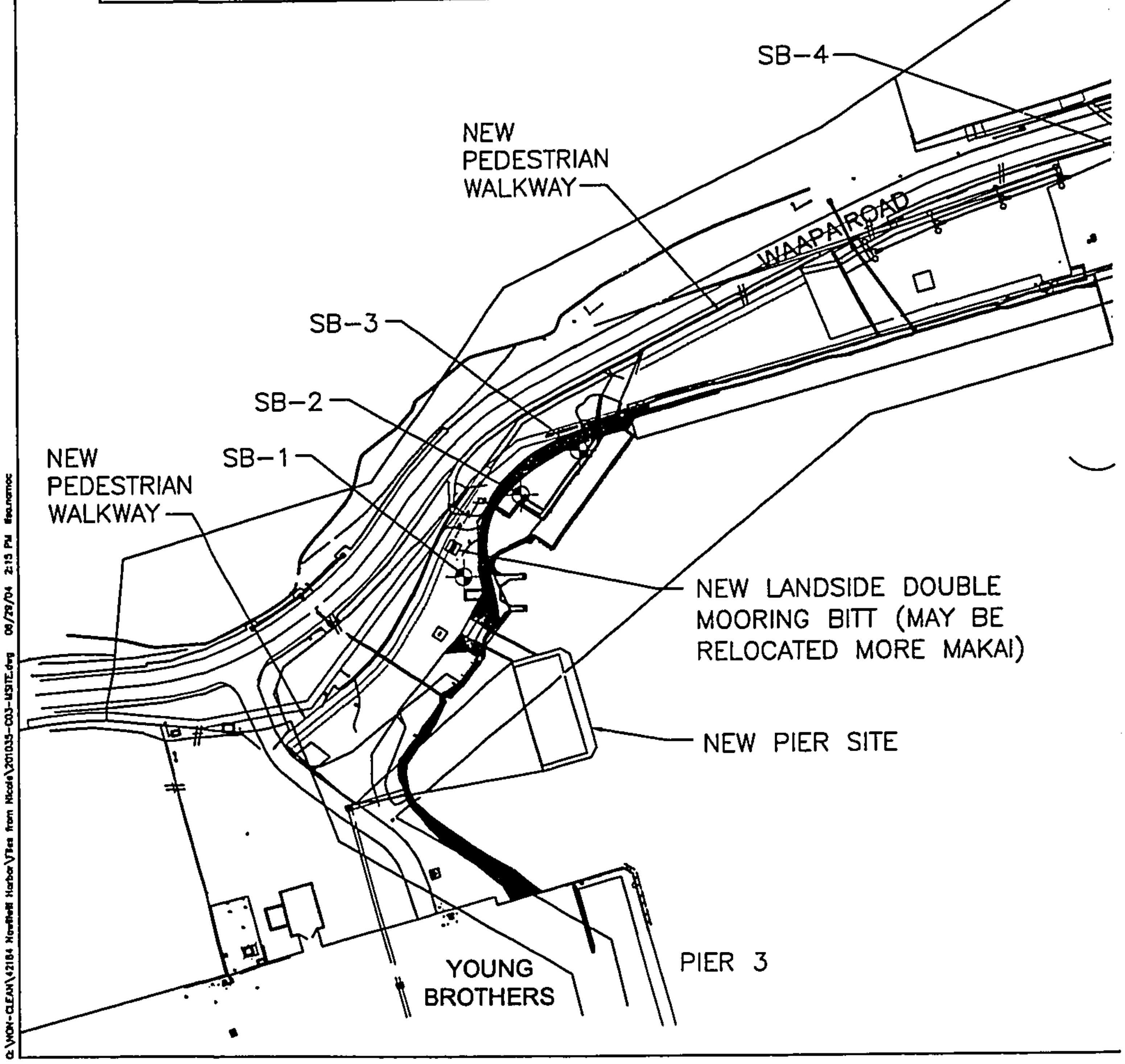
N

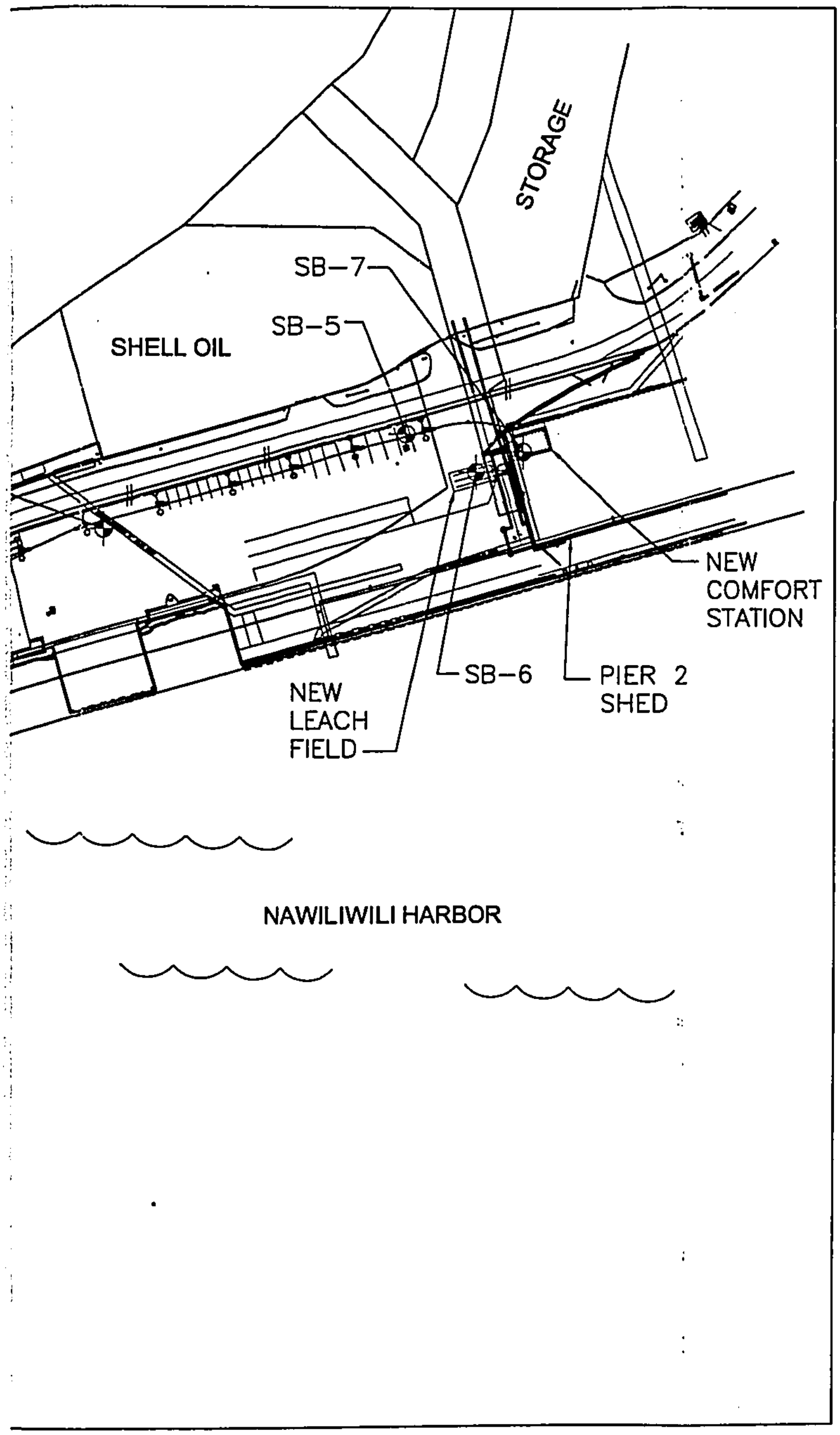
0 250

SCALE 1" = 250' APPROXIMATE

Figure 3
Former Building Locations
Nawiliwili Harbor
Lihue, Kauai, Hawaii

SOIL BORING ELEVATIONS AND COORDINATES			
Boring No.	Elevation	Northing	Easting
SB-1	3.51	44815.78	546810.60
SB-2	8.04	44887.74	546858.28
SB-3	7.76	44925.54	546908.84
SB-4	8.01	45172.40	547390.16
SB-5	7.55	45253.11	547642.46
SB-6	7.51	45220.67	547701.98
SB-7	7.84	45237.89	547742.92





LEGEND

SB-4 EARTH TECH SOIL BORING LOCATIONS

NOTES

1. COORDINATES ARE REFERRED TO GOVERNMENT TRIANGULATION STATION "NAWILIWILI"
2. ELEVATIONS ARE REFERRED TO USCOE BRASS DISK – 8, ELEVATION=7.89 MILLW

N

0 250

SCALE 1" = 250' APPROXIMATE

Figure 4
Boring Locations
Nawiliwili Harbor
Lihue, Kauai, Hawaii

Appendix A
Boring Logs

Borehole Log

Project Name: Nawiliwili Harbor		Project Number: 4218408	Borehole/ Well Number: SB-1
Borehole Location: North Pier Area			Sheet 1 of 1
Drilling Agency: Valley Well Drilling		Driller: Dean McClure	Total Depth of Boring BGS (feet): 9.5
Drilling Equipment: Detrich Trailer Rig		Date & Time Started: 4/20/2004 ; 1330	Total Number of Samples: 2
Drilling Method: Hollow Stem Auger (HSA)		Date & Time Finished: 4/20/2004 ; 1430	Number of Normal Samples: 2 / Number of QC Samples: 0
Borehole Diameter (in.) 2"	Size and Type of Bit: 2" diameter	Water Level: NA / First: NA	Drive: NA / Pitcher: NA
Drilling Fluid: NA		Logged By: J. Goethals	Checked By:
Completion Information:			

Depth (feet)	Samples: Number	Type	Blow Count	Percent Recovery	Headspace (ppm)	Estimated %: Gravel	Sand	Fines	Log: Graphic	USCS or Rock Type	Lithologic Description	Remarks
1			50									
2	1		40 16		3	70	20	10			FILL: dark grayish blue, GLEY 3/1; basalt cobbles and boulders; sandy gravel matrix damp; loose; some angular coral shell fragments.	NH-NP-SB01-S2.0 collected at 1400 hrs., 4/20/2004. PID = 3 ppm.
3	2		32 16									NH-NP-SB01-S3.0 collected at 1430 hrs., 4/20/2004.
4			50			50	-	50			FILL: brown, 10 YR 4/2; silty with basalt gravel.	
5–9											First groundwater observed at 3.5' bgs in wet split spoon sample. NX Coring attempted.	
10											RECOVERY IS MINIMAL DUE TO COBBLES & BOULDERS IN SILTY MARINE SEDIMENTS. DRILLING SUSPENDED AT 9.5' BGS.	All methane monitoring = 0 ppm.
11–20												

NAWILIWILI.NAWILI.GPJ FORD 03/15/04

Borehole Log

Project Name: Nawiliwili Harbor		Project Number: 42184.08	Borehole/ Well Number: SB-2
Borehole Location: North Pier Area			Sheet 1 of 1
Drilling Agency: Valley Well Drilling		Driller: Denn McClure	Total Depth of Boring BGS (feet): 8.0
Drilling Equipment: Detrich Trailer Rig		Date & Time Started: 4/22/2004 ; 0900	Total Number of Samples: 3
Drilling Method: Hollow Stem Auger (HSA)		Date & Time Finished: 4/22/2004 ; 1000	Number of Normal Samples: 2 / Number of QC Samples: 1
Borehole Diameter (in.) 2'	Size and Type of Bit: 2" diameter	Water Level: NA / First: NA	Drive: NA / Pitcher: NA
Drilling Fluid: NA		Logged By: J. Goethals	Checked By:
Completion Information:			

Depth (feet)	Samples: Number	Type	Blow Count	Percent Recovery	Headspace (ppm)	Estimated %: Gravel	Sand	Fines	Log: Graphic	USCS or Rock Type	Lithologic Description	Remarks
1			7									
2	1		10 14		3	40	20	40		GM	FILL; brown, 10 YR 4/2; silty sand with basalt gravel.	NH-NP-SB02-S2.0 collected at 0915 hrs., 4/22/2004. PID = 3 ppm.
3			11 15		33							PID = 33 ppm.
4	2 3		15 12 18		150 75						FILL; blue gray, GLEY 4/1; basalt cobbles and boulders from base course fill; moist; loose.	NH-NP-SB02-S4.0 and NH-NP-SB02-D4.0 collected at 0930 hrs., 4/22/2004. PID = 150 and 75 ppm.
5–6			22 24 32									
7											First groundwater at 7.0' bgs.	
8											REFUSAL AT 8' BGS ON BOULDERS, DRILLING STOPPED.	All methane monitoring = 0 ppm.
9–20												

NAWILIWILI.NAWILI.GPJ FORD.GDT 5/7/04

Borehole Log

Project Name:	Nawiliwili Harbor	Project Number:	4218408	Borehole/ Well Number:	SB-3
Borehole Location:	North Pier Area			Sheet	1 of 1
Drilling Agency:	Valley Well Drilling	Driller:	Dean McClure	Total Depth of Boring BGS (feet):	8.0
Drilling Equipment:	Detrich Trailer Rig	Date & Time Started:	4/22/2004 ; 1015	Total Number of Samples:	2
Drilling Method:	Hollow Stem Auger (HSA)	Date & Time Finished:	4/22/2004 ; 1100	Number of Normal Samples: 2	Number of QC Samples: 0
Borehole Diameter (in.) 2"	Size and Type of Bit: 2" diameter	Water Level: NA	First: NA	Drive: NA	Pitcher: NA
Drilling Fluid:	NA	Logged By:	J. Goethals	Checked By:	
Completion Information:					

Depth (feet)	Samples: Number	Type	Blow Count	Percent Recovery	Headspace (ppm)	Estimated %: Gravel	Sand	Fines	Log: Graphic	USCS or Rock Type	Lithologic Description	Remarks
2	1		6 8 9 3		22	50	40	10		GM	FILL: light brown, 10 YR 6/3; sandy gravel (coral), loose, some angular coral shell fragments.	NH-NP-SB03-S2.0 collected at 1030 hrs., 4/22/2004. PID = 22 ppm.
4	2		6 7 10 10 12		17	50	20	30		GC	Grades to FILL with clay.	NH-NP-SB03-S4.0 collected at 1030 hrs., 4/22/2004. PID = 17 ppm.
7											First groundwater observed at 7' bgs.	
8											DRILLING GETS VERY HARD, SAMPLE REFUSAL AT 8' BGS ON BASALT BOULDERS. DRILLING TERMINATED.	All methane monitoring = 0 ppm.

NAWILIWILI.NAWILI OFFORD GDT 5/7/04

Borehole Log

Project Name: Nawiliwili Harbor	Project Number: 42184.08	Borehole/ Well Number: SB-4	
Borehole Location: Pier 2 Parking/Sidewalk Area near Waapa Road		Sheet 1 of 1	
Drilling Agency: Valley Well Drilling	Driller: Dean McClure	Total Depth of Boring BGS (feet): 4.5	
Drilling Equipment: Detrich Trailer Rig	Date & Time Started: 4/22/2004 ; 0810	Total Number of Samples: 2	
Drilling Method: Hollow Stem Auger (HSA)	Date & Time Finished: 4/22/2004 ; 0855	Number of Normal Samples: 2	Number of QC Samples: 0
Borehole Diameter (in.) 2" / Size and Type of Bit: 2" diameter	Water Level: NA / First: NA	Drive: NA	Pitcher: NA
Drilling Fluid: NA	Logged By: J. Goethals	Checked By:	
Completion Information:			

Depth (feet)	Samples: Number	Type	Blow Count	Percent Recovery	Headspace (ppm)	Estimated %: Gravel	Sand	Fines	Log: Graphic	USCS or Rock Type	Lithologic Description	Remarks
0–0.5											6" Asphaltic Cover	
2	1		20 28 50		46	20	40	40		GC	FILL: dark yellowish brown, 10 YR 4/6; sand with clay; fine; well graded with coral gravel.	NH-SW-SB04-S1.5 collected at 0815 hrs., 4/22/2004. PID = 46 ppm.
3–4	2		7 12 16		53	20	40	40		GC	Same as above.	NH-SW-SB04-S4.0 collected at 0845 hrs., 4/22/2004. PID = 53 ppm.
5–20												All methane monitoring = 0 ppm.

NAWILIWILI\NAWILI GPJ FORD GDT 5/7/04

Borehole Log

Project Name: Nawiliwili Harbor		Project Number: 4218408	Borehole/Well Number: SB-5
Borehole Location: Pier 2 Parking/Sidewalk Area near Waapa Road			Sheet 1 of 1
Drilling Agency: Valley Well Drilling		Driller: Dean McClure	Total Depth of Boring BGS (feet): 5.0
Drilling Equipment: Detrich Trailer Rig		Date & Time Started: 4/21/2004 ; 1500	Total Number of Samples: 1
Drilling Method: Hollow Stem Auger (HSA)		Date & Time Finished: 4/21/2004 ; 1530	Number of Normal Samples: 1 / Number of QC Samples: 0
Borehole Diameter (in.) 2"	Size and Type of Bit: 2" diameter	Water Level: NA / First: NA	Drive: NA / Pitcher: NA
Drilling Fluid: NA		Logged By: J. Goethals	Checked By:
Completion Information:			

Depth (feet)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Percent Recovery	Samples: Headspace (ppm)	Estimated %: Gravel	Estimated %: Sand	Estimated %: Fines	Log: Graphic	Log: USCS or Rock Type	Lithologic Description	Remarks
1			2 9 11		70	20	30	50		GC	FILL; dark yellowish brown, 10 YR 4/6; sand with clay; fine; greenish gray staining from petroleum contamination.	PID = 70 ppm.
2			5									
3			12 17		61	20	30	50		GC	Same as above, fill grading to sand. Noticeable petroleum product odor.	PID = 61 ppm. NH-SW-SB05-S4.5 collected at 1515 hrs., 4/21/2004. PID = 43 ppm.
4	1		3 5 11		43							
5											BORING TERMINATED AT 5' BGS.	All methane monitoring = 0 ppm.
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Borehole Log

Project Name: Nawiliwili Harbor	Project Number: 4218408	Borehole/ Well Number: SB-6	
Borehole Location: North Pier Area		Sheet 1 of 1	
Drilling Agency: Valley Well Drilling	Driller: Dean McClure	Total Depth of Boring BGS (feet): 6.5	
Drilling Equipment: Detrich Trailer Rig	Date & Time Started: 4/21/2004 ; 1320	Total Number of Samples: 3	
Drilling Method: Hollow Stem Auger (HSA)	Date & Time Finished: 4/21/2004 ; 1435	Number of Normal Samples: 2	Number of QC Samples: 1
Borehole Diameter (in.): 2" / Size and Type of Bit: 2" diameter	Water Level: NA / First: NA	Drive: NA	Pitcher: NA
Drilling Fluid: NA	Logged By: J. Goethals	Checked By:	
Completion Information:			

Depth (feet)	Samples: Number	Type	Blow Count	Percent Recovery	Headspace (ppm)	Estimated %: Gravel	Sand	Fines	Log: Graphic	USCS or Rock Type	Lithologic Description	Remarks
1												
2	1		6 8 16		3	-	80	20		SW	FILL: light brown/pinkish, 7.5 YR 6/4; fine grained coral sand; damp; loose.	NH-RR-SB06-S1.5 collected at 1330 hrs., 4/21/2004. PID = 3 ppm.
3			3 7		160	-	70	30		SW	Same as above.	PID = 160 ppm.
4			6			30	50	20		GW	FILL: brown, 7.5 YR 4/2; silty sand and gravel; fine grading to coarse; saprolitic structure; some clay.	NH-RR-SB06-S5.5 and NH-RR-SB06-D6.0 collected at 1430 hrs., 4/21/2004. PID = 70 ppm.
5–6	2 3		10 15 20		70						First groundwater observed at 6.5' bgs.	
7											HEAVY PETROLEUM STAINING AND ODOR. DUPLICATE SAMPLE TAKEN AT 6' BGS. BORING TERMINATED AT 6.5' BGS.	All methane monitoring = 0 ppm.
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

NAWILIWILI NAWILI GP/FORD GDT 5/7/04

Borehole Log

Project Name: Nawiliwili Harbor	Project Number: 4218408	Borehole/ Well Number: SB-7	
Borehole Location: North Pier Area		Sheet 1 of 1	
Drilling Agency: Valley Well Drilling	Driller: Dean McClure	Total Depth of Boring BGS (feet): 6.0	
Drilling Equipment: Detrich Trailer Rig	Date & Time Started: 4/21/2004 ; 1120	Total Number of Samples: 1	
Drilling Method: Hollow Stem Auger (HSA)	Date & Time Finished: 4/21/2004 ; 1315	Number of Normal Samples: 1	Number of QC Samples: 0
Borehole Diameter (in.) 2" / Size and Type of Bit: 2" diameter	Water Level: NA / First NA	Drive: NA	Pitcher: NA
Drilling Fluid: NA	Logged By: J. Goethals	Checked By:	
Completion Information:			

Depth (feet)	Samples: Number	Samples: Type	Samples: Blow Count	Samples: Percent Recovery	Samples: Headspace (ppm)	Estimated %: Gravel	Estimated %: Sand	Estimated %: Fines	Log: Graphic	Log: USCS or Rock Type	Lithologic Description	Remarks
1–2			1		57	-	100	-		SW	FILL: pale brown, 10 YR 7/3; clean coralline sand; well graded; damp; loose.	PID = 57 ppm.
2–3			2, 5, 3									
3–4			4			-	100	-		SW	Same as above.	
4–6	1		9		63						Gray green soil discoloration from petroleum impact - heavy petroleum odor. Groundwater estimated at 5' bgs.	NH-RR-SB07-S4.0 collected at 1300 hrs., 4/21/2004. PID = 63 ppm.
6											BORING TERMINATED AT 6' BGS.	All methane monitoring = 0 ppm.

NAWILIWILI.GPJ NAWILIWILI.GPJ FORD.GDT 5/7/04

Appendix B
Photos

Photo 1.

Ground penetrating radar survey at SB-1 location

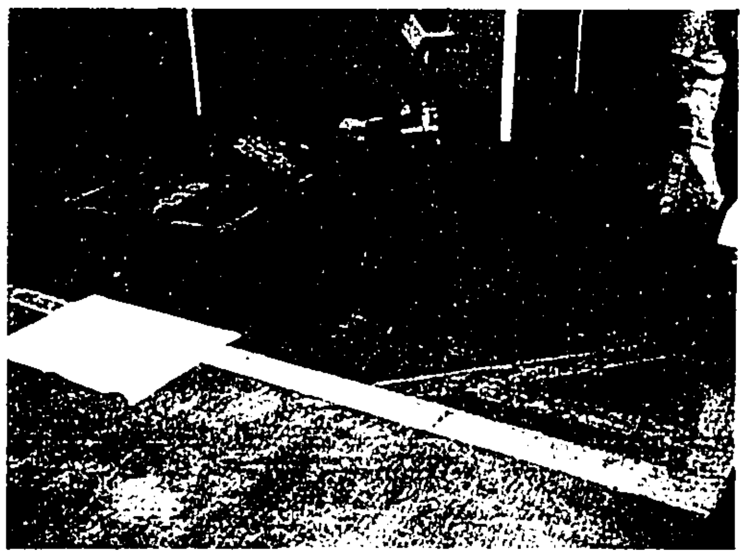


Photo 2.

Geophysical survey at SB-7 location inside Pier 2 Shed

Photo 3.

Starting hollow stem auger drilling at SB-1

Photo 4.

Ground penetrating radar survey at SB-5

Photo 5.

Minimal gravel/rock sample recovery at boring SB-1

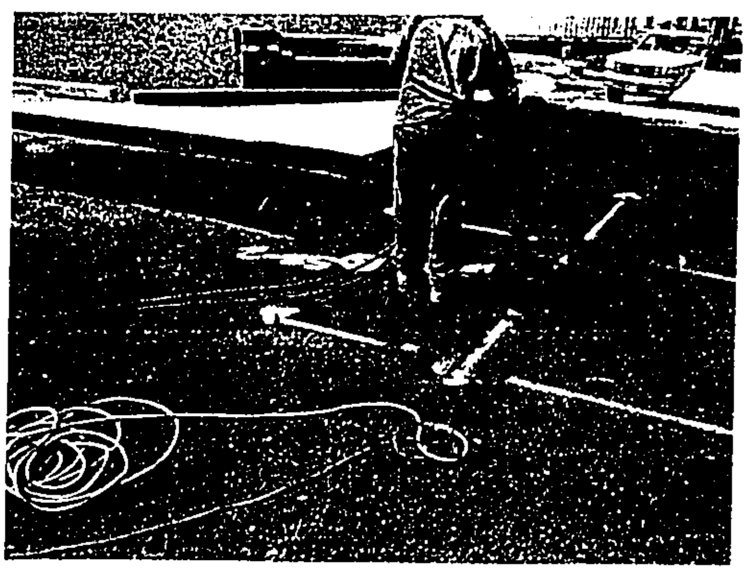


Photo 6.

Coring contractor, Pacific Coring, penetrating concrete/asphalt cover material at SB-2

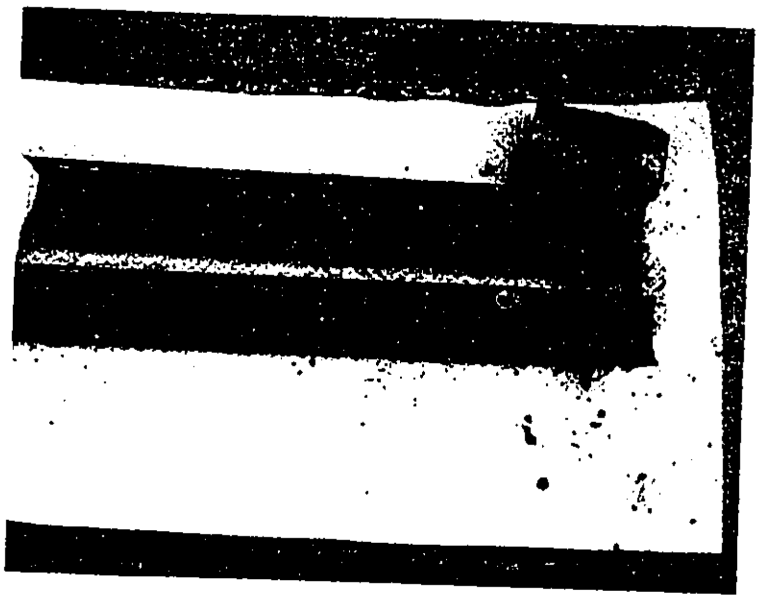


Photo 7.

Grossly discolored soils from SB-7 boring (4' bgs)

Photo 8.

Stack of concrete cores from SB-3, SB-5, SB-6 and SB-7

Photo 9.

Drill cutting soils at boring SB-6. Note greenish brown/gray soil from past petroleum impacts.

Photo 10.

Portugal Surveying Crew from Kauai

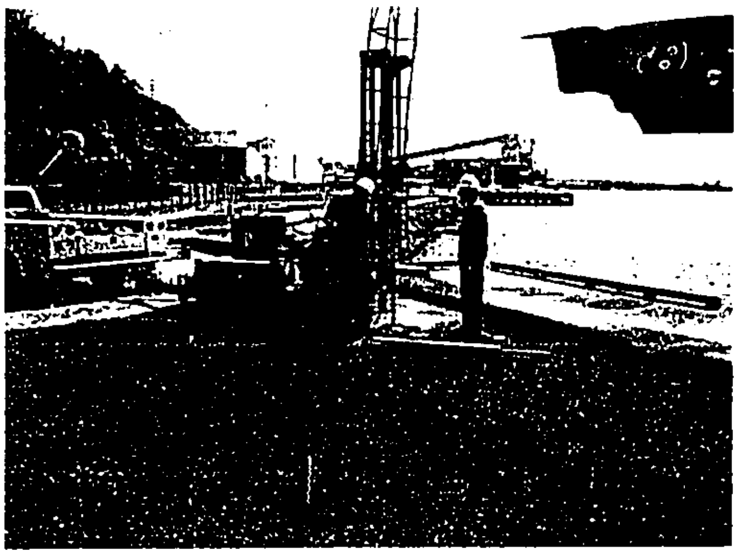


Photo 11.

Boring SB-3

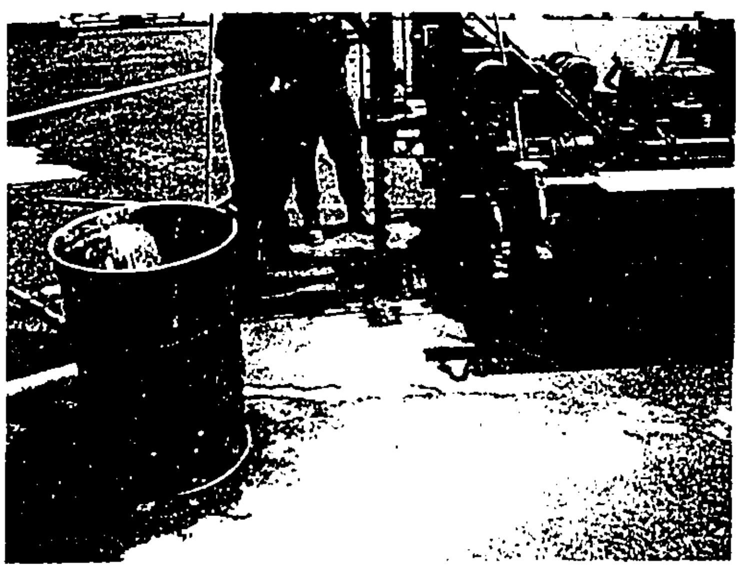


Photo 12.

Drilling boring SB-6

Appendix C
Laboratory Analytical Data

ESN
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DOT - Harbors Kauai

ESN Project #D404230119

TPH ANALYSES OF WATERS BY EPA 8015-MOD.

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C12 (mg/L)	TPH-DIESEL C12-C24 (mg/L)	TPH-OIL C20-C40 (mg/L)	SURROGATE RECOVERY (%)	FLAGS
Blank	4/30/2004	nd	nd	nd	99%	
NH-F001	4/30/2004	nd	nd	nd	66%	
NH-F001 Dup	4/30/2004	nd	nd	nd	68%	
NH-E001	4/30/2004	nd	nd	nd	69%	
DETECTION LIMITS		0.60	0.60	1.0		

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-FBP): 65% TO 135 %

QA/QC DATA - LABORATORY CONTROL SPIKE ANALYSES

	TPH-GAS	TPH-DIESEL	TPH-OIL
Spike Added	15.15	15.15	15.15
Measured Conc.	15.58	14.67	14.86
% Recovery	102.8%	96.8%	98.1%
Spike Added	15.15	15.15	15.15
Measured Conc.	16.00	13.70	13.43
% Recovery	105.6%	90.4%	88.6%
RPD	2.6%	6.8%	10.1%

RPD LIMITS: 20%
CA-DOHS-ELAP CERTIFICATION #1887A
ANALYSES PERFORMED BY : B. Capps
DATA REVIEWED BY: C. Poma CP

Environmental Services Network

ESN
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ESN Project #D404230119

TPH ANALYSES OF SOILS BY EPA 8015-MOD.

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C12 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)	TPH-OIL C20-C40 (mg/kg)	SURROGATE RECOVERY (%)	FLAGS
Blank	4/29/2004	nd	nd	nd	131%	
Blank	4/30/2004	nd	nd	nd	99%	
NH-NP-SB01-S2.0	4/30/2004	nd	nd	nd	104%	
NH-NP-SB01-S2.0 Dup	4/30/2004	nd	nd	nd	118%	
NH-NP-SB01-S3.0	4/30/2004	nd	nd	nd	133%	
NH-RR-SB07-S4.0	4/30/2004	nd	nd	nd	128%	
NH-RR-SB06-S1.5	4/29/2004	nd	nd	nd	103%	
NH-RR-SB06-S5.5	4/30/2004	nd	5800	nd	MI	
NH-RR-SB06-D6.0	4/29/2004	nd	3400	nd	MI	DF 2
NH-SW-SB05-S4.5	4/29/2004	nd	nd	82	98%	
NH-SW-SB04-S4.0	4/29/2004	nd	nd	nd	134%	
NH-NP-SB02-S2.0	4/29/2004	nd	nd	nd	99%	
NH-NP-SB02-S4.0	4/29/2004	nd	nd	nd	70%	
NH-NP-SB02-D4.0	4/29/2004	nd	nd	nd	75%	
NH-NP-SB03-S2.0	4/29/2004	nd	nd	nd	117%	
NH-NP-SB03-S4.0	4/29/2004	nd	nd	nd	101%	
NH-NP-SB03-S4.0 Dup	4/29/2004	nd	nd	nd	86%	
DETECTION LIMITS		20	20	40		

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-FBP): 65% TO 135%

QA/QC DATA - LABORATORY CONTROL SPIKE ANALYSES

	TPH-GAS	TPH-DIESEL	TPH-OIL
Spike Added	500	500	500
Measured Conc.	517	444	558
% Recovery	103.4%	88.8%	111.6%
Spike Added	500	500	500
Measured Conc.	565	453	568
% Recovery	113.0%	90.6%	113.6%
RPD	8.9%	2.0%	1.8%

RPD LIMITS: 20%
CA-DOHS-ELAP CERTIFICATION #1887A
ANALYSES PERFORMED BY : B. Capps
DATA REVIEWED BY: C. Poma CAP

Environmental Services Network

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ESN Project #D404230119

PCB ANALYSES OF SOILS BY EPA 8082

SAMPLE NUMBER	DATE ANALYZED	PCB-1016 (mg/kg)	PCB-1221 (mg/kg)	PCB-1232 (mg/kg)	PCB-1242 (mg/kg)	PCB-1248 (mg/kg)	PCB-1254 (mg/kg)	PCB-1260 (mg/kg)	SURROGATE RECOVERY (TCMX) (%)	FLAGS
Blank	4/29/2004	nd	nd	nd	nd	nd	nd	nd	103%	
NH-NP-SB01-S2.0	4/29/2004	nd	nd	nd	nd	nd	nd	nd	98%	
NH-NP-SB01-S2.0 Dup	4/29/2004	nd	nd	nd	nd	nd	nd	nd	66%	
NH-NP-SB01-S3.0	4/29/2004	nd	nd	nd	nd	nd	nd	nd	84%	
NH-NP-SB02-S4.0	4/29/2004	nd	nd	nd	nd	nd	nd	nd	128%	
NH-NP-SB02-D4.0	4/29/2004	nd	nd	nd	nd	nd	nd	nd	103%	
NH-NP-SB03-S2.0	4/29/2004	nd	nd	nd	nd	nd	nd	nd	73%	
NH-NP-SB03-S4.0	4/29/2004	nd	nd	nd	nd	nd	nd	nd	90%	
DETECTION LIMITS		0.20	0.20	0.20	0.05	0.05	0.05	0.05		

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX): 65% - 135%

QA/QC Data - PCB Analyses - SOILS

	Labortory Control Spike			Labortory Control Spike Duplicate					FLAGS
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	RPD (%)	Acceptable Recovery Limits	
PCB 1260	1.000	1.052	105.2%	1.000	1.049	104.9%	0.3%	20%	

CA-DOHS-ELAP CERTIFICATION #1887A
ANALYSES PERFORMED BY : T. McCall
DATA REVIEWED BY: C. Poma CEP

Environmental Services Network

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ESN Project #D404230119

PCB ANALYSES OF SOILS BY EPA 8082

SAMPLE NUMBER	DATE ANALYZED	PCB-1016 (mg/kg)	PCB-1221 (mg/kg)	PCB-1232 (mg/kg)	PCB-1242 (mg/kg)	PCB-1248 (mg/kg)	PCB-1254 (mg/kg)	PCB-1260 (mg/kg)	SURROGATE RECOVERY (TCMX) (%)	FLAGS
Blank	5/5/2004	nd	nd	nd	nd	nd	nd	nd	110%	
NH-NP-SB02-S2.0	5/5/2004	nd	nd	nd	nd	nd	nd	nd	105%	
NH-NP-SB02-S2.0 Dup.	5/5/2004	nd	nd	nd	nd	nd	nd	nd	117%	
DETECTION LIMITS		0.20	0.20	0.20	0.05	0.05	0.05	0.05		

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX): 65% - 135%

QA/QC Data - PCB Analyses - SOILS

	Labortory Control Spike			Labortory Control Spike Duplicate					
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	RPD (%)	Acceptable Recovery Limits	FLAGS
PCB 1260	1.000	0.999	99.9%	1.000	1.043	104.3%	4.3%	20%	

CA-DOHS-ELAP CERTIFICATION #1887A
ANALYSES PERFORMED BY : T. McCall
DATA REVIEWED BY: C. Poma CP

Environmental Services Network

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ESN Project #D404230119

TOTAL METAL ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	Lead (Pb) EPA 7420 (mg/kg)	Cadmium (Cd) EPA 7130 (mg/kg)	Chromium (Cr) EPA 7190 (mg/kg)	FLAGS
Blank	4/30/2004	nd	nd	nd	
NH-NP-SB01-S2.0	4/30/2004	20	nd	21	
NH-NP-SB01-S2.0 Dup	4/30/2004	21	nd	22	
NH-NP-SB01-S3.0	4/30/2004	37	nd	32	
NH-RR-SB07-S4.0	4/30/2004	9.2	nd	nd	
NH-RR-SB06-S1.5	4/30/2004	nd	nd	nd	
NH-RR-SB06-S5.5	4/30/2004	nd	nd	nd	
NH-RR-SB06-D6.0	4/30/2004	nd	nd	nd	
NH-SW-SB05-S4.5	4/30/2004	nd	nd	nd	
NH-SW-SB04-S4.0	4/30/2004	49	nd	nd	
NH-NP-SB02-S2.0	4/30/2004	nd	nd	97	
NH-NP-SB02-S4.0	4/30/2004	nd	nd	120	
NH-NP-SB02-D4.0	4/30/2004	nd	nd	140	
NH-NP-SB03-S2.0	4/30/2004	110	nd	63	
NH-NP-SB03-S4.0	4/30/2004	70	nd	80	
NH-NP-SB03-S4.0 Dup	4/30/2004	49	nd	60	
DETECTION LIMITS		5.0	1.0	20	

QA/QC DATA - MATRIX SPIKE ANALYSES

Sample Name: 0119 SB01-S2.0

	Lead (Pb)	Cadmium (Cd)	Chromium (Cr)
Spike Added	250	25	250
Measured Conc.	249	25	233
% Recovery	99.6%	100.2%	93.3%
Spike Added	250	25	250
Measured Conc.	254	25	231
% Recovery	101.5%	99.3%	92.5%
RPD	1.8%	1.0%	0.8%

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

RPD LIMITS: 20%
CA-DOHS-ELAP CERTIFICATION #1887A
ANALYSES PERFORMED BY : B. Capps
DATA REVIEWED BY: C. Poma CAP

Environmental Services Network

ESN Northwest

EARTHTECH-D.O.T. PROJECT
Hawaii
ESN Pacific
Client Project #D404230119

Heavy Metals in Soil by EPA-7000 Series

Sample Number	Date Analyzed	Nickel (Ni) EPA 7520 (mg/kg)	Copper (Cu) EPA 7210 (mg/kg)	Antimony (Sb) EPA 7040 (mg/kg)	Arsenic (As) EPA 7061 (mg/kg)	Silver (Ag) EPA 7760 (mg/kg)	Zinc (Zn) EPA 7950 (mg/kg)	Iron (Fe) EPA 7380 (mg/kg)
Method Blank	4/28/04	nd	nd	nd	nd	nd	nd	nd
NH-NP-SB01-S2.0	4/28/04	1200	200	nd	53	nd	45	600
NH-NP-SB01-S2.0 Dup.	4/28/04	1200	210	nd	44	nd	47	630
NH-NP-SB01-S3.0	4/28/04	1000	150	nd	84	nd	93	620
NH-NP-SB02-D4.0	4/28/04	1000	110	nd	44	nd	36	580
NH-NP-SB02-S4.0	4/28/04	1200	130	nd	80	nd	28	640
NH-NP-SB03-S2.0	4/28/04	970	120	nd	64	nd	39	650
NH-NP-SB03-S4.0	4/28/04	1200	130	nd	93	nd	42	600
Method Detection Limits		20	20	20	20	20	20	20

"nd" Indicates not detected at listed detection limits.

ANALYSES PERFORMED BY: Marilyn Farmer

STL Seattle

Client Name	ESN Northwest, Inc.
Client ID:	SB02-D4
Lab ID:	120854-03
Date Received:	4/30/04
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
Dilution Factor	1
% Solids	67.97

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**RL**	**Flags**
Aluminum	37000	13.9	
Calcium	1710	139	
Magnesium	1610	139	

STL Seattle

Client Name	ESN Northwest, Inc.
Client ID:	SB02-S4
Lab ID:	120854-04
Date Received:	4/30/04
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
Dilution Factor	1
% Solids	71.34

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**RL**	**Flags**
Aluminum	32100	13.3	
Calcium	7070	133	
Magnesium	2270	133	

STL Seattle

Client Name	ESN Northwest, Inc.
Client ID:	SB01-S2.0
Lab ID:	120854-05
Date Received:	4/30/04
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
Dilution Factor	1
% Solids	83.43

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	RL	Flags
Aluminum	23500	11.1	
Calcium	43300	111	
Magnesium	24200	111	

STL Seattle

Client Name	ESN Northwest, Inc.
Client ID:	SB01-S3.0
Lab ID:	120854-06
Date Received:	4/30/04
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
Dilution Factor	1
% Solids	81.72

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**RL**	**Flags**
Aluminum	19800	11.4	
Calcium	79700	114	
Magnesium	15800	114	

STL Seattle

Client Name	ESN Northwest, Inc.
Client ID:	SB03-S2.0
Lab ID:	120854-07
Date Received:	4/30/04
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
Dilution Factor	1
% Solids	77.53

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**RL**	**Flags**
Aluminum	32600	12.6	
Calcium	39800	126	
Magnesium	4070	126	

STL Seattle

Client Name	ESN Northwest, Inc.
Client ID:	SB03-S4.0
Lab ID:	120854-08
Date Received:	4/30/04
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
Dilution Factor	1
% Solids	76.2

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**RL**	**Flags**
Aluminum	31200	12.9	
Calcium	61300	129	
Magnesium	6110	129	

STL Seattle

Lab ID:	Method Blank - SP930
Date Received:	-
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**RL**	**Flags**
Aluminum	ND	10	
Calcium	ND	100	
Magnesium	ND	100	

STL Seattle

Matrix Spike Report

Client Sample ID:	DP-6(10-11)
Lab ID:	120777-07
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
QC Batch ID:	SP930

Metals by ICP - USEPA Method 6010

Parameter Name	**Sample Result (mg/kg)**	**Spike Amount (mg/kg)**	**MS Result (mg/kg)**	**MS % Rec.**	**Flag**
Aluminum	5600	451	7550	428	X7a
Calcium	18000	2260	24500	270	X7a
Magnesium	4200	2260	6980	125	

STL Seattle

Duplicate Report

Client Sample ID:	DP-6(10-11)
Lab ID:	120777-07
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
QC Batch ID:	SP930

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Aluminum	5600	6300	-12.0	
Calcium	18000	22000	-20.0	
Magnesium	4200	4600	-9.1	

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	SP930
Date Prepared:	5/3/04
Date Analyzed:	5/4/04
QC Batch ID:	SP930

Metals by ICP - USEPA Method 6010

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Aluminum	0	400	397	99.2	399	99.6	0.4	
Calcium	0	2000	2080	104	2080	104	0	

STL Seattle

Sample Identification:

Lab. No.	Client ID	Date/Time Sampled	Matrix
120775-1	NH-F001		Liquid
120775-2	NH-E001		Liquid

STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	NH-F001
Lab ID:	120775-01
Date Received:	4/27/04
Date Prepared:	4/28/04
Date Analyzed:	4/29/04
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	RL	MDL	Flags
Aluminum	ND	0.1	0.0116	
Calcium	6.27	1	0.0043	
Iron	0.0385	0.1	0.0005	J
Magnesium	3.52	1	0.0089	

STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	NH-F001
Lab ID:	120775-01
Date Received:	4/27/04
Date Prepared:	4/28/04
Date Analyzed:	4/29/04
Dilution Factor	5

Metals by ICP-MS - USEPA Method 6020

Analyte	Result (mg/L)	RL	MDL	Flags
Arsenic	ND	0.0025	0.00051	
Antimony	0.00105	0.005	0.000136	J B1
Cadmium	ND	0.0025	0.000124	
Chromium	0.00541	0.005	0.000298	B1
Copper	0.000825	0.005	0.000313	J
Lead	ND	0.0025	0.00012	
Nickel	0.00025	0.005	0.000204	J
Silver	0.00208	0.0025	0.000094	J B1
Zinc	0.00926	0.005	0.00054	

STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	NH-E001
Lab ID:	120775-02
Date Received:	4/27/04
Date Prepared:	4/28/04
Date Analyzed:	4/29/04
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	RL	MDL	Flags
Aluminum	ND	0.1	0.0116	
Calcium	10.2	1	0.0043	
Iron	0.0886	0.1	0.0005	J
Magnesium	10.4	1	0.0089	

STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	NH-E001
Lab ID:	120775-02
Date Received:	4/27/04
Date Prepared:	4/28/04
Date Analyzed:	4/29/04
Dilution Factor	5

Metals by ICP-MS - USEPA Method 6020

Analyte	Result (mg/L)	RL	MDL	Flags
Arsenic	0.00148	0.0025	0.00051	J
Antimony	0.000675	0.005	0.000136	J B1
Cadmium	ND	0.0025	0.000124	
Chromium	0.00936	0.005	0.000298	B2
Copper	0.0252	0.005	0.000313	
Lead	0.000215	0.0025	0.00012	J
Nickel	0.00063	0.005	0.000204	J
Silver	0.00204	0.0025	0.000094	J B1
Zinc	0.0211	0.005	0.00054	

STL Seattle

Lab ID:	Method Blank - TP911
Date Received:	-
Date Prepared:	4/28/04
Date Analyzed:	4/29/04
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	RL	MDL	Flags
Aluminum	0.0124	0.1	0.0116	J
Calcium	ND	1	0.0043	
Iron	ND	0.1	0.0005	
Magnesium	ND	1	0.0089	

00007

STL Seattle

Lab ID:	Method Blank - TP911
Date Received:	-
Date Prepared:	4/28/04
Date Analyzed:	4/28/04
Dilution Factor	1

Metals by ICP-MS - USEPA Method 6020

Analyte	Result (mg/L)	RL	MDL	Flags
Arsenic	ND	0.0005	0.000102	
Antimony	0.00017	0.001	0.0000271	J
Cadmium	ND	0.0005	0.0000247	
Chromium	0.000112	0.001	0.0000595	J
Copper	ND	0.001	0.0000625	
Lead	ND	0.0005	0.000024	
Nickel	ND	0.001	0.0000407	
Silver	0.000085	0.0005	0.0000188	J
Zinc	ND	0.001	0.000108	

STL Seattle

Matrix Spike Report

Client Sample ID:	L3-042204
Lab ID:	120730-08
Date Prepared:	4/28/04
Date Analyzed:	4/29/04
QC Batch ID:	TP911

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/L)	Spike Amount (mg/L)	MS Result (mg/L)	MS % Rec.	Flag
Aluminum	0.016	4	3.93	98	
Calcium	53	20	72.4	98	
Iron	0.057	22	21.7	98	
Magnesium	22	20	42.5	104	

STL Seattle

Matrix Spike Report

Client Sample ID:	L3-042204
Lab ID:	120730-08
Date Prepared:	4/28/04
Date Analyzed:	4/28/04
QC Batch ID:	TP911

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/L)	Spike Amount (mg/L)	MS Result (mg/L)	MS % Rec.	Flag
Arsenic	0.00314	4	4.11	103	
Antimony	0.0023	3	3.02	101	
Cadmium	0	0.1	0.102	102	
Chromium	0.014	0.4	0.401	97	
Copper	0.0012	0.5	0.535	107	
Lead	0.0007	1	1	100	
Nickel	0.0084	1	1	99	
Silver	0.0002	0.6	0.665	111	
Zinc	0.015	1	1.08	107	

STL Seattle

Duplicate Report

Client Sample ID:	L3-042204
Lab ID:	120730-08
Date Prepared:	4/28/04
Date Analyzed:	4/29/04
QC Batch ID:	TP911

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD %	Flag
Aluminum	0.016	0.015	6.5	
Calcium	53	53	0.0	
Iron	0.057	0.05	13.0	
Magnesium	22	22	0.0	

00011

STL Seattle

Duplicate Report

Client Sample ID:	L3-042204
Lab ID:	120730-08
Date Prepared:	4/28/04
Date Analyzed:	4/28/04
QC Batch ID:	TP911

Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD %	Flag
Arsenic	0.0031	0	200.0	X4a
Antimony	0.0023	0.0017	30.0	X4a
Cadmium	0	0	NC	
Chromium	0.014	0.006	80.0	X4a
Copper	0.0012	0.0013	-8.0	
Lead	0.0007	0.00064	9.0	
Nickel	0.0084	0.0077	8.7	
Silver	0.0002	0.00016	22.0	X4a
Zinc	0.015	0.015	0.0	

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number: S40427-1
Client: ESN PACIFIC
Client Job Name: EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number: D404230119

BTEX (8260), mg/kg		MTH BLK	LCS	NH-RR-SB07-S4.0
Matrix	Soil	Soil	Soil	Soil
Date extracted	Reporting	04/28/04		04/28/04
Date analyzed	Limits	04/28/04	04/28/04	04/28/04
Benzene	0.02	nd	95%	nd
Toluene	0.05	nd	96%	nd
Ethylbenzene	0.05	nd		nd
Xylenes	0.05	nd		nd
Methyl-t-butyl ether	0.05	nd		nd
Surrogate recoveries:				
Dibromofluoromethane		97%	97%	99%
Toluene-d8		99%	99%	99%
4-Bromofluorobenzene		100%	98%	100%

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number: S40427-1
Client: ESN PACIFIC
Client Job Name: EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number: D404230119

BTEX (8260), mg/kg		NH-RR-SB06-S1.5	NH-RR-SB06-S5.5
Matrix	Soil	Soil	Soil
Date extracted	Reporting	04/28/04	04/28/04
Date analyzed	Limits	04/28/04	04/29/04
Benzene	0.02	nd	nd
Toluene	0.05	nd	nd
Ethylbenzene	0.05	nd	nd
Xylenes	0.05	nd	nd
Methyl-t-butyl ether	0.05	nd	nd
Surrogate recoveries:			
Dibromofluoromethane		97%	99%
Toluene-d8		99%	98%
4-Bromofluorobenzene		99%	96%

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number: S40427-1
Client: ESN PACIFIC
Client Job Name: EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number: D404230119

BTEX (8260), mg/kg		NH-RR-SB06-D6.0	NH-SW-SB05-S4.5
Matrix	Soil	Soil	Soil
Date extracted	Reporting	04/28/04	04/28/04
Date analyzed	Limits	04/29/04	04/30/04
Benzene	0.02	nd	0.19
Toluene	0.05	nd	0.07
Ethylbenzene	0.05	nd	nd
Xylenes	0.05	nd	nd
Methyl-t-butyl ether	0.05	nd	nd
Surrogate recoveries:			
Dibromofluoromethane		97%	97%
Toluene-d8		100%	102%
4-Bromofluorobenzene		98%	100%

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

BTEX (8260), mg/kg		NH-SW-SB04-S4.0	NH-NP-SB02-S2.0
Matrix	Soil	Soil	Soil
Date extracted	Reporting	04/28/04	04/28/04
Date analyzed	Limits	04/29/04	05/03/04
Benzene	0.02	nd	nd
Toluene	0.05	nd	nd
Ethylbenzene	0.05	nd	nd
Xylenes	0.05	nd	nd
Methyl-t-butyl ether	0.05	nd	nd
Surrogate recoveries:			
Dibromofluoromethane		98%	97%
Toluene-d8		97%	99%
4-Bromofluorobenzene		100%	98%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
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ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

BTEX (8260), mg/kg		MS	MSD	RPD
Matrix	Soil	Soil	Soil	
Date extracted	Reporting	04/28/04	04/28/04	
Date analyzed	Limits	04/28/04	04/28/04	
Benzene	0.02	103%	102%	1%
Toluene	0.05	103%	102%	1%
Ethylbenzene	0.05			
Xylenes	0.05			
Methyl-t-butyl ether	0.05			
Surrogate recoveries:				
Dibromofluoromethane		98%	97%	
Toluene-d8		98%	98%	
4-Bromofluorobenzene		100%	100%	

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number: S40427-1
Client: ESN PACIFIC
Client Job Name: EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number: D404230119

Analytical Results

PAH(8270), mg/kg		MTH BLK	LCS	NH-NP-SB01-S2.0	NH-NP-SB01-S3.0
Matrix	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	04/27/04		04/27/04	04/27/04
Date analyzed	Limits	04/27/04	04/27/04	04/27/04	04/27/04
Acenaphthene	0.10	nd	95%	nd	nd
Benzo(a)pyrene*	0.10	nd	103%	nd	nd
Fluoranthene	0.10	nd	119%	0.11	nd
Naphthalene	0.10	nd		nd	nd
Total Carcinogens				nd	nd
Surrogate recoveries:					
2-Fluorobiphenyl		107%	87%	105%	100%
p-Terphenyl-d14		107%	81%	106%	111%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

Analytical Results

PAH(8270), mg/kg		NH-RR-SB07-S4.0	NH-RR-SB06-S1.5	NH-RR-SB06-S5.5
Matrix	Soil	Soil	Soil	Soil
Date extracted	Reporting	04/27/04	04/27/04	04/27/04
Date analyzed	Limits	04/27/04	04/27/04	04/27/04
Acenaphthene	0.10	nd	nd	0.12
Benzo(a)pyrene*	0.10	nd	nd	nd
Fluoranthene	0.10	nd	nd	nd
Naphthalene	0.10	nd	nd	nd
Total Carcinogens		nd	nd	nd
Surrogate recoveries:				
2-Fluorobiphenyl		108%	98%	87%
p-Terphenyl-d14		109%	95%	94%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number: S40427-1
Client: ESN PACIFIC
Client Job Name: EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number: D404230119

Analytical Results

PAH(8270), mg/kg		NH-RR-SB06-D6.0	NH-SW-SB05-S4.5	NH-SW-SB04-S4.0
Matrix	Soil	Soil	Soil	Soil
Date extracted	Reporting	04/27/04	04/27/04	04/27/04
Date analyzed	Limits	04/27/04	04/27/04	04/27/04
Acenaphthene	0.10	0.14	nd	nd
Benzo(a)pyrene*	0.10	nd	nd	nd
Fluoranthene	0.10	nd	nd	nd
Naphthalene	0.10	nd	nd	nd
Total Carcinogens		nd	nd	nd
Surrogate recoveries:				
2-Fluorobiphenyl		91%	90%	95%
p-Terphenyl-d14		96%	79%	92%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

Analytical Results

PAH(8270), mg/kg		NH-NP-SB02-S2.0	NH-NP-SB02-S4.0	NH-NP-SB02-D4.0
Matrix	Soil	Soil	Soil	Soil
Date extracted	Reporting	04/27/04	04/27/04	04/27/04
Date analyzed	Limits	04/27/04	04/27/04	04/27/04
Acenaphthene	0.10	nd	nd	nd
Benzo(a)pyrene*	0.10	nd	nd	nd
Fluoranthene	0.10	nd	nd	nd
Naphthalene	0.10	nd	nd	nd
Total Carcinogens		nd	nd	nd
Surrogate recoveries:				
2-Fluorobiphenyl		97%	95%	97%
p-Terphenyl-d14		86%	98%	87%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

Analytical Results		NH-NP-SB03-S2.0	NH-NP-SB03-S4.0
PAH(8270), mg/kg			
Matrix	Soil	Soil	Soil
Date extracted	Reporting	04/28/04	04/27/04
Date analyzed	Limits	04/28/04	04/27/04
Acenaphthene	0.10	nd	nd
Benzo(a)pyrene*	0.10	nd	nd
Fluoranthene	0.10	nd	nd
Naphthalene	0.10	nd	nd
Total Carcinogens		nd	nd
Surrogate recoveries:			
2-Fluorobiphenyl		94%	96%
p-Terphenyl-d14		92%	105%

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

		NH-NP-SB03-S4.0	NH-NP-SB03-S4.0	
Analytical Results		MS	MSD	RPD
PAH(8270), mg/kg				
Matrix	Soil	Soil	Soil	
Date extracted	Reporting	04/27/04	04/27/04	
Date analyzed	Limits	04/27/04	04/27/04	
Acenaphthene	0.10	101%	108%	7%
Benzo(a)pyrene*	0.10	118%	119%	1%
Fluoranthene	0.10	98%	109%	11%
Naphthalene	0.10			
Total Carcinogens				
Surrogate recoveries:				
2-Fluorobiphenyl		92%	90%	
p-Terphenyl-d14		84%	94%	

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number: S40427-1
Client: ESN PACIFIC
Client Job Name: EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number: D404230119

Analytical Results

PAH(8270), ug/L		MTH BLK	LCS	NH-F001	NH-E001	MS	MSD	RPD
Matrix	Water	Water	Water	Water	Water	Water	Water	
Date extracted	Reporting	04/27/04		04/27/04	04/27/04	04/27/04	04/27/04	
Date analyzed	Limits	04/27/04	04/27/04	04/27/04	04/27/04	04/27/04	04/27/04	
Acenaphthene	1.0	nd	96%	nd	nd	86%	99%	14%
Benzo(a)pyrene*	1.0	nd	97%	nd	nd	91%	100%	9%
Fluoranthene	1.0	nd	94%	nd	nd	86%	99%	14%
Naphthalene	1.0	nd		nd	nd			
Total Carcinogens				nd	nd			
Surrogate recoveries:								
2-Fluorobiphenyl		121%	89%	106%	103%	95%	103%	
p-Terphenyl-d14		117%	84%	99%	100%	89%	97%	

Data Qualifiers and Analytical Comments

* - Carcinogenic Analyte
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Results reported on dry-weight basis
Acceptable Recovery limits: 50% TO 150%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

Analytical Results

8260, mg/kg		MTH BLK	LCS	NH-NP-SB01-S2.0	NH-NP-SB01-S3.0
Matrix	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	04/28/04		04/28/04	04/28/04
Date analyzed	Limits	04/28/04	04/28/04	04/28/04	04/28/04
Vinyl chloride	0.05	nd		nd	nd
1,1-Dichloroethene	0.05	nd	90%	nd	nd
1,1,1-Trichloroethane	0.05	nd		nd	nd
Trichloroethene	0.02	nd	93%	nd	nd
Tetrachloroethene	0.02	nd		nd	nd
Benzene	0.02	nd	95%	nd	nd
Toluene	0.05	nd	96%	nd	nd
Ethylbenzene	0.05	nd		nd	nd
Xylenes	0.05	nd		nd	nd
Methyl-t-butyl ether	0.05	nd		nd	nd
*-instrument detection limits					
Surrogate recoveries					
Dibromofluoromethane		97%	97%	98%	98%
Toluene-d8		99%	98%	98%	99%
4-Bromofluorobenzene		100%	98%	99%	100%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number: S40427-1
Client: ESN PACIFIC
Client Job Name: EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number: D404230119

Analytical Results

8260, mg/kg		NH-NP-SB02-S4.0	NH-NP-SB02-D4.0	NH-NP-SB03-S2.0
Matrix	Soil	Soil	Soil	Soil
Date extracted	Reporting	04/28/04	04/28/04	04/29/04
Date analyzed	Limits	04/29/04	04/29/04	04/29/04
Vinyl chloride	0.05	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd
1,1,1-Trichloroethane	0.05	nd	nd	nd
Trichloroethene	0.02	nd	nd	nd
Tetrachloroethene	0.02	nd	nd	nd
Benzene	0.02	nd	nd	nd
Toluene	0.05	nd	nd	nd
Ethylbenzene	0.05	nd	nd	nd
Xylenes	0.05	nd	nd	nd
Methyl-t-butyl ether	0.05	nd	nd	nd
*-instrument detection limits				
Surrogate recoveries				
Dibromofluoromethane		98%	97%	98%
Toluene-d8		100%	99%	99%
4-Bromofluorobenzene		98%	100%	100%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

Analytical Results

8260, mg/kg		NH-NP-SB02-S2.0	NH-NP-SB03-S4.0
Matrix	Soil	Soil	Soil
Date extracted	Reporting	04/28/04	04/28/04
Date analyzed	Limits	05/03/04	04/29/04
Vinyl chloride	0.05	nd	nd
1,1-Dichloroethene	0.05	nd	nd
1,1,1-Trichloroethane	0.05	nd	nd
Trichloroethene	0.02	nd	nd
Tetrachloroethene	0.02	nd	nd
Benzene	0.02	nd	nd
Toluene	0.05	nd	nd
Ethylbenzene	0.05	nd	nd
Xylenes	0.05	nd	nd
Methyl-t-butyl ether	0.05	nd	nd
*-instrument detection limits			
Surrogate recoveries			
Dibromofluoromethane		98%	99%
Toluene-d8		100%	98%
4-Bromofluorobenzene		100%	100%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

Analytical Results		NH-NP-SB01-S2.0	NH-NP-SB01-S2.0	
8260, mg/kg		MS	MSD	RPD
Matrix	Soil	Soil	Soil	
Date extracted	Reporting	04/28/04	04/28/04	
Date analyzed	Limits	04/28/04	04/28/04	
Vinyl chloride	0.05			
1,1-Dichloroethene	0.05	82%	82%	0%
1,1,1-Trichloroethane	0.05			
Trichloroethene	0.02	100%	98%	2%
Tetrachloroethene	0.02			
Benzene	0.02	103%	102%	1%
Toluene	0.05	103%	102%	1%
Ethylbenzene	0.05			
Xylenes	0.05			
Methyl-t-butyl ether	0.05			
*-instrument detection limits				
Surrogate recoveries				
Dibromofluoromethane		98%	97%	
Toluene-d8		98%	98%	
4-Bromofluorobenzene		100%	100%	

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S40427-1
Client:	ESN PACIFIC
Client Job Name:	EARTHTECH-DOT-HARBORS, KAUAI
Client Job Number:	D404230119

Analytical Results

8260, µg/L		MTH BLK	LCS	NH-F001	NH-E001	MS	MSD	RPD
Matrix	Water	Water	Water	Water	Water	Water	Water	
	Reporting							
Date analyzed	Limits	04/27/04	04/27/04	04/27/04	04/27/04	04/27/04	04/27/04	
Vinyl chloride	0.2	nd		nd	nd			
1,1-Dichloroethene	1.0	nd	106%	nd	nd	83%	89%	7%
1,1,1-Trichloroethane	1.0	nd		nd	nd			
Trichloroethene	1.0	nd	107%	nd	nd	96%	106%	10%
Tetrachloroethene	1.0	nd		nd	nd			
Benzene	1.0	nd	108%	nd	nd	97%	106%	9%
Toluene	1.0	nd	108%	nd	nd	98%	108%	10%
Ethylbenzene	1.0	nd		nd	nd			
Xylenes	1.0	nd		nd	nd			
Methyl-t-butyl ether	1.0	nd		nd	nd			
*-instrument detection limits								
Surrogate recoveries								
Dibromofluoromethane		101%	101%	103%	102%	101%	102%	
Toluene-d8		101%	101%	100%	101%	100%	101%	
4-Bromofluorobenzene		98%	99%	99%	102%	100%	100%	

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

ESN NORTHWEST CHEMISTRY LABORATORY

EARTHTECH-DOT HARBORS PROJECT
Hawaii
ESN Pacific
Client Project #D404230119

Heavy Metals in Soil by EPA-7000 Series

Sample Number	Date Analyzed	Nickel (Ni) EPA 7520 (mg/kg)	Antimony (Sb) EPA 7040 (mg/kg)	Copper (Cu) EPA 77210 (mg/kg)	Arsenic (As) EPA 7061 (mg/kg)	Silver (Ag) EPA 7760 (mg/kg)	Zinc (Zn) EPA 7950 (mg/kg)	Iron (Fe) EPA 77380 (mg/kg)
Method Blank	5/10/04	nd	nd	nd	nd	nd	nd	nd
NH-NP-SB02	5/10/04	950	nd	200	nd	nd	33	700
Method Detection Limits		20	20	20	5	20	20	20

"nd" Indicates not detected at listed detection limits.

ANALYSES PERFORMED BY:Marilyn Farmer

ESN NORTHWEST CHEMISTRY LABORATORY

EARTHTECH-DOT HARBORS PROJECT
Hawaii
ESN Pacific
Client Project #D404230119

QA/QC Data - Total Metals EPA-7000 Series Analyses

Sample Number: Feb-44

	Matrix Spike			Matrix Spike Duplicate			RPD
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	(%)
Lead	125	121	97	125	117	94	3.36
Cadmium	12.5	14.3	114	12.5	13.7	110	4.29

	Laboratory Control Sample		
	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)
Lead	125	120	96
Cadmium	12.5	14.7	118
Chromium	125	122	98

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY:Marilyn Farmer

STL Seattle

Sample Identification:

Lab. No.	Client ID	Date/Time Sampled	Matrix
120968-1	NH-NP-SB02-52.0		solid

STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	NH-NP-SB02-52.0
Lab ID:	120968-01
Date Received:	5/6/04
Date Prepared:	5/11/04
Date Analyzed:	5/11/04
Dilution Factor	1
% Solids	71.21

Metals by ICP - USEPA Method 6010

Sample results are on a dry weight basis.

Analyte	Result (mg/kg)	RL	MDL	Flags
Aluminum	48600	12.2	1.2	
Calcium	1340	122	6.88	
Magnesium	1040	122	1.96	

STL Seattle

Lab ID:	Method Blank - SP958
Date Received:	-
Date Prepared:	5/11/04
Date Analyzed:	5/11/04
Dilution Factor	1

Metals by ICP - USEPA Method 6010

Sample results are on an as received basis.

Analyte	Result (mg/kg)	RL	MDL	Flags
Aluminum	ND	10	0.982	
Calcium	ND	100	5.64	
Magnesium	ND	100	1.61	

STL Seattle

Blank Spike/Blank Spike Duplicate Report

Lab ID:	SP958
Date Prepared:	5/11/04
Date Analyzed:	5/11/04
QC Batch ID:	SP958

Metals by ICP - USEPA Method 6010

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Aluminum	0	400	380	94.9	377	94.3	-0.63	
Calcium	0	2000	1910	95.4	1910	95.4	0	

STL Seattle

Matrix Spike Report

Client Sample ID:	6295F-51-00
Lab ID:	121031-01
Date Prepared:	5/11/04
Date Analyzed:	5/11/04
QC Batch ID:	SP958

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Aluminum	4200	200	4840	315	X7a
Calcium	30000	1000	31500	161	X7a
Magnesium	5000	1000	5850	85	

STL Seattle

Duplicate Report

Client Sample ID:	6295F-51-00
Lab ID:	121031-01
Date Prepared:	5/11/04
Date Analyzed:	5/11/04
QC Batch ID:	SP958

Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Aluminum	4200	4200	0.0	
Calcium	30000	29000	3.4	
Magnesium	5000	4800	4.1	

Applied P & Ch Laboratory
13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:
Earth Tech (HI)
Attention: Jen Goethals
841 Bishop St., Suite 500
Honolulu HI 96813
Tel: (808)523-8874 Fax: (808)523-8950

Service ID #: 801-042707
Collected by:
Collected on: 04/20-22/04

Received: 04/27/04
Extracted: 04/28/04
Tested: 04/27-05/03/04
Reported: 05/04/04

Sample Description: Soil
Project Description: 42184 DOT-Harbors

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result NH-NP-SB02-D4.0 04-02707-1	NH-NP-SB02-S2.0 04-02707-2	NH-NP-SB02-S4.0 04-02707-3
MOISTURE	ASTM-D2216	%Moisture	0.5	28.5	29.6	30.1
ORGANOTINS [a]						
Dilution Factor				1	1	1
TRIBUTYLTIN	Organotin	µg/kg	10	<14	<14	<14
MONOBUTYLTIN	Organotin	µg/kg	10	<14	<14	<14
DIBUTYLTIN	Organotin	µg/kg	10	<14	<14	<14
TETRABUTYLTIN	Organotin	µg/kg	10	<14	<14	<14

Component Analyzed	Method	Unit	PQL	Analysis Result NH-NP-SB03-S2.0 04-02707-4	NH-NP-SB03-S4.0 04-02707-5
MOISTURE	ASTM-D2216	%Moisture	0.5	21.6	17.0
ORGANOTINS [a]					
Dilution Factor				1	1
TRIBUTYLTIN	Organotin	µg/kg	10	<13	<12
MONOBUTYLTIN	Organotin	µg/kg	10	<13	<12
DIBUTYLTIN	Organotin	µg/kg	10	<13	<12
TETRABUTYLTIN	Organotin	µg/kg	10	<13	<12

Component Analyzed	Method	Unit	PQL	Analysis Result NH-NP-SB01-S2.0 04-02707-6	NH-NP-SB01-S3.0 04-02707-7
MOISTURE	ASTM-D2216	%Moisture	0.5	8.5	7.8

Component Analyzed	Method	Unit	PQL	Analysis Result NH-NP-SB01-S2.0 04-02707-6	NH-NP-SB01-S3.0 04-02707-7
ORGANOTINS (a)					
Dilution Factor				1	1
TRIBUTYLTIN	Organotin	μg/kg	10	<11	<11
MONOBUTYLTIN	Organotin	μg/kg	10	<11	<11
DIBUTYLTIN	Organotin	μg/kg	10	<11	<11
TETRABUTYLTIN	Organotin	μg/kg	10	<11	<11

PQL: Practical Quantitation Limit. MDL: Method Detection Limit. CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit. "-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

(a) Re-analysis in progress.

Respectfully submitted,

Dominic Lau
Laboratory Director
Applied P & Ch Laboratory

CHAIN-OF-CUSTODY RECORD

CLIENT: EARTH TECH
ADDRESS: 841 BISHOP ST, HON 96813
PHONE: 523-8874 FAX: 523-8950
E-MAIL: jem.goethals@earthtech.com
CLIENT PROJECT #: 42184.08 PROJECT MANAGER: Tom Hanneman

TURNAROUND TIME (circle one): 24 Hr 48 Hr 5 Day or Other: ________
DATE: 4/22/04 PAGE ________ OF ________
ESN PROJECT #: D4042301 19
LOCATION/PROJECT NAME: DOT-Harbors Kauai
COLLECTOR: Jem Goethals COLLECTION DATE: 4/22/04

#	Sample ID	~~Depth~~	Time ~~Sample Type~~	Date ~~Container Type~~	8021b VOC	5035 Ext.	8021b BTEX	8021b MtBE	8015 TPH-G/D/O	413.1 O&G	418.1 TRPH	8081 PEST	8082 PCB	8100 PAH	1010 FLASH	Total Metals by AA or ICP Pb, Cd, Cr	Ni, As, Sb, Mo, Ag, Cu	Zn, Al, Fe, Ca	Chlorinated [illegible]	Field Notes	# of Containers	Laboratory Count
1	NH-SW-SB04-S4.0		0845	4/22/04			X	X	X					X		X						
2	NH-SW-SB02-S2.0		0915	4/22/04			X	X	X				*	X		X	*	*	*			
3	NH-NP-SB02-S4.0		0930				X	X	X				X	X		X	X	X	X			
4	~~NH~~ NP																					
5	NH-NP-SB02-D4.0		0930	4/22/04			X	X	X				X	X		X	X	X	X			
6	NH-NP-SB03-S2.0		1030	4/22/04			X	X	X				X	X		X	X	X	X			
7	NH-NP-SB03-S4.0		1045	4/22/04			X	X	X				X	X		X	X	X	X			
8																						
9																						
10																				NOTE:		
11																				NO IDW		
12																				SAMPLES		
13																				INCLUDED		
14																				FIELD SAMPLE		
15																				VOLUME		
16																				LIMITED		
17																						
18																						
19																				*ADD. ANALYSES		
20																				REQ FAX 5/5/04		

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
Jem Goethals	4/23/04 0900	Jim McCall	4/30/04
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT
TOTAL # OF CONTAINERS ________
COC SEALS Y / N / NA
SEALS INTACT Y / N / NA

LABORATORY NOTES:
4°C

CHAIN-OF-CUSTODY RECORD

CLIENT: EARTH TECH
ADDRESS: 841 BISHOP ST, HON 96813
PHONE: 523-8874 FAX: 523-8950
E-MAIL: jem-goethals@earthtech.com
CLIENT PROJECT #: 42194.08 PROJECT MANAGER: Tom Hanneman

TURNAROUND TIME (circle one): 24 Hr 48 Hr 5 Day or Other: ____
DATE: 4/22/04 PAGE ____ OF ____
ESN PROJECT #: ____
LOCATION/PROJECT NAME: DOT-Harbors Kauai
COLLECTOR: Jem Goethals COLLECTION DATE: 4/22/04

	Sample ID	Depth	Time	Sample Type (TIME)	Container Type (DATE)	8021b VOC	5035 Ext	8021b BTEX	8021b MBE	8015 TPH-G/D/O	413.1 O&G	418.1 TRPH	8081 PEST	8082 PCB	8100 PAH	1010 FLASH	Total Metals by AA or ICP	Pb, Cd, Cr	Ni, As, Sb, Hg, Ag	Zn, Al, Fe, Ca	Chlorinated Solvents		Field Notes	# of Containers	Laboratory Count
1	NH-SW-SB04-	S4.0		0845	4/22/04			X	X	X				✓	X			X	✓	✓	✓		✓ = added		
2	NH-SW-SB02- (NP)	S2.0		0915	4/22/04			X	X	X				✓	X			X	✓	✓	✓				
3	NH-SW-SB02- (NP)	S4.0		0930				X	X	X				X	X			X	X	X	X		5/5/04		
4	NH- (NP)																								
5	NH-NP-SB02-	D4.0		0930	4/22/04			X	X	X		–		X	X			X	X	X	X				
6	NH-NP-SB03-	S2.0		1030	4/22/04			X	X	X				X	X			X	X	X	X				
7	NH-NP-SB03-	S4.0		1045	4/22/04			X	X	X				X	X			X	X	X	X				
8																									
9																									
10																							NOTE:		
11																							NO IDW		
12																							SAMPLES		
13																							INCLUDED		
14																							FIELD SAMPLE		
15																							VOLUME		
16																							LIMITED		
17																									
18																									
19																									
20																									

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[signature]	4/23/04 0900		

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT
TOTAL # OF CONTAINERS ____
COC SEALS Y / N / NA
SEALS INTACT Y / N / NA
RECEIVED T...

LABORATORY NOTES:

SAMPLE DISPOSAL INSTRUCTIONS: ESN Dispose @ $2.00/sample ___ Return to Client ___

CHAIN-OF-CUSTODY RECORD

CLIENT: EARTH TECH
ADDRESS: 841 BISHOP ST - SUITE 500, HONOLULU
PHONE: 523-8874 FAX: 523-8950
E-MAIL: jem.goetzals@earthtech.com
CLIENT PROJECT #: ______ PROJECT MANAGER: T. Hammeman

TURNAROUND TIME (circle one): 24 Hr 48 Hr 5 Day or Other: ______
DATE: 4/23/04 PAGE ______ OF ______
ESN PROJECT #: D40423O119
LOCATION/PROJECT NAME: DOT-Harbors Kauai
COLLECTOR: Jem Goetzals COLLECTION DATE: 4/21/04

#	Sample ID	~~Depth~~	~~Time~~	Time ~~Sample Type~~	DATE ~~Container Type~~	8021b VOC	5035 Ext.	8021b BTEX	8021b MtBE	8015 TPH (G D O)	413.1 O&G	418.1 TRPH	8081 PEST	8082 PCB	8100 PAH	1010 FLASH	Total Metals by AA&ICP Pb, Cd, Cr	Ni, As, Sb, Mo, Ba, Cu	Zn, Al, Fe, Co	Chlorinated Solvents		Field Notes	# of Containers	Laboratory Count
1	~~NA-001~~	~~1.5~~	~~[illegible]~~	~~soil~~	~~2xb liner~~			~~X~~	~~X~~	~~X~~				~~X~~	~~X~~									
2	NH-NP-SB01-S2.0			1400	4/20/04			X	X	X				X	X		X	X	X	X				
3	NH-NP-SB01-S3.0			1030	4/21/04			X	X	X				X	X		X	X	X	X				
4	NH-RR-SB07-S4.0			1300	4/21/04			X	X	X				~~X~~	X		X					No PCB TEST		
5	NH-RR-SB06-S1.5			1330	4/21/04			X	X	X					X		X							
6	NH-RR-SB06-S5.5			1415	4/21/04			X	X	X					X		X							
7	NH-RR-SB06-S6.0			1430	4/21/04			X	X	X					X		X							
8	NH-SW-SB05-S4.5			1515	4/21/04			X	X	X					X		X							
9																								
10																								
11	NH-F001			1400	4/22/04			X	X	X				X	X		X	X	X	X				
12	NH-E001			130	4/22/04			X	X	X				X	X		X	X	X	X				
13																								
14																						NOTE:		
15																						NO IDW		
16																						SAMPLES		
17																						INCLUDED		
18																								
19																								
20																								

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[signature]	4/23/0900	Jim McCall	4/30/04
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT
TOTAL # OF CONTAINERS ______
COC SEALS Y / N / NA
SEALS INTACT Y / N / NA

LABORATORY NOTES:
4°C

CHAIN OF CUSTODY RECORD

CLIENT: ESN Pacific
ADDRESS: 1818 Kahai St
PHONE: 808-847-0067 FAX: 808-847-0917
E-MAIL:
CLIENT PROJECT #: PROJECT MANAGER: C Pond

TURNAROUND TIME (circle one): 24 Hr 48 Hr 5 Day or Other:
DATE: 4/26/04 PAGE 1 OF 1
ESN PROJECT #: D/04230119
LOCATION/PROJECT NAME: EarthTech - D.O.T. Harbors Kaua...
COLLECTOR: COLLECTION DATE:

#	Sample ID	Depth	Time	Sample Type	Container Type	8021b VOC	5035 Ext.	8021b BTEX	8021b MtBE	8015 TPH-G/D/O	413.1 O&G	418.1 TRPH	8081 PEST	8082 PCB	8100 PAH	1010 FLASH	Total Metals by AA or ICP Ni, As, Sb, Mg, Ag, Cu	Zn, Al, Fe, Ca			Field Notes	# of Containers	Laboratory Count
1	NH-NP-SB01-S2.0			Soil	JAR												X	X			nickel, Arsenic,		
2	NH-NP-SB01-S3.0																X	X			Antimony,		
3	NH-NP-SB02-D4.0																X	X			magnesium,		
4	NH-NP-SB02-S4.0																X	X			silver, Copper,		
5	NH-NP-SB03-S2.0																X	X			Zinc, Aluminum,		
6	NH-NP-SB03-S4.0																X	X			Iron, Calcium		
7																							
8																							
9																							
10																							
11																							
12																							
13																							
14																							
15																							
16																							
17																							
18																							
19																							
20																							

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[signature]	10:00 AM 4/26/04	[signature]	4/27/04
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT
TOTAL # OF CONTAINERS 6
COC SEALS Y / N / NA
SEALS INTACT Y / N / NA
RECEIVED TEMP. —

LABORATORY NOTES:

SAMPLE DISPOSAL INSTRUCTIONS: [illegible]

1001?

CHAIN-OF-CUSTODY RECORD

CLIENT: ESN Pacific
ADDRESS: 1814 Kahai St.
PHONE: 808-847-0067 FAX: 808-847-0917
E-MAIL:
CLIENT PROJECT #: PROJECT MANAGER: Cloma

TURNAROUND TIME (circle one): 24 Hr 48 Hr 5 Day or Other:
DATE: 4/26/04 PAGE 1 OF 1
ESN PROJECT #: D40423 0119
LOCATION/PROJECT NAME: EarthTech - DOT Harbors Kauai
COLLECTOR: COLLECTION DATE:

	Sample ID	Depth	Time	Sample Type	Container Type	8021b VOC	5035 Ext.	8021b BTEX	8021b MtBE	8015 TPH-G/D/O	413.1 O&G	418.1 TRPH	8081 PEST	8082 PCB	8100 PAH	1010 FLASH	Total Metals by AA or ICP	Pb Cd Cr	Ni As Sb Mg	Ag Cu	Zn Al Fe	Ca	Field Notes	# of Containers	Laboratory Count
1	NH-F001			W	poly													X	X	X	X	X	nickel		
2	NH-E001																	X	X	X	X	X	Arsenic,		
3																							Antimony,		
4																							Magnesium		
5																							Silver,		
6																							Copper, Zinc,		
7																							Iron, Aluminum,		
8																							Calcium,		
9																							Lead,		
10																							Cadmium,		
11																							Chromium		
12																									
13																									
14																									
15																									
16																									
17																									
18																									
19																									
20																									

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME
[signature]	4/26/04 10:00AM	Khosley	4/27/04 10A
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS: ___ ESN Dispose @ $2.00/Sample ___ Return to Client

SAMPLE RECEIPT
TOTAL # OF CONTAINERS ______
COC SEALS Y / N / NA
SEALS INTACT Y / N / NA
RECEIVED TEMP

LABORATORY NOTES:

CLIENT: ESN Pacific

ADDRESS: 1818 Kahai St.

PHONE: 808-847-0067 FAX: 808-847-0917

E-MAIL:

CLIENT PROJECT #: PROJECT MANAGER: C Loma

TURNAROUND TIME (circle one): 24 Hr 48 Hr 5 Day or Other:

DATE: 4/26/04 PAGE 1 OF 1

ESN PROJECT #: D404230119

LOCATION/PROJECT NAME: EarthTech · DOT - Harbors Kauai

COLLECTOR: COLLECTION DATE:

#	Sample ID	Depth	Time	Sample Type	Container Type	8021b VOC	5035 Ext.	8021b BTEX	8021b MtBE	8015 TPH-G/D/O	413.1 O&G	418.1 TRPH	8081 PEST	8082 PCB	8100 PAH	1010 FLASH	Total Metals by AA or ICP	8260 MTBE BTEX	8260 Cl solvents*	8270 *			Field Notes	# of Containers	Laboratory Count
1	NH-NP-SB01	S2.0		Soil														X	X	X					
2	NH-NP-SB01	S3.0																X	X	X			*Cl solvents:		
3	NH-RR-SB07	S4.0																X		X			Report only		
4	NH-RR-SB06	S1.5																X		X			PCE, 1,1DCE,		
5	~~NH-RR-SB04-S6.5~~																	X		X			VC, ~~TCE~~,		
6	NH-RR-SB06	D6.0																X		X			1,1 TCA		
7	NH-SW-SB05	S4.5																X		X					
8	NH-SW-SB04	S4.0																X		X			*8270:		
9	NH-NP-SB02	S2.0																X		X			Report only		
10	NH-NP-SB02	S4.0																X	X	X			Napthalene,		
11	NH-NP-SB02	D4.0																X	X	X			Acenapthene,		
12	NH-NP-SB03	S2.0																X	X	X			Fluoranthene,		
13	NH-NP-SB03	S4.0		↓														X	X	X			Benzo(a)pyrene		
14																		X	X	X					
15	NH-F001			H_2O																					
16	NH-E001			↓														X	X	X					
17																		X	X	X					
18																									
19																									
20																									

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[signature]	4/26/04 10:00AM	[signature]	4/27/04 1100

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT

TOTAL # OF CONTAINERS

COC SEALS Y / N / NA

SEALS INTACT Y / N / NA

RECEIVED TEMP.

LABORATORY NOTES:

MPL[illegible] OSAL[illegible] UCT[illegible] [illegible]ispos[illegible] 00/S[illegible] Return to Client

CHAIN-OF-CUSTODY RECORD

CLIENT: ESN Pacific
ADDRESS: 1818 Kahai St. Honolulu, HI 96819
PHONE: 808-847-0067 FAX: 808-847-0917
E-MAIL: ESNPacific@verizon.net
CLIENT PROJECT #: PROJECT MANAGER: C Pama

TURNAROUND TIME (circle one): 24 Hr 48 Hr 5 Day or Other:
DATE: 5-5-04 PAGE 1 OF 1
ESN PROJECT #: D40423 0119
LOCATION/PROJECT NAME: EarthTech - DOT Harbors
COLLECTOR: COLLECTION DATE:

	Sample ID	Depth	Time	Sample Type	Container Type	8021b VOC	5035 Ext.	8021b BTEX	8021b MtBE	8015 TPH-G/D/O	413.1 O&G	418.1 TRPH	8081 PEST	8082 PCB	8100 PAH	1010 FLASH	Total Metals by AA or ICP	Ni, As, Sb,	Ag, Cu,	Zn, Fe		Field Notes	# of Containers	Laboratory Count
1	NH-NP-SB02	-S2.0		SOIL	Glass 4oz													X	X	X			1	
2																								
3																								
4																								
5																								
6																								
7																								
8																								
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19																								
20																							1	

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
B Capo	5-5-04	Julie Whelle	5/6/04
RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE RECEIPT
TOTAL # OF CONTAINERS
COC SEALS Y / N / NA
SEALS INTACT Y / N / NA

LABORATORY NOTES:

1 2008 68.

CHAIN-OF-CUSTODY RECORD

CLIENT: ESN Pacific
ADDRESS: 1818 Kahai St. Honolulu, HI 96819
PHONE: 808-847-0067 FAX: 808-847-0917
E-MAIL: ESNPacific@verizon.net
CLIENT PROJECT #: PROJECT MANAGER: Ohma

TURNAROUND TIME (circle one): 24 Hr 48 Hr 5 Day or Other:
DATE: 5-4-04 PAGE 1 OF 1
ESN PROJECT #: D40423 0119
LOCATION/PROJECT NAME: EarthTech - D.O.T. Harbors
COLLECTOR: COLLECTION DATE:

	Sample ID	Depth	Time	Sample Type	Container Type	Analyses 8021b VOC	5035 Ext.	8021b BTEX	8021b MtBE	8015 TPH-G/D/O	413.1 O&G	418.1 TRPH	8081 PEST	8082 PCB	8100 PAH	1010 FLASH	Total Metals by AA or ICP		Mg, Al,	Ca			Field Notes	# of Containers	Laboratory Count
1	NH-NP-SR02	-520		SOIL	Glass 4oz														X	X				1	
2																									
3																									
4																									
5																									
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B. [signature] 5-4	5-5-04	K. [signature]	5/5/04 1030Am

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
[redacted]			

SAMPLE RECEIPT
TOTAL # OF CONTAINERS
COC SEALS Y / N / NA
SEALS INTACT Y / N / NA

LABORATORY NOTES: