TO: **Mr. Brian J. J. Choy, Director** 10/11/95
Office of Environmental Quality Control
220 S. King St, 4th Floor
Honolulu, HI 96813

FM: Bob Jordan (Project Coordinator)
Dept. Geology and Geophysics SOEST
2525 Correa Rd
Honolulu, HI 96822 PH (808) 961-5603 Big Isle, Bob
PH 956-4779 Oahu, Fred

Re: **Negative Declaration for the HUGO Project, A Research and Education Communications Cable Between The Big Isle and Loihi**

The University of Hawaii as an agency, has reviewed the comments received during the 30-day public comment period which began on the OEQC Bulletin Publication Date of 5/23/95. The agency has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the 10/23/95 OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the Final EA.

Please contact myself or Fred Duennebier at the above phone numbers if you have questions.

Mahalo,
Bob Jordan

CC: Fred Duennebier
Alex Malahoff

Def. letter pg D-23
-JT

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

1995-10-23-HI-FEA-HUGO Project
Hawaii Undersea
Geo-Observatory

UHM

soest

ENVIRONMENTAL ASSESSMENT
HUGO PROJECT
Final 9/12/95

Prepared by:
Fred K. Duennebier, Robert C. Jordan
University Of Hawaii at Manoa Dept. of Geology and Geophysics
School of Ocean and Earth Science and Technology

FOREWORD

This document has been through **pre-assessment** evaluation with responses and actions on responses being addressed in **Appendix E**. It has also been through a **draft review** process with responses and actions on responses being addressed in **Appendix F**. This is the final environmental assessment. Changes from the draft version are indicated by a line in the side margin, with a vertical line representing a change or addition, and a horizontal line indicating a deletion or move of text.

Although this is the final document, the process continues. There are numerous permits and permissions that must be obtained, and the process of informing the public continues. Some of the process of our **public outreach** is discussed in **Appendix G**. We hope that the regulatory authorities and the public will see the benefits this project has to offer, and in turn will offer their approvals.

TABLE OF CONTENTS

FIGURES, MAPS, PHOTOS

0.1 ENVIRONMENTAL ASSESSMENT CHECKLIST

(ξ 11-200-10)

Draft Env. Assess.____ Negative Declaration__Y__ EIS Preparation Notice____ NEPA____

Document Title ____Environmental Assessment HUGO Project Final 9/12/95_____

__Y__1. Identify the ~~Applicant or~~ Agency proposing the action. **(page 7 section 1.0)**

__Y__2. Identify the Approving Agency. **(7 sect 2.0)**

__Y__3. Identify the Agencies consulted. **(7 sect 3.0)**

- __Y__ Was applicable county planning office notified of project? **(7 sect 3.0)**
- __Y__ Were any appropriate community groups notified? **(7 sect 3.0)**
- __Y__ Is the project in the Conservation District, Special Management Area, Shoreline Setback **(6 sect 0.4, all three)**
- __Y__ Has appropriate agency been contacted (concerning dual purpose EA)? **(7 sect 2 note)**
- __Y__ For Final EAs, were comment letters and responses included? **(Appendix F)**
- __Y__ For Final EAs, were comments adequately addressed? **(Appendix F)**

__Y__4. General *description of the proposed action:* **(8 sect 4.0)**

- __Y__ Technical **(9 sect 4.1)**
- __Y__ Economic (Proposed timing or phasing of project? **(11 Schedule/Timing)**
  Project cost? (State and County Projects)) **(12 sect 4.2 last sentences)**
- __Y__ Social (How does the project affect the community?) **(12 sect 4.3 employment, info, schools, tsunamis, and 11 sect 4.2 salaries)**
- __Y__ Environmental characteristics ξ 11-200-12(b)(11)
  Is the project located in an environmentally sensitive zone (floodplain, tsunami zone, erosion prone area, geologically hazardous land, estuary, fresh water, coastal waters, archaeological/historic/cultural sites, natural resources)? **(18 para 2 area hit by 2 tsunamis in recent history. Pg D26 top, coastal waters. 23 sect 9.0 summary)**

__Y__5. Summary description of the affected environment including: **(14 sect 5.0...)**
__Y__Site location map ~~(U.S.G.S. Topographic map preferred)~~ **(page M2)**

__Y__6. Summary of the major impacts: ξ 11-200-12(b) **(21 sect 6.0)**

__Y__Short Term:
Construction impacts? **(13 sect 4.4 Construction, Inconvenience, Traffic, Water, Noise)**
__Y__Long Term:
__No__ Significant effect on water or air resources? (Contact DOH, CWB, CAB?) **(13 sect 4.4 Water, Air)**
__Y__ Does project discuss noise, traffic, and visual impacts? **(13 sect 4.4 Noise, Traffic, Aesthetic)**
__Y__ Was DLNR/SHPD contacted concerning archaeologic and historic district/sites concerns? **(20 sect 5.3 last para)**
__Y__ Was a flora and fauna survey done to determine the presence of any rare, threatened, or endangered species or their habitat at the site? ξ 11-200-12(b)(9). **(Terrestrial pg 15 sect 5.1.2, Marine pg 16 sect 5.1.3)**

__Y__7. Alternatives considered (if any). **(21 sect 6.0 para 1 alternate site, pg 22 sect 6.0 para 2 No action alternative)**

__Y__8. Mitigation measures proposed (if any). **(22 sect 7.0 Tide zone, soil erosion, marsh, reef, whale, historic sites)**

__Y__9. Agency letter of ~~submittal (Draft EAs) or~~ determination (Negative Declarations ~~& EISPNs~~) **(pages 23 and D23...)**
Status of any other necessary approvals or permits? **(Append H)**

__Y__10. Findings and reasons to support the determination. **(23 sect 9.0)**

__NA__11. Agencies to be consulted if an EIS is prepared.

__NA__ If this EA concerns only a portion of the overall project, has a previous EA/EIS been filed?
__No__ Does project have a significant effect on environment? Re: Significance Criteria ξ 11-200-12(b)
(No significant impact. While Title 11 chapter 200-12(b)(11) suggests that most actions in a tsunami zone would be considered significant, in this instance since the proposed project would not increase the likelihood of tsunami damage, and since the facility would be unmanned (pg 8 sect 4.0 Desc. para 1), and since one of the project purposes would be to provide tsunami warning as a public service, that this criteria does not require a significant impact determination.)

Revised: July 1, 1992

Recommendations:
1) Consult with appropriate authorities on adequacy of only posting signs to prevent walking on pier conduit (Page 9).
2) Review marine environment between years 1-2 and report significant environmental changes to proper authorities.

0.2 Citation Of Requirements

0.2.1. This environmental assessment was prepared for a shoreline setback variance per requirements of Rule 8 of the County of Hawaii Planning Commission, 8-8(a)(2)(D) on page 8-7, by authority of HRS 205A and Rule 8, section 8-1. This project falls under this requirement because it lies along the shoreline and crosses the shoreline setback as specified by Rule 8, section 8-4(b), which specifies the setback as usually 40 feet from the shoreline.

0.2.2. This environmental assessment was also prepared for a conservation district use permit with the State DLNR per requirements of DLNR "Master Application Form, Rev. 6/93", section V, page 2. This project falls under this requirement because it crosses the conservation district which in the area of this project extends from *three miles offshore (per the submerged lands act)* to approximately 300-500 feet mauka of the shore (per the Dept. of Business and Economic Development (DBED) Land Use Commission).

0.3 Guiding Document Citation

This assessment was prepared following "A Guidebook For The Hawaii State Environmental Review Process", Appendix F "Environmental Assessments", written by the State of Hawaii Office of Environmental Quality Control, August 1992.

0.4 Planned Submittals (For Permits Etc.)

1) University of Hawaii at Manoa (as E.A. approving agency)
2) County of Hawaii, Planning Dept.
   -For a Planning Commission Shoreline Setback Variance
   1 Original 20 Copies $200 Fee
   -For a Planning Dept. Special Management Area Permit
   1 Copy
3) State of Hawaii, Dept. of Land and Natural Resources (DLNR)
   -For a Conservation District Use Application
   20 Copies $ TBD Fee

1.0 Applicant

University Of Hawaii at Manoa
Dept. of Geology and Geophysics
School of Ocean and Earth Science and Technology
HUGO Project

Project Contacts;
(Big Island) Bob Jordan (Research Associate)
P.O. Box 6360
Hilo, HI 96720-8926
Ph 961-5603
(Oahu) Dr. Fred Duennebier (Principal Investigator)
University of Hawaii at Manoa
School of Ocean and Earth Science and Technology (SOEST)
HUGO Project
Honolulu, HI 96822
Ph (808) 956-4779 Fax: (808) 956-4780.

2.0 Identification Of Approving Agency

University of Hawaii at Manoa

Note: This is a joint Environmental Assessment with DLNR and County of Hawaii Planning Dept. review, but per the included letter (**Appendix D5**), dated 2/7/95, from State of Hawaii Office of Environmental Quality Control, the agency listed above will be the only "Approving Agency".

3.0 Agencies Consulted In Making Assessment

State: DLNR, Historic Preservation Div. DLNR, Dept. of Transportation, DOT Harbors Div., Office of State Planning, Office of Environmental Quality Control, Office of Hawaiian Affairs, University of Hawaii at Manoa (UHM) Environmental Center, UHM Marine Biologist Steve Dollar, University of Hawaii at Hilo (UHH) Marine Science Dept. Marine Option Program Walter Dudley, Dept. of Health Water Quality Div.

Federal: U.S. Army Corps of Engineers, U.S. Dept. of Commerce National Marine Fisheries Service, Dept. of Hawaiian Home Lands,

County of Hawaii: Planning Dept., Dept. of Public Works, Dept. of Parks and Recreation, Dept. of Research and Development, Dept. of Water Supply

Community Organizations/Groups: Pele Defense Fund, Nation Of Hawaii, Sierra Club, Kauahaoa Congregational Church, Hawaiian Civic Club, Shirakawa Ice House Owner (for fishermen), Pahala School faculty and staff, Naalehu Main Street.

Individuals: Public at large at public information meeting at Naalehu School Cafeteria 1/24/95 7PM (all land owners within 300 feet of land parcels to be used by HUGO were invited by mail to this meeting), and Hilo Seven Seas Luau House 2/28/95 7PM, Abel and Janet Lui, Puu Davis, numerous others. Also draft EA copies were placed in Naalehu, Kona and Hilo public libraries for public review.

Companies: Hawaiian Electric Light Co. (HELCO), GTE Hawaiian Telephone, AT&T Cable Systems, Inc.

(Note: listing these parties does not imply their approval, only that they were consulted)

4.0 General Description Of The Proposed HUGO Project

(Note: all figures, maps and pictures are located together at end of main text)

Project Location (Maps M1-7)

In the county of Hawaii, district of Kau, starting next to Whittington county Beach Park TMK 3-9-5-14-1 on private land, then crossing that parcel and one other private parcel, the county park, and a state owned pier, then into the ocean and along an indirect route (Maps M3,5) to the summit of Loihi located approximately 20 miles southeast of Whittington Beach Park in the Pacific Ocean.

Project Access

Highway 11 from Hilo towards Naalehu at approximately the 60.61 mile marker via the park access road or a private pasture access road.

Description

The School of Ocean and Earth Science of the University of Hawaii at Manoa proposes to lay an electro-optical cable from Honuapo (near Whittington Beach Park, a county park) on the Island of Hawaii, to the summit of Loihi seamount (an active underwater volcano) for the purpose of providing an underwater observatory for study of Loihi seamount. This national facility would be the first deep-ocean scientific laboratory in the world, and would be used by Hawaii scientists and students, and scientists and students around the world. The shore portion of the facility would be a remotely controlled unmanned data recording site.

Information to be collected include (Figure F1);
1) evidence of volcanic activity of Loihi seamount
2) evidence of the deformation of the volcano as magma is injected into it
3) changes in water chemistry and temperature related to volcanic activity
4) changes in the biological community on the volcano
5) signals from earthquakes of local and distant origin
6) sea level changes caused by tsunamis
7) sounds from whales and other marine life
8) and potentially up to 100 experiments to be proposed by scientists and students around the world.

The Hawaii Undersea Geo-Observatory Project (HUGO), was conceived at the University of Hawaii, and is funded by a research grant from the National Science Foundation (Dr. Fred Duennebier, Principal Investigator, Dr. Alex Malahoff, Co-Investigator), with considerable support from AT&T, who have donated the main cable, and the ship time to deploy it. Work on the land station is scheduled to begin in late 1995, and the main cable is scheduled for emplacement in early 1996, when operations would begin.

Once the main cable (Figures F2 and F3) is laid (Map M3), sensors and experiments would be installed using the University of Hawaii HURL PISCES V submersible, (Figure F4), which would take experiments to the seamount, and plug them into a junction box attached to the end of the cable. Data from experiments would be sent in real-time to a shore station at Honuapo, where they would be processed, archived, and sent to scientists, schools, and other interested parties such as Hawaii Volcano Observatory and the Pacific Tsunami Warning Center. The HUGO system would have the potential of supporting about 100 experiments on Loihi. The system is designed to operate for at least ten years. Because of the fragile nature of the cables and experiments involved, other

scientists and marine operators who wish to do work at the ocean floor in this area would need to coordinate their work closely with the HUGO Project.

HUGO would utilize the following areas:

OCEAN: The cable (**Figures F2 and F3**) from Loihi seamount to the Honuapo Pier (**Map M3**) would be approximately 1" in diameter, and would lie on the sea floor. While the cable itself would not appreciably alter the environment, dredging and anchoring should be prohibited in the area near the cable to prevent damage to the cable.

PIER: At the shore end, an armored section of HUGO cable (**Figure F2**) would be installed in conduit on the top of the existing pier foundation. Approximately half way to the end of the pier, the cable would curve into the ocean, attached to the pier supports. People could use the conduit to walk on to reach the end of the pier to fish. Although the cable would not be dangerous to the people, and people would not harm the cable, the conduit is likely to be slippery, and there is a significant chance of falling. Rather than block off the pier to prevent this, we would post warning signs to discourage use of the cable in this manner. Honuapo Pier would be an excellent site for construction of a fishing pier using the existing pier structure. Such use of the pier by park users could be completely compatible with the proposed project. The HUGO cable could lie along the side of the walkway to the end of the pier.

PARK: We propose to bring the cable to shore at Honuapo (Whittington Beach Park, a county beach park). The cable would be buried in a 4.5" wide trench crossing the park (**Map M5**). Approximately 50 feet mauka of the pier there would be a junction vault where the ocean cable would change from a heavily armored cable to smaller, easy to handle shore cables. The vault would also contain sea water electrodes in 30' deep holes for electrical power returning from Loihi. The cable would be buried while crossing the park.

PRIVATE LANDS: Beyond the park the cable would either be placed in a trench or up on poles to the recording site. Trailers would be installed at the recording site attached to concrete foundation blocks at the corners of each trailer. Three-phase power would be extended from pole #84 by HELCO along the road to the recording site (**Map M6**). Phone service would be supplied at the trailers by GTE. The area is currently supplied with single-phase 12 KV electrical power.

4.1 Technical Characteristics

Project Purpose

The purpose of the HUGO Project is to install an unmanned ocean floor observatory on Loihi Seamount connected to shore at Honuapo by an electro-optical communications cable allowing students and researchers to conduct education and research, and to provide tsunami hazard information to Hawaii.

How The Project Would Be Accomplished

Current funding would see the project through installation and initial operation, which would be a proof of functionality stage. Later funding would provide for continued operation and full system development. The initial system would contain several experiments, a seismometer for measurement of earthquakes, a hydrophone to listen to marine life, including whales, temperature sensors, and a pressure sensor to measure tsunamis.

The main component of HUGO is a fiber optic cable which would be laid from Loihi to shore by an AT&T cable laying ship, probably the Long Lines. The cable laying operation would involve lowering a junction box (a box with electro-optical connectors on it) to the ocean floor at the summit of Loihi

seamount with the cable attached. The ship would then steam from Loihi to Honuapo at approximately 4 knots, laying the cable. As the ship approaches shore, it would lay excess cable on the bottom at diver depths to allow repair of the shore-end of the cable, should it be damaged. The end of the cable would be floated to a buoy, approximately 200 yards off the end of the pier, to which a messenger cable to haul the cable to shore would be attached. The entire cable ship operation should require approximately 24 hours. Aided by the messenger cable, floats, a small boat, and a winch on shore, the cable would then be brought to the end of the pier where it would be fed into conduit. The cable would be pinned to the ocean floor and the pier where appropriate to prevent scouring action. Pins would be placed by means of drilling and securing the pins in the holes.

The cable route on shore would be from the pier (**photo 1**), across the pier approach (**photo 3**), and in buried conduit to the junction vault located near the group of people seen in **photo 2** . In the junction vault, the ocean cable would be spliced to shore cables which would be smaller and easier to feed through conduit. Sea water electrodes would also be spliced into the shore cables in the junction vault. The electrodes would complete the electrical circuit for power used by experiments on Loihi. The electrodes would be placed in holes drilled through the bottom of the junction vault to a depth approx. 20' below sea level.

From the junction vault the cables would be in buried in conduit across the park lawn (**photo 4**) to the shower (**photo 5**), where the buried conduit would turn mauka (to the right in **photo 5**). At the base of the cliff (**photo 6**) the cables would go up a pole in conduit, and up to the trailer vans on poles. The view of the recording site and poles would be largely obscured by trees and vegetation, much as the NOAA tsunami warning building (**photo 8**) is obscured (white patch above picnic table in **photo 7**). The HUGO trailer vans would be placed approximately 80 feet mauka of the NOAA tsunami building at the trailer van site (**photo 10**) at an elevation of approximately 60 feet above sea level (**Map M7**). The entire land cable route is shown in **Maps M5 and M6**, and the ocean route is shown in **Map M3** .

On Loihi there would be equipment that controls electrical power distribution to experiments, and to prepare data for transmission to shore. Experiments would be plugged in to this equipment by submersible vehicles.

On shore, there would be equipment trailer vans that would prepare electrical power for transmission to Loihi, and equipment that would receive and store data from experiments on Loihi. The equipment would also be able to send commands to the experiments on Loihi to modify experiments and calibrate sensors.

Spatial Dimensions, Components, Etc.

Shore Recording Site

Vans: 2 Equipment Trailer Vans (8'x20' each, similar to Young Bros. containers) anchored to concrete foundation blocks at the corners.

Land: 10,000 sq. ft to allow for containers and approximate 30' fire perimeter with parking area for three cars

Cables: ~600' of Shore Cables (assorted per appropriate code and uses) trenched on shore (4.5" wide trench). Electrical Power Cable: 2 Conductor, sized appropriately 20 Amps Max., 1000 Volts D.C. on shore end. Data Cables: Similar to cable TV fiber optic cables, assorted twisted pair instrumentation cable (copper)

Junction Vault: (~4'W x ~6'L x ~3'D) Junction of Ocean and Shore Cables. Sea water Electrical Power Return Electrodes: 3 Holes, 8" diameter x ~30' deep for electrodes. Locked lid to prevent entry

Utility Upgrade. Approximately 1 mile HELCO upgrade from single phase to 3 phase, 12 KVolts, mostly along highway 11. Poles already present, but would probably be replaced. 2 phone lines, occasional use (not continuous). All cables would be protected to code, buried where practical, and inside conduit or on poles where burial is not practical.

Ocean

~45 km (~20 miles) of S-L Light Fiber Optic Ocean Cable, ~7/8" diameter, polyethylene exterior, 1 copper conductor, plow steel strain member, and 6 optical fibers.

~1.6 km (~.7 mile) Fish Bite protected cable near shore beyond the armored cable, ~1.25" diam., contains S-L Light cable with additional 2 layers of steel tape and polyethylene.

~550' armored cable near shore, ~1.7" diameter, Tar soaked nylon yarn exterior. The cable would be contained in an ~4" conduit from approximately 75 feet makai of the pier to the Junction vault. The conduit may also house a tsunami sensor for the NOAA Pacific Tsunami Warning Center of the type currently in place at the Honuapo Pier.

Schedule/Timing

Work on shore components would begin in late 1995, laying of the ocean cable would be in early 1996 (February), operation to immediately follow.

Construction Times (days)

30 Shore work (12 in the park)
1 Ocean cable laying

4.2 Economic Characteristics

The proposed project is funded by the National Science Foundation, and would provide salary support for five to ten scientists and technicians in Hawaii for at least ten years. The observatory is a national facility providing a magnet for scientists and educators locally and from around the world to participate in research in Hawaii.

At a local level with labor from in the immediate area (Naalehu, Punaluu, etc.) there would be work involved with site preparation and maintenance. The trailer site, part of the cable route, and access to the site are heavily overgrown by tall grass and Hale Koa. These would be cleared and maintained by hand labor.

At a more general local level (Big Island), HUGO would provide work for HELCO to upgrade existing electrical service in the area. This would involve replacing approx. 7 old poles with new poles, and installation of a new transformer. Work would also be provided for an electrical contractor to provide electrical work on the customer side of the power meter. This would involve trenching the park for buried cables, placing poles or trenching outside the park, digging the junction vault hole and electrode bore holes, fabrication and installation of the junction vault, and other work related to cables and electrical service. Considerable work is also being created by the need for environmental studies for permits. A team of biologist has been hired from the Univ. of Hawaii at Hilo to study marine and land biology in the area.

At a more distant local level (Oahu), considerable work is currently being done and would continue to be done related to design and construction of the HUGO system. While most of the economic benefits in the immediate area are

during construction and are not large, HUGO would be a magnet to encourage funding of experiments to use HUGO. HUGO would be designed simply enough that it is even hoped that high school students would be able to obtain funding and create their own experiments. One of the keys to ensuring success of such efforts would be to make sure that the appropriate skills are available, and it is clear that these skills are available within the schools and Universities. The total value of this project is approximately 5 million dollars, with the bulk of the value being the donated fiber optic cable and the donated ship time to lay it. The cost of development (salaries and materials) up to system deployment and initial operational testing would be approximately 1.5 million dollars. The value of the shore station would be approximately 100,000 dollars.

4.3 Social Characteristics

Direct Effects

HUGO would provide limited employment to Kau. As the operation at Honuapo would be largely unmanned, the only employment would be for initial construction and maintenance of the facility.

The HUGO experiments would provide citizens of Hawaii with a considerable amount of interesting information, from deep-water tsunami heights to the sounds of whales, from temperatures of frigid sea water and hot volcanic geysers to more precise locations of earthquakes, from how much lava is inflating Loihi to video pictures of strange creatures that live in frigid waters with no light and over a thousand pounds of water pressure crushing each square inch of their bodies. This strange new world that HUGO would inhabit would be brought home to us by the experiences of our kids at school. Hopefully these experiments would help to encourage some of our kids to pursue careers in science and give them experience in how research and commercial engineering projects are accomplished. It would also give all of us a greater appreciation of the marvelous strange world we live in, figuratively speaking, right in our own back yards. We would request funding to provide acoustic, earthquake, and tsunami data from Loihi to the local schools and the University of Hawaii at Hilo, as well as other schools and groups that are interested. We intend to involve students from Kau High School in the project as much as possible, including helping students with science projects using HUGO data, having students participate in operating the station, and presentation of results by scientists at the school. HUGO sensors would provide information on the arrival and height of tsunamis to the Kau coastline. These data would be transmitted to the Pacific Tsunami Warning Center for evaluation of the hazard.

Indirect Effects

HUGO would be the first fiber-optic deep-sea volcano observatory in the world. The people of Kau could be proud to host this facility, and to be part of its success. HUGO, like the Mauna Kea Observatory , the Natural Energy Laboratory at Keahole Point, and the DUMAND Project, would be another technological accomplishment for the Big Island and the State of Hawaii.

The establishment of HUGO in the Naalehu/Punaluu area would also cause a sense of pride in having such a unique facility right there. Also, in these times of closing sugar mills, while HUGO is not a large project, and would in no way replace the loss of sugar mills, it is still a very desirable project in terms of benefits and minimal adverse impacts. In addition to the direct and indirect impacts of the project already mentioned, HUGO plans to assist and support in requesting creation of a walkway and fishing platform on the Honuapo pier. If

this is approved, the park users would be provided with an excellent site for fishing at Honuapo. This would provide a social outlet, and maybe even a fishing club might be formed as there was in the old days.

4.4 Environmental Characteristics

Construction and operations associated with the HUGO project should have a negligible impact on the environment.

Aesthetics: The only features of HUGO that would be visible are the top of the buried junction vault, and the conduit going out on the top of the pier. Both of these are at the extreme south end of the park. There may also be a pole line mauka of the park, but this would be mostly obscured by trees.

Construction Inconvenience: Trenching (confined to land), drilling of the electrode holes, laying of the cable, and construction on the pier should cause only temporary and minimal disruption of park use.

Water Quality: There would be no significant changes in water quality caused by construction or operations of the HUGO Project.

Utility Impacts: Electric and telephone utility lines would be upgraded, requiring some tree trimming to utility standards. Electrical loads would be low initially, but a few years in the future may reach HUGO's system capacity of 20-30KVA. Approximately 9 poles would be replaced with new poles to ensure a system life of 10 years. Voltages would remain the same at 12KV. Service would be upgraded from single to three phase power.

Air Pollution: There would be no air pollution other than minimal short term pollution caused by the normal operation of the cable ship and construction equipment used during installation of HUGO. There would be no long term air pollution.

Traffic Congestion: There would be no short or long term traffic congestion. Since this is an unmanned facility, there would only be occasional visits by technicians and scientists installing and servicing experiments. Adequate off road parking at the shore facility would be provided for routine operations, and adequate parking is available at Whittington Beach Park for the construction phase.

Noise Levels: There would be little if any noise pollution caused by the HUGO Project. The only long term sources of noise would be window air conditioners in the equipment vans, which is not expected to be heard over the normal surf sounds, except right at the trailers, which the public would not normally be near. Some short term noise would be generated during the construction phase by the trenching, drilling, and cable laying operations.

Biological Impacts: There would be no biological disturbances caused by the installation or operations of the HUGO Project except during cable laying operations, where small amounts of coral would be displaced by the cable. This would be a short-term disturbance, as the coral is expected to grow over the cable and conduit on the ocean floor. The cable ship itself would have no more effect than passage of any ship.

Project Termination: After the project is terminated, all construction would be removed, and the land would be constructively returned to its original state. The cable from the pier to Loihi would be left in place anticipating possible future use.

Electrical Currents: There are no known effects of DC electrical currents in oceanic cables. Unlike cables carrying alternating currents, no electromagnetic radiation is generated. The cables to be used in HUGO would be

operated in modes similar to many other transoceanic cables that operate without any known adverse effects on marine biota.

Historical Sites: The known historic sites in the vicinity of the project are; 1) Honuapo pier 2) small section of asphalt and curb 3) bait pots 4) stone steps 5) numerous concrete foundation slabs 6) molasses tank foundations 7) fuel tank foundations 8) a concrete/lava rock seawall 9) round steel dome 10) survey marker 11) concrete steps and sidewalk 12) stone seawall 13) large fish pond 14) stone wall.

The only sites that would be directly affected by the proposed project would be the pier (attachment of cable conduit), and the asphalt (a 4.5" wide trench to bury cable conduit crossing the park, see **Map M6**) which the DLNR Historic Preservation Division in Hilo (Mark Smith) has determined is not of any likely historical significance **(9/18/95 DLNR letter**). The other sites are in the general vicinity, but are not expected to be effected.

5.0 Summary Description Of The Affected Environment (Appendix A Figure A-1, Maps M2-7)

Tax Map Key numbers of involved and neighboring properties:

3-9-5-14-1	(County park, Whittington Beach Park)
3-9-5-14-49	(State pier)
3-9-5-14-37,40	(Private land, neighboring individuals)
3-9-5-14-7,29	(Private land, C. Brewer)

Access to the area is from Route 11, approximately 60.7 miles south of Hilo. Access to the recording site is along a 22' wide dirt road on private land, providing access to pasture lands. This dirt road exits the main road at utility pole #2.

5.1 Area Descriptions

5.1.1 Geographic Areas

General Area: Foundations for numerous steel tanks and concrete building foundations are also located in the area. The area has been extensively modified by human activities earlier in this century.

Private Lands: The areas inside the private lands TMK 3-9-5-14-7 and 29 in the area of the project are mostly a combination grass, Keawe and Hale Koa woodland, and park lawn. There are some remnants of sugar mill structures, namely oil tank foundations, concrete steps and walkways, and a concrete warehouse foundation.

County Park: Structures in Whittington Beach Park include rest rooms, picnic pavilions, BBQ pits, picnic tables, a volleyball court, rock walls, and a shower. The park is supplied with fresh water (not potable) for the shower and restrooms. There is a tsunami siren in the park, but no telephone service. Single-phase electrical power provides electric lights in the rest rooms and pavilions. The area to be affected inside Whittington Beach Park is grass lawn and bare basaltic rock. Vegetation includes grass lawn, milo, and keawe. No rare or unusual vegetation or animals are present.

Pier: Derelict and not in use. The pier has been abandoned for at least thirty years, and consists of a skeleton of concrete posts and beams. The Honuapo pier was originally used as a train/cargo depot for sugar products, and train tracks ran from the sugar mill to the end of the pier.

Shoreline: The shoreline at Honuapo is rocky with billowy pahoehoe basalt outcrops containing small fissures. Sea cliffs border the south end of the

park, while average slopes mauka of the park area are approximately 60' rise in 300' (**Map M7**).

Ocean: The ocean floor along which the cable would be laid is mainly bare lava flows and talus with thin vernier of coral (**Map M3**). Seas are generally rough and not suitable for swimming or other water sports, except fishing. Sea turtles common near the shore would not be disturbed except for a two-day period when the cable is being installed. Fish ponds beyond the northern end of the park and tide pools in the area would not be affected.

5.1.2 Terrestrial Environment

For biological purposes, the study area was classified in to different ecosystems. These areas were woodlands, park, strand (strip of land near the ocean shore supporting land life, as opposed to marine life), and the pier (above water).

Woodlands, Park, and Strand

These areas compose the land portion that HUGO would inhabit. They were surveyed by Dr. Grant Gerrish (Ph.D. Botanical Science, UH Manoa) from the University of Hawaii at Hilo, Marine Science Dept. His report is included as **Appendix A** .

In summary, the terrestrial report states on **page A3** "No Threatened, Endangered or Rare plants were found within the study area. It is very unlikely that rare plants would utilize the Leucaena-Prosopis-Panicum Woodland or the Park area because the native vegetation of both of these areas appears to have been extirpated long ago. No Threatened, Endangered or rare birds or mammals were observed during the biological field survey, nor does the study area possess unique resources likely to attract such species."

Dr. Gerrish identifies only one area of particular significance. He states on **page A3** "The Strand includes a very small saltwater marsh (Stemmermann 1981) that probably meets the criteria of a regulated wetland (Corps of Engineers 1987)". Dr. Gerrish recommends on **page A3** that;

1) Measures should be taken to reduce the probability of soil erosion whenever vegetation is removed.
2) That the salt water marsh not be disturbed without further consultation and approval by the U.S. Army Corps of Engineers.

In light of these recommendations, the following procedures would be employed:

1) Trenching on land would be accomplished by a machine that excavates a narrow 4.5" wide trench. This would greatly reduce the volume of exposed dirt over what a backhoe would produce, and thus reduce the probability of soil erosion. The bulk of trenching would be in flat park grass lawn, which would contain the spread of dirt in the unlikely event of heavy rains in what is otherwise a very dry location.
2) The marsh area would not be disturbed by HUGO. For a precise location of the marsh relative to the pond refer to **Appendix A13 (Figure A-1** , cross hatched area, which shows the marsh as one edge of the pond). The closest any portion of HUGO would get to the marsh is approximately 100' mauka of the marsh area, for a cable trench near the park restrooms (refer to **Map M6** for pond and cable route locations). For a photographic view of the cable route see **Page P5 (photo 9**) where the cable would come out between the two buildings, and turn left (to the right on the picture) up the hill; the marsh is outside the picture (to the left). The pond is visible in **Page P6 (photo 12** above the picnic table). The nearest the cable approaches is off the picture (to the right).

The Pier (above water)

The HUGO cable would transit the top surface of the pier structure. This top surface is approximately 11' above mean sea level. The portion of the pier above the mean sea level does not appear to be suitable habitat for any Threatened, Endangered or Rare plants or animals. This surface is bare concrete and occasional exposed rusty steel, and does not appear to be hospitable to life except as a temporary perch.

5.1.3 Marine Environment

The marine environment was surveyed by two groups

1) A team from the University of Hawaii at Hilo Marine Sciences Dept., Marine Option Program (MOP), and their report is included as **Appendix B** .
2) A team from the University of Hawaii at Manoa, School of Ocean & Earth Science and Technology, and their report is included as **Appendix C** .

Summary of two reports

The area in general is described as a high energy habitat due to the location on the windward coast and the effects of the large nearby mountains which intensify the winds. These factors lead to exposure to typically rough seas. Three basic zones were observed;

1) Near shore approx. 0 to 30 foot depth consisted of boulders, sturdy flat corals and abandoned man-made refuse (boiler, railroad car, chains, anchors, cable, rails, ships ballast bricks, etc.).
2) Intermediate approx. 30-40 foot depths consisted of basalt ridges (with flat corals of wide variety of species and forms) and sand filled channels.
3) Deeper approx. 40-60 foot depths consisted of broad sandy plains with rubble, coral sand, mud and fewer living organisms than the other zones.

In general the corals are described as poorly developed and flat. This is a result of adaptation to the intense wave activity in the area. The environment has shaped the coral into "...a poorly developed, low relief coral reef. Nonetheless, the reef that was present appeared to be healthy and colonized by a typical assemblage of reef fishes and invertebrates and diverse seaweeds" (**Appendix B2**). Coral cover was considered high in quantity and diversity for Hawaiian waters (**Appendix C2**). Characterization of the conditions in the area stated that the "wave stress is not severe enough to restrict the settlement, optimal growth, and optimal diversity of corals" (**Appendix C9**). This leads to the conclusion that any areas damaged by the cable anchoring process (involve drilling small holes (approx. 1/2" diameter) into the ocean floor and into pier pilings, in addition to cable and shielding conduit placed on the sea floor), "will likely be rapidly colonized with new coral colonies or algal recruits" (**Appendix C13**).

With regards to protected marine animals, three that occur in Hawaiian waters have been identified; the hawksbill turtle, green sea turtle, and humpback whale. The hawksbill turtle "is known infrequently from waters off of Hawaii" (**Appendix C11**), and was not observed in the area. Both dive teams observed green sea turtles in the area (**Appendices B5, C11**). With regards to likely effect on turtles by this project, it was stated "there is little or no reason to expect that the project will negatively alter the habitat for turtles" (**Appendix C13**). With regards to humpback whales, it was stated that "Because the fiber optic cable is similar to existing submerged telecommunications cable which are not resulting in apparent negative impacts to marine mammals, there is no basis to conclude

that the proposed HUGO cable will cause negative effects to endangered or threatened species, particularly humpback whales" (**Appendix C3**)

Concerning other protected species, the surveys that were done revealed that "No endangered or threatened species of fishes, invertebrates or seaweeds were observed" (**Appendix B5**).

Conclusion Of Two Reports

One report states "the potential for impacts to marine communities as a result of the HUGO project appear to be minimal or nonexistent... the potential alterations to marine community structure that might occur as a result of physically securing the cable to the sea floor and pier would probably be reversible and recovery rapid once the cable is attached. The ability to tolerate and recover from such events appears to already be part of the physiological range of the community components" (**Appendix C14**).

The other report states "we see no reason for additional and more in-depth surveying prior to construction" (**Appendix B5**), and "The proposed 2-5 cm diameter cable is unlikely to have major impacts on marine biodiversity" (**Appendix B6**).

One report made several recommendations which are discussed in the proposed mitigation measures **section 7.0** .

5.2 Historical Background

History Of Kau

Approximately 1000 years ago the district of Kau on the Island of Hawaii was probably the site of settlement by the first Hawaiians, descendants of Polynesians from the South Seas. If there were a few preceding groups of other peoples that had "drifted" to Hawaii from other parts of the Pacific Basin, they were probably conquered and possibly used as sacrifices ("Prosperity Through Preservation in the Great and Majestic District of Kau", 1988, Glen M. Winterbottom).

The first Hawaiian settlers found fertile plains, lush valleys, forested hills, and abundant offshore fish. There were few beaches and bays, no reefs, and limited fresh water. The harshness of the environment with the open ocean on the windward side of Kau, and the majestic and ever-present volcanic activity combined to endow Kau with a mana (supernatural power) that forged the residents into a people with strong wills and an independent nature. The residents formed a very strong bond to their land.

During the pre-European millennium, the Hawaiians cleared large areas of pre-historic vegetation, and their farms and culture flourished. The peoples' strong independent wills are evidenced in the stories telling of three chiefs that abused the people of Kau. These chiefs were dispatched by their own people, and earned the people of Kau the reputation of "Kau makaha" (ferocious, savages).

The loss of about 400 of King Kamehameha's soldiers in a 1790 eruption of Kilauea, and the killing of the last native chief of Kau` by treachery of King Kamehameha's emissaries greatly demoralized the people of Kau and set the stage for decline. The region had a lack of sufficient fences, and imported cattle, horses, and goats destroyed crops. During the 19th century, people neglected their fields to work in the lucrative sandalwood and pulu trade (fern fibers to stuff pillows and mattresses). Drought and fires and disease combined with these factors to cause famine, debt and depopulation of Kau. The Great Mahele (1848) resulted in the rapid transfer of land to foreigners and an influx of immigrants to the region to work the sugar plantations. The great earthquakes and tsunami of

1868, coupled with landslides and lava flows devastated much of the region resulting in great loss of life, destruction of fishing villages and agriculture leading to more famine.

The heyday for the Hawaiian population occurred from 1870 to 1900. The old customs and culture combined with the new ways, and the people were hired into important positions in the local government. The first wharf at Honuapo was built in the late 1870s to support the rapidly expanding sugar trade. In 1881, the Pahala sugar mill was the second largest mill in the world. The first sugar railroad in Kau was built in the 1890s, and rail was used to transport sugar to the pier at Honuapo until 1942, its function replaced by trucks to Hilo. In 1946 the pier warehouse was destroyed by a tsunami from Alaska. In the 1960's and 1970's a resort was built, and macadamia nut farms were started in Kau, one farm eventually becoming the largest macadamia nut farm in the world. In 1972 the Honuapo sugar mill closed, with milling moving to Pahala. In 1974 the U.S. Sugar Act protecting sugar markets lapsed, adding pressure to an already decreasing profit margin. In 1975 a tsunami crushed the remaining deck on the Honuapo pier.

The Kau area is primarily agricultural. In the early days the harvest of an assortment of crops was mostly for consumption by Kau, and was done on small plots of land. In the most recent 100 years, sugar for export was the main crop, and it was done on an industrial scale, eventually creating the largest sugar plantation in the world. The population became diverse and many different ethnic groups were imported for work on the plantations.

The last sugar mill (Pahala) on the Big Island is scheduled to close in the next year or so. Drought is still a periodic problem in Kau, as water is important to cattle that are still raised in the area, and fires become a hazard during drought (2000 acres burned in April 1995). The economic situation in Kau is difficult, and shows little sign of improvement in the near future.

In the most recent times, Kau has provided one of the last areas on the Island with relatively inexpensive housing. This has lead to population growth in the last few decades, and produced additional population centers. The older population centers are the agricultural (sugar mill) towns of Punaluu and Naalehu, and one of the newer is the primarily residential area of Hawaiian Ocean View in Kahuku, Kau.

Oral Histories

Several persons with significant ties to the Honuapo area were interviewed for oral histories. These were Pele Hanoa (former resident of Punaluu next to Honuapo, kapuna of Kau Historical Society, member of Big Isle Burial Council), Freida Kamai/Bruns (daughter of Honuapo port captain, lived just above Honuapo pier), and Margaret Carmichael/Whittington (daughter of head road overseer of Kau district, wife of engineer for Hutchinson sugar plantation, lived in house just above and south of pier).

The interviews were taped and transcripts were written. The tapes and transcripts were provided to the persons interviewed, the DLNR State Historic Preservation Div., and the Kau Historical Society. Tapes consist of three 90 minute tapes totalling 2.5 hrs and 82 minutes, and transcripts are 7 and 9 pages (Kamai & Carmichael were one 2 tape interview).

Written History

A "Catalog of the History of Kau" chronology of historic events was also produced from literature research. This catalog was provided to the DLNR State Historic Preservation Div., the Kau Historical Society, and other individuals. It

consists of 8 pages spanning from ~1000 A.D. to present, and is annotated with references for each entry.

5.3 Historic Sites

One of the criteria that would trigger evaluation of this project by the DLNR would be the presence near the project of a historic site listed on either the National or State Register of Historic Sites. According to DLNR records (**Appendix D**, 8/9/95 DLNR letter), there are no historic sites in the project area that are listed on either register.

DLNR records show that the Honuapo Pier was submitted to the Review Board (the body that determines eligibility for the National and State Register) for consideration in 1974 but was not placed on the Register because of insufficient descriptions. Even though the pier is not on either Register, and though it does not carry the regulatory weight of the Register, there is an inventory of historic sites maintained by the DLNR. The inventory is not a complete record of historic sites in any given area because most areas have not been thoroughly surveyed for historic sites. That inventory lists the Honuapo Pier as Site #50-10-74-7359. It should be pointed out that other criteria (discussed in section 0.2 and further in **Appendix F** letter 2 .item 2.2) trigger DLNR evaluation of the project .

The Honuapo/proposed project area has an abundance of historic sites (many sugar mill related features). The sites listed below are considered historic sites according to the definition provided by SHPD (**Appendix D** , 8/9/95 DLNR letter), which applies to all architectural structures, archaeological features or objects that are over 50 years old.

Sites That Would Be Directly Affected By The Project

1) The Honuapo Pier (**Maps M4,5,6**) mentioned above, is a remnant of the plantation era in Hawaiian history. A top-view of the structure is shown in **Figure F5** , and photos of the pier are shown on pages **P6-P9** . The montage of pier photographs (**Page P8**) from different times in history is a collection that to our knowledge has not been produced anywhere else. Several people within the community have talked about historically restoring the pier. It is hoped that this montage may help the community to gain some perspective into which period of history to restore the pier if a restoration can be accomplished.
2) A small (10'x14') irregular section of asphalt was probably constructed as part of sugar operations. This site is located in the lawn between the proposed Junction Vault and restrooms. A small (1'x8') concrete curb lies immediately mauka of the asphalt (**Map M6**).

Sites In The Vicinity That Would NOT Be Affected By The Project

3) An interview with a Kapuna of the Kau Historical Society (Pele Hanoa) also indicated the presence of bait pots, shallow depressions in the basalt lava that were used by ancient Hawaiians to cut their fishing bait in. These are located on the shore immediately north of the pier approach.
4) There is also a set of stone steps that according to the daughter (Freida Kamai/Bruns) of the Honuapo port captain, were the steps to the port captains office. These steps are located approximately 30 feet SE of the curb and asphalt (described above), on the embankment at the makai edge of the park lawn. The steps now lead from the park lawn down approx. 4 feet to a rocky shoreline.
5) Numerous concrete foundation slabs are scattered in the area. The most visible is located immediately mauka of the park parking (**Maps M5,6**), and is approx. 30'x110' in size and was labeled "General Supply Warehouse" on a 1929

Hutchinson Sugar Plantation map or "Plantation Warehouse" on a 1944 Hawaii Territory Survey map (Marks). The next most prominent, although overgrown, is just north of the seawall mauka of the south end of the park.

This slab is labeled "Pump" on the 1944 map, and not shown on the 1929 map and is approx. 15'x25'. The next slab is makai (east) of the park parking and approx. centered north south on the large slab mention above. This slab is approx. 25'x30', although maps show it larger, the 1944 map labels it "Standard Oil Warehouse" and the 1929 map "Standard Oil Plant". Next are two large slabs to the north-east, one approx. 60'x120' in size, labeled "Plantation Warehouse" on the 1944 map and not on the 1929 map. The second further east is smaller at approx. 51'x73.5' (per NOAA National Ocean Survey 8578 F 1979) and not shown on either map.

6) Two molasses tank (**Map M6**) foundations 65' diam. are located mauka (northwest) of the pump house mentioned above, shown as 65'x21.5' Molasses Tanks, proposed site" on the 1929 map and as "Steel Tanks" on the 1944 map.
7) Four fuel tank foundations (circular concrete curbs with black sand interior pads are located approx. 120' makai (east) of the dirt road which is mauka of the proposed trailer site. A fifth beyond the fence is shown (**Map M7**) but has not been seen. The 1929 map labels them starting from the unseen tank as "No.4 Gasoline, No.5 Fuel Oil, No.3 Star Oil, No.2 R.C. Gasoline, No.1 R.C. Gasoline". The north most tank No.1 has a dilapidated wood dog size house on it, No.2 has the approx. 10'x10' NOAA tsunami warning building on it. The 1944 map show two other unlabeled tanks within 20' of these 5 tanks.
8) A concrete/lava rock seawall is located a few hundred feet northeast of the small pond shown on **Map M6** and is approx. 43' long, 2' tall and 1' wide.
9) A round steel dome, approx. 5' diam., possibly a winch or boom pivot or tank, is located at the east end of the above mentioned concrete seawall. The 1929 map shows "Old Landing" in this general area.
10) A survey marker (National Ocean Survey, stamping 8578 G 1979, although the G looks like a zero) is located on the concrete/lava rock seawall described above. Although less than 50 years old, this is listed because it is related to an unlocated 1929 survey marker.
11) Concrete steps and sidewalk are located at the south end of the large slab mauka (northeast) of the park parking described earlier, and they extend from behind a large banyan tree approx. 100' up to the four fuel tank foundations.
12) A stone seawall is located directly west of the proposed junction vault shown on **Map M6** starting approx. 1' east of the fence and extending approx. 40' to the west and being approx. 10' tall from the park lawn elevation down to sea level.
13) A large fish pond is located approx. 800' northeast from the small pond shown on **Map M5**, and is approx. 500' in diam.
14) A stone wall either newly constructed or reconstructed in about July 1995 by a native Hawaiian, located attached to the stone steps described earlier. The size is approx. 30' long by 3' tall.

The DLNR Archaeology, Architecture and Culture and History Branches have reviewed this environmental assessment and supplemental materials that have been submitted to the DLNR. They concur that an adequate attempt has been made to identify and evaluate historic sites in the project area and that the proposed project would have "no adverse effect" on historic sites (per 8/9/95 letter).

5.4 Culture

As might be expected by the history of Kau described above in section 5.2, the people of Kau have been molded by their environment and history. The people in Kau are proud and independent, many living without electrical power or phone service, in a sense living on the frontier, much like their forebears. They have strong feelings for their community and life-style, and many are very vocal about resisting projects that might lead to harm to the environment or a reduction in the rural atmosphere. Others would rather see the economic situation of Kau improve through development, so that their children would not have to leave Kau because of lack of economic opportunity.

A well publicized public information meeting was held at Naalehu in January, 1995, to inform the residents of Kau about the HUGO Project. Approximately 20 people attended. While many were very wary initially, most were in support of the project after learning what it entailed. A typical comment was "sounds like it won't do any harm, and the kids would learn more about volcanoes". However, a couple of attendees feared that the project would be used as an excuse by the government to confiscate lands, or that the project would lead to further unwanted development, and little could be said to allay their distrust.

Several long time residents of Kau were interviewed about Honuapo and the Kau area. One of the most memorable accounts (Pele Hanoa, 1995) was reminiscent of old time story telling, which is traditional for the Hawaiian culture, and it conveyed a moral that is voiced repeatedly by the local population. The moral is that the aina (land) and the culture, should be respected and not taken for granted, and that if this is not done, there are consequences. She told a couple of stories to illustrate this point.

One story was of a "stupid haole" (haole meant in the old definition as a description of one who is a foreigner and does not respect the culture, not intended as a racial indication of skin color). The story was how he dynamited a rain god of the Hawaiian people (in the form of a rock statue), and soon a flood ensued that wiped out the town of Hilea, one of the main sugar mill towns. Later the body of the disrespectful person was found in the cane fields, eaten up by pigs, the consequence of his own actions.

The second story was of about the Jason Project, a recent (1995) science education project involving a television production about science in Hawaii, with volcanoes being highlighted. She described how the production had bad luck with accidents, but after the appropriate protocol in the form of a blessing by a kahuna, everything went smoothly. Note: as a matter of respect, the HUGO project plans to seek appropriate protocols prior to construction.

A third story was told (Margaret L. Carmichael/Whittington, Freida Kamai/Bruns 1995) of how up until recently, interracial marriages were not easily accepted by families, and in about 1930, a mixed race couple who wanted to get married were forbidden to do so by their families. The couple committed suicide by throwing themselves into Halemaumau crater rather than be separated. Both story tellers commented on how some things are better than they have been in the past.

6.0 Identification/Summary Of Major Impacts And Alternatives

No major impacts to the environment are anticipated. No viable alternatives for the shore termination of the HUGO cable have been identified. An alternate location for the recording facility is located on TMK 3-9-5-14-40 immediately mauka of the Kauahaoa Church Cemetery. This site is more desirable because it provides a more direct cable route to the pier, and avoids most of the county park. We were unable to negotiate a lease from the land owners, and concerns were raised about disturbing unknown graves outside the cemetery and

about cultural concerns of being so near the cemetery. These concerns were raised in a DLNR SHPD letter 11/30/94 Hibbard to Jordan and during an oral history interview with Pele Hanoa 3/14/95 who is on the Hawaii Island Burial Council. The site adjacent to the cemetery has been abandoned in favor of the site above the NOAA tsunami warning building which will totally avoid the cemetery.

An alternative to this project is to take "no action" on the HUGO Project. While this is a possible alternative, it would probably cost considerably more (since it must be done with self contained battery powered experiments with more frequent ship visits based on battery life instead of experiment longevity), produce much less data (due to battery life and storage capability), and the educational benefits would be much less and would be effectively limited to the upper echelons of the education system. By implementing HUGO, much more data would become available in a more cost effective manner. HUGO would also provide a central means to distribute the data and to facilitate the best use of that data. While the no action alternative is viable, it is a continuation of existing systems, and in these times of reducing budgets, probably means reductions instead of continuation. Proceeding with HUGO would be far more beneficial, particularly to the students in Kau where the system would be installed and where those students would get first hand experience with HUGO, thus bringing the science from the university to the high school level.

7.0 Proposed Mitigation Measures

Although no major impacts are expected from the HUGO Project, and no mitigation or preservation plan has been required by the DLNR Historic Preservation Division, the following steps are planned to minimize disturbances to the environment:

Inter Tidal Zone Protection

The inter tidal zone would be protected by using the Honuapo pier to support the HUGO cable as it enters the sea. By doing so, the cable would pass over the inter tidal zone without impacting it. Cable installation would not involve the inter tidal area. The only conceivable adverse impact would occur during severe rain runoff with exposed dirt from trenching being in the area. This would be minimized by the use of minimum sized trenches, minimum duration of having the trench open, and other best management practices. The inter tidal zone under the pier has no tidal pools, and consists of boulders.

Soil Erosion Prevention

1) Trenching on land would be accomplished by a machine that excavates a narrow 4.5" wide trench. This would greatly reduce the volume of exposed dirt over what a back hoe would produce, and thus reduce the probability of soil erosion. The bulk of trenching would be in level grass lawn in the park, which would contain the spread of dirt in the unlikely event of heavy rains in what is otherwise a very dry location.
2) The trailer sight would be cleared of vegetation, and a gravel pad constructed to cover exposed dirt. This would minimize soil erosion.

Marsh Area Protection

The marsh area would not be disturbed by HUGO. For a precise location of the marsh relative to the pond refer to **Maps M5,6**. The closest any portion of HUGO would get to the marsh is approximately 100' mauka of the marsh area, for a cable trench near the park restrooms (refer to **Map M6** for pond and

cable route locations/distances). For a photographic view of the cable route see page P5 (**photo 9**) where the cable would come out between the two buildings, and turn left (to the right on the picture) up the hill (the marsh is outside the picture to the left). The pond is visible in page P6 (**photo 12** above the picnic table). The nearest the cable approaches is off the picture (to the right).

Reef Protection

The cable would be pinned to the ocean bottom where it would tend to scour organisms on the ocean floor. The pinning would minimize the motion relative to the ocean floor and thus protect coral.

Whale Protection

One concern raised by the National Marine Fisheries Dept. is the possibility of whale entanglement in the cable if it spans submarine valleys. While this is possible, the bathymetry of the cable route (**Map M3**) does not suggest large numbers of valleys or pinnacles that would cause the cable to be suspended for substantial distances. This risk is therefore estimated to be minimal.

Historic Site Protection

The DLNR SHPD will be contacted immediately if, unexpectedly, cultural deposits or human remains are discovered during trenching. Work would also be stopped in the immediate area of any deposits or human remains discovered.

8.0 Determination.

The determination of this approving authority is that of a Negative Declaration, and that an environmental impact statement shall not be required.

9.0 Findings And Reasons For Supporting Determination.

The approving authority found the HUGO environmental assessment to be in compliance with HRS 343 relating to environmental impact statements, and Title 11 Chapter 200 Hawaii Administrative Rules of the Dept. of Health relating to the Environmental Impact Statement Rules. The project was found to be not exempt from these requirements due to use of state and county lands.

An early assessment was accomplished, and all materials required to be in this environmental assessment were determined to be present. Significance criteria were also applied, and all eleven items were determined to not significantly impact the environment. The eleventh item did state that most actions in an environmentally sensitive area such as this proposed project is located (tsunami zone and coastal waters), would normally be considered to cause a significant impact, but that due to the lack of potential for harm to the environment due to nature of the project and the potential public benefit of the project, it was determined that this proposed project would not have a significant effect on the environment solely due to its location.

The EA was also evaluated for conformance to the Environmental Assessment Checklist (A Guidebook for the Hawaii State Environmental Review Process, Appendix F, Environmental Assessments) and it was determined that all subjects were adequately addressed.

Two recommendations were made; 1) to consider additional means (beyond signs) of preventing the public from walking on the pier conduit, and 2) at some time in the second year of operation of the project, that the marine

environment should be examined to see if any significant environmental impacts are occurring, and that any such changes should be reported. The applicant agrees to follow both recommendations.

FIGURES

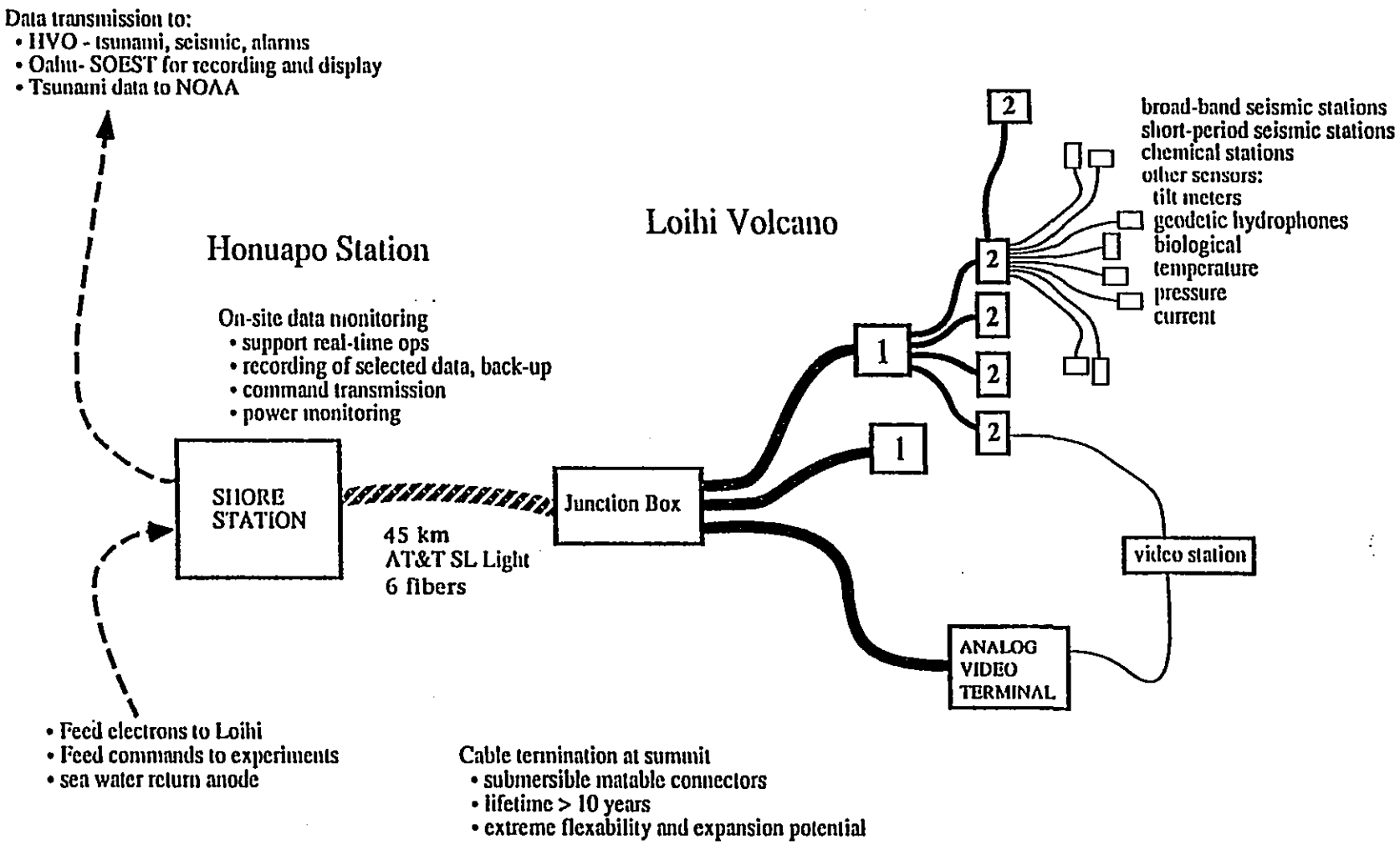
&

MAPS

&

PICTURES

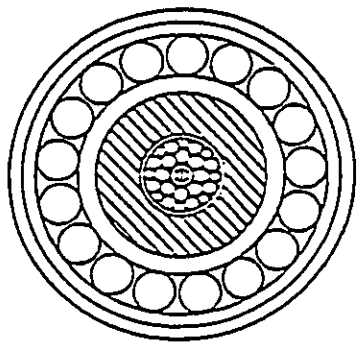
"System Description" Figure 1



Hawaii Undersea Geo-Observatory

FKD July 4, 1995

CROSS SECTION



CABLE PROPERTIES

OUTER DIAMETER	42.2 mm	1.660 in
STOWAGE FACTOR	65.5 cf/km	121.4 cf/NM
*MAXIMUM WORKING LOAD	19,051 kg	42,000 lbs
BREAKING STRENGTH	22,770 kg	50,200 lbs

	kg/km	lbs/km	lbs/ft	lbs/NM
WEIGHT IN AIR	4,197	9,252	2,020	17,135
WEIGHT IN SEA WATER	2,753	6,070	1,050	11,242

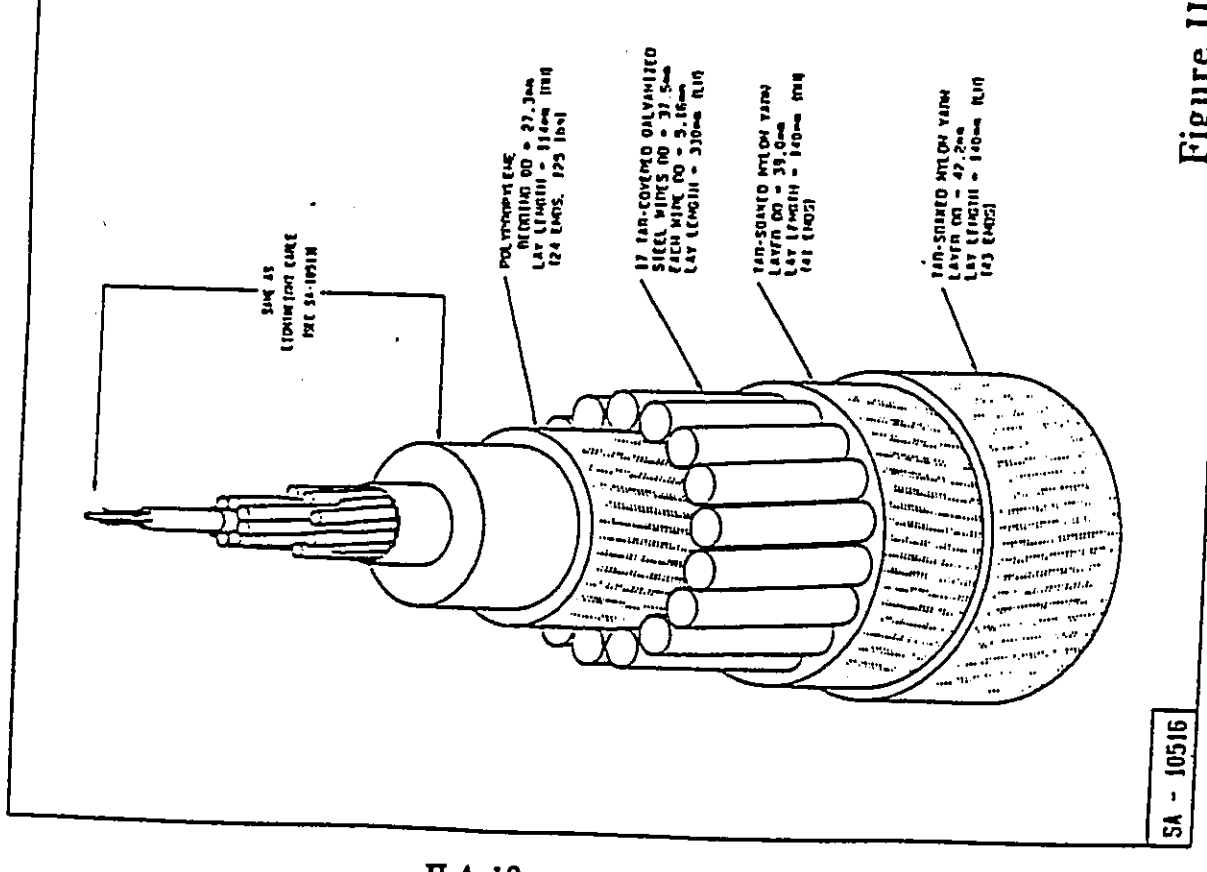
NOTES:
* - AT 1.5m MINIMUM BENDING RADIUS.

CROSS SECTION OF CABLE FOR SL SUBMARINE SYSTEMS
SA
(SINGLE ARMORED)
WITH SPECS: (KS-23158 L5)

#2	JRH	GCS	01/19/90

SA - 10516

Figure II.A-7



"Cable Structure" Figure 2

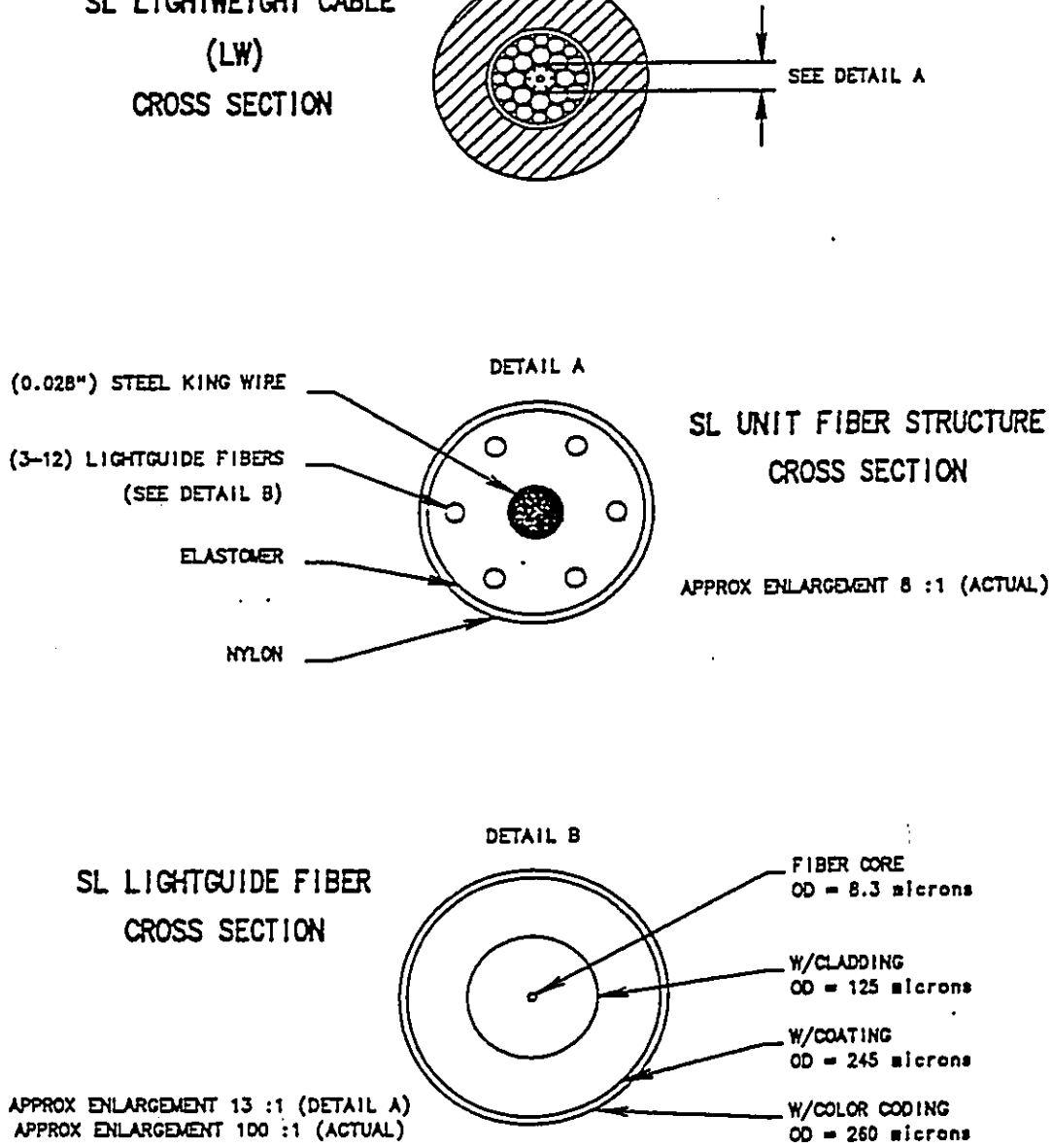


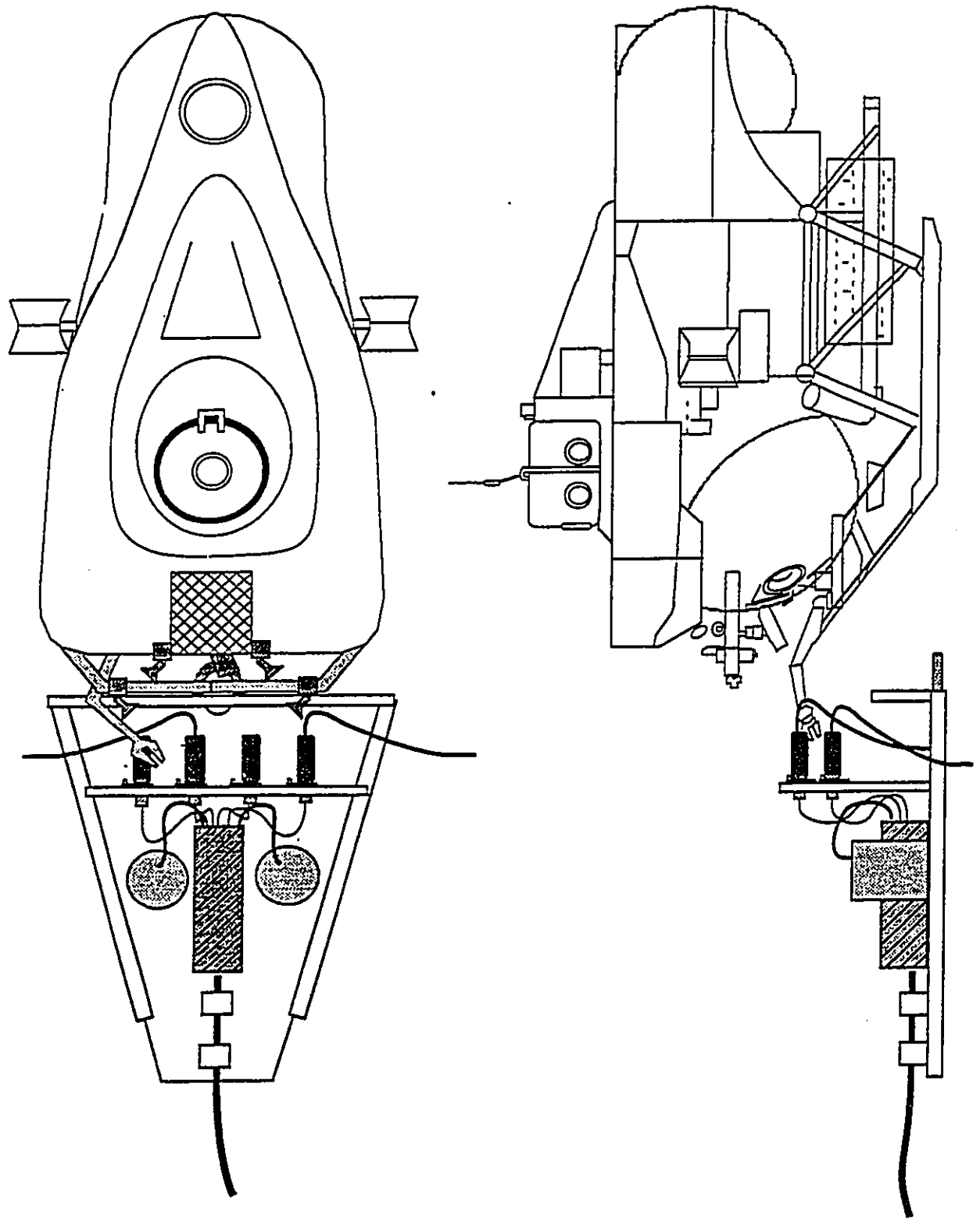
FIGURE II.A-1

CROSS SECTION DETAIL FOR SL SUBMARINE SYSTEMS

UNIT FIBER STRUCTURE, LIGHTGUIDE FIBER

WITH SPECS: (KS-23156 L1)

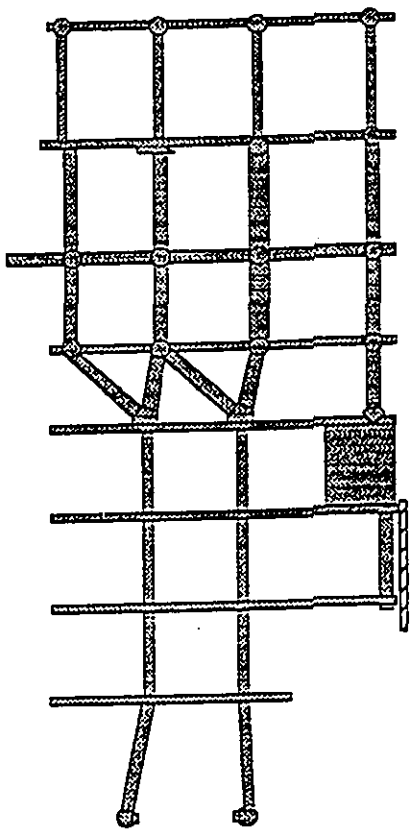
AT&T PROPRIETARY

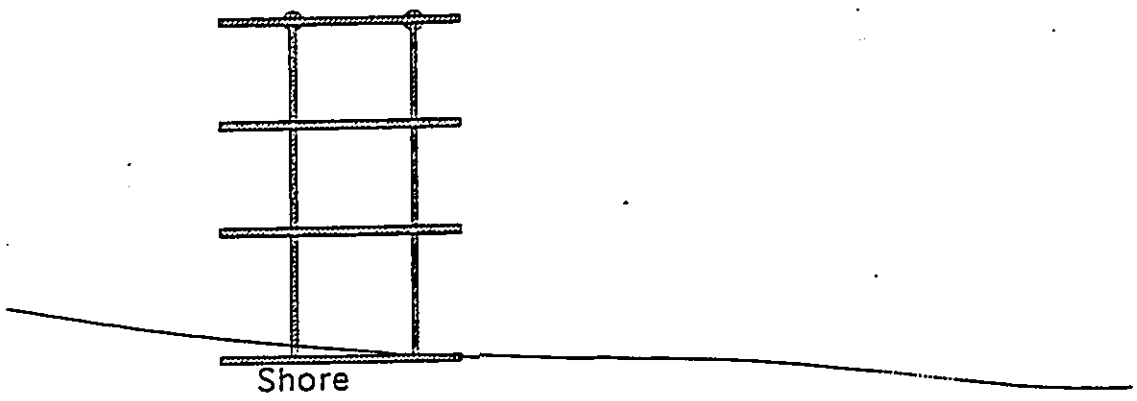


"HURL Pisces II Submersible" Figure 4

TOP VIEW

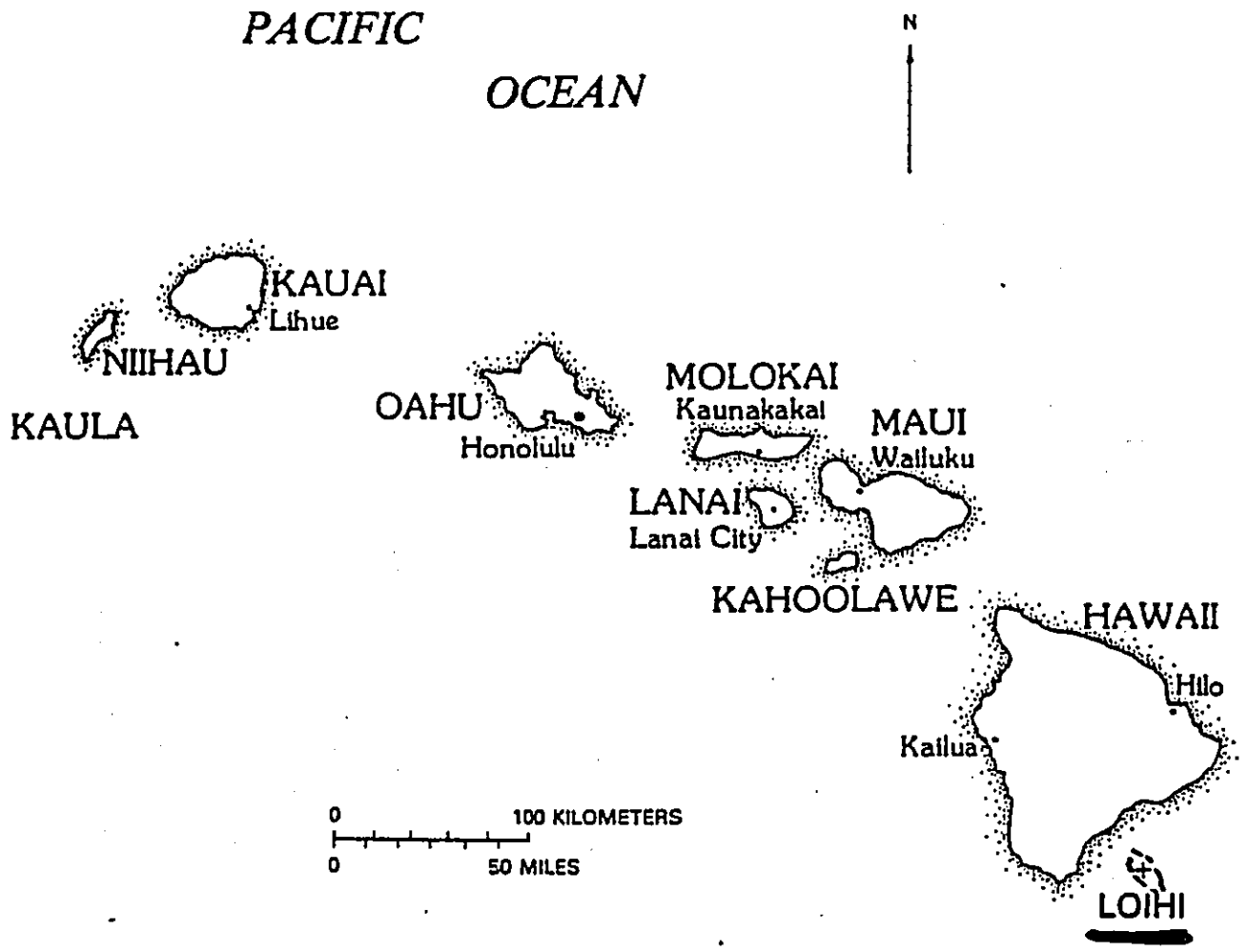
Approx. 50'



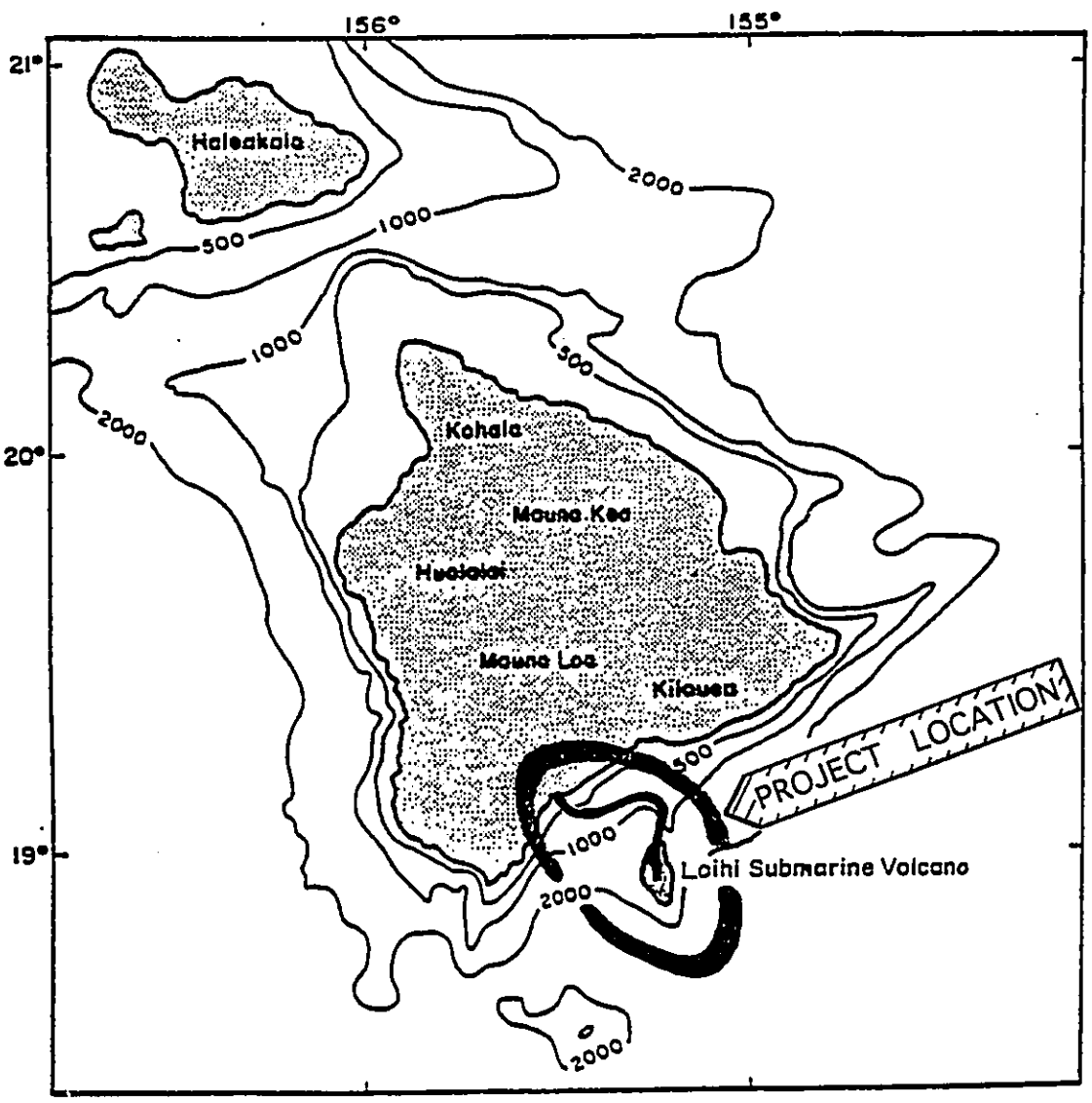


existing Honuapo Pier:

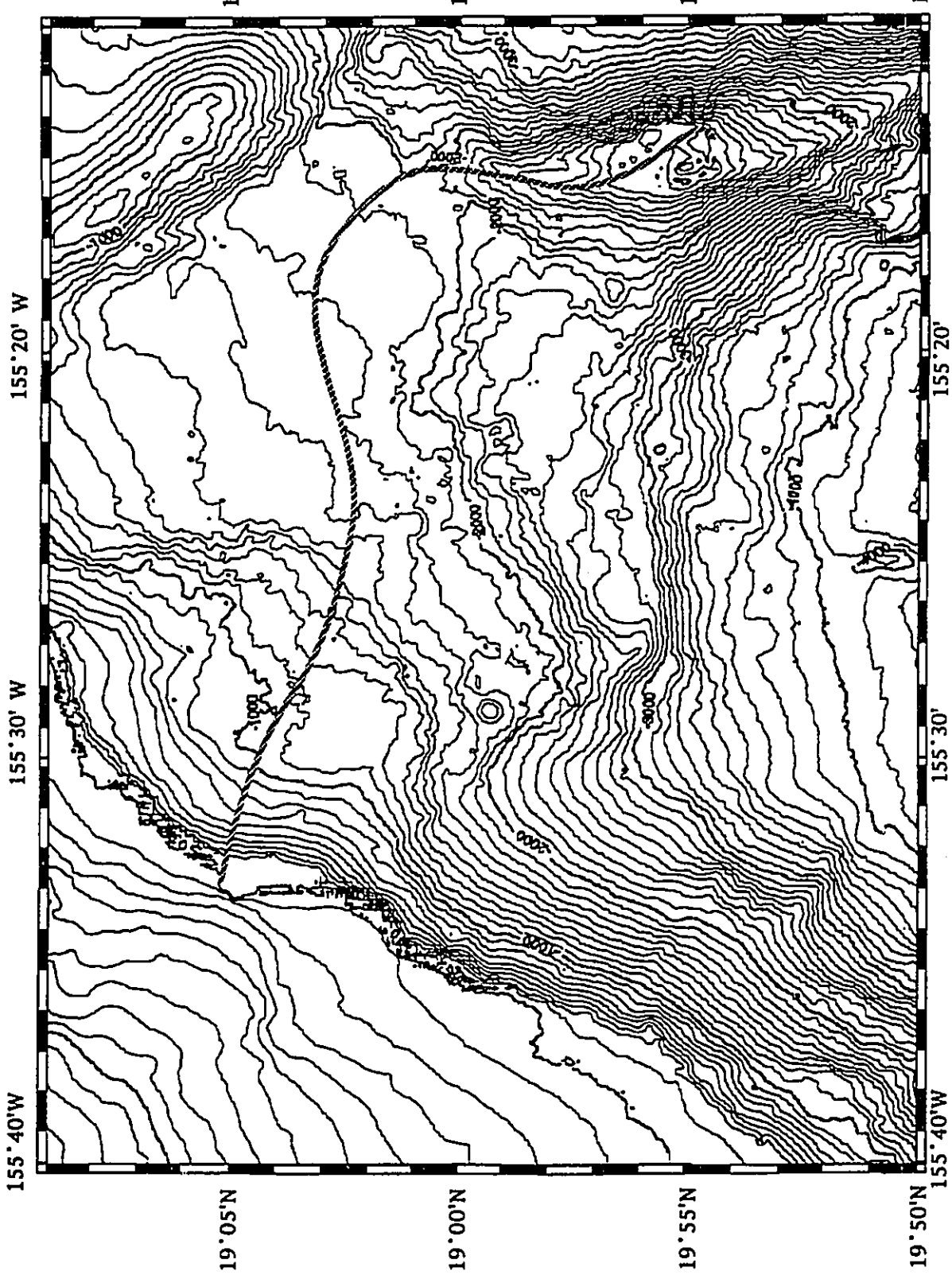
"Honuapo Pier" Figure 5



"Hawaiian Islands and Loihi" Map 1

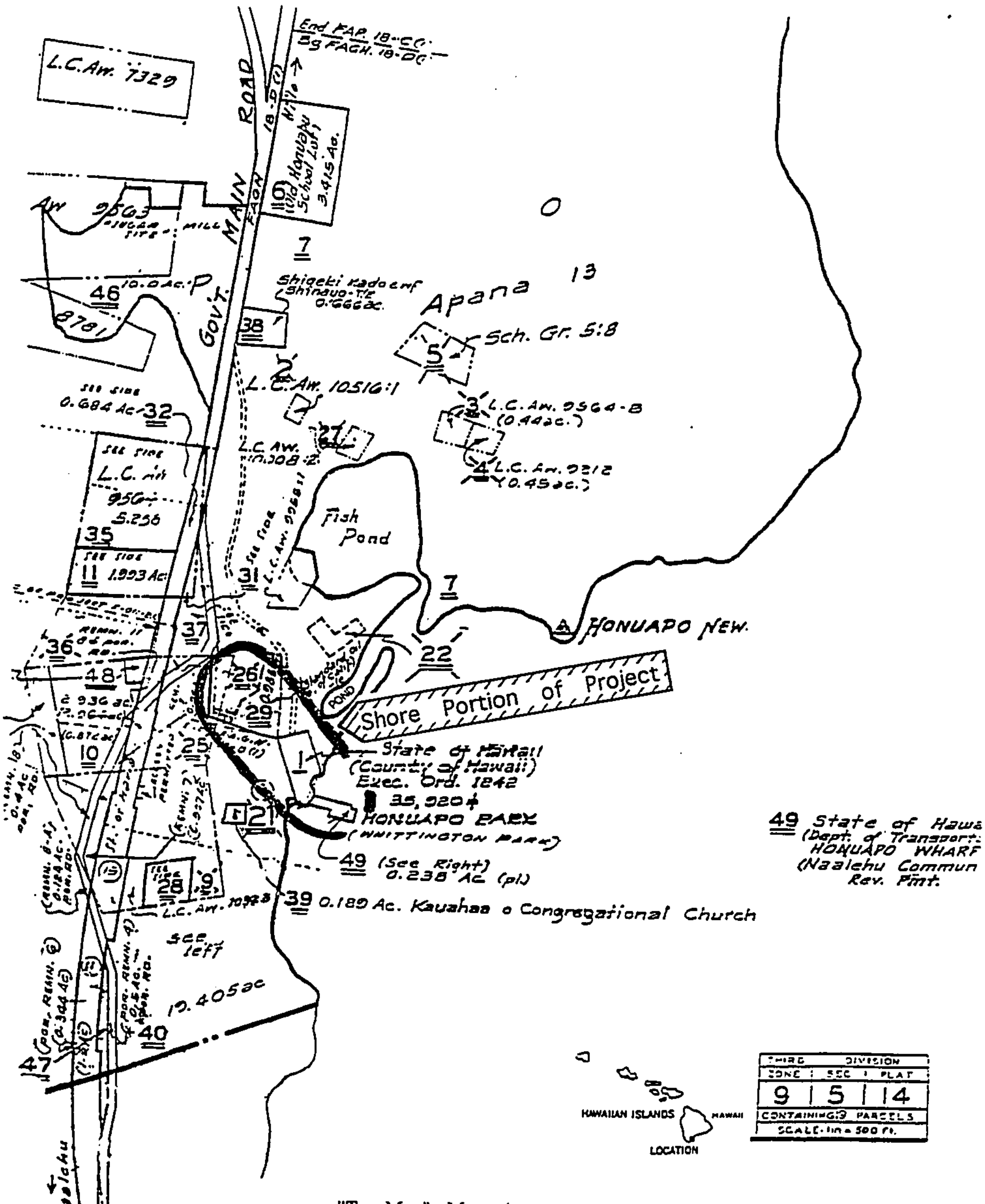


"Big Island and Loihi" Map 2

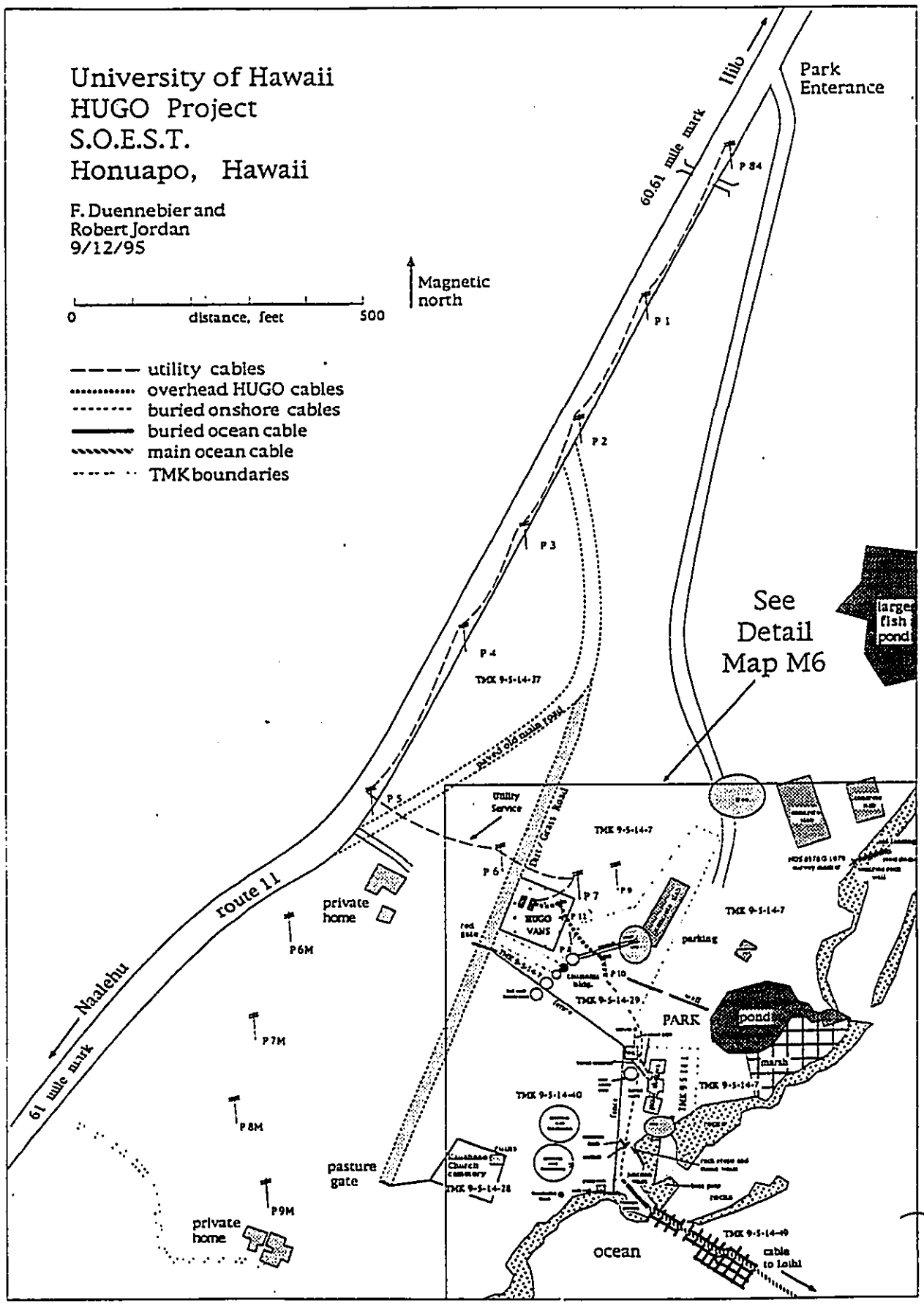


Bathymetry southeast of Hawaii. The proposed HUGO cable route is shown by the line running from Honuapo at the upper left to the summit of Loihi seamount. The depths of water are in meters.

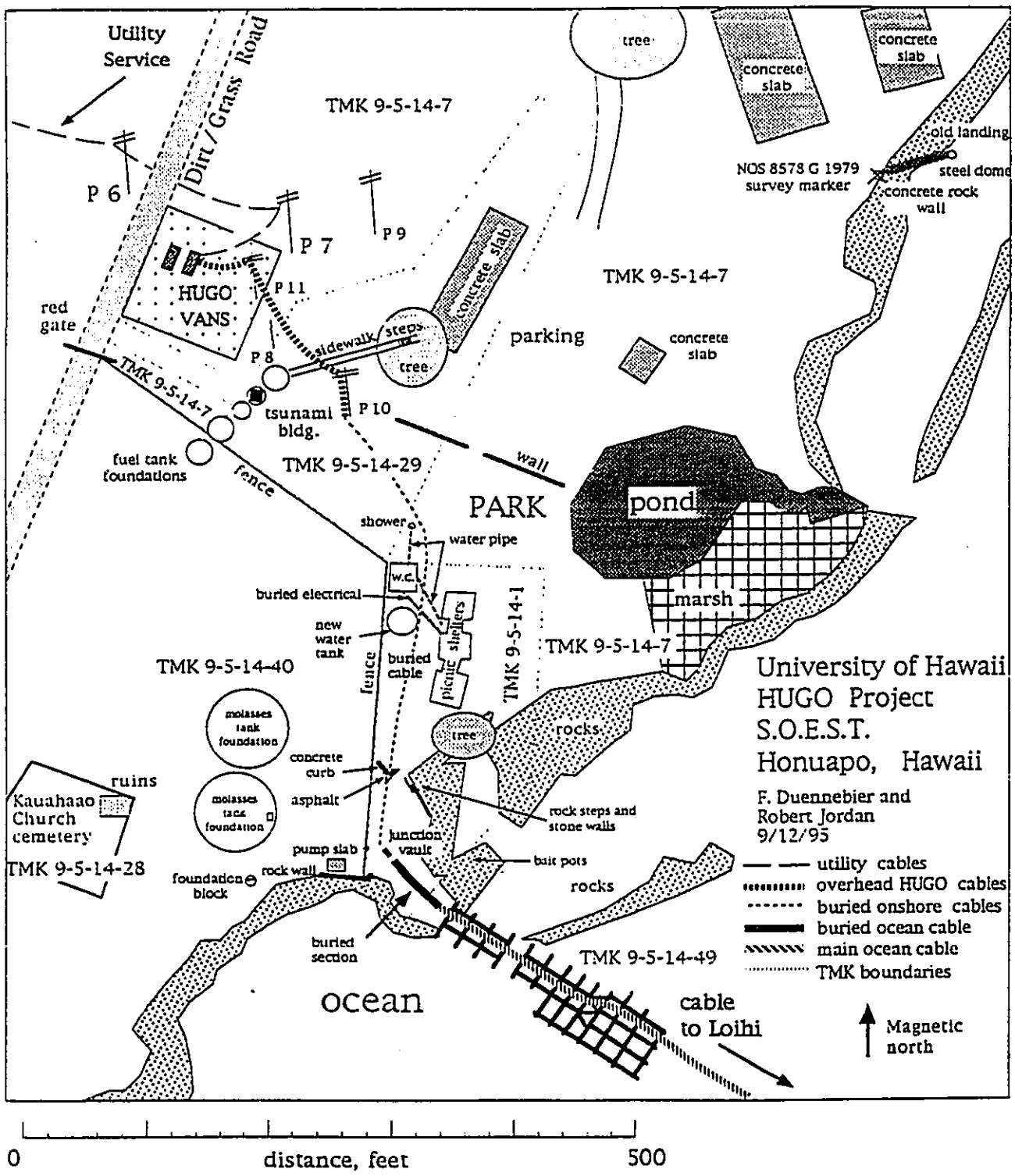
"HUGO Cable Route and Bathymetry" Map 3


L.C.Aw. 7329
End FAP. 18-CC
GOV'T. MAIN ROAD
Apana 13
Sch. Gr. 5:8
L.C.Aw. 10516:1
Fish Pond
HONUAPO NEW.
Shore Portion of Project
State of Hawaii
(County of Hawaii)
Exec. Ord. 1842
HONUAPO PARK
49 (See Right)
0.238 Ac.
39 0.189 Ac. Kauahaa o Congregational Church
49 State of Hawaii
(Dept. of Transport.
HONUAPO WHARF
(Naalehu Commun
Rev. Pmt.
HAWAIIAN ISLANDS
HAWAII
LOCATION
9 5 14
Naalehu

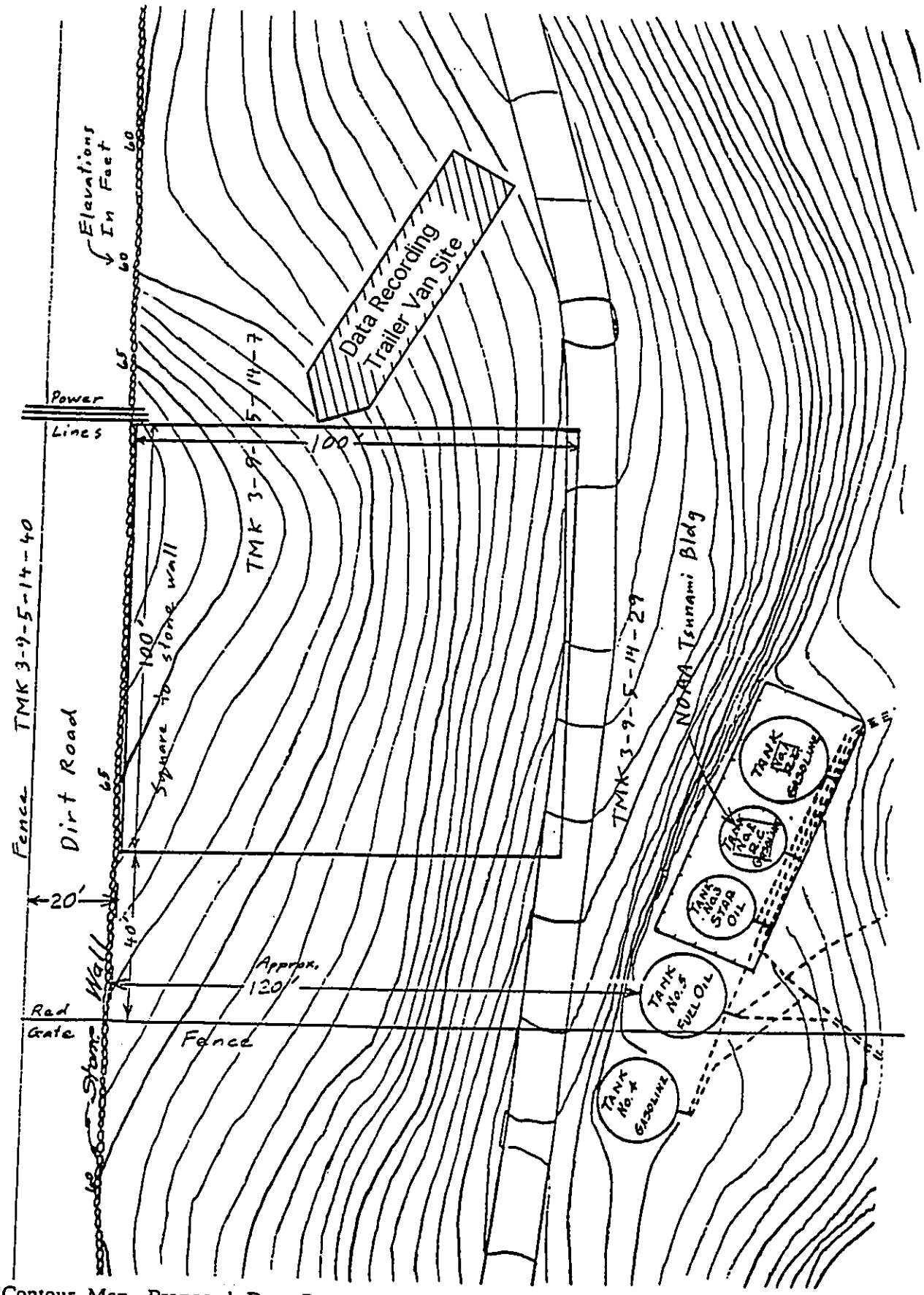
"Tax Map" Map 4



"Site Map" Map 5

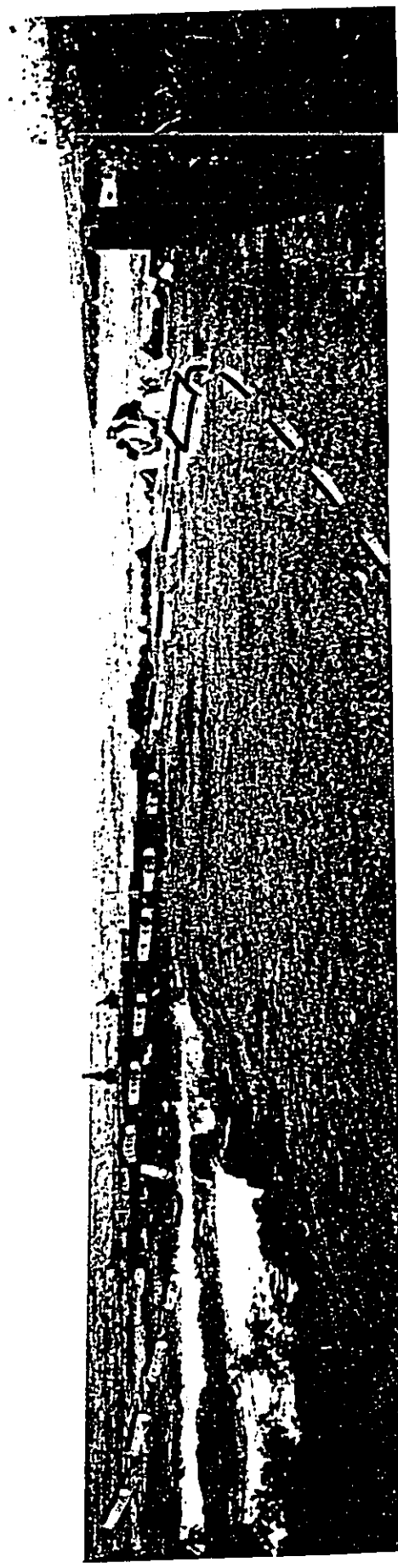


"Site Map Detail" Map 6

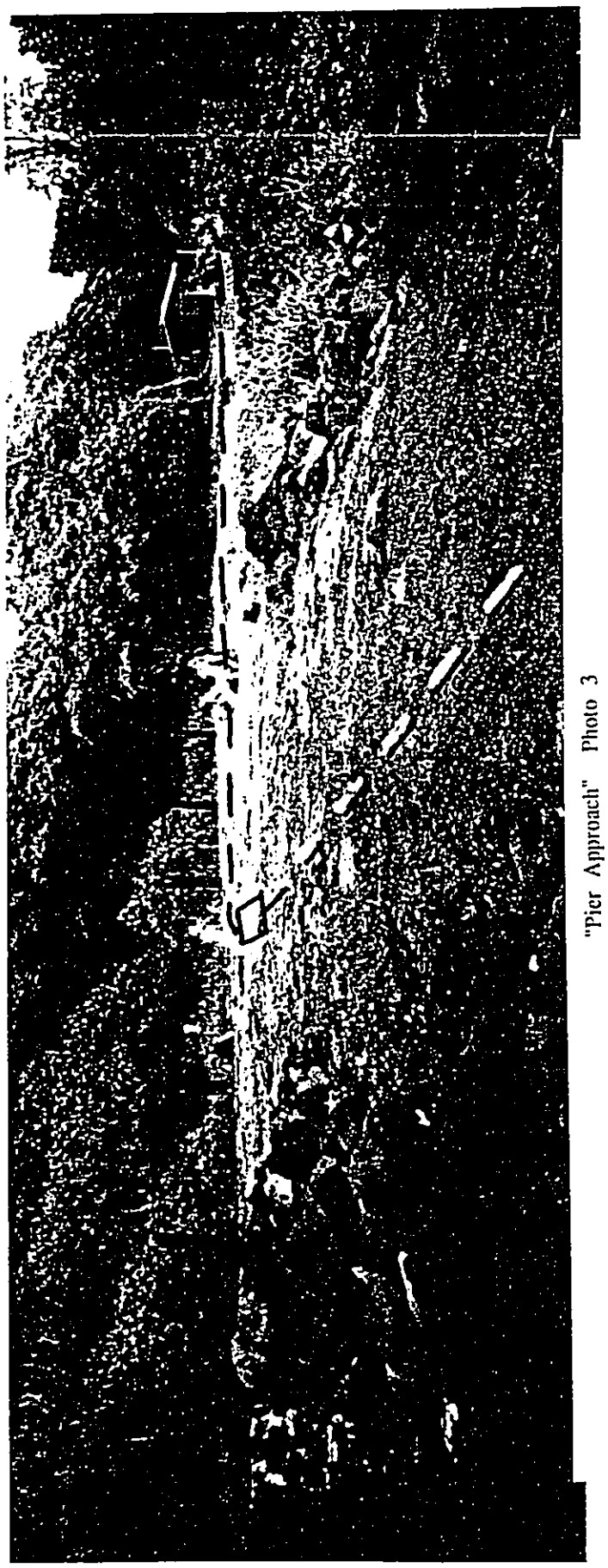


"Contour Map, Proposed Data Reccording Trailer Van Site" Map 7

"Homuapo Pier" Photo 1

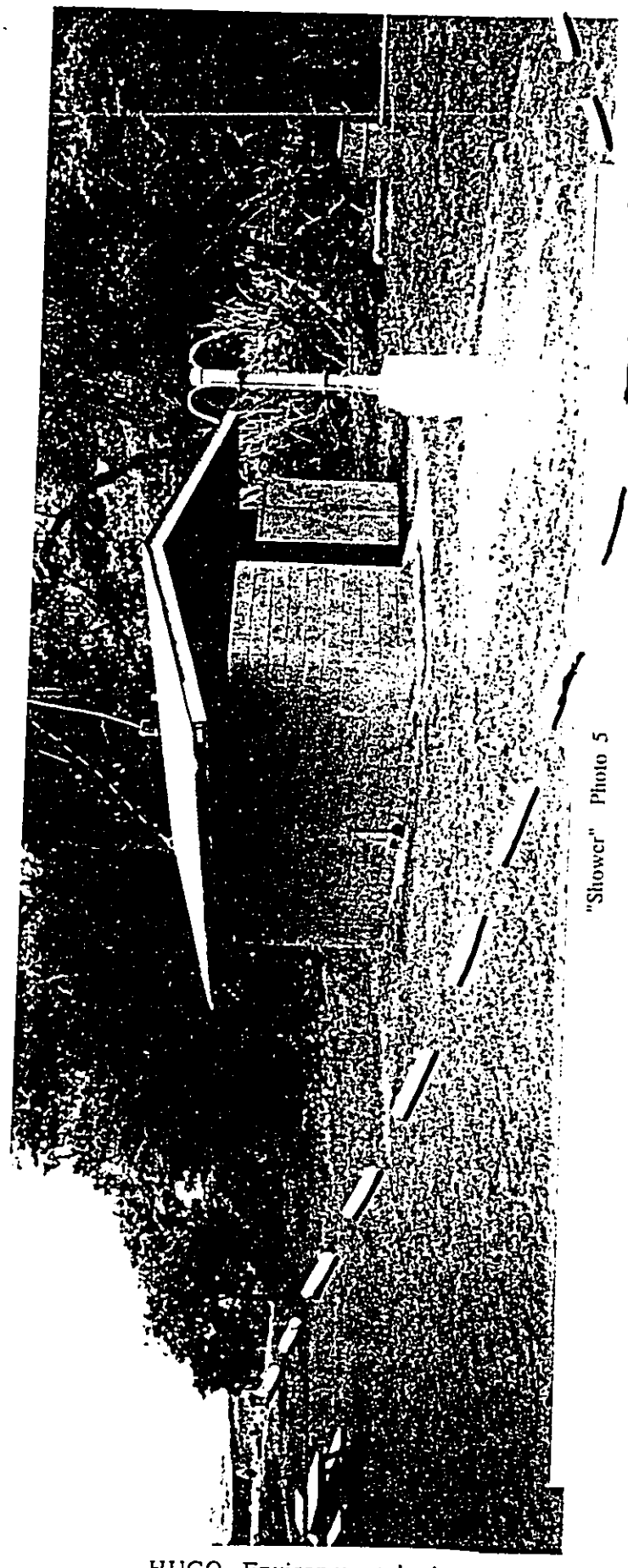


"Proposed Junction Vault Location" Photo 2

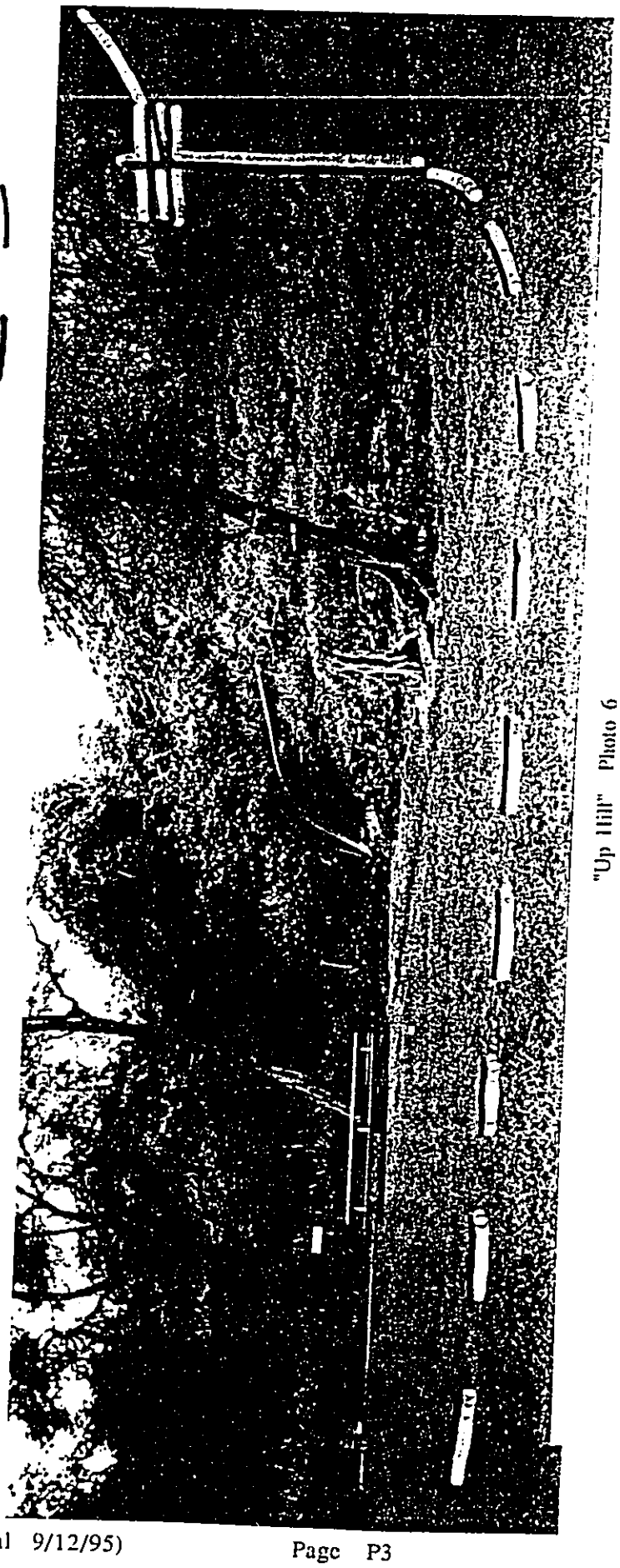


"Pier Approach" Photo 3

"Proposed Junction Vault To Shower" Photo 4

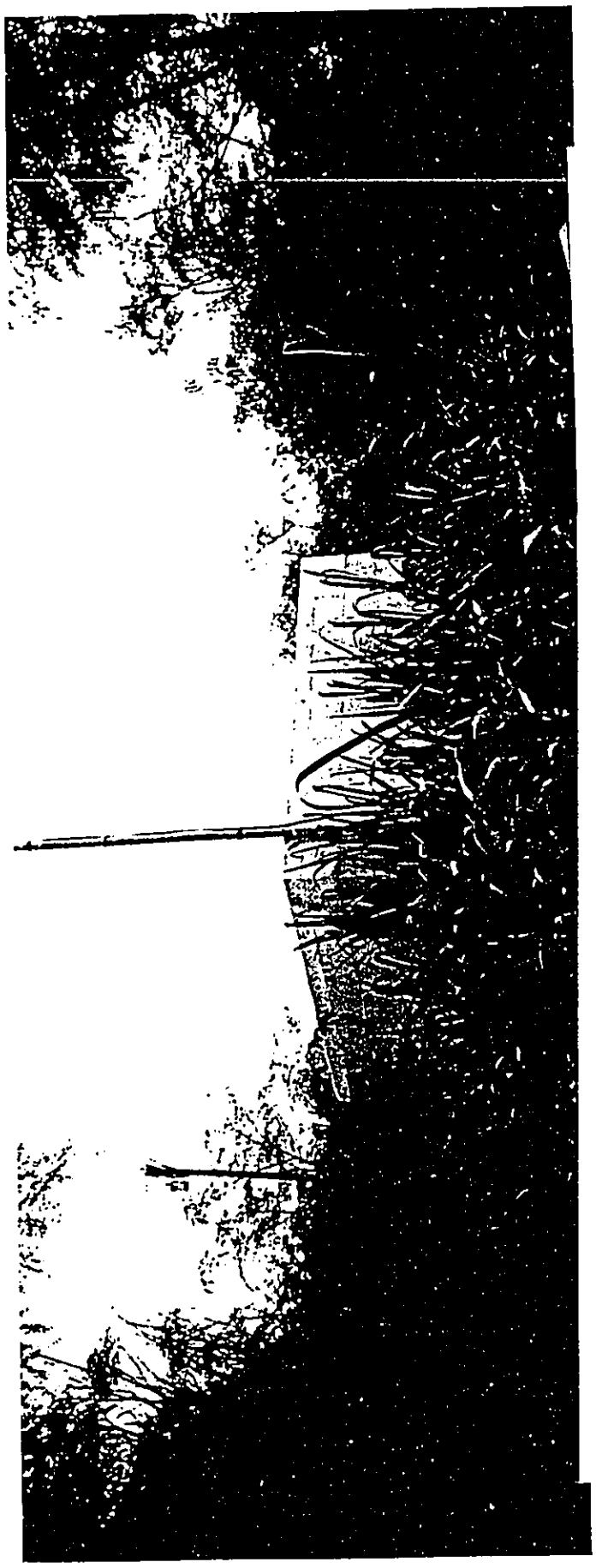


"Shower" Photo 5

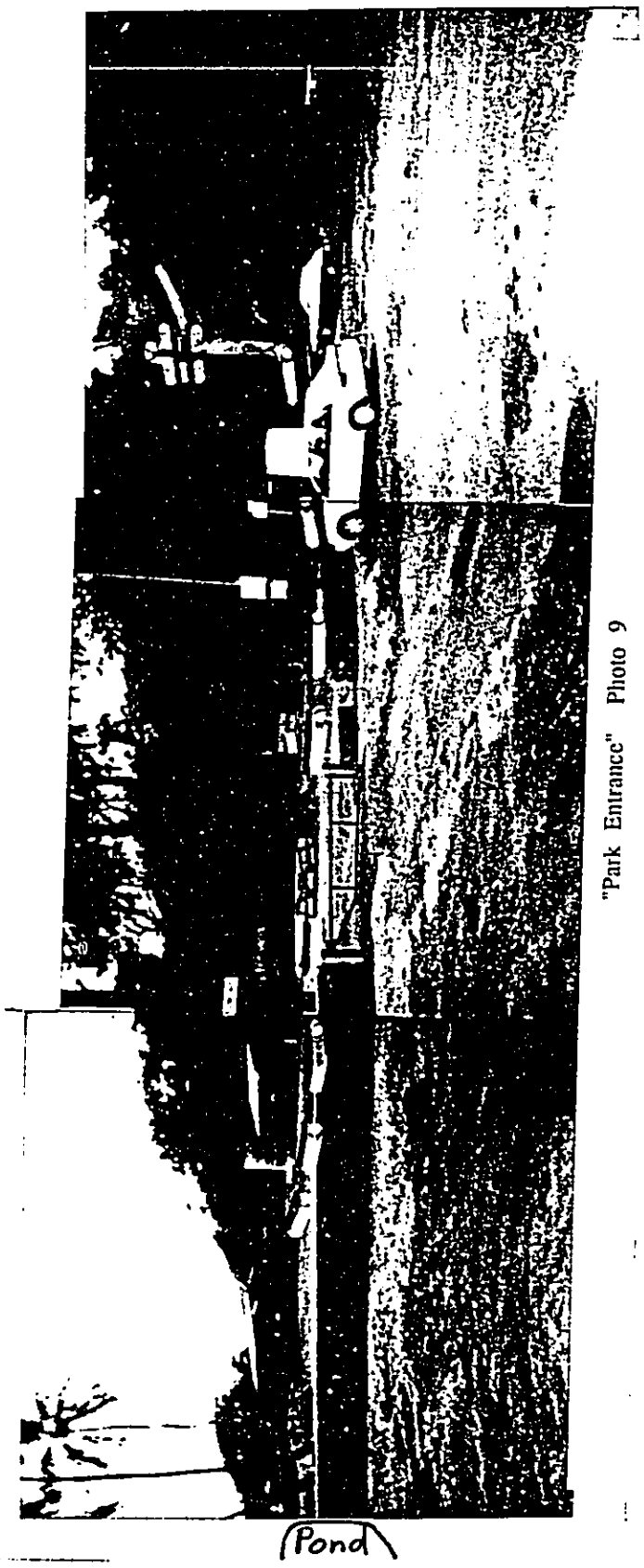


"Up Hill" Photo 6

"Obscuring Vegetation" Photo 7



"NOVA Tsunami Bldg" Photo 8

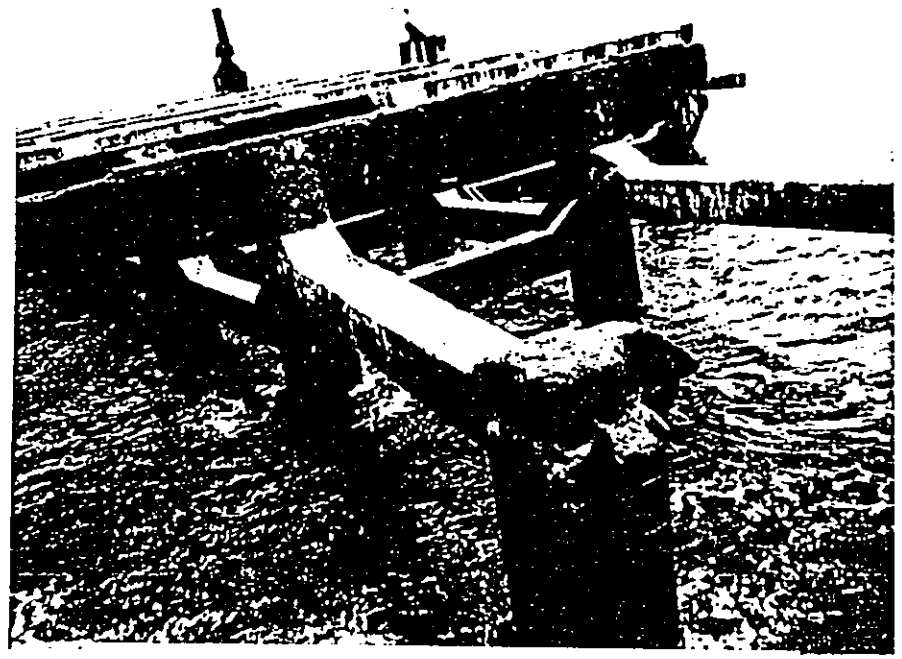


"Park Entrance" Photo 9

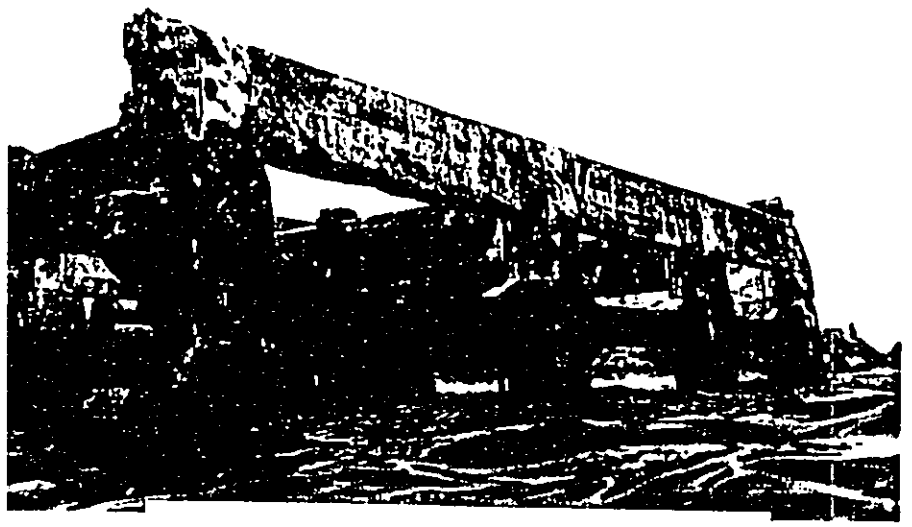
"Trailer van site" Photo 10

"Pier Approach" Photo 11

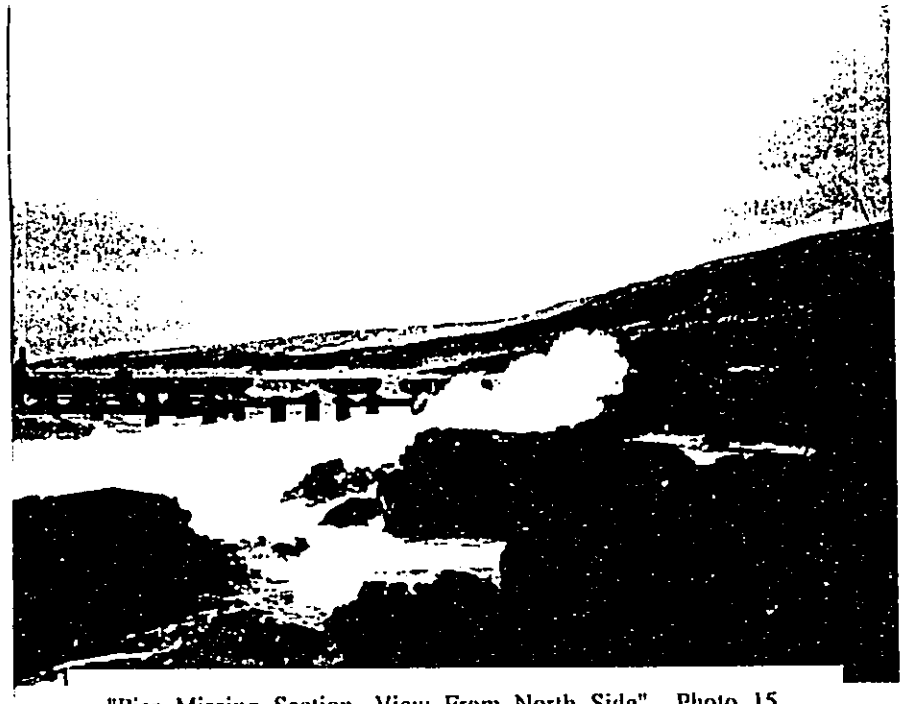
"Pond (in background)" Photo 12



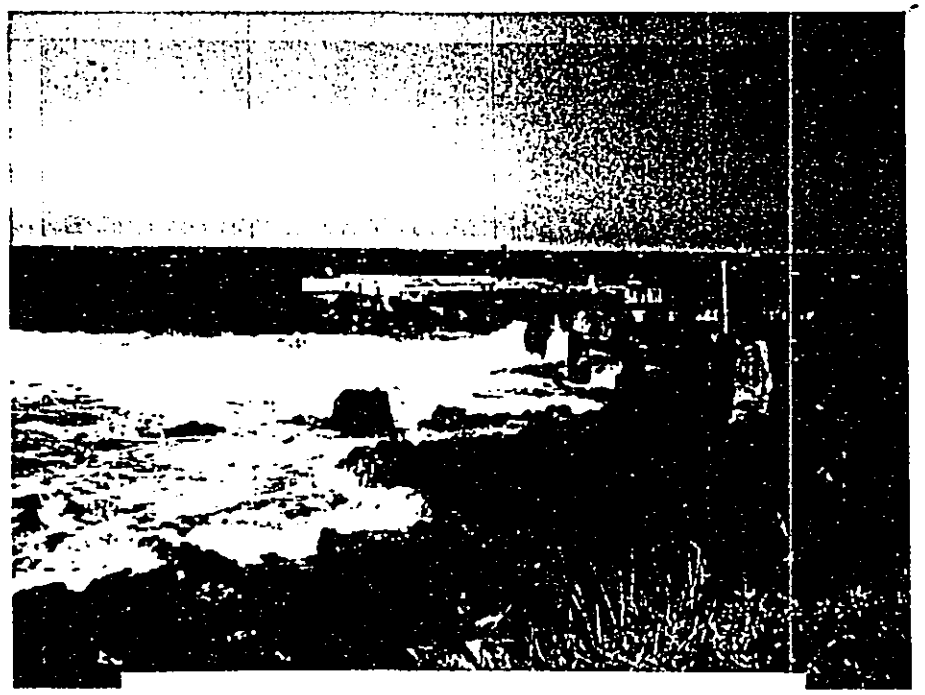
"Pier Makai From Missing Section" Photo 13



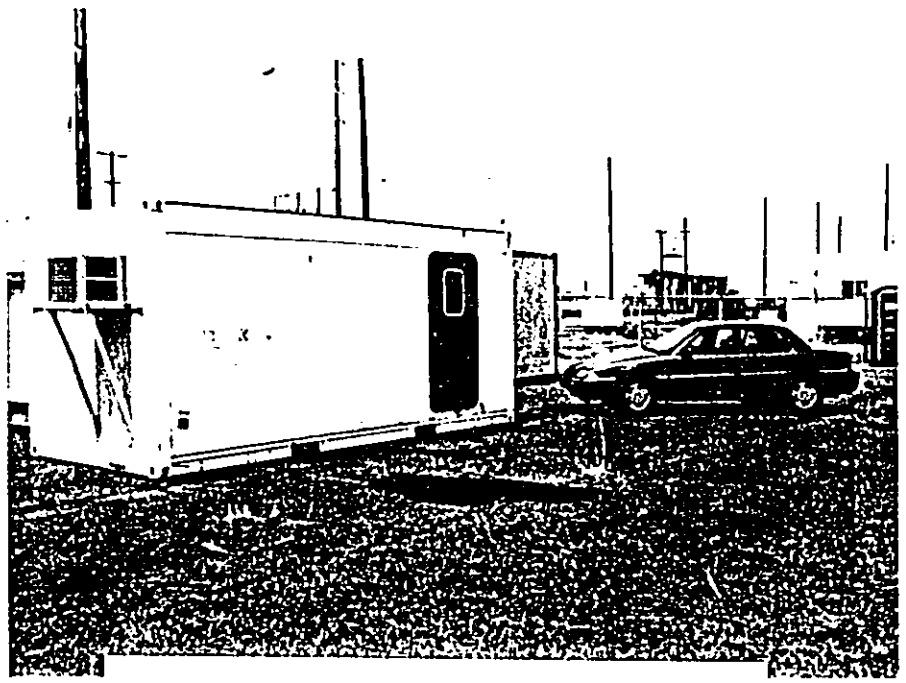
"Pier, Makai End" Photo 14



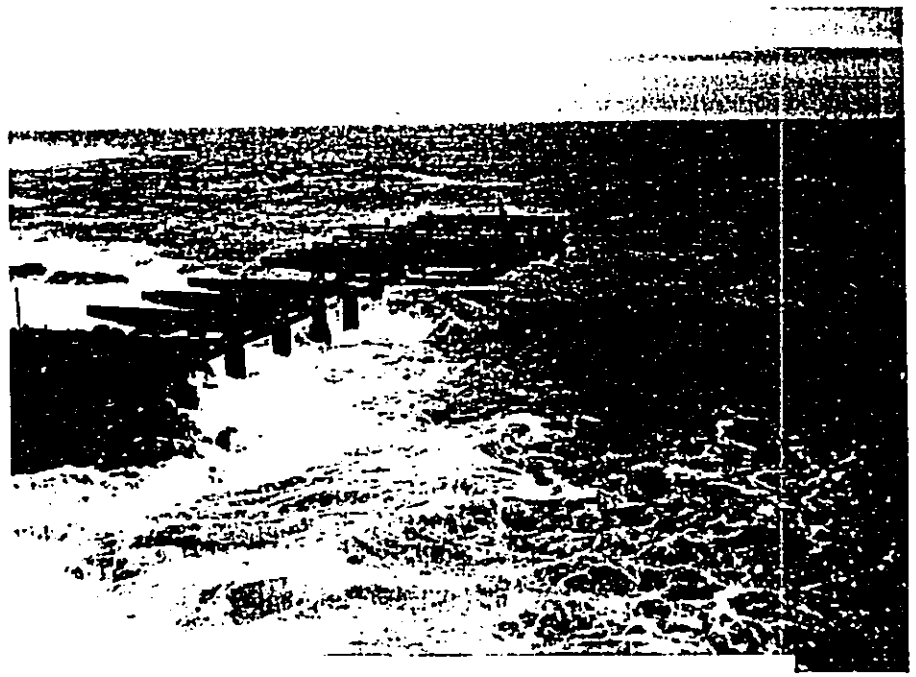
"Pier Missing Section, View From North Side" Photo 15



"Pier, View From North Side" Photo 16



"Container Van" Photo 17



"Pier, Elevated Shore View" Photo 18

The Many Faces of Honuapo Pier

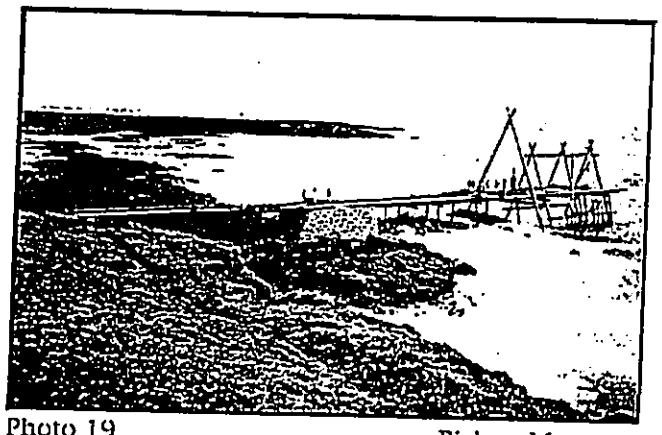


Photo 19 Bishop Museum

1880

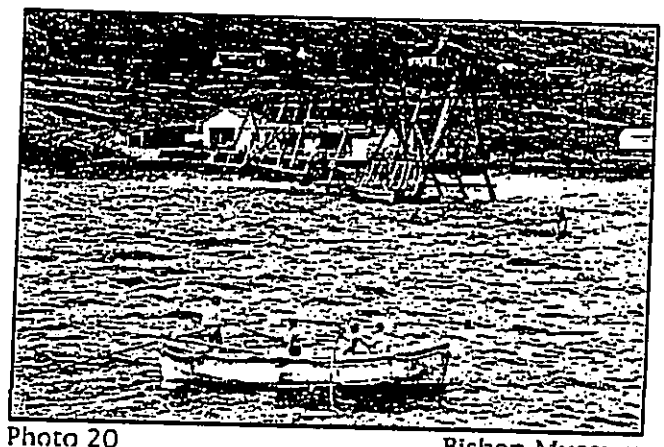


Photo 20 Bishop Museum

1908

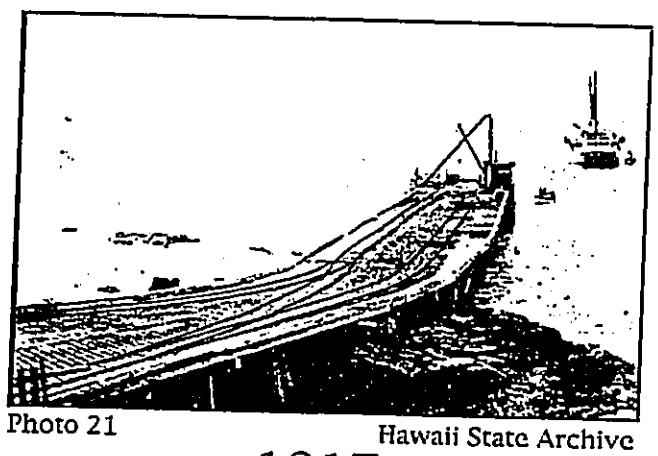


Photo 21 Hawaii State Archive

1917

Photo 22 Bishop Museum

1925

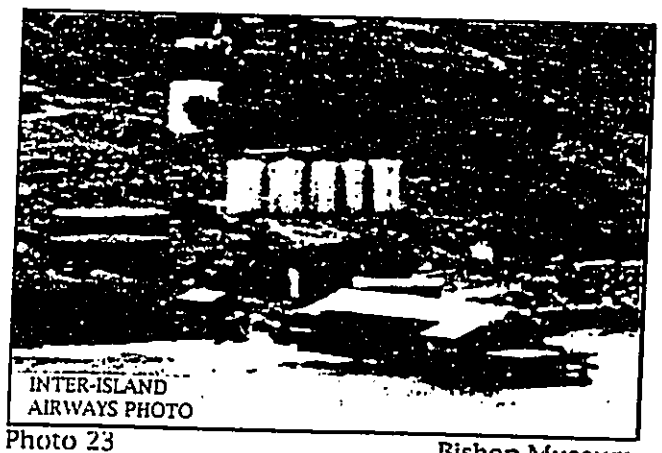


Photo 23 Bishop Museum

1930

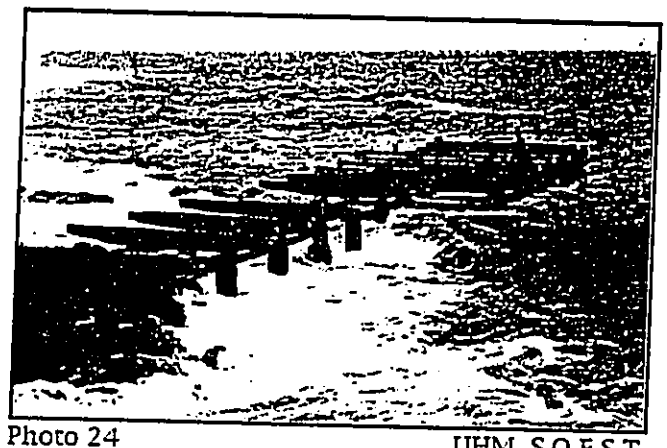
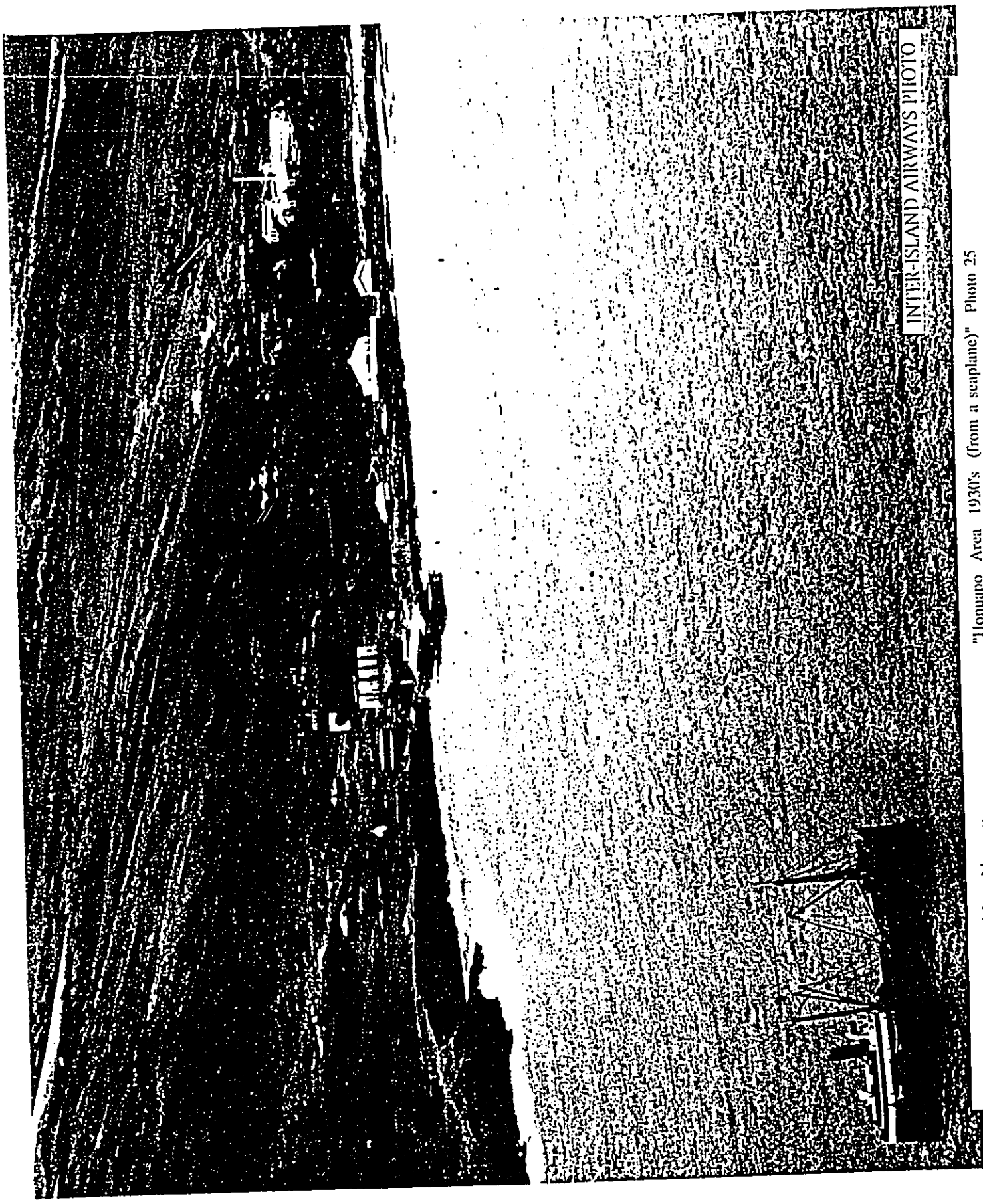


Photo 24 UHM S.O.E.S.T.

1995



"Honuapo Area 1930's (from a seaplane)" Photo 25

Bishop Museum

Appendix A

TERRESTRIAL FLORA AND FAUNA REPORT FOR HAWAII UNDERSEA GEO-OBSERVATORY (HUGO) SHORE STATION AT HONUAPO, HAWAII COUNTY

PREPARED FOR:

SCHOOL OF OCEAN & EARTH SCIENCE & TECHNOLOGY
UNIVERSITY OF HAWAII AT MANOA
HONOLULU, HAWAII

PREPARED BY:

GRANT GERRISH, Ph.D
NATURAL SCIENCES DIVISION
UNIVERSITY OF HAWAII AT HILO
HILO, HAWAII

March 14, 1995

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EXECUTIVE SUMMARY

This flora and fauna study supports an environmental assessment for the HUGO project at Honuapo, Hawaii County. The study area, approximately 4 hectares (10 acres) in size, includes Whittington County Park, 2 homes, and a large area used as cattle pasture. The study consists of a field survey of the terrestrial (= not marine) plants and animals of the proposed site and a literature review.

Three vegetation types were found within the study area (Figure A-1): 1) an extensive area of Leucaena-Prosopis-Panicum (Koa Haole-Kiawe-Guinea Grass) Woodland; 2) a very narrow strip of Strand vegetation; and 3) the "Park," including a mown lawn and park facilities. Forty-three species of vascular plants were recorded in the study area (Table A-1). Seven of these are species indigenous to Hawaii, the remaining thirty-six are introduced species. No endemic species were found. The Leucaena-Prosopis-Panicum Woodland and the Park are dominated by alien species with indigenous species occurring as a very minor element. The Strand vegetation includes 15 alien species and 7 indigenous.

No Threatened, Endangered or rare plants were found within the study area. It is very unlikely that rare plants would utilize the Leucaena-Prosopis-Panicum Woodland or the Park area because the native vegetation of both of these areas appears to have been extirpated long ago. No Threatened, Endangered or rare birds or mammals were observed during the biological field survey, nor does the study area possess unique resources likely to attract such species. The Strand includes a very small saltwater marsh (Stemmermann 1981) that probably meets the criteria of a regulated wetland (Corps of Engineers 1987).

The recommendations include that appropriate measures should be taken to reduce the probability of soil erosion whenever vegetation is removed and that the saltwater marsh not be disturbed without further consultation and approval by the U.S. Army Corps of Engineers.

INTRODUCTION

A study of the terrestrial (=nonmarine) flora and fauna of the site proposed for the Shore Station of the HUGO project was conducted by biologist, Grant Gerrish (Ph.D. - Botnaical Science, Univeristy of Hawaii at Manoa). This biological study supports an Environmental Assessment being prepared by the School of Ocean & Earth Science & Technology.

METHODS AND SITE DESCRIPTION

This flora and fauna study consists of a biological field survey at the proposed project area and a literature review of appropriate documents and references. This study is limited to terrestrial plants and animals and does not describe marine animals, if any, that may come ashore within the project area.

The proposed project area is a coastal site within the Ahupuaa of Honuapo, Hawaii County, Hawaii, including land between the high tide line and Hawaii Belt Highway (State Route 11) (Figure A-1). The study area, as described in this report and shown in Figure A-1, is much larger than would actually be required to contain the facilities of the proposed Shore Station. The study area, approximately 4 hectares (10 acres) in size, includes Whittington County Park, 2 homes, and a large area used as cattle pasture. The lawns and landscaped areas surrounding the homes were excluded from this study.

The biological field survey consisted of a walking survey during which all parts of the study area were visited at least twice. This survey was conducted between 10:00 AM and 2:00 PM on December 1, 1994, by Dr. Grant Gerrish. During this survey, each different vegetation type was described as a plant community. The approximate boundaries of each community were mapped (Figure A-1).

A list of vascular plant species found in each community was compiled and the abundance or importance of each species was visually estimated (Table A-1). Casual observations of birds and mammals were also recorded with no estimate of abundance.

Plant nomenclature follows Wagner et al. (1990). The Federal Register (1990a and 1990b) and updated lists of Endangered Species (USFWS 1993) were consulted to see if any plants found were listed or proposed for listing as Endangered or Threatened Species by the U.S. Fish and Wildlife Service. Finally, the National List (USFWS 1988) was consulted to determine the wetland indicator status of each plant species. Bird names are in accordance with the published list of the Hawaii Audubon Society (HAS 1989).

RESULTS

FLORA

VEGETATION Three plant communities or vegetation types were recognized within the study area (Figure A-1): 1) the most extensive of these is a Leucaena-Prosopis-Panicum (Koa Haole-Kiawe-Guinea Grass) Woodland, much of which is used for cattle pasture; 2) a very narrow strip of Strand vegetation is found above the high tide line; 3) the third type, designated "Park," includes a mown lawn, a few managed trees and shrubs, a paved parking lot, and several picnic shelters and other small structures. No attempt was made to record all of the alien grass and forb species within the Park.

Forty-three species of vascular plants were recorded in the study area (Table A-1). Seven of these are indigenous species, the remaining thirty-six are alien to Hawaii. No endemic species were found. The Leucaena-Prosopis-Panicum Woodland is dominated by alien species with only one indigenous species occurring as a very minor element. The Strand vegetation includes 15 alien species and 7 indigenous, all of which are widely distributed in Hawaii. A single indigenous species was recorded in the Park.

The Leucaena-Prosopis-Panicum Woodland, covering the majority of the site, is a relatively uniform vegetation of Leucaena (koa haole) and Prosopis (kiawe) trees up to about 8 m (25 feet) high. The tree canopy averages 50% cover with some small clearings. Leucaena is more dominant in the northeastern part of the study area, and Prosopis more prominent in the southwestern part. A few other tree species are widely scattered. The ground-cover throughout this community is a dense thicket of Panicum maximum (guinea grass). This grass is up to 2.5 m (8 ft.) high and so dense that few other herbaceous plants occur. The few other herbs and shrubs found in this community occur predominantly on the edges of roads or around old foundations.

The Strand community is made up of plants widely scattered on lava in a narrow strip between the sea and the Park. Overall plant coverage in this community is between one and five per cent. Little soil is present, limiting plant growth to crevices or rubble piles. This zone is subject to saltwater spray and splash from breaking waves. The plants on the Strand are species typically found growing in this type of habitat. Most conspicuous are the low (<6 m or 20 ft.) Thespesia populnea (Milo) trees and a few Scaevola sericea (naupaka kahakai) shrubs. The alien grass, Chloris barbata (swollen fingergrass) has the greatest coverage of the herbaceous cover, but indigenous herbs such as Fimbrystylis cymosa (mauu) and Sesuvium portulacastrum (akulikuli) are also scattered across the Strand.

The Strand includes a very small saltwater marsh (Stemmermann 1981); the approximate location of this wetland is shown cross-hatched in Figure A-1. This marsh borders a tidal pool and appears to be periodically inundated by high tides. The vegetation of this small area is a dense stand of Paspalum vaginatum (seashore paspalum), an alien grass typical of saltwater marshes.

The third community type, Park, includes an area of mown lawn and a large parking lot. Because of the unnaturalness of this vegetation, the abundance of species found there was not estimated. Conspicuous among the trees within the park is a single large Ficus sp. (banyan), and some Cocos nucifera (coconut) and Casuarina equisetifolia (ironwood) trees. The only indigenous plant recorded was a single Thespesia tree.

ENDANGERED PLANTS No Endangered or rare plants were found within the study area. It is very unlikely that rare plants or any endemic plants would utilize the Leucaena-Prosopis-Panicum Woodland or the Park area because the native vegetation of both of these areas appears to have been extirpated long ago. The dominance of these areas by vigorous alien plants makes them unsuitable for most

rare species. Although some rare endemic plant species do occur in strand habitat elsewhere in Hawaii, a thorough search of the Strand community within the study area found no rare or endemic plants to be present.

WETLANDS The "Wetland Indicator" status of each plant species is given in Table A-1 (USFWS 1988). The Leucaena-Prosopis-Panicum Woodland contains no Obligate or Facultative Wetland plants. The one Facultative plant found, Pluchea odorata (sourbush), occurs only occasionally in this community. Clearly, this community is not a wetland nor were any localized wetland areas found.

A small area, described in the "Vegetation" section above, bordering a tidal pool within the Strand and Park vegetation is a saltwater marsh. The one dominant plant, Paspalum vaginatum, is a Facultative Wetland species. This marsh is very near sea level (less than 1 meter) and appears to be frequently inundated by high tides. The soil was not investigated, but may have wetland characteristics. This small marsh probably meets the criteria of a regulated wetland (Corps of Engineers 1987).

Excluding the saltwater marsh just described, the remainder of the Strand is sparsely vegetated and on a well-drained substrate. Although the flora of this community contains a number of Facultative plant species (Table A-1), this area lacks a hydric (wetland) soil. The substrate is solid pahoehoe lava, or in some places, boulders broken from lava. Finer soil particles are found only in widely scattered cracks or pockets in the rock. Hydrological indicators of wetlands are also lacking. The entire Strand may be subject to salt spray and wave-splash during storms, but the slope and topography preclude standing water.

FAUNA

BIRDS AND MAMMALS Three bird species were observed during the biological field survey. Two of these are common introduced birds, the Zebra Dove (Geopelia striata) and Nutmeg Mannikin or Ricebird (Lonchura punctulata). Both were observed in the Leucaena-Prosopis-Panicum Woodland but undoubtedly move about among all three communities in the study area. The third species is the indigenous Kolea or Pacific Golden Plover (Pluvialis fulva). This common species was seen along the Strand and probably also utilizes the mown grass lawn within the Park. It would not be expected to use the Leucaena-Prosopis-Panicum Woodland vegetation. Presumably, other common introduced bird species, such as the Common Myna (Acridotheres tristis) or the Japanese White-eye (Zosterops japonicus) would at times occur within the study area.

No mammals were observed within the study site. Sign of domestic cattle are common within fenced portions of the Leucaena-Prosopis-Panicum Woodland. It is likely that domestic or feral dogs and cats range throughout the study area. Introduced mice and rats and the introduced Small Indian Mongoose would be expected to occur within the study area, although none were observed during the field survey.

ENDANGERED ANIMALS No Threatened, Endangered or rare birds or mammals were observed during the biological field survey, nor does the study area possess unique resources likely to attract such species. The widely distributed 'Io or Hawaiian Hawk (Buteo solitarius) or the Hawaiian Hoary Bat (Lasiurus cinereus semotus) may at times occur within the vicinity (Berger 1990, Tomich 1986). Both of these species are listed as Endangered (Federal Register 1990b). Both of these species are well-adapted to human-altered landscapes and make use of alien as well as native vegetation.

Evaluation of the possible occurrence of marine animals within the study area is outside the scope of this biological survey.

DISCUSSION AND RECOMMENDATIONS

BIOLOGICAL RESOURCE VALUES OF THE FLORA AND FAUNA

Resource values of flora and fauna can be either 1) general, or 2) biodiversity. General resource value is the benefit that any plant and animal community provides, regardless of the plant and animal species. These values include prevention of soil erosion, moderation of climatic extremes, biomass production and aesthetic values. Biodiversity refers to the number of species present or the variety of vegetation types within the landscape. In the Hawaiian Islands, communities considered to have biodiversity value are those that are 1) habitat to Endangered or rare species, 2) unique communities that occur in only a few places or a limited area, 3) communities dominated by endemic species with a minimum of interruption by alien species or other human activities. In addition to these biodiversity values, listed Threatened or Endangered species and wetland communities are legally protected under State and Federal law.

For the most part, the flora and fauna within and near the HUGO Project area have only general resource value. These species and their communities have little biodiversity value because they do not contain plants endemic to the Hawaiian Islands nor are the communities themselves unique.

No rare or endemic plant species occur within the study area. All the dominant plants of the Leucaena-Prosopis-Panicum Woodland and the Park are alien species; indigenous plants play only a minor role in these communities. The Leucaena-Prosopis-Panicum Woodland community itself is classified as a variant of the Kiawe (Prosopis) Forest, a subdivision of Coastal Dry Forests, and occurs on all the main islands (Gagne and Cuddihy in Wagner et al 1990). The seven indigenous plants found in the Strand commonly occur on coastal sites in Hawaii and throughout the Pacific and do not form a unique community here.

RECOMMENDATION No special measures need be taken to protect individual species found within the study area. Appropriate measures should be taken to preserve the general resource values of the vegetation, especially to reduce the probability of soil erosion whenever vegetation is removed.

WETLANDS

The saltwater marsh bordering a tidal pool (Figure A-1) probably fulfills the criteria of a regulated wetland.
RECOMMENDATION Do not disturb this small marsh without further consultation and approval of the U.S. Army Corps of Engineers.

ENDANGERED PLANTS AND ANIMALS

No listed Threatened, Endangered or species otherwise considered rare were found within the study site. Furthermore, the environmental conditions of the study area are not likely to provide habitat for any endangered terrestrial plants or animals. The listed Endangered Hawaiian Hawk or the listed Endangered Hawaiian Hoary Bat may occur in the vicinity of the study area, but both species are generalists that would not be dependent upon any specific or unique resource within the study site.
RECOMMENDATION Because of the absence of endangered species, no precautions need be taken.

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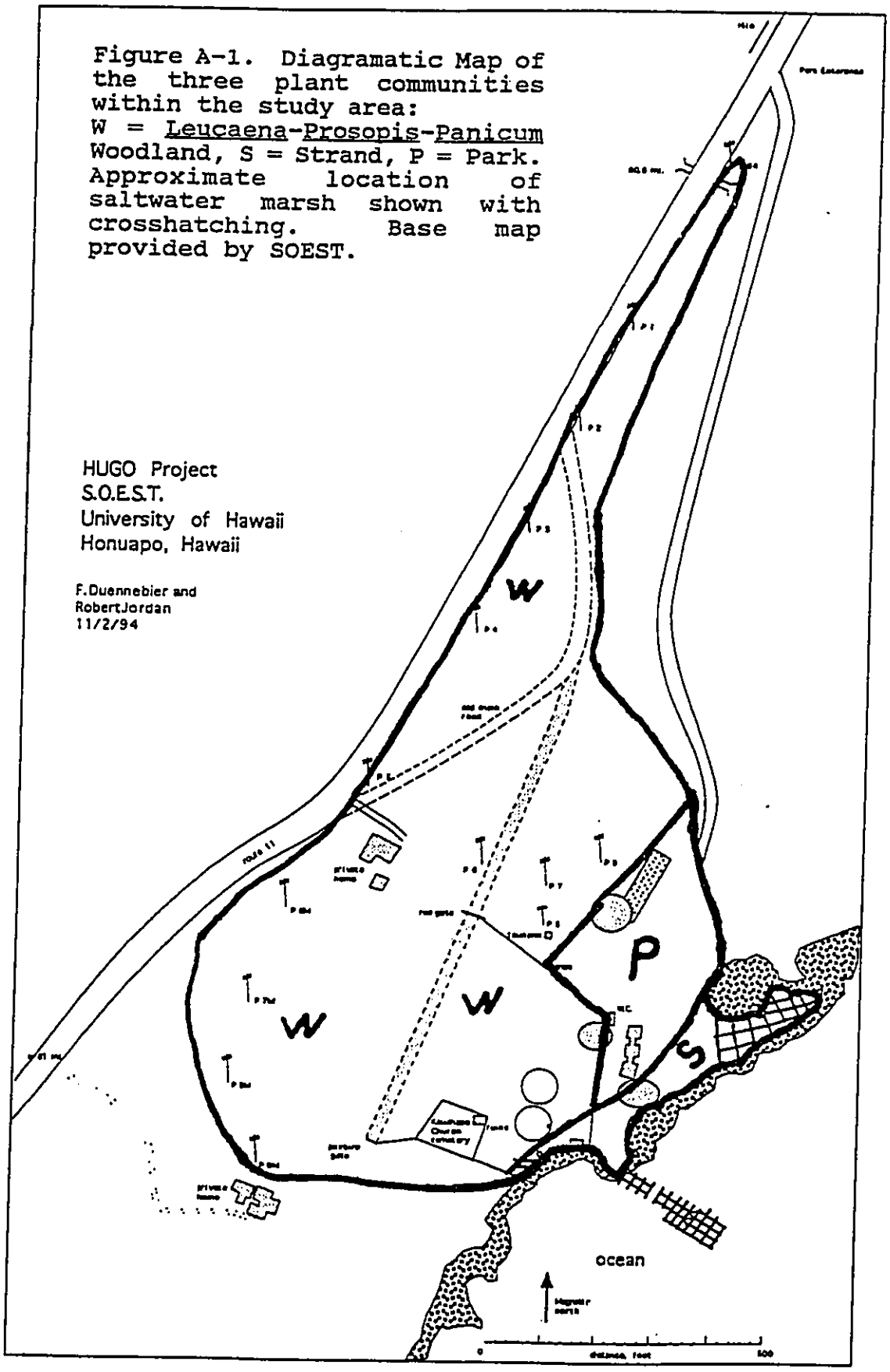
Figure A-1. Diagramatic Map of the three plant communities within the study area: W = Leucaena-Prosopis-Panicum Woodland, S = Strand, P = Park. Approximate location of saltwater marsh shown with crosshatching. Base map provided by SOEST.



HUGO Project
S.O.E.S.T.
University of Hawaii
Honuapo, Hawaii

F.Duennebier and
RobertJordan
11/2/94

TABLE A-1. Alphabetical list of vascular plants recorded within the HUGO Shore Station project area. STATUS = Region of Origin (A = Alien to Hawaii, I = Indigenous to Hawaii, P = Polynesian introduction to Hawaii.) WETLAND = Wetland indicator status (NI = Not wetland indicator, FA = Facultative, FW = Facultative Wetland, FU = Facultative Upland.) COMMUNITY = Community where found within project area (W = Leucaena-Prosopis-Panicum Woodland, S = Strand, P = Park; abundance within COMMUNITY indicated as D = Dominanat, C = Common, O = Occasional, I = Infrequent, R = Rare, P = Present).

STATUS	SCIENTIFIC NAME COMMON NAME	WETLAND	COMMUNITY		
			W	S	P
A	Abutilon grandifolium (Willd.) Sweet hairy abutilon	NI	I		
A	Ageratum conyzoides L. maile-honohono	FA		I	
A	Amaranthus spinosus L. spiny amaranth	FU	I		
A	Antigonon leptopus Hook. & Arnott Mexican creeper	NI	I		
A	Bidens pilosa L. Spanish needle	NI	I		
A	Bougainvillia Commerson ex Juss. sp. bougainvillea	NI	I		
A	Canavalia cf. cathartica Thouars maunaloa	FU		I	
A	Carica papaya L. papaya	NI	I		
A	Casuarina equisetifolia L. paina, ironwood	FU			P
A	Chamaecrista nicitans (L.) Moench partridge pea	NI	I		
A	Chloris barbata (L.) Sw. swollen fingergrass	FU		C	

TABLE A-1. (Continued) Vascular plants of the study area.

STATUS	SCIENTIFIC NAME COMMON NAME	WETLAND	COMMUNITY W	S	P
P	Cocos nucifera. L. niu, coconut	NI	I		P
P	Cordia subcordata Lam. kou	NI		R	
A	Cynodon dactylon (L.) Pers. Bermuda grass	FU	I		P
A	Dactyloctenium aegyptium (L.) Willd. beach wire grass	NI		O	
A	Eleusine indica (L.) Gaertn. goose grass	FU			P
A	Emilia sonchifolia (L.) DC Flora's paintbrush	NI		O	
A	Ficus cf. benghalensis L. Indian banyan	NI	O		P
I	Fimbrystylis cymosa R. Br. mau'u	FU		C	
A	Haematoxylum campchianum L. bloodwood tree	NI	I		
A	Indigofera suffruticosa Mill. indigo	NI	I		P
I	Jacquemontia ovalifolia (Choisy) H. Hallier pa'uohi'iaka	NI		O	
A	Leonotis nepetifolia (L.) R. Br. lion's ear	NI	I		
A	Leucaena leucocephala (Lam.) de Wit koa haole	NI	D	O	P
A	Lotus subbiflorus Lag. ncn (herb)	NI		O	

TABLE A-1. (Continued) Vascular plants of the study area.

STATUS	SCIENTIFIC NAME COMMON NAME	WETLAND	COMMUNITY W	S	P
A	Mucuna gigantea (Willd.) DC sea bean	NI		I	
A	Panicum maximum Jacq. guinea grass	FU	D	I	P
A	Paspalum vaginatum Sw. seashore paspalum	FW		I	
A	Pluchea odorata (L.) Cass. sourbush	FA	O	O	P
A	Portulaca pilosa L. 'Akulikuli	NI		C	
A	Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth kiawe	FU	D		P
A	Ricinis communis L. castor bean	FU	I		
I	Scaevola sericea Vahl naupaka kahakai	FU		O	
A	Schinus terebinthifolius Raddi christmasberry	FU	O	O	P
I	Sesuvium portulacastrum (L.) L. 'Akulikuli	FA		I	
A	Sida acuta N. L. Burm. ncn	NI	O		
I	Sida fallax Walp. 'ilima	NI	I	O	
A	Spathodea campanulata Beauv. African tulip tree	NI	I		
A	Syzgium cumini (L.) Skeels Java plum	FU	I		

TABLE A-1. (Continued) Vascular plants of the study area.

STATUS	SCIENTIFIC NAME / COMMON NAME	WETLAND	COMMUNITY W	COMMUNITY S	COMMUNITY P
I	Thespesia polpunea (L.) Sol. ex Correa milo	FA		C	P
A	Tournefortia argentea L. fil. tree heliotrope	NI		I	
A	Tridax procumbens L. coat buttons	NI	O		
I	Waltheria indica L. 'uhaloa	NI		O	

Appendix B

Marine Flora and Fauna Assessment...,Report
UHH MSD MOP Team

Marine Flora and Fauna Assessment for the Hawai'i Undersea Geo-Observatory Project at Honu'apo, Hawai'i County

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submitted March 8, 1995
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INTRODUCTION

This report summarizes an initial survey of the nearshore marine environment adjacent to the proposed Hawai'i Undersea Geo-Observatory (HUGO) fiber optic cable route at the pier at Honu'apo, Hawai'i. This study was conducted to 1) to characterize the nearshore marine community diversity and abundance in the area expected to be impacted by the proposed HUGO cable; and 2) to evaluate the possible impact of the project on the nearshore marine community.

METHODOLOGY

This marine biota assessment was conducted along the proposed nearshore (0 to 20 m depth) Hawai'i Undersea Geo-Observatory (HUGO) cable route at Honu'apo, Hawai'i County.

The site was visited on three dates by members of the scientific team: October 14, 1994, January 13, 1995, and February 3, 1995. On the first two dates, high surf and/or wind prevented any subtidal work; however, the intertidal zone was visually surveyed and voucher specimens of marine macroalgae were collected. On the morning of February 3, 1995, the subtidal habitat along a transect 20 m wide from the pier out to 20 m deep was surveyed by four scientific divers using S.C.U. B.A. Visual information was documented with an underwater videocamera and a 35 mm still camera. The substratum composition was visually characterized. Marine fish and macroinvertebrates, including corals, and macroalgae were noted and the abundance of each species was visually estimated. Voucher specimens of marine macroalgae were collected and placed in ziploc baggies to be transported to the laboratory and preserved in a 4% formalin-seawater solution.

After the in situ assessments, species lists were compiled; voucher specimens were identified using microscopes and preserved as dried herbarium specimens or as permanent microscope slides; the video was reviewed by all scientists and annotated; and the still photographs were developed and reviewed.

RESULTS

The nearshore marine environment from 0-20 m deep is characteristic of a high energy habitat, as evidenced by high percent cover of coarse marine sediment, flat basaltic outcroppings, rock and coral rubble, and a poorly developed, low relief coral reef. Nonetheless, the reef that was present appeared to be healthy and colonized by a typical assemblage of reef fishes and invertebrates and diverse seaweeds. The dive entry area, east of the pier, as well as the substratum fronting the pier, to a depth of 10 m , is characterized by fractured basalt and boulders supporting a few isolated colonies of hermatypic (reef-building) corals. An abandoned boiler, railroad car and

anchors were observed at 9 m deep. Seaward of the pier, at depths between 10 m and 13 m, the substratum consists of boulders, cobbles, and rubble with minimal coral coverage. An old, partially buried cable was observed to run from the base of the seaward pier pilings out to 20 m and beyond. The composition of the substratum changes abruptly at 13 m deep as hermatypic corals become the dominant feature. These low relief colonies, primarily *Porites lobata*, *Porites compressa*, and *Pocillopora meandrina*, provide living coral coverage of greater than 50% cover. Also at approximately 13 m deep, sand channels, aligned perpendicular to the shore and surrounding the live coral patches, were more noticeable. From 16 m to 20 m deep (and deeper, to the edge of underwater visibility, which was approximately 16 m at the time), the substratum was characterized by a broad, sandy plain. The vast expanse of sediment (coverage greater than 80%) was primarily calcareous with a small amount of terrigenous debris. Low relief basalt outcroppings are also present at these depths.

The following species were observed at Honu'apo.

SEAWEEDS Division	Species	Common Name	Relative Abundance
Chlorophyta	*Caulerpa racemosa*	sea grapes	uncommon
	Cladophora socialis		uncommon
	Codium reediae		uncommon
	Halimeda opuntia		common
	Neomeris annulata		abundant
	Ulva fasciata	sea lettuce	common
Phaeophyta	*Chnoospora minima*		abundant
	Dictyota divaricata		abundant
	Hincksia breviarticulata		abundant
	Sargassum echinocarpum	*limu kala*	abundant
	Sphacelaria sp.		abundant
Rhodophyta	*Acanthophora pacifica*		common
	Aglaothamnion boergesenii		uncommon
	Ahnfeltiopsis concinna	*limu aki'aki*	abundant
	Amansia glomerata		common
	Carpopeltis sp.		common
	Ceramium hematispinum		common
	Champia parvula		common
	Chondria simpliciuscula		uncommon
	Crouania minutissima		common
	Dotyella filamentosa		abundant
	Gelidiopsis intricata		uncommon
	Gibsmithia hawaiiensis		uncommon
	Haliptilon subulatum		uncommon
	Haloplegma dupreyerii		common

SEAWEEDS continued

Division	Species	Common Name	Relative Abundance
	Jania adhaerens		common
	Laurencia sp.		uncommon
	Peyssonellia rubra		common
	Porolithon onkodes		abundant
	Portieria hornemanni		abundant
	Pterocladia capillacea		common
	Tolypiocladia glomerulata		common
	Trichleocarpa oblongata		common

INVERTEBRATES

Phylum	Species	Common Name	Relative Abundance
Porifera	unknown	sponges	uncommon
Cnidaria	*Montipora verrucosa*	brown rice coral	abundant
	Montipora flabella	blue rice coral	common
	Pocillopora meandrina	cauliflower coral	abundant
	Palythoa sp.	rubber coral	common
	Porites lobata	lobe coral	abundant
	Porites compressa	finger coral	common
Mollusca	*Cellana* spp.	limpets (*'opihi*)	uncommon
Annelida	*Spirobranchus giganteus*	Christmas tree worms	common
Arthropoda	*Grapsus tenuicrustatus*	rock crab (*a'ama* crab)	abundant
Echinodermata	*Actinopyga mauritiana*	speckled sea cucumber	uncommon
	Colobocentrotus atratus	shingle urchin (*ha'uke'uke*)	common
	Echinometra mathaei	rock boring urchin	abundant
	Heterocentrotus mammillatus	slate pencil urchin	abundant

FISHES

Family	Species	Common Name	Relative Abundance
Moray eels	*Gymnothorax meleagris*	whitemouth moray	common
Sea basses	*Cephalopholis argus*	bluespotted grouper	uncommon
Hawkfishes	*Paracirrhites arcatus*	arc-eye hawkfish	abundant
	Paracirrhites forsteri	blackside hawkfish	common
Goatfishes	*Parupeneus multifasciatus*	manybar goatfish	abundant
Butterflyfishes	*Chaetodon lunula*	racoon butterfly fish	abundant
	Chaetodon multicinctus	multiband butterfly fish	abundant
	Chaetodon ornatissimus	ornate butterfly fish	common
	Chaetodon quadrimaculatus	four spot butterfly fish	abundant
	Chaetodon unimaculatus	teardrop butterfly fish	uncommon
	Forcipiger flavissimus	forcepsfish	abundant

FISHES continued

Family	Species	Common Name	Relative Abundance
Angelfishes	*Centropyge potteri*	Potter's angelfish	uncommon
Tilefishes	*Malacanthus brevirostris*	flagtail filefish	uncommon
Damselfishes	*Chromis agilis*	agile chromis	abundant
	Chromis hanui	chocolate-dip chromis	common
	Chromis vanderbilti	blackfin chromis	common
	Dasyclus albisella	Hawaiian dascyllus	abundant
	Plectroglyphidodon imparipennis	brighteye damselfish	common
Wrasses	*Bodianus bilunulatus*	Hawaiian hogfish	abundant
	Coris venusta	elegant coris	common
	Labroides phthirophagus	Hawaiian cleaner wrasse	common
	Novaculichthys taeniourus	rockmover	uncommon
	Thallosoma duperrey	saddle wrasse	common
Parrotfishes	*Scarus perspicillatus*	spectacled parrotfish	common
	Scarus spp.	juvenile parrotfish	abundant
Surgeonfishes	*Acanthurus achilles*	Achilles tang	common
	Acanthurus leucopareius	whitebar tang	abundant
	Acanthurus nigrofuscus	brown tang	abundant
	Acanthurus olivaceus	orangeband tang	common
	Acanthurus triostegus	convict tang	common
	Ctenochaetus strigosus	goldring surgeonfish	abundant
	Zebrasoma flavescens	yellow tang	common
Moorish Idols	*Zanclus cornutus*	moorish idol	common
Triggerfishes	*Rhinecanthus rectangulus*	reef triggerfish	common
	Sufflamen bursa	lei triggerfish	common
Trunkfishes	*Ostracion meleagris*	spotted trunkfish	common
Puffers	*Arothron meleagris*	spotted puffer	common
OTHER			
Marine Reptiles			
	Chelonia mydas	green sea turtle	2 sitings

CONCLUSIONS

No endangered or threatened species of fishes, invertebrates or seaweeds were observed. Two green sea turtles were observed and this species is listed as threatened by the Federal government. In addition, several of the seaweed species at Honu'apo (e.g. *Pterocladia*, *Amansia*, *Sargassum*) are known to be consumed by green sea turtles in Hawai'i.

Based on the marine biota observed during this single "reconnaissance" dive, we see no reason for additional and more in-depth surveying prior to construction. However, it is possible that rare species, especially fish and invertebrates, were

overlooked by the visual sampling technique used. In addition, it must be noted that no night reconnaissance dive was made, and many fish and invertebrates are nocturnal and would be missed during a daytime survey. Also this survey consisted of but one dive and two intertidal visits during the winter season, and species diversity and abundances may change throughout the year.

It is recommended that if the cable carries a DC current through it, the cable should be well-insulated and shielded from mechanical damage. Chondrichthyian fishes (sharks and rays) can detect very low DC electric fields (such as generated by prey organisms' muscles) and will demonstrate a feeding response (biting) which could damage the cable.

The proposed 2-5 cm diameter cable is unlikely to have major impacts on marine biodiversity. However, the coral reef that is present, although not well-developed, was sufficient to support a large number of reef fishes, invertebrates, and algae which represent important local marine resources. The presence of numerous corallivorous butterfly fishes in the 13-20 m depths is further evidence of the health of the coral community at Honu'apo. In addition, a previous study (Smith, *Pacific Science*, . October 1992) on the intertidal algae at Honu'apo, documented 60 species of seaweeds between the 0.5 and 0.75 m tidal height, which supports our survey's conclusion of high algal diversity at Honu'apo. Therefore, the cable should not be allowed to swing widely and scour the bottom. Care should be taken when deploying and anchoring the cable not to destroy the reefs, as their destruction could have an adverse effect on local marine productivity.

Appendix C

Baseline Assessment of the Marine... ,Report
UHM Steve Dollar

BASELINE ASSESSMENT OF THE MARINE COMMUNITIES IN THE VICINITY OF THE HAWAII UNDERSEA GEO-OBSERVATORY (HUGO) SHORE STATION, HONU'APO, ISLAND OF HAWAII

DRAFT

Prepared for

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April 24, 1995

EXECUTIVE SUMMARY

The proposed Hawaii Undersea Geo-Observatory (HUGO) is a permanent ocean bottom scientific observatory on Loihi seamount connected to shore by an electro-optical cable for real-time data monitoring of instrument packages on the volcano. It is planned to run the cable from Loihi to the southeast coastline of the Island of Hawaii, where it will come ashore at Whittington Beach, at Honu'apo. In the nearshore region extending from the shoreline to approximately the 50 foot depth, the cable will likely be shielded in a PVC conduit which will be securely attached to the sea floor. The cable will come ashore attached to an old concrete pier with intact pilings that extends approximately 200 feet off the rocky shoreline. Assessment of the benthic and reef fish community structure off the proposed cable corridor was conducted in April 1995 in order to evaluate the potential effects the planned HUGO might have on the marine ecosystem. In addition to qualitative assessments of the marine environment, 6 transects surveys were conducted to provide representative quantification of the major marine organisms and substratum types.

Physical structure of the nearshore region consists predominantly of rocky basaltic shorelines that form the land-sea interface. The reef area is divided into three major zones; a shallow nearshore zone characterized by basaltic boulders and substantial water motion from breaking waves, a mid-reef zone which comprises the major "reef-building area" which also consists primarily of basaltic boulders, and a outer sand/rubble plain. While the area is generally subjected to rough seas from tradewind generated, and southerly swells, it is protected from the largest swells that emanate from north Pacific storms. As a result, physical conditions do not appear to be rigorous enough to restrict well-developed benthic and fish communities from inhabiting the nearshore area.

In general, the coral community at Honu'apo consists of large flat encrustations of *Porites spp.* and *Montipora spp.*, and the sturdy branching species *Pocillopora meandrina* which cover the basaltic boulders and concrete pilings. Pooled coral cover for all transects was 43% and varied from 12% to 58% on individual transects; community composition that can be considered high and diverse coral cover for Hawaiian reefs. While numerous algae were identified, there were no large areas of subtidal macroalgal beds. Reef fish community structure was fairly typical of the assemblages found in undisturbed Hawaiian reef environments, and was characterized by six general categories: juveniles, plantivorous damselfishes, herbivores, rubble-dwellers, swarming tetrodonts, and surge-zone fishes. The presence of food fishes indicates that the area has been subjected to low to moderate amounts of fishing pressure. The area appears to be frequented by numerous green sea turtles.

The primary activity in the nearshore area of the cable corridor required to secure the cable and conduit will likely involve drilling small holes in the solid surfaces. These holes will serve to anchor bolts which will secure straps holding the cable in place. The activity of drilling will likely not produce any significant effects in terms of biotic disturbance; corals and other benthos removed by the cable attachment process will likely recolonize the bared substratum rapidly. Suspended sediment produced by drilling bolt holes will be small in quantity, similar in composition to natural sediment, and rapidly dispersed by normal water motion. By virtue of the necessity to secure the cable to prevent stress or breakage, the cable/conduit will not move once in place, thereby preventing any damage to biotic components. Periodic inspection of the cable can be easily conducted (especially after large wave events) to ensure that the anchoring devices are effective.

Because the fiber optic cable is similar to existing submerged telecommunications cable which are not resulting in apparent negative impacts to marine mammals, there is no basis to conclude that the proposed HUGO cable will cause negative effects to endangered or threatened species, particularly humpback whales. Because the alteration to the marine environment from the cable anchoring procedures will be minimal or non-existent, there is little or no potential for affects to turtles.

Stresses from natural forces that are presently the dominant factors in influencing community structure at Honu'apo appear to be substantially greater than those that could result from the proposed project. Secondary impacts associated with operation of the HUGO facility once the cable is in place do not appear to present any potential for changes.

INTRODUCTION AND PURPOSE

Planning is underway for the Hawaii Undersea Geo-Observatory (HUGO), which will be a permanent ocean bottom scientific observatory on Loihi seamount connected to shore by electro-optical cable for real-time data monitoring of instruments on the volcano. The main cable to shore will contain 6 active optical fibers, one dedicated to analog television-type data transmission, one dedicated to commands (downlink), and 4 dedicated to digital data transmission from Loihi (uplink).

The shore station for the cable landing is located at Whittington Beach at Honu'apo, approximately 30 miles south of Kilauea volcano, on the southeast coastline of the Island of Hawaii. Electrical power will be supplied to the main cable at the shore station; initially the shore station will also be the access point for sending commands to experiments and for monitoring and recording data. An old concrete pier previously used for landing barges is located at Honu'apo. While the pier is in an advanced state of disrepair, the concrete pilings appear to be relatively sturdy. The pilings extend approximately 200 feet seaward from the shoreline, with the most seaward pilings located at a water depth of approximately 30 feet (see Figure 1).

Current plans call for attaching the cable to the sea floor and pilings in order to prevent damage or breakage to the cable by wave forces in the the shallow nearshore zone. While the exact methods for attaching the cable to the solid surfaces has not been established, it is likely that the cable will be encased in a rigid conduit (PVC pipe) and strapped to the pier, pilings and nearshore seafloor. A probable method to secure the straps will be to drill holes in the solid surfaces with an underwater drill rig; expandable anchor bolts secured into the drilled holes will be used to fasten the conduit-cable assembly to the pier and nearshore bottom out to a depth of 40-50 feet.

While all planning and construction activities for the HUGO cable placement will place a high priority on maintaining the existing nature of the marine environment, it is nevertheless important to address any potential impacts that may be associated with the planned project. For this purpose, a baseline survey was conducted to evaluate the existing condition of the marine environment. Based on the results of the survey it is possible to delineate the probable effects to the marine environment that will result from the proposed activity. Presented below are the methods, results and conclusions of the baseline assessment of biotic communities offshore of the proposed HUGO cable landing area at Honu'apo.

METHODS

All fieldwork was carried out on April 8, 1995, and was conducted by diver/scientists working from shore using SCUBA equipment. Biotic structure of benthic (bottom dwelling) communities inhabiting the reef environment was evaluated by establishing a descriptive and quantitative baseline between the shoreline and the 15 meter (m) (~45 foot) depth contour. Initial qualitative reconnaissance surveys were conducted that covered the area off the pier at Honu'apo from the shoreline out to the limits of coral reef formation. These reconnaissance surveys were useful in making relative comparisons between areas, identifying any unique or unusual biotic resources, and providing a general picture of the physiographic structure and benthic assemblages occurring throughout the region of study.

Following the preliminary survey, six quantitative transect sites were selected offshore of the pier area (see Figure 1). Transects 1-3 were located directly offshore of the pier along the probable route of the cable landing; transects 4-6 were located to the south of pier. Transect 1 was located at the most seaward area of extensive reef growth at a depth of 30 feet; Transect 2 was located just off the most seaward pilings of the pier; Transect 3 was located underneath the pier. Transects 4-6 were located at approximately the corresponding distances from shore approximately 100 feet to the south of the pier. Each transect was oriented parallel to depth contours so as to bisect a single reef zone. Care was taken to place transects in random locations that were not biased toward either peak or low coral cover.

Quantitative benthic surveys were conducted by stretching a 50-m long surveying tape in a straight line over the reef surface. A quadrat frame with dimensions of 1 m by 0.66 m (3 feet by 2 feet), was sequentially placed over 10 random marks on the transect tape so that the tape bisected the long axis of the frame. At each quadrat location a diver knowledgeable in the taxonomy of resident species visually estimated and recorded the percent cover and occurrence of organisms and substratum type within the quadrat frame. No attempt was made to disturb substrata to observe organisms, and no attempt was made to identify and enumerate cryptic species dwelling within the reef framework. Only macrofaunal species greater than approximately 2 centimeters were noted.

Following the fieldwork the in-situ cover estimates were used to calculate community structure parameters (percent cover, species diversity). The quadrat transect method is a modification of the technique described in Kinzie and Snider (1978), and has been employed in numerous field studies of Hawaiian reef communities (e.g. Dollar 1979, Grigg and Maragos 1974), and has proven to be particularly useful for quantifying coverage of attached benthos such as corals and large epifauna (e.g., sea urchins, sea cucumbers). While this methodology is quantitative for the larger exposed fauna, many coral reef invertebrates are cryptic or

nocturnal. Coupled with the generally small size of cryptic invertebrates, quantitative assessment of these groups requires methodologies that are beyond the scope of the present baseline assessment program.

Quantitative assessment of reef fish community structure was conducted in conjunction with the benthic surveys. As the transect tape was being laid along the bottom, all fish observed within a band approximately 2 meters wide along the transect path were identified by species name and enumerated. Care was taken to conduct the fish surveys so that the minimum disturbance was created by divers, ensuring the least possible dispersal of fish. Only readily visible individuals were included in the census. No attempt was made to seek out cryptic species or individuals sheltered within coral. This transect method is an adaptation of techniques described in Hobson (1974).

RESULTS AND DISCUSSION

Physical Structure

Honu'apo is situated near the southernmost point of the southeast coastline of the Big Island. This coastline runs parallel to the direction of northeast tradewinds, which intensify as a result of orographic effects created by the slope of Mauna Loa. As a result, during tradewind weather, which is considered normal weather (occurring approximately 90% of the time in summer months and 50% of the time in winter months), sea conditions at Honu'apo are typically very rough from tradewind generated swell. In addition, with southern exposure, the area is exposed to long-period southerly swells which typically reach Hawaii during the summer months. However, owing to the southwest exposure, the area is completely protected from long-period swells generated by winter storms in the North Pacific. North pacific swells are generally substantially larger than the largest southerly swells that impact the shorelines of the Hawaiian Islands. Thus, while the Honu'apo region is typified by extremely rough sea conditions, the region is not impacted by the largest class of waves that impinge on Hawaiian shorelines.

The shoreline and nearshore area at Honu'apo is composed primarily of jagged basaltic lava. The seaward edge of the lava shoreline is composed primarily of either basaltic boulder fields, or vertical sea cliffs 5 to 10 feet in height. Beyond the shoreline, the structure of the offshore environment consists of a zonation scheme with four predominant regions. Beginning at the shoreline and moving seaward, the shallowest zone beyond the shoreline is comprised of a seaward extension of the basaltic shoreline bench, primarily composed of basaltic boulders that have entered the ocean after breaking off from the shoreline. *Pocillopora meandrina*, a sturdy hemispherical coral was a dominant colonizer of the nearshore area. This species is able

to flourish in areas that are physically too harsh for most other species, particularly due to wave stress. Transects 3 and 6 were located in the *Pocillopora meandrina*-boulder zone. *P. meandrina* was also noted to be the main colonizer of the concrete pilings of the pier; on many of the pilings nearly all of the concrete surfaces were covered by living coral colonies.

Seaward of the concrete pier, bottom topography remains primarily scattered basaltic boulders. However, the dominant living bottom cover consists primarily of large flat encrustations of corals of the genera *Porites* and *Montipora*. Transects 2 and 5 were conducted in the deeper, more seaward areas of the boulder zone.

Seaward of the nearshore boulder zone, bottom structure is composed predominantly of a gently sloping bench composed of basalt, interspersed with lava extrusions and sand channels. In some areas, the bench is characterized by low relief in the form of undercut ledges and basaltic outcrops. While the majority of the bottom is composed of solid surfaces, fine-grained calcareous sediment also comprises a component of bottom cover. Water depth in this mid-reef zone ranges from about 30 to 40 feet. Predominant biotic assemblages in this area were flat encrusting corals or the genera *Porites* and *Montipora*. As wave stress in this region is substantially less than in the shallower areas, and suitable hard substrata abound, the area provides an ideal locale for colonization by attached benthos, particularly reef corals, and generally the widest assortment of species and growth forms are encountered in this region. Transects 1 and 4 were located on the reef bench.

The seaward edge of the reef platform (at a depth of about 40-50 feet) is marked by small ledge, that likely marks the seaward extension of an ancient lava flow. Seaward of the ledge, substratum changes from the solid continuation of the island mass to an aggregate of generally unconsolidated sand and rubble. While the sand was predominantly calcareous in origin, it was noted that there was a significant fraction of terrigenous mud in the surface sediment of some areas. Living macrobenthos in the sand/rubble plain was substantially reduced compared to the shallower inshore zones.

Biotic Community Structure

Marine community structure can be defined as the abundance, diversity, and distribution of stony and soft corals, motile benthos such as echinoderms, and pelagic species such as reef fish. Probably the most useful biological assemblages for direct evaluation of environmental impacts to the offshore marine environment are benthic (bottom-dwelling) communities. Because benthos are generally long-lived, immobile, and can be significantly affected by exogenous input of potential pollutants, these organisms must either tolerate the surrounding conditions within the limits of adaptability or die.

As members of the benthos, stony corals are of particular importance in nearshore Hawaiian environments. Corals compose a large portion of the reef biomass and their skeletal structures are vital in providing a complex of habitat space, shelter, and food for other species. Since corals serve in such a keystone function, coral community structure is considered the most "relevant" group in the use of reef community structure as a means of evaluating past and potential impacts associated with human activities. For this reason, and because alterations in coral communities are easy to identify, observable change in coral population parameters is a practical and direct method for obtaining the information for determining the effects of stress in the marine environment. In addition, because they comprise a very visible component of the nearshore environment, detailed investigations of reef fish assemblages are presented.

Coral Communities

Table 1 shows abundance estimates of invertebrates observed throughout the region of study. The predominant taxon of macrobenthos (bottom-dwellers) throughout the reef zones off the HUGO landing site are Scleractinian (reef-building) corals. Results of quantitative line transects provide a data base characterizing coral community structure. Table 2 shows the quantitative summary of coral community structure from the six transects, while Table 3 is comprised of individual quadrat results.

In total, 13 species of "stony" corals, and one "soft corals" were observed throughout the region of study, while 8 species of coral were encountered on transects. The number of coral species on a single transect ranged from 5 to 7. Species of coral that were observed in the region but did not occur on transects included *Porites brighami*, *Pocillopora eydouxi*, *Pavona varians*, *P. duerdeni* and *Leptastrea purpurea* (see Tables 1 and 2). In total, living coral cover accounted for 43% of bottom cover. The dominant species on all of the transects was *Porites lobata*, which accounted for about 35% of total coral cover, and about 15% of all bottom cover. The second and third most abundant species, *Montipora patula* and *Montipora verrucosa*, accounted for about 22% and 20% of coral cover, and 10% and 9%, of total bottom cover, respectively. Thus, these three species comprised about 77% of living coral cover, and 34% of all bottom cover.

The most common coral species, *Porites lobata*, *Montipora patula* and *Montipora verrucosa* were ubiquitous throughout the region of study, generally occurring as large, flat encrustations on the surfaces of boulders. Research on coral reef community structure on the island of Hawaii indicates that coral abundance and zonation are primarily a function of wave stress (Dollar 1982, Dollar and Tribble 1993). The overall coral cover on transects at Honu'apo (43%) can be considered relatively high for a nearshore area. While determination

of size-frequency distributions was not a component of the data collection, it was noted that most of the colonies were considered "large and mature." Diversity of coral communities as determined by the transect results was between 1.0 and 1.5 (Table 2), which is considered high for coral reefs. Thus, the community appears to be relatively stable with respect to catastrophic disturbances. While the coral species assemblages observed at the study site appear to be moderated by the high energy environment (lack of branching species), it also appears that wave stress is not severe enough to restrict settlement, optimal growth, and optimal diversity of corals.

Other Benthic Macroinvertebrates

The other dominant group of macroinvertebrates are the sea urchins (Class Echinoidea). Table 1 summarizes the occurrence of sea urchins at all of the survey stations. The most common urchin was *Echinometra matheai*, which occurred in all reef zones. *E. matheai* are small urchins that are generally found within interstitial spaces bored into basaltic and limestone substrata. *Heterocentrotus mammillatus* and *Colobocentrotus atratus* were other species of urchins that occurred commonly on many transects. *H. mammillatus*, commonly called the "slate-pencil urchin" occur as larger individuals (compared with *E. matheai*) that are generally found on the reef surface, rather than within interstitial spaces. *C. atratus*, commonly called the "shingle urchin", occurs primarily on rocks shorelines within the intertidal area.

Sea cucumbers (Holothurians) observed during the survey consisted of two species, *Holothuria atra* and *Actinopyga mauritiana*. Individuals of these species were distributed sporadically across the mid-reef and deep reef zones (Table 1). Numerous sponges were also observed on the reef surface, often under ledges and in interstitial spaces.

The design of the reef survey was such that no cryptic organisms or species living within interstitial spaces of the reef surface were enumerated. Since this is the habitat of the majority of mollusks and crustacea, detailed species counts were not included in the transecting scheme. No dominant communities of these classes of biota were observed during the reef surveys at any of the study stations.

Algae

Aside from encrusting corals, the predominant bottom cover of basaltic boulders was a short algal turf, and encrusting coralline algae. In another study of the Honu'apo area, 33 species of algae were identified in the vicinity of the study site, with 10 species classed as abundant (no quantitative basis was provided for the classification scheme) (McDermid et al.

1994). During the present study, no areas of extensive frondose algae abundance were observed, with the exception of *Ahnfeltiopsis concinna* that occurred on the intertidal rocks.

Reef Fish Community Structure

A rich and diverse reef fish community was seen at Honu'apo. Transect results are presented in Table 4. On individual transects, number of fish species ranged from 17-24, number of individuals ranged from 102-184, and species diversity ranged from 2.12-2.51. A total of 854 individuals representing 51 species were noted. The reef fish community off Honu'apo is typical of that found along most of the coastline of Hawaii (Hobson 1974, Walsh 1984), and can be grouped into several categories: juveniles, planktivorous damselfishes, herbivorous surgeonfishes, wrasses, and butterflyfish.

Juvenile fish belonged mostly to the family Acanthuridae (surgeon fish), with representatives from the families Labridae (wrasses), Mullidae (goat fish) and Chaetodontidae (butterfly fish). Juveniles were abundant in areas dominated by basalt boulders, which included all of the transects except transect 4. The complex habitat created by the large boulders provides shelter for small fish.

Planktivorous damselfish, principally the blackfin chromis (*C. vanderbilti*) was abundant in all areas surveyed, and often comprised more than a third of the total number of individuals encountered along a transect. Herbivorous surgeonfishes, primarily the brown surgeonfish (ma'i'i'i, *A. nigrofuscus*) and goldring surgeonfish (kole, *Ctenochaetus strigosus*) were also abundant. In the shallower areas, whitebar surgeonfish (maikoiko, *Acanthurus leucopareius*) were common. Other well represented species were convict tangs (manini, *A. triostegus*), orangeband surgeonfish (na'ena'e, *A. olivaceus*), ringtail surgeonfish (pualu, *A. blochii*) and eye-stripe surgeonfish (palani, *A. dussumieri*). Several parrotfish (uhu, *Scarus spp.*) were also noted.

Wrasses and butterfly fish were also common at Honu'apo. Although the saddle wrasse (hinalea lauwili, *Thalassoma duperrey*) was the most abundant member, several other species were common. Also notable was the abundance of fourspot butterfly fish (lau hau, *Chaetodon quadrimaculatus*) and several other species that feed on coral polyps.

Surge zone fish were not quantitatively assessed because of the difficulty in working on the wave-swept basalt terraces that these fish inhabit. Visual observations, however, revealed that this biotope supported a large number of fish, principally herbivores such as rudderfish (nenue, *Kyphosus bigibbus*), surgeonfish (*Acanthurus spp.*), and unicornfish (mostly umaumalei, *Naso lituratus*). Christmas wrasse (awela, *Thallassoma trilobatum*) and surge

wrasse (hou, *T. purpureum*) were also abundant in the surge zone. Few juvenile fish were seen inhabiting the surge zone environment.

Several species of "food fish" (taken by subsistence and/or recreational fishermen) were observed during the survey. Schools of goatfish (weke, *Mulloidichthys flavolineatus*) and Hawaiian mackerel (opelu, *Decapterus macarellus*) were observed while diving. Several grand-eyed porgeys (mu, *Monotaxis grandoculis*) were observed. Rocky ledges and large coral heads sheltered fair numbers of squirrelfish (u'u, menpachi, *Myripristes berndti*). Other food fishes included parrotfish (uhu, *Scarus spp.*), goatfish (moana kea and malu, *Parupaneus cyclostomus* and *P. bifasciatus*), jacks (papio, *Caranx melamphygus*), and grouper (roi, *Cephalopholus argus*). None of these species were particularly abundant. Orange-eyed surgeonfish (kole, *Ctenochaetus strigosus*), were moderately abundant, as were some other the other surgeonfish. Many other the larger food fish actively avoided divers, and most of the menpachi were rather small, suggesting that the site receives a fair amount of fishing pressure. This is not surprising given the accessible nature of the site.

Overall, fish community structure at Honu'apo is fairly typical of assemblages found in undisturbed Hawaiian reef environments. A variety of habitats and healthy reef growth offer shelter and diverse foraging environments. The behavior and size of several species of food fish indicates that the area has been subjected to moderate amounts of fishing.

Endangered and Protected Species

Three species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle (*Chelonia mydas*) occurs commonly around the Island of Hawaii, and is known to feed on selected species of macroalgae. The endangered hawksbill turtle (*Eretmochelys imbricata*) is known infrequently from waters off of Hawaii. In fact, the name Honu'apo means "caught turtle" according to the "Place Names of Hawaii" (Pukui et al. 1974), suggesting that the area has historically been a site of high turtle abundance. Several green sea turtles were sighted on the surface and underwater during the baseline surveys off Honu'apo.

Populations of the endangered humpback whale (*Megaptera novaeangliae*) are known to winter in the Hawaiian Islands from December to April. The present survey was conducted in April; however no whales were observed during the survey.

CONCLUSIONS

The ultimate purpose of baseline surveys is to estimate the potential for impact to environments from shoreline-related activities. Implementation of the proposed plan for the HUGO project would involve laying a small diameter fiber optic cable from Loihi seamount to Honu'apo, on the southeast coastline of the island of Hawaii. In the nearshore area (between approximately the 40-50 foot depth and the shoreline) it will be necessary to securely anchor the cable (and a shielding conduit consisting of PVC pipe) to the bottom and pier pilings to ensure protection from damage that could result from stress induced by extreme water movement associated with wind, waves and currents. Securing the cable in a rigid fashion to the seafloor will also minimize or eliminate damage to marine biota.

While design plans for attachment mechanisms have not been finalized, it is anticipated that no excavation will be required. It is likely that attachment will be carried out by drilling small (1/2 inch diameter, 2-3 inches deep) holes for anchor bolts which will hold the cable and shielding conduit in place. It is probable that the cable will be attached to the nearshore platform in the bouldered area, as well as the pier pilings. It is unlikely that the cable will be attached in an elevated position above the sea floor at any location except the pier. With the exception of such anchoring of the cable, there are no plans for any alteration of the shoreline or offshore areas.

Similar underwater anchor bolts have been previously used with great success in Hawaiian settings. Permanent transects surveyed in the "Comprehensive Environmental Monitoring Program" for the Natural Energy Laboratory of Hawaii Authority are marked with buoys attached to anchor bolts affixed to a basaltic bottom similar to that at the proposed HUGO landing site (Marine Research Consultants 1995). These bolts have remained in place for the past three years, including the extreme waves that reached the west coast of Hawaii from Hurricane Iniki. As a result, it appears that the system has the strength and durability to withstand the rigors of the nearshore environment at Honu'apo. In addition, similar anchoring mechanisms have been used throughout the world to secure permanent boat moorings; a method which provides environmental benefits when compared to conventional anchoring.

During the installation process, it is likely that a small amount of living biota, primarily corals and algae, will be removed in the areas where the anchor bolts are placed. Such removal is likely unavoidable owing to the relatively high coral cover in the proposed nearshore cable corridor. As described above, the corals inhabiting this area are primarily broad flat encrustations; a growth form that precludes transplanting. Removal should be minimal, totaling a very small fraction of living cover in the corridor. In addition, results of the survey indicate extremely abundant and diverse benthic populations in the corridor. Following the anchoring

process, any areas denuded of living biota, as well as the cable and shielding conduit, will likely be rapidly colonized with new coral colonies or algal recruits.

While the drilling procedure may result in the creation of a small amount of suspended sediment, it is extremely unlikely that this particulate material would have any effect on biota. The sediment created by drilling would not differ in composition from natural sands that are abundant in the area. Corals and other reef organisms are capable of removing sediment suspended by natural phenomena, up to threshold levels of deposition where cleaning mechanisms are overwhelmed and organisms become buried. Water motion in the Honu'apo area generated by wind, waves, and currents is generally sufficient to disperse any suspended sediment prior to deposition on the bottom to a degree that could potentially affect biota. Community structure is presently adapted to extremes in sediment stress from natural conditions, primarily resuspension of natural sediments by wave-induced turbulence. Organisms that occur in the region are therefore capable of withstanding the stress associated with natural sediment loads. In comparison to the frequent natural sediment resuspension within the study area, the small additional input that may occur from the anchoring activity would likely have no effect on community structure.

As mentioned in the Results, there are several protected marine species that inhabit the offshore environment. With respect to turtles, with no need for excavation or blasting, there is little potential in the planned method to anchor the cable for negative effects to the area in terms of either habitat or food supply. With the cable secured tightly adjacent to the reef surface and the pier pilings, there should be little potential for creation of hazards that could result in trapping turtles. Short term minor, and temporary, changes in water quality resulting from anchoring the cable (suspended sediments) would also not be of a magnitude to affect the behavior of sea turtles. There is also little apparent suggestion that the proposed HUGO project will increase usage of the marine environment by divers or spearfishermen. With no projected increase in human usage, and no permanent alteration of the physical setting in terms of shelter and food availability, there is little or no reason to expect that the project will negatively alter the habitat for turtles.

The cable planned for use for the HUGO project is a standard trans-oceanic electro-optical cable containing 6 SL single-mode fibers and electrical conductor. As such, this cable is similar to existing fiber-optic cables used for telecommunications. As existing cables do not appear to have resulted in noticeable effects to marine mammals, particularly humpback whales, there is little or no reason to expect the HUGO cable to cause any such effects (personal communication, John Naughton, NMFS). In addition, the area where the cable will be anchored to the bottom is within approximately 150 feet of the shoreline, an area that is generally not traversed by whales. None of the activities associated with anchoring the cable,

or of the ongoing performance of the HUGO appear to have any potential to affect whale behavior.

In summary, the potential for impacts to marine communities as a result of the HUGO project appear to be minimal or nonexistent. None of the activities associated with securing a fiber optic cable from the summit of Loihi to a shoreline station at Honu'apo appear to have the potential to induce any noticeable changes in physio-chemical water quality parameters of a magnitude sufficient to cause changes in biological community structure. In addition, physical alteration of the environment will be minor with no permanent effects. Marine environments are routinely subjected to natural stresses that can be much more destructive than the small changes that could result from the cable landing. The potential alterations to marine community structure that might occur as a result of physically securing the cable to the sea floor and pier would probably be reversible and recovery rapid once the cable is attached. The ability to tolerate and recover from such events appears to already be part of the physiological range of the community components.

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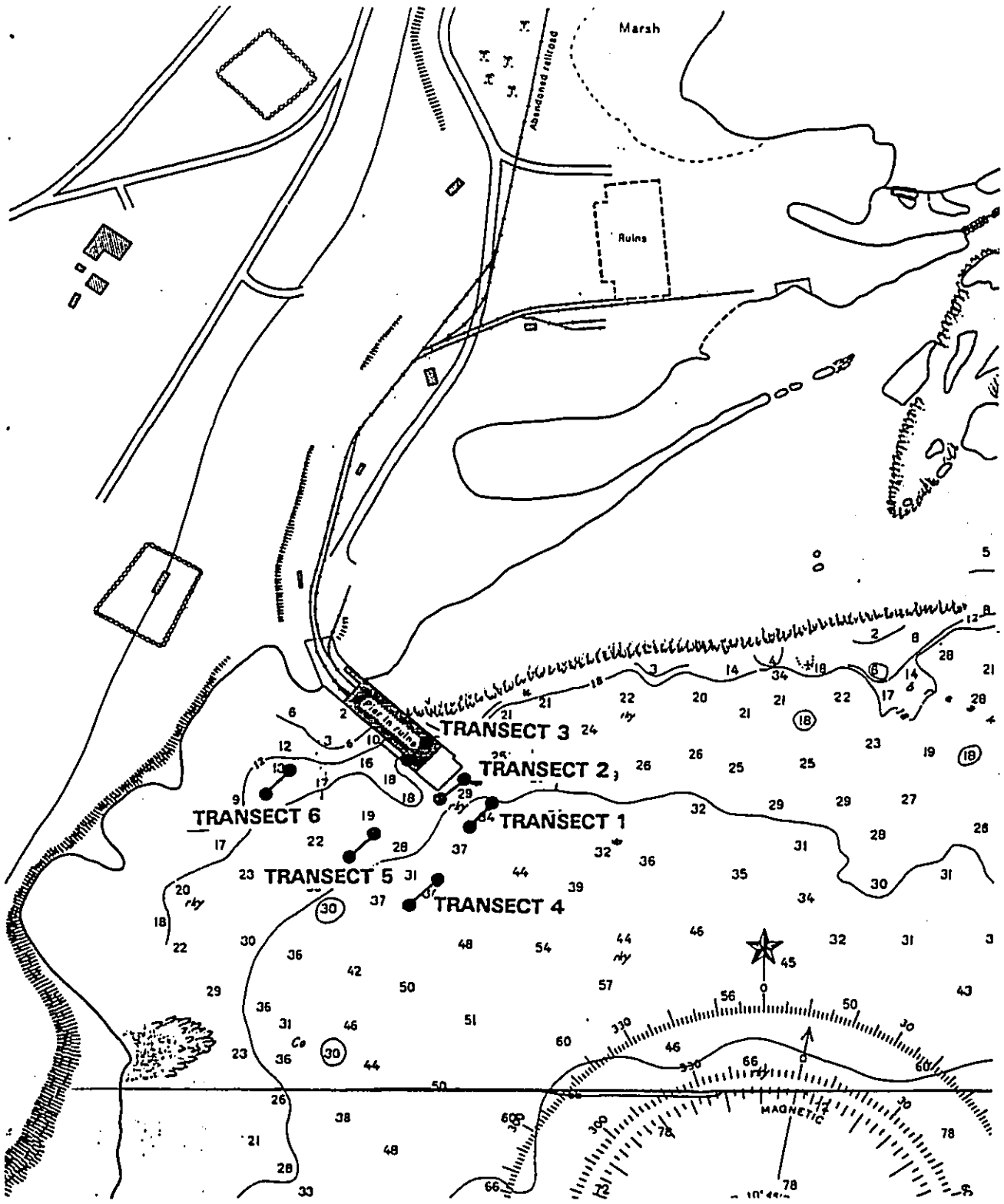

FIGURE 1. Map showing location of old concrete pier at Honu'apo, Hawaii that is planned to be used as the point where HUGO cable will be brought onshore. Also shown are locations of 6 transects on which quantitative biotic data was collected.

TABLE 1. Marine Invertebrate occurrence at transect stations off the proposed HUGO cable landing site, Honu'apo 'Hawaii. 'For station locations, see Figure 1.
Abundance code: "R" = rare (0 - 5 individuals or colonies sited on station)
"O" = occasional (5 - 20 individuals or colonies sited on station)
"C" = common (more than 20 individuals or colonies sited on station)

FAMILY	TRANSECT					
Species	1-30'	2-28'	3-10'	4-35'	5-25'	6-15'
SCLERACTINIA						
(Reef-Building Corals)						
Porites lobata	C	C	C	C	C	C
Porites compressa	C	C	R	R	R	R
Porites brighami		R		R		
Pocillopora meandrina	C	C	C	C	C	C
Pocillopora eydouxi	O					R
Montipora verrucosa	C	C	C	C	C	C
Montipora patula	C	C	C	C	C	C
Montipora flabellata	R	O	O	O	C	O
Leptastrea purpurea		R		R		
Cyphastra ocellina		R		R	R	R
Pavona varians	O	O		R	R	
Pavona duerdeni	R		R	R		
ZOANTHINIARIA						
(Colonial "soft" corals)						
Palythoa tuberculosa	O	O	R	R	R	R
HOLOTHUROIDEA						
(Sea Cucumbers)						
Actinopyga mauritiana	R					R
Holothuria atra	R	R	R	R	O	O
ECHINOIDEA						
(Sea Urchins)						
Echinothrix diadema	R		R	R		
Echinothrix calamaris		R			R	
Echinometra mathaei	C	C	C	C	C	C
Echinometra oblonga	R	R		O		
Echinostrephus aciculatus	R		R		R	
Heterocentrotus mammillatus	C			C	C	O
PORIFERA						
misc. sponges	C	C	C	C	C	C

TABLE 2. Coral species percent cover, non-coral substrata cover, and coral community statistics from transect surveys off the proposed HUGO landing site at Honu'apo, Island of Hawaii. For transect locations, see Figure 1.

CORAL SPECIES	TRANSECT 1-30'	2-28"	3-10'	4-35'	5-25'	6-15
Porites lobata	25.7	18.9	10.6	18.5	13.4	5.0
Porites compressa	1.6	1.2		5.1	0.2	
Pocillopora meandrina	0.3	4.2	13.9	3.9	5.0	1.1
Montipora patula	4.3	7.6	23.4	1.7	17.2	4.2
Montipora verrucosa	8.5	19.4	1.8	12.9	8.4	0.6
Montipora flabellata		1.5	4.4	1.2	13.8	0.2
Cyphastrea ocellina			0.1			
Palythoa tuberculosa			0.8			1.1
TOTAL CORAL COVER	40.4	52.8	55.0	43.3	58.0	12.2
NUMBER OF SPECIES	5	6	7	6	6	6
CORAL COVER DIVERSITY	1.018	1.403	1.42	1.419	1.551	1.382
NON-CORAL SUBSTRATA						
Limestone	9.2	7.2	2.0	6.5	2.9	1.5
Sand	0.5	0.0	0.2	20.8	1.2	14.3
Basalt	42.9	33.0	42.4	20.2	37.9	70.8
Rubble	7.0	9.8	0.3	9.2	0.0	0.2

TABLE 3. Results of coral transect surveys showing percent cover of coral species and non-coral substratum on 6 benthic transects at Honu'apo, Hawaii.

TRANSECT SITE:	HUGO	MEAN CORAL COVER	40.4
TRANSECT ID #:	T-1 30'	STD. DEV.	12.2
DATE:	3/8/95	SPECIES COUNT	5
		SPECIES DIVERSITY	1.018

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	24	42	26	24	46	28	21	14	8	24	257.0
Porites compressa				6		4				6	16.0
Pocillopora meandrina							3				3.0
Montipora verrucosa	3	3	12	26	3	2	2	12	3	19	85.0
Montipora patula		3	11				2	21	6		43.0
QUAD CORAL TOTAL	27	48	49	56	49	34	28	47	17	49	404.0
Basalt	60	50	43	32	46	60	19	46	73		429.0
Limestone	13	2	3	12	5	6	23	7	10	11	92.0
Sand			5								5.0
Rubble							30			40	70.0

TRANSECT SITE:	HUGO	MEAN CORAL COVER	52.8
TRANSECT ID #:	T-2, 28'	STD. DEV.	24.3
DATE:	3/8/95	SPECIES COUNT	6
		SPECIES DIVERSITY	1.403

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata	14	13		31	28	21	26	6	36	14	189.0
Porictes compressa	8					2			2		12.0
Pocillopora meandrina	16	6		9	3	2				6	42.0
Montipora flabellata				6						9	15.0
Montipora patula	6	26		6	6	18		7		7	76.0
Montipora verrucosa	28	21	2	32	28	31	16	8	20	8	194.0
QUAD CORAL TOTAL	72	66	2	84	65	74	42	21	58	44	528.0
Basalt	28	29		16	34	19	44	67	42	51	330.0
Limestone	26	5		2	1	7	14	12		5	72.0
Sand											0.0
Rubble			98								98.0

TRANSECT SITE:	HUGO	MEAN CORAL COVER	55.1
TRANSECT ID #:	T-3, 10'	STD. DEV.	22.6
DATE:	3/8/95	SPECIES COUNT	7
		SPECIES DIVERSITY	1.417

SPECIES	QUADRAT										SPECIES TOTAL
	1	2	3	4	5	6	7	8	9	10	
Porites lobata		9	4	3	31	26	10	12	11		106.0
Pocillopora meandrina	12	9	24	8	6	16	2	28	6	28	139.0
Montipora verrucosa			18								18.0
Montipora flabellata			11	8		2				24	45.0
Montipora patula		62	18	26	52	12	32	16	8	8	234.0
Palythoa tuberculosa			2						4	2	8.0
Cyphastrea ocellina		1									1.0
QUAD CORAL TOTAL	12	81	77	45	89	56	44	56	29	62	551.0
Basalt	86	18	21	50	11	40	54	44	64	36	424.0
Limestone	2	1	2	4		2	1		6	2	20.0
Sand						2					2.0
Rubble				1			1		1		3.0

TABLE 3. continued.

TRANSECT SITE:	HUGO	MEAN CORAL COVER	43.3
TRANSECT ID #:	T-4, 35'	STD. DEV.	24.4
DATE:	3/8/95	SPECIES COUNT	6
		SPECIES DIVERSITY	1.419

SPECIES	QUADRAT										SPECIES
	1	2	3	4	5	6	7	8	9	10	TOTAL
Porites lobata	22	40	1	12	26	14	14	24	8	24	185.0
Porites compressa		21					12		4	14	51.0
Pocillopora meandrina		18		12			1	8			39.0
Montipora verrucosa	14	18	1	14	24	6	8	10	8	26	129.0
Montipora patula	13								4		17.0
Montipora flabellata								6	6		12.0
QUAD CORAL TOTAL	49	97	2	38	50	20	35	48	30	64	433.0
Basalt			21	21	30	12	35	27	35	21	202.0
Limestone	2		3	9	1	12	13	1	23	1	65.0
Sand	40	1	60	32	12	11	15	23	12	2	208.0
Rubble	9	2	14		7	45	2	1		12	92.0

TRANSECT SITE:	HUGO	MEAN CORAL COVER	58
TRANSECT ID #:	T-5, 25'	STD. DEV.	13.1
DATE:	3/8/95	SPECIES COUNT	6
		SPECIES DIVERSITY	1.551

SPECIES	QUADRAT										SPECIES
	1	2	3	4	5	6	7	8	9	10	TOTAL
Porites lobata	32	24	6	6	13	2	4		26	21	134.0
Porites compressa			2								2.0
Pocillopora meandrina	8		4	5	6	3		6	6	12	50.0
Montipora patula		4	46	22		16	6	30	24	24	172.0
Montipora verrucosa	4	14	4	4	12	4	6	24	8	4	84.0
Montipora flabellata				22	41	51	18		6		138.0
QUAD CORAL TOTAL	44	42	62	59	72	76	34	60	70	61	580.0
Basalt	55	56	38	27	25	22	54	38	29	35	379.0
Limestone	1	2		2	3	2	12	2	1	4	29.0
Sand				12							12.0
Rubble											0.0

TRANSECT SITE:	HUGO	MEAN CORAL COVER	12.2
TRANSECT ID #:	T-6, 15'	STD. DEV.	8.5
DATE:	3/8/95	SPECIES COUNT	6
		SPECIES DIVERSITY	1.382

SPECIES	QUADRAT										SPECIES
	1	2	3	4	5	6	7	8	9	10	TOTAL
Porites lobata	2	2		6	2	2	8	7		21	50.0
Pocillopora meandrina	4	2	3							2	11.0
Montiora verrucosa										6	6.0
Montipora flabellata				2							2.0
Montipora patula	4	6				6	1	11	14		42.0
Palythoa tuberculosa							1	8	2		11.0
QUAD CORAL TOTAL	10	10	3	8	2	8	10	26	16	29	122.0
Basalt	67	66	83	66	65	79	84	59	81	58	708.0
Limestone	1	2	1	2		1	2	3	2	1	15.0
Sand	12	20	13	24	33	12	4	12	1	12	143.0
Rubble		2									2.0

TABLE 4. Reef fish abundance on transects off the HUGO landing site at Honuapo. For transect locations see Figure 1.

FAMILY	TRANSECT					
Species	I-30'	2-28'	3-10'	4-35'	5-25'	6-15
KYPHOSIDAE						
Kyphosus bigibbus			13			8
CIRRHITIDAE						
Cirrhitus pinnulatus			2			
Paracirrhites arcatus	2	1		2	2	
MULLIDAE						
Mulloides flavolineatus			30			30
Parupeneus multifasciatus	4	11	7	4	6	4
P. pleurostigma				1		
P. porphyreus						1
SERRANIDAE						
Cephalopholis argus	1			1		
LUTJANIDAE						
Aphareus furcatus		1				
CHAETODONTIDAE						
Chaetodon quadrimaculatus	2	8	2	2	2	2
C. ornatissimus			2		2	
C. unimaculatus						2
C. multicinctus				2		3
C. lineolatus			2			
Forcipiger flavissimus	2					
POMACENTRIDAE						
Abudefduf abdominalis						6
A. sordidus			3			
Plectro. imparipennis			2			
Stegastes fasciolatus	3		3	2	2	
Chromis hanui	3					
C. vanderbilti	42	60		45	20	18
C. ovalis	3				3	
LABRIDAE						
Novaculichthys taeniourus	1					
Pseudocheilinus octotaenia	2			1		
Bodianus bilunulatus	1	1			1	
Coris gaimard	2	3		3		
C. venusta					1	
Thalassoma duperrey	5	12	12	14	11	13
T. trilobatum		1	2			
Gomphosus varius						1
Labroides phthirophagus	1	1				
Pseudojuloides cerasinus	1			2		
Stethojulis balteata		3	3			
Halichoeres ornatissimus			1		2	
SCARIDAE						
Scarus perspicillatus	1					
juvenile Scarus		7		3		
ACANTHURIDAE						
Zebrasoma flavescens		8				
Z. veliferum			2			
Acanthurus triostegus			26		6	18
A. leucopareius			12			
A. olivaceus	6	3			7	
A. dussumieri	3	9				3
A. blochii		8			2	
A. nigrofuscus	27	39	28	17	29	18
Ctenochaetus strigosus	14		25	7		8
Naso lituratus	2			3		3
N. unicornis					2	
ZANCLIDAE						
Zanclus cornutus		3	4			
BALISTIDAE						
Rhinecanthus rectangulus		1			1	2
Sufflamen bursa	2	4	2	2	2	
TETRADONTIDAE						
Canthigaster jactator	2			2	1	
NUMBER SPECIES	24	20	21	18	19	17
NUMBER INDIVIDUALS	132	184	183	113	102	140
SPECIES DIVERSITY	2.37	2.24	2.51	2.12	2.34	2.41

Appendix D

Correspondence

Stephen K. Yamashiro
Mayor

Virginia Goldstein
Director

Norman Olesen
Deputy Director

County of Hawaii

PLANNING DEPARTMENT

25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-9615

February 2, 1995

Mr. Bob Jordan
Research Associate
HUGO Project
General Delivery
Hawi, HI 96719

Dear Mr. Jordan:

Pre-Assessment Consultation
Hawaii Undersea Geo-Observatory (HUGO) Project
TMK: 9-5-14:1, 7, 29 & 49; Honuapo, Kau

This is to acknowledge receipt of your letter dated December 12, 1994, regarding the proposed undersea cable project to Loihi from Wittington Beach Park area. We have reviewed the project and provide the following comments:

1. The subject properties are situated within the County's Special Management Area (SMA) and therefore, the project requires an SMA Use Permit. The project will also require a Shoreline Setback Variance as the onshore cables will be situated within the 40-foot shoreline setback area. The Hawaii County Planning Commission will hold a public hearing and make the final decision.

2. The subject properties are situated within the State Land Use Conservation and Agricultural Districts. Proposed action within the Conservation District requires Conservation District Use Permit approval from the Board of Land and Natural Resources. Within the Agricultural District and for areas involving 15 acres or less, a Special Permit must be secured from the Planning Commission.

3. The properties are zoned Agriculture-20 acres (A-20a) by the County.

4. The requirements of Chapter 343, HRS, relating to Environmental Impact Statement, need to be complied with as the project involves state and/or county funds and lands. In addition, the onshore cables will be situated within the shoreline setback area.

5. Authorization from the various landowners are required.

Thank you for the opportunity to review and comment on the HUGO Project. Should you have any questions, please feel free to contact Alice Kawaha of this office at 961-8288.

Sincerely,

Virginia Goldstein

VIRGINIA GOLDSTEIN
Planning Director

AK:dmo
ljord.agk

Stephen K. Yamashiro
Mayor

Donna Fay K. Kiyosaki
Chief Engineer

Riley W. Smith
Deputy Chief Engineer

County of Hawaii

DEPARTMENT OF PUBLIC WORKS

25 Aupuni Street, Room 202 • Hilo, Hawaii 96720-4252
(808) 961-8321 • Fax (808) 969-7138

December 22, 1994

Mr. Bob Jordan, Research Associate
General Delivery
Hawi, HI 96719

SUBJECT: HUGO PROJECT
TMK: 9-5-14: 1

This is in response to you December 12, 1994 memo.

All improvements shall be in compliance with Hawaii County Code Chapter 10 - Erosion and Sedimentation Control and Chapter 27- Flood Control. However, based on the information provided in your memo, their does not appear to be any improvements proposed which will require permits from Engineering Division.

If you have any questions, please call Glenn Okada of my staff at 961-8327.

GALEN M. KUBA, Acting Division Chief
ENGINEERING DIVISION

GO

cc: Building Division

BUILDING DIVISION - DPW
COUNTY OF HAWAII - 25 AUPUNI STREET - HILO, HAWAII 96720
HILO OFFICE (808) 961-8331 KONA OFFICE (808) 329-4857

December 21, 1994

Mr. Bob Jordon, Research Assoc.
General Delivery
Hawi, HI 96719

SUBJECT: HUGO PROJECT

This is in response to your 12/12/94 letter to us. The following are Building Division comments. We will forward your letter to the Engineering Division for their comments.

The trailer vans may be parked at the construction site for the duration of the construction work. It may be used for construction storage or office purposes, but not as a dwelling. A temporary permit is required.

When construction ceases, a building permit is required and the building must meet the 1991 Uniform Building Code unless a variance is approved.

An electrical permit is required for the cable hookups.

WAYNE ONOMURA, Division Chief
Building Division

DHM:ju

cc: Engineering Division

J. CAYETANO
[redacted]
VERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-2452

February 7, 1995

Mr. Bob Jordan
Research Associate
General Delivery
Hawi, Hawaii 96719

Dear Mr. Jordan:

Subject: HUGO Project

This is in response to your memorandum of February 2, 1995, regarding the State Environmental Impact Statement (EIS) Process.

The University of Hawaii is an agency of the State of Hawaii. Therefore, the HUGO project is considered an "agency action" under the EIS Law. As the proposing agency, the University of Hawaii should prepare an environmental assessment and determine whether an environmental impact statement is required.

Because the project is both in the Conservation District and the Shoreline Setback Area, the State Department of Land and Natural Resources (DLNR) and the Hawaii Planning Department have jurisdiction over the project. Therefore, DLNR and the Hawaii Planning Department must be consulted during the process of preparing the environmental assessment and determining whether an environmental impact statement is required.

If you have any questions, please call Jeyan Thirugnanam at 586-4185. Thank you.

Sincerely,

Gary Gill
Director

OFFICE OF STATE PLANNING
Office of the Governor
MAILING ADDRESS: P.O. BOX 3540, HONOLULU, HAWAII 96811-3540
STREET ADDRESS: 250 SOUTH HOTEL STREET, 4TH FLOOR
TELEPHONE: (808)587-2846, 587-2800

Benjamin J. Cayetano, Governor
FAX: Director's Office 587-2848
Planning Division 587-2824

Ref. No. C-1002

January 10, 1995

Mr. Bob Jordan
University of Hawaii at Manoa
School of Ocean and Earth Science and Technology
Department of Geology and Geophysics
2525 Correa Road
Honolulu, Hawaii 96822

Dear Mr. Jordan:

Subject: Environmental Pre-Assessment for the Hawaii Undersea Geo-Observatory Project (HUGO)

Thank you for the opportunity to provide comments on the proposed HUGO project at this early stage.

We generally support the purpose of the project. However, we need to be assured that the project will be designed to avoid or minimize adverse environmental and ecological impacts relative to the objectives and policies of Hawaii's Coastal Zone Management (CZM) law, Chapter 205A, HRS. This will be a prerequisite to any federal permit or approval that may be required.

The laying of cable on the ocean floor is a concern for us. If it is not secured to the ocean floor, there is a potential for damage to adjacent coral ecosystems from the movement of the unsecured cable. A relevant CZM objective is to protect valuable coastal ecosystems from disruption and degradation. In addition, the Hawaii Coral Reef Initiative (CRI) recognizes the need for the preservation and protection of coral reef resources. In an effort to avoid any negative impacts on these coral ecosystems, techniques to anchor the cable without damaging the marine environment should be explored in the preparation of the environmental assessment.

The environmental assessment should also discuss the potential impacts on land-based resources and the permits/approvals that would be required.

If there are any questions, please contact Harold Lao at 587-2883.

Sincerely,

Gregory G. Y. Pai, Ph.D.
Director

BENJAMIN J. CAYETANO
GOVERNOR

DIRECTOR

DEPUTY DIRECTORS
KANANI HOLT
GLENN M. OKIMOTO
JOYCE T. OMINE

IN REPLY REFER TO:

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

December 29, 1994

HAR-E 3076.95

Mr. Bob Jordan
Research Assistant, HUGO Project
General Delivery
Hawi, Hawaii 96719

Dear Mr. Jordan:

Subject: Pre-Assessment Consultation, HUGO Project

Thank you for your memo of December 12, 1994, requesting our input for your environmental assessment for the Hawaii Undersea Geo-Observatory Project (HUGO).

We understand HUGO will install a power and communication cable between the Big Island's shore and the scientific experiments on Loihi, which is an undersea volcano 20 miles offshore of the district of Kau.

Based on the information provided, this department's facilities will not be affected.

Thank you for the opportunity to comment.

Sincerely,

Glenn M. Okimoto
Acting Director of Transportation

26

BENJAMIN J. CAYETANO
Governor of Hawaii

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. Box 621
Honolulu, Hawaii 96809

Chairperson
MICHAEL D. WILSON
Board of Land and Natural Resources

Deputy Director
GILBERT COLOMA-AGARAN

Aquaculture Development
Aquatic Resources
Boating and Ocean Recreation
Bureau of Conveyances
Conservation and Environmental Affairs
Conservation and Resources Enforcement
Forestry and Wildlife
Historic Preservation
Land Management
State Parks
Water and Land Development

JAN 6 1995

Mr. Bob Jordan, Research Associates
HUGO Project
General Delivery
Hawi, Hawaii 96719

Dear Mr. Jordan,

Thank you for your letter of December 12, 1994. Your proposal is still being reviewed by the Department. However, in order to meet your thirty-day response deadline, we are sending you this brief reply.

Your proposed project will require a Conservation District Use Permit as well as an easement agreement from this Department. For your convenience, we have enclosed a Conservation District Use Application. We would like to advise you, at this time, that processing of the application may take up to six months. Land disposition for an easement would be negotiated following approval of the application.

If there is any question on this matter, please contact Don Horiuchi at 587-0381.

Very truly yours,

Michael D. Wilson

Encl.

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
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CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

November 30, 1994

LOG NO: 13223
DOC NO: 9411ms01

Mr. Robert Jordan, Research Associate
HUGO Project (Hawaii Undersea Geo-Observatory)
General Delivery
Hawi, Hawaii 96715

Dear Mr. Jordan:

SUBJECT: **Filed inspection for the surface facilities of the proposed HUGO Project Hanuapo (Whittington Beach Park), Ka'u, Hawaii Island**
TMK: 9-5-14: various

Thank-you for accompanying our staff archeologist, Marc Smith, during the field visit on September 21, 1994.

The proposed project will consist of two sealed vans housing the electrical and recording equipment. Cables carrying power, control information, and data will run from these vans to a buried junction box just outside the park. The junction box will contain the cable splice to convert the cables to an armored cable which can withstand the surf zone. Also several bore holes to sea level will be drilled in the base of the junction box. The single armored cable will go along the top of the existing pier out to near the seaward end where it will go to the ocean floor and onward to the volcano Loihi.

Two proposed alignments where pointed out to Mr. Smith. Alignment A begins just west of the Kauahaao Church Cemetery, runs along the north side of the cemetery, then due east to the pier. Alignment B begins near the existing NOAA tsunami warning system base station and follows exiting cables and waterlines east and south along the boundary of Whittington Peach Park (see attached map). These cables may be buried lines, or placed on elevated poles.

Based on the site inspection, it appears that the most sensitive area to be impacted by the proposed project is the Kauahaao Church Cemetery. The cemetery is enclosed by a stacked stone wall and the proposed Alignment A is outside of the wall, however, there is a possibility that burials could exist nearby but outside of the walled cemetery lot. In addition to the possibility that a burial could be inadvertently uncovered during excavations for the cable, there may be some cultural concerns regarding the proximity of the cables to the cemetery. You informed Mr. Smith

R. Jordan
Page 2

that you were consulting with the caretakers of the cemetery, an approach that we support. Through our History and Culture branch of the Historic Preservation Division, we can also provide some assistance in documenting and recording the grave-sites if needed.

Both alignments will cross areas that contain ruins associated with the wharf and historic commercial activities. The ruins consist primarily of concrete warehouse and storage tank foundations, and the remains of the pier. No superstructures remain. In areas where the proposed cable will cross any of these features, it is recommended that they be documented and recorded. The Architecture branch of the Historic Preservation Division can provide some assistance in establishing adequate standards for documentation.

At the time of the field inspection, it was still undecided if the cables would be buried, or placed on elevated poles. Potentially, the elevated pole option may create less impacts to significant historic sites. However, our desire to have the historic features documented and recorded would apply to either option.

In summary the Historic Preservation Division concerns are:

1. Documenting and preserving the Kauahaao Church cemetery and any additional nearby unmarked graves. Also, that consultation with the church, cemetery caretaker, and lineal descendants be continued.

2. Documenting the remaining historic structures associated with the commercial activities at the wharf. This may include mapping and photographing the existing features, researching historic accounts and collecting oral histories from long term local residents.

If you should have any further questions, please contact Patrick McCoy at 587-0006 (Honolulu), or Marc Smith at 933-4346 (Hilo).

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

MS:amk

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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JOHN P. KEPPELER II

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

December 23, 1994

LOG NO: 13520
DOC NO: 9412PM21

Mr. Bob Jordan, Research Associate
HUGO Project
General Delivery
Hawi, Hawaii 96719

Dear Mr. Jordan:

SUBJECT: Hawaii Undersea Geo-Observatory Project (HUGO)
Honuapo (Whittington Beach Park), Ka'u, Hawaii Island
TMK: 9-5-14: various

This is in response to your memo dated December 12, 1994 soliciting inputs on your project.

You should have received by now a letter from us dated November 30, 1994 that identifies several concerns based on the field inspection by Marc Smith on September 21, 1994.

If you have any additional questions or requests please contact either Marc Smith (933-4346) or Pat McCoy (587-0006).

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

PM:amk

BENJAMIN J. CAYETANO
Governor of Hawaii

REF:OCEA:CT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. Box 621
Honolulu, Hawaii 96809

Chairperson
MICHAEL D. WILSON
Board of Land and Natural Resources

Deputy Director
GILBERT COLOMA-AGARAN

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Aquatic Resources
Boating and Ocean Recreation
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Conservation and Environmental Affairs
Conservation and Resources Enforcement
Forestry and Wildlife
Historic Preservation
Land Management
State Parks
Water and Land Development

FILE NO.: 95-607

Mr. Bob Jordan
Research Associate (HUGO Project)
P.O. Box 6361
Honolulu, Hawaii 96720-8926

AUG 9 1995

Dear Mr. Jordan:

SUBJECT: Draft Environmental Assessment for the Hawaii Undersea Geo-Observatory Project (HUGO Project), Honuapo, Kau, Hawaii

We have completed our review of the subject Draft Environmental Assessment (EA) and have the following comments:

Historic Preservation Division

Staff members from our Archaeology, Architecture and Culture and History Branches have reviewed the Environmental Assessment and supplemental materials that you submitted to our office. They concur that an adequate attempt has been made to identify and evaluate historic sites in the project area and that the proposed project will have a "no adverse effect" on historic sites.

We ask, however, that those sections dealing with historic resources be revised and reorganized to more clearly argue this conclusion. Before continuing, we would like to express our appreciation for the efforts made by you in conducting oral history interviews with several individuals who were raised in the area or who have a particular interest in historic and cultural preservation in Kau. Our comments and requested revisions are outlined below.

1. Environmental Characteristics (4.45; pages 11 and 12). This subsection entitled" Environmental Characteristics" must include a paragraph on historic sites just as it discusses biological impacts, air pollution and other topics. This could be a brief summary of the known historic sites in the vicinity of the project area.

2. Historical Background (5.2; pages 15-16). The introductory discussion to the historic sites section should be revised to more accurately describe the current status of known sites in the project area and the legal basis for consulting with the State Historic Preservation Division (SHPD) during the public review process.

a. Legal Mandates. The presence of an historic site or district in a project area only triggers an EA (Environmental Assessment) if that site or district is on the National and State Register of Historic Places. In this case, the only historic site listed in our inventory from this area is the Honuapo landing or pier (Site #50-10-74-7359) and it is not on the Register.

According to our records, this site was apparently submitted to the Review Board (the body that determines eligibility for the National and State Register) for consideration in 1974 but was not placed on the Register because of insufficient descriptions. There are, however, several other factors that mandate our participation in the review process.

Under Chapter 6E-8, HRS, the SHPD must be given the opportunity to review all projects funded or undertaken by State or County agencies or those taking place on State or County lands. This law applies here because the project includes the use of State and County lands and the University of Hawaii is a State agency. This law should be referenced here and a statement added that descriptions of the proposed project have been submitted to the SHPD for review and concurrence.

b. The Term "Artifact." The term artifact is generally applied to historic objects that are portable or can be removed from a historic site. We ask that instead of the word "artifact," the terms "historic site" or historic property" be applied to all architectural structures, archaeological features or objects that are over 50 years old. This also applies to the discussion on page 16(5.3).

3. Reorganization of Sections 5.2 (Historical Background), 5.3 (Remnants and Artifacts), and Culture (5.4). We suggest that components of these three sections be reorganized. One section should clearly describe each historic site known to be in the vicinity of the project area. The information needed for such a summary has been adequately compiled by you, it only needs to be summarized in a single section. This should include both sites potentially affected by the project directly as well as those in the general vicinity. For example, this would include the Honuapo pier, the bait cups, the foundations of former plantation facilities, the asphalt patch and the large fishpond to the north of the project area.

In mentioning the State Historic Sites Inventory, it should be made clear that it is not a complete record of historic sites in any given area because most areas have not been thoroughly surveyed for historic sites. A subsequent section should then be devoted to the historical background information compiled during the literature search and oral interviews. Some information presented under "Culture" may be more appropriate in the Historical Background section because it represents the later phases of the historic spectrum.

4. History of Kau. We question a number of statements made in the historical background section and ask that they be revised.

p. 16, para. 1. We don't question the fact that the Hawaiians of Kau formed a strong bond with their land. We do however question that this bond was "stronger than any people anywhere." Many peoples have very similar bonds to their lands.

p. 16, para. 3. While Kamehameha did spend portions of his youth in Kau, it is stretching the point to say he was "raised" in Kau. Also, Kau was not the last region to be subjugated in the unification of the "islands." It was essentially subjugated before most of the other islands and certainly before the Island of Kauai. The earliest, written descriptions and drawings of Kau indicate that fences were present before the introduction of cattle, horses and goats. Clearly the number and lengths of fences increased during the historic period but there had also been a need to keep pigs from the gardens during the pre-contact period.

5. Remnants and Artifacts (5.3). The statement that "Verbal permission" was obtained from State Historic Preservation Division to trench through the asphalt patch should be removed. Our Division does not grant nor recognize verbal communications in concurring with significance evaluations or mitigation measures. Our Hawaii Archaeologist, Mr. Smith, did tell you that he felt they would be able to obtain permission to disturb the asphalt but this verbal assessment does not constitute concurrence. Concurrence must be recorded in writing.

6. Identification and Summary of Major Impacts and Alternatives (6.0). In discussing alternative project locations, it should be mentioned that SHPD (Ltr. Hubbard to Jordon, Nov. 30, 1994) and Pele Hanoa (Member of the Hawaii Island Burial Council) expressed concern about the proposed alignment that ran past the church cemetery.

7. Proposed Mitigation Measures (7.0). While it is true that the SHPD will not require any mitigation measures or a preservation plan, a statement should be added that the SHPD will be contacted immediately if, unexpectedly, cultural deposits or human remains are discovered during trenching. Work should also be stopped in the immediate area of any deposits or human remains discovered.

Office of Conservation and Environmental Affairs

We have reviewed the Conservation District subzone maps and have determined that the project area (including the submerged lands and lands mauka of the shoreline) is located in the Resource Subzone of the Conservation District (see attached map). Additionally, please clarify the distance between the shoreline area and the Loihi Volcano in the EA. Also, most of the photographs in the EA are illegible. Please include legible photographs in the Final EA.

Further, please note that the number of copies and filing fee for a Conservation District Use Application (CDUA) as shown on your title page are incorrect. Twenty copies of the application are required and the filing fee is dependent upon the type of permit you are applying for (see Section 13-5-32, HAR). We have attached a copy of an updated CDUA form and a copy of Title 13-5, HAR for your convenience. Please do not hesitate to contact us regarding the application process or rules.

Thank you for your cooperation in this matter. Please feel free to call Cathy Tilton at our Office of Conservation and Environmental Affairs at 587-0377, should you have any questions.

Aloha,

Gilbert S. Coloma-Agaran
for MICHAEL D. WILSON

Attachments

REF:OCEA:TES

AUG 21 1995

File No.: 95-607

Mr. Bob Jordan
Research Associate (HUGO Project)
P.O. Box 6360
Honolulu, Hawaii 96720-8926

Dear Mr. Jordan:

SUBJECT: Draft Environmental Assessment for the Hawaii Undersea Geo-Observatory Project (HUGO Project), Honuapo, Kau, Hawaii - Follow-up Comments

Below are additional comments to our August 9, 1995, letter from the Division of Land Management regarding the subject matter:

The Division of Land Management would like to be informed throughout the environmental review process since the project affects State-owned Conservation lands. Additionally, the focal point of the project is to monitor the undersea volcano named Loihi, located approximately twenty miles off shore. This activity may raise concerns with certain Hawaiian religious groups. Therefore, it would be prudent to include these religious groups as well as other community organizations, such as the Ka'u Hawaiian Civic Club, Pele Defense Fund, Ka Lae Ohana, in the environmental review process.

Thank you for the opportunity to review and comment on the proposed project. Please call Cathy Tilton at our Office of Conservation and Environmental Affairs at 587-0377, should you have any further questions.

Aloha,

/S/ GILBERT S. COLOMA-AGARAN
MICHAEL D. WILSON

bxc: LM

cf:tes

- D18 -

Transmittal memo 7671 | # of pages ▸ 1
To Jon
From Cathy Tilton
Co. DLNR/OCEA

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 · 2550 Campus Road · Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 · Facsimile: (808) 956-3980

June 22, 1995
EA:0122

Mr. Fred Duennebier
University of Hawaii
Department of Geology and Geophysics, SOEST
Honolulu, Hawaii 96822

Dear Mr. Dunnebier:

Draft Environmental Assessment
Hawaii Undersea Geo-Observatory (HUGO) Project
Honuapo, Hawaii

The University of Hawaii, Department of Geophysics, proposes to install a scientific laboratory at the summit of Loihi Seamount, located about 20 miles southeast of the island of Hawaii. The observatory will be connected to shore by an electro-optical cable which will come ashore at the Honuapo Pier, where it will be terminated at a manhole in Whittington Beach Park.

We reviewed this Draft Environmental Assessment (EA) with the assistance of Paul Berkowitz of the Environmental Center.

General Comments

For the most part our comments concern the structure of the document rather than its content. For instance, on page 8, the text refers to Appendix G1, photo 1; however Appendix G1 does not exist. It seems that Appendix G1 refers to the photos which come after the main text but before Appendix A. Another section (page 19) refers to Appendix F6 which also does not seem to exist as either an appendix (A to E only) or a figure (pages F1-F5). In short, the presentation of appendices, figures, and photos is confusing and needs to be reorganized and relabeled.

The section entitled "General Description of the Project" contains categories for economic, social. and environmental characteristics. Instead of providing a project

description (as is done in sections 4.0 and 4.1), these sections exhaustively list the impacts of the project. For instance, the environmental section describes how the project will affect coral reefs, aesthetics, water quality, air pollution, traffic, and noise. This is typically the type of information that would be placed in the "Major Impacts" section.

Some of the items under "Proposed Mitigation Measures" are actually descriptions of the impacts. For instance, the whale protection category describes why whales will not be affected by the project: it does not state how any of the potential impacts will be mitigated. For this particular case, since no impacts are expected on whales, no mitigation measures are needed. Typically, the mitigation section is used to discuss how potential impacts will be ameliorated, not to further discuss the impacts.

Since Draft EAs present information on projects which have not been approved, it is more appropriate to use language such as "the proposed project would do the following." This contrasts sharply with statements such as "the project will have the following impacts." Several sections use the latter tone in this EA.

Social Concerns

Section 4.3 on social characteristics implies that HUGO will effectively restore some of the community pride lost "in these times of closing sugar mills." While HUGO is an exciting project, it seems unrealistic to view it as a replacement for the sugar industry, as these two items do not have similar roles within the community.

In terms of community programs and educational programs, the document should be more specific about how the community might benefit from the proposed project. What is the exact nature of these community projects? Has money been set aside for educational programs? Will the project actually help to restore the Honuapo pier, or merely provide "support in requesting creation of a walkway and fishing platform" ? In each of these areas, the document should be less vague.

Miscellaneous Notes

In discussing the proposed project's impacts, the document should include an estimate of the construction time. For what length of time will Whittington Beach Park be disturbed?

In evaluating alternatives, the "no action" option should be considered.

Given the area's proximity to Kauahaao Church Cemetery, the status of Honuapo as a historic site, and presence of bait pots nearby, it seems essential to discuss the precautions that will be taken during construction to avoid disturbing important sites.

Conclusion

In general, the proposed project seems environmentally benign. Aside from the structural flaws in the document, most of the content seems acceptable. Before continuing further, clarifications are needed with regard to community effects, archaeological impacts, and construction time.

Thank you for the opportunity to review this Draft EA.

Sincerely,

John T. Harrison
Environmental Coordinator

cc: OEQC
Roger Fujioka
Paul Berkowitz

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213
TEL (310) 980-4000; FAX (310) 980-4018

May 22, 1995 F/SWO33:ETN

Mr. Bob Jordan
University of Hawaii - Manoa
SOEST/HUGO
2525 Correa Road
Honolulu, Hawaii 96822

Dear Bob:

Thank you for the opportunity to review the two reports prepared for the development of the environmental assessment for the Hawaii Geo-Observatory (HUGO). Your primary concerns were related to the effect of installing the power cable and any associated EMF that may be generated on marine mammals and/or sea turtles.

Green turtles (Chelonia mydas) are known to be present around the landing site for the cable, and humpback whales (Megaptera novaeangliae) can be found within the 100 fm isobath along the east coast of the Big Island during the winter months. There are also hawksbill turtle (Eretmochelys imbricata) nesting sites along this coast. However, since the cable will be shielded and armored there should be no direct field effects on whales or turtles. Indirect effects of attracting sharks as predators of sea turtles will also be mitigated by the shielding. Finally, care should be exercised when installing the cable to keep substrate damage to a minimum.

If a permit from the Corps of Engineers is required I will be commenting directly on the permit application at that time as part of the National Marine Fisheries Service's official response. I can be reached at 808/973-2987 should you have any further questions.

Sincerely,

Eugene T. Nitta
Protected Species Program
Coordinator

cc: F/SWO23 - Naughton

University of Hawai'i at Mānoa

Facilities Planning and Management Office
Physical Plant Building • 2002 East-West Road • Honolulu, Hawai'i 96822
Facsimile: (808) 956-5385

October 11, 1995

MEMORANDUM

TO: Fred Duennebier / HUGO Project
University of Hawai'i at Mānoa
Dept. of Geology and Geophysics
School of Ocean and Earth Science and Technology

FROM: Eugene Imai
Senior Vice President for Administration

SUBJECT: **NEGATIVE DECLARATION FOR HAWAI`I UNDERSEA GEO-OBSERVATORY (HUGO)**
FINAL ENVIRONMENTAL ASSESSMENT
TMK 3-9-5-14-1,7,29,37,40,49, KA`Ū, COUNTY OF HAWAI`I

PROPOSING AGENCY: University Of Hawai'i at Mānoa, Department of Geology and Geophysics, School of Ocean and Earth Science and Technology

APPROVING AGENCY: University Of Hawai'i at Mānoa

BRIEF DESCRIPTION OF PROPOSED ACTION:

This is an agency action as specified on page 7 section 2.0 of the EA.

The Department of Geology and Geophysics School of Ocean and Earth Science and Technology of the University of Hawai'i at Mānoa proposes to lay a length of cable approximately 21 miles long from the island of Hawai'i to a submerged volcano named Lō'ihi. They also propose to install temporary (10 years) unmanned equipment trailer vans on the Big Island that would hold equipment that operates the cable and equipment on Lō'ihi and records data returned from Lō'ihi. They plan for a system life of at least ten years.

The shore end of the cable would be located in the district of Kā'u, on private lands, and near and passing through a county park (Whittington), then passing on top of a derelict pier (Honu'apo) owned by the state, then into the ocean and the jurisdiction of the federal government. The shore site is approximately 60 miles south of Hilo on highway 11.

The cable is a combination of cables of different sizes that would be spliced together. These cables would use metal and seawater conductors to carry electricity to power experiments, and optical fibers to carry data.

The stated purpose of the proposed action is to provide a research and education facility for the study of Lō'ihi. The proposed system would start with approximately 3 experiments, but would have the capacity to support up to approximately 100 experiments.

DETERMINATION:

After review of the Final Environmental Assessment (EA), it is the determination of this agency that the proposed project would likely have no significant impacts on the environment (Negative Declaration).

REASONS SUPPORTING DETERMINATION:

The Final EA was evaluated for conformance to Chapter 343 Hawai'i Revised Statutes (Environmental Impact Statements) and was found to be in conformance. Chapter 343-5 requires preparation of an Environmental Assessment based on the use of state and county lands, and lands in conservation district according to the state land use commission under chapter 205, and lands in the shoreline area as defined in section 205-A-41.

The Final EA was also evaluated for conformance to Title 11 Chapter 200 Hawai'i Administrative Rules of the Dept. of Health (Environmental Impact Statement Rules) and was found to be in conformance. Title 11-200-5 specifies that use of state or county lands subjects the project to requirements of HRS 343 and HAR DOH Title 11-200 and that the project is not exempt under HAR DOH Title 11-200-8 due to use of state and county lands. Title 11-200-9 specifies that an early assessment be accomplished, and that was done as indicated by appendix E of the EA. Title 11-200-10 specifies the contents of an EA, and evaluation of the EA finds all required materials present.An evaluation of significance criteria was also performed according to Title 11-200-12, based on descriptions of primary, secondary, cumulative, short term, and long term expected consequences during three phases of the project, construction, operation and project termination. The following paragraphs describe different aspects of the significance criteria.

1) No irrevocable commitment to loss or destruction of natural or cultural resources is expected. Several aspects of the project indicate that it is a relatively small project with little likely impact on the environment. The shore portion of the facility to be installed is described as an unmanned data recording site (page 8). Use of small trenches in the park should minimize visual impacts to the park (page 9). Poles mauka of the park instead of trenches in areas with trees and vegetation to obscure the poles (page 10) would reduce impacts on potential historic sites (page D13) while not causing undue visual impacts. The proposed project has done an adequate job of identifying historic sites and various branches of the DLNR State Historic Preservation Div. have concurred that the proposed project will have no adverse impacts on historic sites (page D13). In addition, the proposed project has agreed to halt any disturbances and contact the DLNR Historic Preservation Div. immediately if any possible historic items are encountered during construction (page 23 and page F3 action 9). It has also been stated that after the project is terminated, all construction would be removed, and the land would be constructively returned to its original state (page 13). The cable from the pier to Lō'ihi would be left in place for future use, but no indication is given by any parties that this would be harmful in any way.

2) No curtailment in the range of beneficial uses of the environment is anticipated except temporarily during construction where certain areas would be roped off, but access to facilities would be maintained (page F3 action 7).

3) No conflicts have been identified with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344 HRS and its revisions and amendments, court decisions or executive orders.

4) No substantial adverse effects on the economic or social welfare of the community or state are described, and numerous potential benefits are described (pages 11,12) with the most significant direct effect being the infusion of $1.5 million of federal monies into the state economy (page 12), although since the project development is being done in Honolulu, most of that benefit is occurring in Honolulu (page 11).

5) No substantial affects to public health are described and none seem likely.

6) No substantial secondary impacts such as population changes or public facilities are described. There would be modifications to utilities in the area, but since this involves replacement of existing poles and the upgrades described are relatively minor (pages 13, M5), these changes are not determined to be substantial.

7) No substantial degradation of environmental quality is described by the EA and none seem likely.

8) No considerable cumulative effects on the environment have been identified and none seem likely, and no commitment to larger actions has been identified.

9) No substantial affects on rare, threatened or endangered species or its habitats has been identified in spite of one terrestrial and two marine studies (pages 15-17). One of the reports expressed concern about scouring of the reef by a cable, but adequate mitigation measures involving pinning the cable have been agreed to (page 23).

10) No substantial affects on air or water quality or ambient noise levels have been identified (page 13). There is some long term noise expected from window air conditioners, but that is described as below ambient levels. Some noise is expected from construction, and that is described as short term and in view of the relatively small size of the project, determined to be not substantial.

11) The last significance criteria states that most actions shall be determined to have a significant effect on the environment if they affect an environmentally sensitive area. The areas given as examples that are applicable to the proposed project are tsunami zones and coastal waters. The project area is in an area of tsunamis since it has been repeatedly ravaged by tsunamis (page 18). Since the project is laying a cable from the Big Island into the ocean, it also involves coastal waters. After careful consideration of the circumstances of this project, we have determined that this is one of the cases where the action would not have a significant effect on the environment. Reasons mitigating in favor of this conclusion are several. The proposed project is of such a nature that it would not cause significant adverse affects to the environment in the event of a tsunami. Additionally, since the facility would be unmanned, there would be minimal threat to human life related to the proposed facility, and since one of the purposes of the proposed facility is to provide tsunami warning information (page 12), it might actually reduce tsunami threat to human life and property. Concerning the coastal waters matter, adequate measures have been pursued to protect the environment. These measures include use of a pier to bypass the shoreline and two marine environment studies which lead to a mitigation measure to protect reefs (pin the cable to the ocean floor, page 23) and to the conclusion that the environment is robust enough in the area of the project that any likely affects will be minimal and will be rapidly recovered by the natural processes of the environment (page 17). Therefore, in view of the lack of potential for harm to the environment, and the potential public benefit of the project, this authority determines that this proposed project would not have a significant effect on the environment solely due to its location in an environmentally sensitive area.

The Final EA was also evaluated for conformance to the Environmental Assessment Checklist (A Guidebook for the Hawai'i State Environmental Review Process, Appendix F, Environmental Assessments) and it was determined that all subjects were adequately addressed.

RECOMMENDATIONS:

In view of the minimal impact nature of this proposed project, no special requirements are being placed on the project, however, as a matter of prudence, we make two suggestions:

1) For protection of the public, additional means of preventing the public from walking on the pier conduit should be considered (page 9).

2) Some time in the second year of operation of the project it would be wise to examine the marine environment to see if the project has had any significant impact, and if there have been, they should be reported to the appropriate authorities. It should be stressed that this suggestion is not made because any damage is expected, but because the rugged coastline involved warrants some degree of caution and monitoring.

CONTACTS FOR FURTHER INFORMATION:
For Negative Declaration Questions:
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For Questions About The Proposed Project:
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Fred Duennebier (HUGO P.I.)
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Appendix E

Actions on Pre-Assessment
Responses

Pre-Assessment Responses

1) County Planning Dept, 2/2/95, (Appendix D1)
Response: This response pointed out that the following approvals will be required; SMA Use Permit, Shoreline Setback Variance, Hawaii County Planning Commission Special Permit and Public Hearing, DLNR Conservation District Use Permit, Meet Requirements of HRS 343 relating to Environmental Impact Statements, and authorization of various land owners.

Action: All these appropriate approvals and permits will be obtained.

2) County Dept of Public Works, 12/22/94, (Appendix D3)
Response: This response pointed out that the project must be in compliance with county codes for erosion, sedimentation, and flood control.

Action: The HUGO project will use best management practices to comply with county codes concerning erosion, sedimentation, and flood control.

3) County Dept of Public Works, Bldg Div., 12/21/94, (Appendix D4)
Response: This response pointed out the following; a) that the vans may be parked at the construction site for the duration of the "construction work", b) that it may be used for construction storage or office purposes but not as a dwelling, c) that a temporary permit is required, d) and that a building permit is required when construction ceases, e) and the "building" must meet the 1991 Uniform Building Code, f) unless a variance is approved, g) and finally, an electrical permit is required.

Action: On 5/2/95 11:20AM by phone, these matters were discussed with David Murakami (signature of the pre-assessment response). After discussion of the nature of the project as a research and education action, and the fact that the trailer vans are to be used as instrumentation and data recording vans, and will not be used as a dwelling, he agreed that they should not be treated as "buildings". He stated that they would qualify as a "Project Office" and the "work exempted". This would a) allow them to remain on the site for the duration of the project instead of just during construction, b) and allow them to be used for the intended purpose as long as they are not used as dwellings, c) and that a temporary permit would not be required, d) and that the trailer vans would not require a building permit e) and would not have to meet the building codes, f) and that a variance from the code would not be required. The electrical permit would still be required. Regarding the last concern of the electrical permit, the appropriate electrical permit will be obtained.

4) State Office of Environmental. Quality Control, 2/7/95, (Appendix D5)
Response: This response pointed out the following; a) that the University of Hawaii should prepare an environmental assessment, b) and determine whether and environmental impact statement is required, c) and that the DLNR must be applied to with regards to the project being within the conservation district, d) and that the Hawaii County Planning Department must be applied to with regards to the project being within the shoreline setback area, e) and that the DLNR and Hawaii County Planning

Department must be consulted during environmental assessment preparation as to whether an environmental impact statement is required.

Action: This environmental assessment is being a) prepared by the University of Hawaii and b) the University as the approving agency will make the determination regarding the need for an environmental impact statement. The DLNR will c) be applied to for a conservaton district use permit. The Hawaii County Planning Department will d) be applied to for a shoreline setback variance, and both the e) DLNR and the County Planning Dept are being consulted with regards to the necessity of an environmental impact statement.

5) State Office of Planning, 1/10/95, (Appendix D6)
Response: This response pointed out the need to a) minimize adverse environmental and ecological impacts with regards to the objectives and policies of the Hawaii Coastal Zone Management law (a prerequisite to federal approvals), and b) to secure the HUGO cable to the ocean floor to protect reef resources, and c) to discuss potential impacts on land-based resources, and d) to discuss the permits/approvals required.

Action: The HUGO project is making considerable effort to
a) meet the objectives of the Hawaii Coastal Zone Management law. HUGO is doing this by working with the community exploring the possibility of improving the recreation facilities in the area (namely investigating restoration of the Honuapo pier), protecting the historic resources of the area by identifying resources and modifying plans to prevent impacting them, protecting scenic and open space resources by burying cables wherever practical, providing a facility important to the state of Hawaii, helping to reduce coastal hazards by providing increased earthquake and tsunami warning abilities. HUGO is also submiting a Federal Consistency Supplemental Information Form as part of the process to obtain a letter of permission from the Army Corps of Engineers for the HUGO project.
b) HUGO will secure the cable to both the pier and the ocean floor to prevent damage to both the cable and the ecosystem. This will be done by drilling small holes and using small anchor bolts.
c) Since the HUGO projeect is an unmanned facility, the it will have minimal impacts on land based resources. The most significant resource will be electrical power equivalent to a capacity of approx. 3 residential homes, which will not be fully utilized until many more experiments are added to the system to bring it up to its design capacity of nearly 100 experiments (there are only 2 experiments, an earthquake sensor, and a tsunami sensor, in the initial installation).
d) Regarding discussion of the permits/approvals required, because this project involves lands near the shoreline, and involves federal, state, county, and private jurisdictions, many permits and approvals are required. All appropriate agencies and parties have been approached either by phone, letter, or in person, and the response has been that the project seems to be relatively minor in size, does not seem to pose any significant adverse effects, and would benefit the people, so that unless some unknown problem becomes apparent, they have every reason to expect approvals to be granted. See Appendix E for list of permits and approvals.

6) State Dept of Transportation, 12/29/94, (Appendix D8)
Response: This response stated that based on the information provided, that DOT facilities will not be affected.

Action: none.

7) State DLNR, 1/6/95, (Appendix D9)
Response: This response states two requirements, a) a conservation district use permit, and b) an easement agreement.

Action: a) The conservation district use permit will be obtained, and b) the easement will be negotiated.

8) State DLNR, Historic Preservation Div., 11/30/94, (Appendix D10)
Response: This response expressed two concerns: a) the documenting and preservation of the Kauahaao Church Cemetery and nearby graves, and that consulation with the church, cemetery caretaker, and lineal descendants be continued, b) and that documenting of historic structures in the Honuapo area be continued, including maps, photographs, researching historic accounts, and collecting oral histories from long term residents.

Action: a) Due to the inability to obtain a lease for the cable route that is adjacent to the cemetery, the alternate route (alignment B refered to in the response) has been chosen. This alternate route comes no closer to the cemetery than 200 feet. Consultation with Mark Smith at the DLNR Historic Preservation Div. has resulted in the opinion that since the HUGO project will no longer be excavating near the cemetery, there will no longer be cause to document that area. He has requested that if any artifacts are encountered while excavating elsewhere, that he be contacted. The HUGO project will contact Mr. Smith in such an event. While the need to work with the church has lessened, the HUGO project still hopes that the church will consider blessing the project with an appropriate protocol at the appropriate time. b) Concerning documenting historic structures, only two "structures" are involved. One is the small patch of asphalt described previously (5.4 Remnants and Artifacts), and the pier which is documented in Section 5.2 and 5.3.

9) State DLNR, Historic Preservation Div., 12/23/94, (Appendix D12)
Response: This response defers to the previous response (Appendix D11) which was based on a field inspection by the Hilo staff archeologist Marc Smith on 9/21/94.

Action: none.

Appendix F

Actions on Responses to
Draft Environmental Assessment (5/5/95)

Appendix F: Actions on Responses to Draft Environmental Assessment (5/5/95)

1) Letter dated 5/22/95 from the U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration National Marine Fisheries Service (Appendix D22).

The only actionable item is the comment "Finally, care should be exercised when installing the cable to keep substrate damage to a minimum".
Care will be taken and is covered in section 7.0 "Proposed mitigation measures", subsection "Reef Protection".

2) Letter dated 6/22/95 from the University of Hawaii at Manoa Environmental Center (Appendix D19).

>Response 1: "General *Comments*" *section*, paragraph 1, refers to confusion of appendices, figures, photos and maps.
Action 1: The two errors referred to on draft pages 8 and 19 along with others have been corrected. Concerning organization, all figures, maps and photos referred to in the main text are grouped together at the end of the main text prior to the appendices, as they appear in the table of contents. This was done so that if some people wanted just the main text, they would still get the maps etc. and could leave out the appendices. Other maps, figures, tables etc. that were provided with reports etc. are included in those reports in appendices.

>Response 2: "General Comments" section, paragraph 2, refers to the economic, social and environmental subsections of the "General Description of the HUGO Project" section 4.0, as providing project impacts instead of project descriptions, and that impacts should be in the "Major Impacts..." 6.0 section.
Action 2: As stated in section 0.3 "Guiding Document Citation", this EA was prepared in accordance with the OEQC Guidebook... appendix F EA's. Under the section title "What is required in an environmental assessment", item 4 specifically requires that the impacts should be described. Additionally, the reason these affects and impacts were not included in the "Major Impacts" section was that no parties have identified any impacts as "Major", as has been stated in the "Major Impacts and Alternatives" 6.0 section.

>Response 3: "General Comments" section, paragraph 3, states that the "Proposed Mitigation Measures" section actually describes impacts instead of mitigation/amelioration measures.
Action 3: The most significant subjects (tidal zone, erosion, marsh, reef and whales) that might have been a possible concern to anyone were addressed by the mitigation section. The reason impacts of each of these subjects was included, was to provide background describing what impacts would be mitigated. This background information serves to familiarize the reader with the potential problem and provide context so that the mitigation measures can be evaluated.
To summarize mitigation measures listed in section 7.0, the tidal zone impacts would be mitigated by use of the pier to pass over the tidal zone, soil erosion would be mitigated by use of a narrow trench and gravel cover, the marsh impacts would be mitigated by the distance of the project from the marsh, reef scouring will be mitigated by pinning the cable to the ocean floor, and whale entanglement would be mitigated by selection of a cable route whose topography would be the smoothest. To elaborate on the last mitigation measure, several (3) cable routes were considered, and the longest route was chosen rather than the shortest because it was judged to provide a smoother terrain, thus the choice of the smoother route serves to mitigate

entanglement by reducing the likelihood of having cable suspended as a result of terrain.

>**Response 4:** "General Comments" section, paragraph 4, refers to use of appropriate language such as "proposed" instead of "will have".

Action 4: This document has been revised based on this input to reflect the pending nature of the approvals for the project.

>**Response 5:** "Social Concerns" section, paragraph 1, refers to an implication of the project restoring "some" community pride lost "in these times of closing sugar mills", and that it is unrealistic to view HUGO as a replacement for the sugar industry.

Action 5: The reviewer is very correct to point out that HUGO and the sugar industry have very different roles. There is no intent to represent the project as any kind of "a replacement" for the sugar industry. The sugar mills were mentioned as a recognition of the end of an era that has strongly shaped the history of the area, and recognition that loss of jobs is an agonizing and demoralizing process.

The second paragraph of the subsection "Indirect effects:" in section 4.3 "Social Characteristics" has been changed to emphasize that HUGO is not a sugar mill "replacement".

>**Response 6:** "Social Concerns" section, paragraph 2, states that there should be more specifics regarding community and educational programs and benefits, such as has money been set aside for these, and will the project actually restore the pier.

Action 6: The initial funding (section 4.2) would only get HUGO built and installed and conduct some initial operational tests. This initial demonstration period prior to following funding is to prove that the system works. There is some risk that the system will be irreparably damaged during deployment, therefore funding of "programs" to utilize HUGO will have to wait until the system is operational. Such program will also depend on what experiments are attached to HUGO, since HUGO is really just a communications system. Therefore, initially the only "programs" would be informal demonstrations to give schools and communities a chance to evaluate some of the data sent up by HUGO. This will allow them to decide for themselves how to best utilize HUGO.

Some planning has gone into the initial demonstrations, such as by talking to a science teacher and administration of Pahala High School. They were very excited about HUGO. The demonstrations would consist of providing limited amounts of data (giving all the data would be expensive and swamp them) of initial experiments to science classes at Pahala. The project also expects to be able to present research results to the students to show them the purpose of such endeavors. These efforts would be relatively inexpensive, and we expect to be able to carry them out with HUGO funds. Additional "programs" resulting from the demonstrations and planning will hopefully result in future funding since none currently exists.

The community would benefit from HUGO from the school involvement, and by availability of additional tsunami warning information thru the existing civil defense system.

Concerning restoration of the Honuapo pier, this project does not have the funding to accomplish any actual restoration work, which might be substantial. As such, the project plans to "merely" assist the community by "requesting" such work. Of course, simply getting to that stage of requesting the work will probably require considerable effort to reach agreement on what if anything should be done. We hope that our assistance and presence would give added emphasis and help obtain success along that line.

>Response 7: "Misc. Notes" section, paragraph 1, requests estimates of construction time and duration of disturbance to Whittington Beach Park.

Action 7: Construction Times (days)

1 Ocean cable laying

30 Shore work

12 Park work (part of 30 days shore work)

The 12 days park work are broken down as follows; 4 Pier preparation, 3 trenching, 3 equipping trench, .5 dig junction vault, .5 dig pole hole, 1 bring cable ashore.

While work would be occurring at different locations (pier, junction vault, trench, pole) at different times for a total of approx. 12 days, none of the work would result in closure of the park. Certain areas will need to be roped off, but access to facilities such as rest rooms will be maintained.

>Response 8: "Misc. Notes" section, paragraph 2, requests that "no action" be considered as an alternative.

Action 8: The "no action" alternative has been included in section 6.0.

>Response 9: "Misc. Notes" section, paragraph 3, requests discussion of precautions to be taken during construction to avoid disturbing important sites such as the cemetery, Honuapo as a historic site, and bait pots.

Action 9: The best protection for possibly important features in the area would be afforded by maintaining physical distance between such features and construction activities. The cemetery is located approx. 200 feet mauka of any HUGO construction, is not visible from the construction site except possibly a short section of a lower wall during drought, and is also across a fence and private property above a small (6') cliff and up hill from the construction site. A cable pulling winch would probably be used in the area between the cliff and fence, but would not be any closer to the cemetery than below the cliff at approx. 180'. Construction employees would be warned that the area beyond the winch is off limits.

The bait pots are also not where construction activities are planned, they are makai of the park lawn and construction will be limited to the park lawn area. Workers would be warned that the shoreline area is not to be disturbed.

Concerning the general area as a historic site, a philosophy of minimum disturbance would be employed. This includes a minimum size trench in the park, and using poles outside the park to minimize digging. In talking with the state DLNR Historic Preservation Div., the project has agreed to halt any disturbances and contact them immediately if any possible historic items are encountered during construction

>Response 10: "Conclusion" section, requests clarification of community effects, archaeological impacts, and construction times.

Action 10: Community effects are addressed by response 6. To expand upon that response a little, HUGO's effects would be expected to be long term and beneficial. The effects would result from increased understanding of geological processes that significantly affect the community. It would also result from increased motivation of students by providing meaningful research in their own "back yards".

Regarding archaeological impacts, there are none expected, primarily due to the avoidance of known sites by means of minimal disturbance of the construction area which is primarily in the already disturbed area of the park, and total avoidance of other areas such and the cemetery and bait pots.

Regarding construction times, they are addressed in response 7 and section 4.1.

3) Letter dated 8/9/95 (File No. 95-607) from the State of Hawaii Dept. of Land and Natural Resources Historic Preservation Div. and Office of Conservation and Environmental Affairs (Appendix D13).

State Historic Preservation Div. (SHPD):

>Response 1: Requests a summary paragraph in the "Environmental Characteristics" subsection listing the known historic sites in the vicinity of the proposed project.

Action 1: The requested paragraph has been added, and the sites are further discussed in section 5.3 Historical Sites (formerly titled Remnants and Artifacts).

>Response 2.1: Requests that the current status of known historic sites in the project area be described.

Action 2.1: Discussion of the status of historic sites in the project area has been added at the start of section 5.3 Historic Sites.

>Response 2.2: Requests that the legal basis for consulting with the SHPD be described.

Action 2.2: Under Chapter 6E-8, HRS, the SHPD must be given the opportunity to review all projects undertaken by State agencies that might affect historic sites, and that their written concurrence must be obtained to proceed. This law applies here because the University of Hawaii is a State agency. This requirement is in addition to the requirement for an environmental assessment required by Chapter 343-5, HRS, triggered by the use of a State agency, State lands, County lands, Conservation District lands and Shoreline Setback Area..

Descriptions of the project have been provided to the SHPD for their review and concurrence, and concurrence with no adverse impact on historic sites was obtained (append. D, 8/9/95 DLNR letter).

>Response 2.3: Requests that the term "Historic Site" or "Historic Property" be used in preference instead of "artifact", for all architectural structures, archaeological features or objects over 50 years old.

Action 2.3: The term "Historic Site" has replaced "artifact" where appropriate.

>Response 3.1: Requests that section 5.3 be clarified to describe all known historic sites that both may be directly affected by the project as well as those in the general vicinity.

Action 3.1: Section 5.3 has been subdivided into two categories; Sites That Would Be Directly Affected By The Project, and Sites In The Vicinity That Would NOT Be Affected By The Project. A more extensive list of historical sites has also been provided with descriptions of characteristics and locations.

>Response 3.2: Requests that any mention of the State Historic Sites Inventory make clear that it is not a complete record of historic sites.

Action 3.2: This has been done where the inventory was mentioned (in main body section 5.3 Historic Sites).

>Response 3.3: Requests that a section be devoted to historical background compiled from literature search and oral interviews.

Action 3.3: Section 5.2 Historical Background (History of Kau) is devoted to historical background. Some items that were in the culture section 5.4 that were more appropriate to history were moved to section 5.2 Historical Background. Some material relating to the status of historical sites was moved out of section 5.2 and into section 5.3 Historical Sites. Discussion of oral histories collected and literature research were also added to the end of 5.2.

>Response 3.4: Requests that some information in section 5.4 Culture be moved to section 5.2 Historical Background.

Action 3.4: The appropriate information was moved as requested.

>Response 4.1: Questions the statement *that Hawaiians had the* absolute strongest bond of any people to their land (p. 16, para. 1).

Action 4.1: Claims of extremes are of course difficult to substantiate. "Strongest" has been changed to "very strong" (section 5.1, para. 2).

>Response 4.2: Suggests that saying Kamehameha 1 was "raised" in Kau is an overstatement of the amount of his youth spent in Kau (p. 16, para. 3).

Action 4.2: The statement has been removed.

>Response 4.3: States that Kau was not the last region subjugated in the unification of the islands (p. 16, para. 3).

Action 4.3: The statement has been removed.

>Response 4.4: States that the earliest written descriptions and drawings of Kau indicate that fences were present before the introduction of cattle, horses and goats, which disagrees with the statement made that the region had no fences (p. 16, para. 3).

Action 4.4: The phrase "no fences" has been modified to "a lack of sufficient fences".

>Response 5: Requests that a statement of verbal permission to trench be removed from section 5.3 (p. 16, para. 5).

Action 5: The verbal permission reference has been removed and reference to a letter determining little likelihood of historical significance has been substituted at the end of section 4.4 Environmental Characteristics, Historical Sites.

>Response 6: Requests that section 6.0 Major Impacts and Alternatives include that SHPD and a member of the Hawaii Island Burial Council expressed concern about a since abandoned proposed cable route next to a church cemetery.

Action 6: Section 6.0 has been modified accordingly.

>Response 7: Requests a statement be added to section 7.0 Mitigation, that work will stop in the immediate area and the DLNR SHPD will be contacted immediately if cultural deposits or human remains are unexpectedly discovered during trenching.

Action 7: The requested statement has been added.

Office Of Conservation And Environmental Affairs (OCEA):

>Response 8: Requests clarification of the distance from shoreline to Loihi.

Action 8: A "Project Location" heading has been added at the start of section 4.0 General Description, and the distance from the shoreline to Loihi is listed there.

>**Response 9:** Requests more legible photographs in the final EA.
Action 9: Better photo-reproductions will be used.

>**Response 10:** Corrects on the title page the number of EA copies required for a CDUA and points out the fee is incorrect.
Action 10: The quantity of copies and fee have been corrected (section 0.4).

4) Letter dated 8/21/95 (File No. 95-607) from the State of Hawaii Dept. of Land and Natural Resources Land Management Div. (LMD) (Appendix D18).

>**Response 1:** Requests that LMD be kept informed throughout the environmental review process.
Action 1: The project will strive to keep LMD informed.

>**Response 2:** Requests that Hawaiian religious and other community organizations such as the Kau Hawaiian Civic Club, Pele Defense Fund and Ka Lae Ohana be included in the environmental review process.
Action 2: The project will strive to include these and other groups in the review process. Along this line, we are tentatively planning a meeting in Naalehu in late September for all community groups we can identify. In talking to Naalehu Main Street, they have conducted a poll which identified approx. 60 groups in the area, of which approx. 20 are reportedly currently active. We hope that many of these groups will be able to at least send a representative. We will contact you when we know further details.

Appendix G

Public Outreach

Appendix G: Public Outreach

This proposed project has strived to inform the public about the project. It has done this via newspaper articles, mailed information, by making public descriptive documents available at several libraries, and by holding public meetings that were advertised in newspapers and on the radio. We have also contacted groups and individuals in the community that we hoped would represent viewpoints of the community and would help get the word out about the project.

These efforts culminated in two public meetings, one in Naalehu in January 1995 with approx. 20 attendees (described previously in section 5.4 Culture), and one in Hilo in February 1995 with one attendee. The Hilo attendee was a landowner neighboring the project site, and was in favor of the project. The attendees at the Naalehu meeting were all very suspicious of the project at the start, but after listening to us describe the project and after we answered all their questions, most people voiced the opinion that it didn't seem like the project could do much if any harm and it might do some good, so go for it.

There were only two attendees that spoke against the project. They stated that they had nothing against the people doing the project, and nothing against the project itself, but that they were concerned what the project might lead to. The main concerns they voiced were;

1) Distrustful because of past things like geothermal.
2) Don't like the university because they are for geothermal and mining.
3) Worried that if walkway built on the pier that a gate will be put up to keep people out.
4) Worried that our project is poking its nose where it doesn't belong and thus causing all these problems, just let things be.
5) Worried about what happens when the project malfunctions.
6) Worried that properties will be condemned.
7) Afraid of development and evictions.
8) Worried boats would use the pier, but couldn't say if such use was good or bad.

Over a period of about a month we attempted to help these two people prepare a written statement of their concerns for incorporation into the environmental assessment, but were unsuccessful. The best we could get was that we should talk to the Nation of Hawaii. We contacted the person we were referred to, and based on phone conversations sent some descriptive information in the mail. They later held a closed meeting reportedly attended by approx. 30 people. Of those attendees, 10 reportedly liked the project and the other 20 wanted to know more about it. Based on that meeting we were invited to attend one of their meetings to provide more information.

A project representative attended one of their meetings in Naalehu on 7/27/95. Additional descriptive details were provided about the project and all questions were answered. As far as we can determine none of the 10 people that were for the project at the earlier meeting attended this second meeting. It became apparent that most of the people in attendance were against the project. The main objections to the project that were voiced were;

1) They're concerned that this project will lead to other things or that it has another purpose such as mining or geothermal, that it is a foot in the door.
2) Some don't like the UH because they wanted to mine manganese and geothermal.

3) Concerned that the government will lock them out of the park and say they can't use the park because of the project.
4) Niele (Ni e lei) poking our nose where it doesn't belong, too inquisitive.

The first four concerns above mirrored concerns voiced by the two people at the first Naalehu public meeting. The following additional concerns were also voiced;

5) Loihi is Pele Tutu's area and is sacred.
6) Honolulu people get jobs from project, but not Kau Hawaiians (51% by blood)
7) Money spent on project should be given to Kau people to build ukuleles and canoes to fish with and feed themselves.
8) They felt the UH should teach Hawaiian culture.
9) Concerned that an anchoring ban near the cable will stop people from catching fish that they need to live.
10) They didn't like the idea that the cable might be left on the ocean floor after the project is either done or loses funding.

They held a voice vote to see if anyone present liked the project, nobody initially said anything, then one haole timidly put up her hand and said a few words, but received only silence. They said based on what was said that night, they would oppose the project all the way.

Based on these meetings and the lack of attendance by group representatives, we are attempting to organize a meeting of group representatives to find out if there is more general support of the project by the community, or if there are others that would be opposed. We also hope to form a community board to facilitate community involvement with HUGO so that the community may better benefit from the project and the project may benefit from the community. We expect the meeting to occur some time in October, and hope that it will show that most of the community wants the project, and we hope that we can work out any concerns that any opposed parties have.

Appendix H

Status of Approvals and Permits

Appendix H: Status of Approvals and Permits

Prep= In Preparation
Subm= Submitted and waiting for approval
Hold= Pending some condition
Appv= Approved

PRIVATE---------
-Appv Letter of permission to apply for permits
-Hold Lease of private land for trailer site.
Pending availability of funds.

COUNTY----------
-Appv Letter of permission to apply for permits
-Prep Letter of permission to use county park
-Hold SMA (Special Management Area)
Pending Final EA approval and SMA major/minor determination
-Prep SSV (Shoreline Setback Variance)
-Prep Special Permit (use of Ag district)
-Prep Building Permit
-Prep Electrical Permit

STATE----------
-Appv Letter of permission to apply for permits
-Hold Easement Agreement (use of state pier)
Pending CDUA approval
-Hold EA (Final Environmental Assessment)
Pending OEQC bulletin publ. and 30 day legal challenge period
-Prep CDUA (Conservation District Use Application)
-Prep Letter of compliance with HRS 343
-Prep CZM (Coastal Zone Management) Federal Consistency Letter

FEDERAL----------
-Prep CZM (Coastal Zone Management) Federal Consistency Letter
-Prep Letter of permission to use navigable waters (federal)

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

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