LINDA CROCKETT LINGLE
Mayor

DAVID W. BLANE
Director

GWEN OHASHI HIRAGA
Deputy Director

COUNTY OF MAUI
PLANNING DEPARTMENT
250 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

October 21, 1996

Mr. Gary Gill, Director
Office of Environmental Quality Control
220 South King Street
Suite 400
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: Final Environmental Assessment And Finding of No Significant Impact for Submarine Fiber Optic Cable Landing at Manele Bay, Island of Lanai, Hawaii TMK 4-9-017:006

The Lanai Planning Commission has reviewed the comments received during the 30-day public comment period which began on September 8, 1996. The Lanai Planning Commission has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the November 8, 1996 OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the Final EA. Please contact Don Schneider at 243-7735 if you have any questions.

Very truly yours,

Gwen Ohashi Hiraga
for DAVID W. BLANE
Planning Director

DWB:DAS
Enclosures
cc: Clayton Yoshida
Project File
Brian Takeda
Don Schneider
(F:OEQC2.fiberoptic)

1996-11-08-LA-FEA - Submarine Fiber Optic Cable Landing at Manele Bay

PREPARED IN ACCORDANCE WITH REQUIREMENTS OF CHAPTER 343, HAWAII REVISED STATUTES

FINAL ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT (FONSI)

Submarine Fiber Optic Cable Landing at Manele Bay, Island of Lanai

HAWAIIAN ISLAND FIBER NETWORK (HI FiberNet)

OCTOBER 1996

PREPARED FOR:
GST Pacwest Telecom Hawaii, Inc.
91-238 Kalaeloa Blvd., Building One
Kapolei, Hawaii 96707

RMTC
R. M. TOWILL CORPORATION
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii • 96817-4941
Voice: (808) 842-1133
Facsimile: (808) 842-1937

FINAL ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT (FONSI)

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PROJECT SUMMARY

Project:	Hawaiian Island Fiber Network (HI FiberNet) Manele Bay, Island of Lanai
Applicant:	GST Pacwest Telecom Hawaii, Inc. 91-238 Kalaeloa Blvd., Suite 100 Kapolei, Hawaii 96707 Contact: Mr. Robert Volker, General Manager Telephone: (808) 682-5266
Accepting Authority:	*County of Maui* Lanai Planning Commission
Tax Map Key:	4-9-17: 6
Location:	Manele Bay Small Boat Harbor, Lanai
Project Area:	10,600 Square Feet
Owner:	State of Hawaii (Dept. of Land and Natural Resources, Boating Division)
Agent:	R. M. Towill Corporation 420 Waiakamilo Road, Suite 411 Honolulu, Hawaii 96817 Contact: Mr. Brian Takeda or Mr. Chester Koga Telephone: (808) 842-1133
Existing Land Uses:	Small boat harbor
State Land Use District:	Conservation
Conservation District Subzone:	Limited
Lanai Community Plan:	Project District 1 (Manele)
County Zoning Designation:	Unzoned

SECTION 1

INTRODUCTION

1.1 PURPOSE AND OBJECTIVES

GST Pacwest Telecom Hawaii, Inc., a subsidiary of GST Telecom Inc., proposes to develop an interisland submarine fiber optic cable system which will link the Islands of Kauai, Oahu, Maui, Lanai, Molokai and Hawaii. The GST network will be largest in the State and the first to connect Molokai and Lanai with the other major islands.

In the early 1990's, GTE Hawaiian Tel installed the first interisland fiber optic cable system to enhance its existing interisland radio system. Information for this environmental assessment is derived from earlier reports written for GTE Hawaiian Tel by R. M. Towill Corporation *(January 1993, Environmental Assessment for the GTE Hawaiian Tel Interisland Fiber Optic Cable System; Wailua Golf Course Kauai; Sandy Beach Park, Oahu; Mokapu Beach, Maui; Spencer Beach Park, Hawaii).*

The proposed system will include three interisland submarine cable segments with eight landing sites **(Figure 1-1)**. The main system will include a 24 strand main cable with linkages from Wailua Golf Course, Kauai, to Makaha Beach, Oahu; Makaha Beach to Keawaula, Oahu; Sandy Beach, Oahu, to Mokapu Beach, Maui; and, Mokapu Beach to Spencer Beach, Hawaii. On the Sandy Beach to Mokapu Beach segment, two branching units comprised of up to 8 fiber optic strands will "branch" off from this segment of the interisland system for landings at Manele Bay, Lanai, and Kaunakakai Harbor, Molokai.

The purposes of the proposed project are as follows:

- To provide the public with an alternative to interisland telecommunication service that is now provided only by a single vendor. It is anticipated that additional competition will result in higher quality and competitive pricing which will benefit the public; and

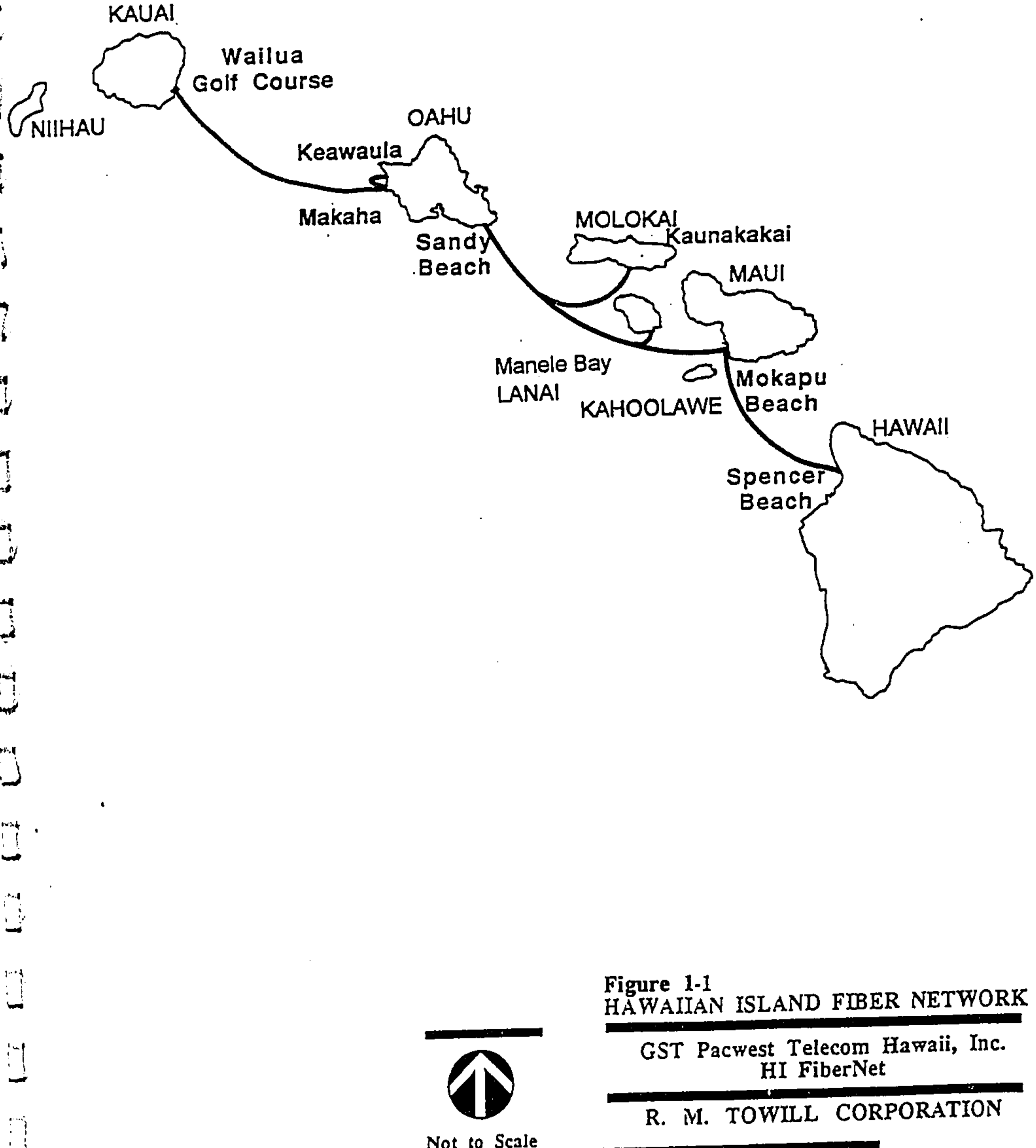

Figure 1-1
HAWAIIAN ISLAND FIBER NETWORK

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

- Fiber optics will allow GST Pacwest Telecom Hawaii, Inc. to enhance service now provided through microwave which have limited bandwidth capacity to serve customers. A fiber optic linkage has higher capacity bandwidth which would allow use of high technology services such as telemedicine and real time videotrafficing.

1.2 PROJECT LOCATION

The landing site to Lanai is Manele Bay Small Boat Harbor, a State-owned recreational boating facility located along the southeast coast of the Island of Lanai **(Figure 1-2)**. Originally a small and undeveloped bay, Manele was probably used by native Hawaiians as a fishing village for centuries. Artifacts of long term occupation (e.g. ancient fishing shrine and rock wall ruins) have been uncovered at the entrance to the harbor and in the immediate vicinity, respectively. During the early part of this century, Manele Bay was used for off-loading lumber, goods, and equipment. Subsequently, it was used for off-loading cattle by Lanai Ranch. During the years of pineapple plantations, the area was used for recreational activities, since pineapple was shipped from Kaumalapau Harbor on the western side of the island.

The present harbor was built as a recreational facility in 1966. In 1988, mooring capacity was expanded by the addition of a short breakwater wall and rock groins to accommodate small boats moored "Tahitian" style.

The fiber optic cable will be laid in the vicinity of the harbor entrance, with a west to east direction. It will land north of the trailer boat storage area on the northwestern corner of the property **(Figure 1-3)**. From the landing site the cable will be routed to a 5' x 10' manhole. From the manhole the cable is proposed to follow the mauka edge of the trailer boat storage area, leading to the boat harbor access road where the cable will terminate at a second manhole. From this manhole, the cable will be routed to the island's phone network.

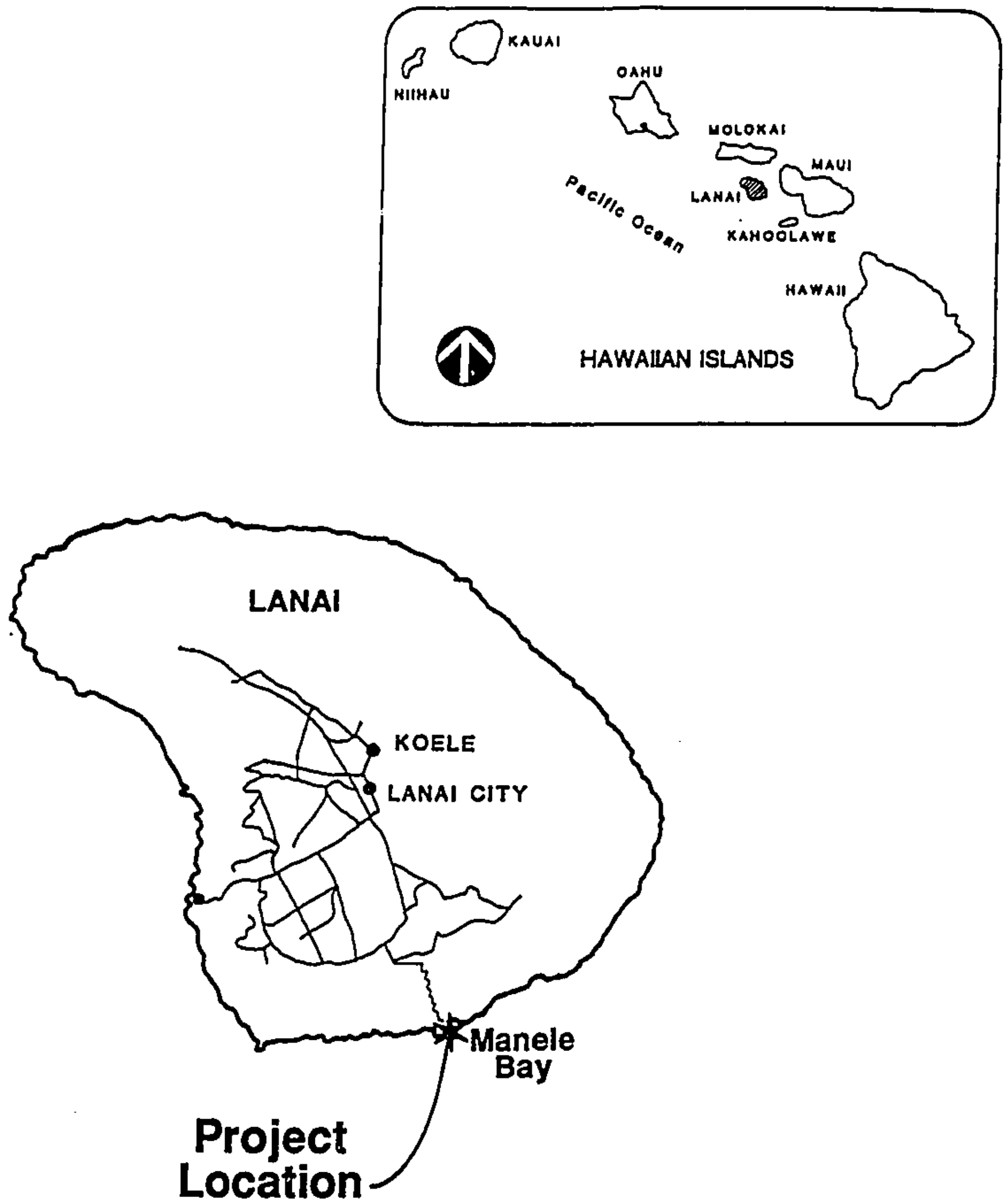

Figure 1-2
LOCATION MAP
Manele Bay, Lanai

0 4 8 MILES

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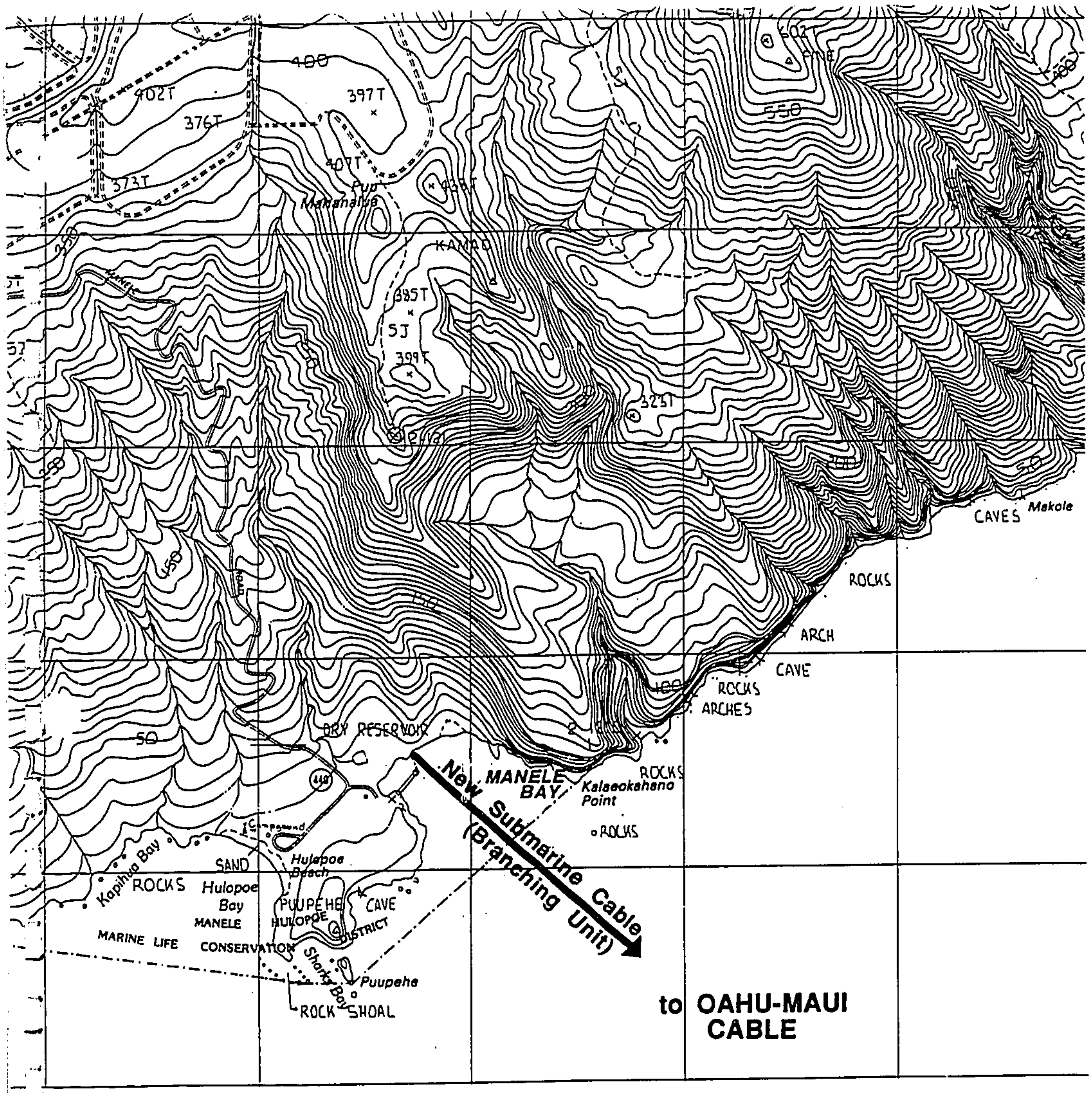

Figure 1-3
CABLE ALIGNMENT PLAN
Manele Bay, Lanai

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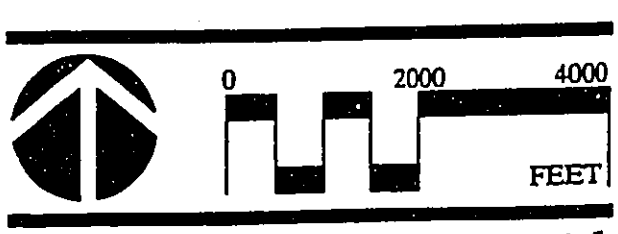

SECTION 2
PROJECT BACKGROUND

2.1 CABLE TECHNOLOGY

The following is a discussion of existing telecommunication cable technology and how the determination was made to use fiber optics.

2.1.1 *Copper and Fiber Optic Cables*

The alternative to fiber optic cable is the use of copper wire cable. Copper wire cables function using a large number of plastic-coated copper wires housed within a plastic or synthetic outer casing. If necessary, steel or other protective materials would be added to ensure strength and resistance to abrasion and breakage. In order to receive a voice transmission an electrical signal must be sent through a pair of copper wires to a receiver, where the electrical signal is converted back into sound. A typical cable, approximately 4 inches in diameter (without the outer protective casing), would house 600 copper wires with the capacity of approximately 3,600 voice circuits.

The copper wire cable will also require use of a repeater to boost the electrical signal over long distances to ensure adequate signal strength at the receiving station. Repeaters will be necessary approximately every 6,000 feet and require a high voltage power source to operate. Repeater dimensions for a 1,200 voice circuit will be approximately 1 to 2 feet in diameter by 3 feet long. Therefore, to accommodate the 4-inch diameter copper cable described above, at least 3 repeaters would be required every 6,000 feet with a requisite power source supplying power to the cable.

In contrast, fiber optic technology relies on use of optical fibers and the transmission of light pulses which are converted into voice signals by the telephone company receiving station. The proposed fiber optic cable would contain approximately 8 fiber optic strands and would be housed in a plastic and steel casing no more than approximately 2 inches in diameter (**Figure 2-1**). Like the copper cable, steel or other protective materials would be added as

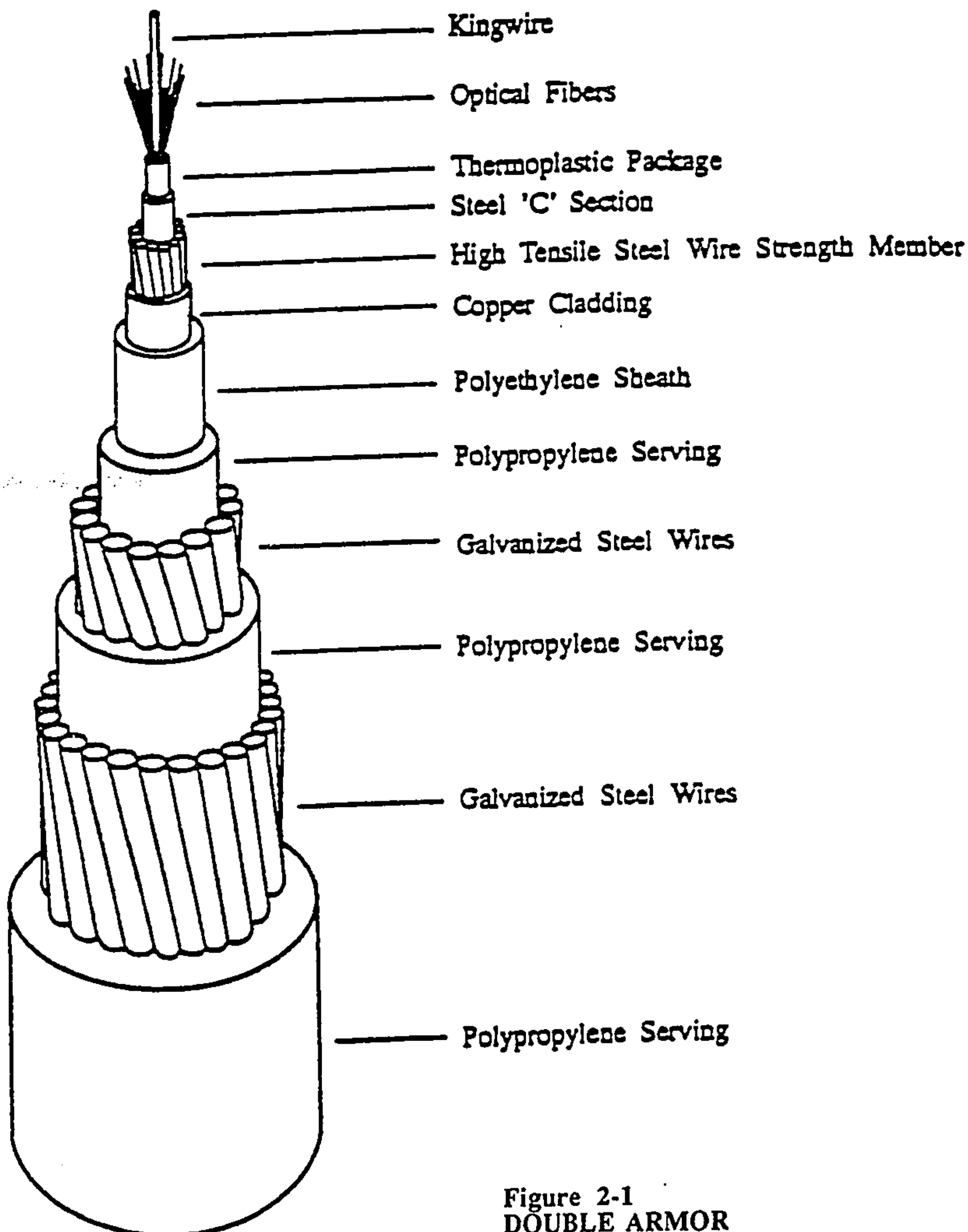

Figure 2-1
DOUBLE ARMOR
FIBER OPTIC CABLE

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

JANUARY 96

needed for strength. Each pair of fiber optic strands would be capable of handling approximately 8,000 voice circuits, for a combined total on the order of 32,000 voice circuits (2 strands = 1 pair, 8 strands = 4 pairs working, and 4 pairs x 8,000 voice circuits = 32,000 voice circuits. In addition, in order for a copper cable to achieve the capacity of a fiber optic cable, it would have to approach a diameter of approximately 8 to 10 feet, would require repeaters, and a high-voltage power line in addition to the copper cable.

Fiber optic technology was selected because:

- Fiber optic cables provide superior capacity and do not require high-voltage repeaters;
- The smaller diameter fiber cable ensures there will be minimal disturbance necessary to site the cable. There is less land needing to be graded, cleared and stockpiled in order to site a 2-inch diameter cable versus a 10-inch diameter cable;
- Sensitive areas that might otherwise be disturbed because of larger equipment and increased mobilization and noise problems would be greatly reduced; and
- Length of time on site would be greatly minimized. Sensitive public or open space areas would not require a lengthy stay by the construction team and therefore would minimize any hardships upon beach users including swimmers, fishermen, surfers and other users.

2.2 SUBMARINE CABLE ROUTE

The submarine cable route selection process involved identification of areas warranting study, based on a set of minimum evaluation criteria. The criteria includes rapid erosion, giant landslides, drowned coral reefs, seismic activity, dumping areas, ship and airplane wrecks, other cables, and the length of routes.

The route selected was one that minimized potential hazards to the installation, and eased maintenance and operation of the cable over a projected 25 year lifetime.

The following provides a detailed description of each of these criteria:

2.2.1. Rapid Erosion

The greatest danger to this cable system, in the submarine portion of the route, is related to the geologically young age of the "Hawaiian Islands and the resulting extremely high erosion rates. The rapid erosion places large volumes of unconsolidated sediment into the shallow waters surrounding the islands. These sediment deposits move rapidly down the steep island slopes when they become unstable. This down-slope sediment movement can be initiated by earthquakes, storm runoff, and storm waves. Installation of cables on steep, sediment-covered submarine slopes should be avoided if possible. Where these slopes cannot be avoided, the cable should traverse as directly up the slope as possible" (SSI, August 1991).

2.2.2 Giant Landslides

Over the past several years, mapping of the Hawaiian Exclusive Economic Zone by the U.S. Geological Survey, using the long range Gloria sonar system, a relatively low-resolution, reconnaissance sonar, has discovered a series of large landslides surrounding the Hawaiian Islands (Moore, et.al., 1989). "The primary danger presently posed to the cable by these inactive landslides is their extremely rough surface. The seafloor in the slide areas are known to be littered with huge volcanic boulders. These boulders have been observed from submersibles to often be the size of a house. These slide surfaces pose a serious threat by producing unacceptable cable spans where the cable is draped over individual blocks, as well as the possibility of having the cable getting tangled if it had to be retrieved for repair" (SSI, August 1991).

2.2.3 Drowned Coral Reefs

A series of drowned coral reefs surrounding the islands are considered dangerous to the Interisland Fiber Optic Cable System. "Locally steep slopes associated with these reefs could cause unacceptable cable spans in areas where strong bottom currents can be expected" (SSI, August 1991).

2.2.4 Seismic Activity

"The greatest danger to the cable from earthquakes is not the actual fault displacement itself, but the possibility they will initiate movement of unstable sediment deposits on the slopes of the islands. Epicentral locations of earthquakes with magnitude 3 or larger in the Hawaiian region should be avoided by the fiber optic cable" (SSI, August 1991).

"Seismic activity in the Hawaiian Islands is concentrated in the vicinity of the active volcanoes on the island of Hawaii, where it is primarily related to the on-going volcanic activity. There are also earthquakes related to the tectonic subsidence of the islands due to the load that the growing volcanoes is putting on the earth's crust. These tectonic earthquakes are also concentrated in the area surrounding the island of Hawaii, where the greatest subsidence is taking place" (SSI, August 1991).

2.2.5 Dumping Areas

"Dredge Spoils disposal sites authorized by the U.S. Army Corp of Engineers are located close to all major island harbors and should be avoided by the cable route" (SSI, August 1991). Other dumping sites including disposal of explosives ordinance, will also have to be avoided.

2.2.6 Ship and Airplane Wrecks

A complete, high resolution side-scan survey of the proposed cable route should be carried out to determine that the route is free of man-made hazards such as ship wrecks and lost airplanes. There have been numerous ships and airplanes lost at sea in the Hawaiian area which have never been located.

2.2.7 Other Cables

There are several other cables in the planning stage including the Hawaii deep water electric transmission cable (from Hawaii to Oahu via Maui), and the Tri-Island power cables (linking Maui, Molokai and Lanai).

Along parts of this route the cable will have to be laid in close proximity to other, presently existing communications cables. In these areas, the recommendations of the International Cable Protection Committee (ICPC) should be used as a guideline. At their 1985 Plenary Meeting in Sydney, Australia, ICPC recommended that no previously existing cable be crossed at less than a 45 degree angle, the closer the crossing can be to a right angle the better, and where possible a spacing of five miles should be maintained.

Prior to making final decisions on cable placement, ICPC also recommends that American Telephone and Telegraph (AT&T) be contacted to determine if there are conflicts with military or other government cables.

2.2.8 Length of Routes Less Than 200 Kilometers

All routes are designed to be less than 200 kilometers in length in order to be serviced by repeaterless cables. The fiber optic cable will operate on a single light transmission source generated from its Central Office and transmitted to a receiving Central Office. Since repeaters will not be required to retransmit the signal, no electrical power will need to be routed through the cable.

2.3 LANDING SITES SELECTION

In August of 1991 a study was conducted to select landing sites for the GTE Hawaiian Tel Fiber Optic Cable System connecting the islands of Kauai, Oahu, Maui, and Hawaii. A set of criteria was used to reduce the field of potential landing sites. The advantages and disadvantages of each site were evaluated to provide the basis for comparing the sites.

The following is a brief discussion of criteria for determining landing sites:

2.3.1 Shoreline/Nearshore Conditions

The shoreline and nearshore conditions are a consideration because the depth of the water from the landing site towards the ocean must be deep enough to protect the cable. Approximately 50 to 60 feet of water will be required before wave forces diminish to levels where wave action does not affect the cable. Areas with extensive shallow water far from shore (i.e.4,000'+) were considered difficult or suboptimal in providing protection during storms and other high wave conditions.

The composition of bottom conditions limits acceptable landing sites. Sandy bottoms are preferred due to the possible environmental impacts of anchoring, armoring, or trenching through rock or coral in order to securely fasten the fiber optic cable. Also if the ocean bottom has extensive sand deposits, especially adjacent to the shoreline the cable can eventually be covered by sand, providing maximum protection against wave forces.

2.3.2 Public Use Considerations

It is anticipated that impacts to public recreational areas will be minimal given the short-term and relatively minor requirements for installing a fiber optic cable. However because of potential for difficulties with area users, landing sites in areas of major public use are considered a constraint to selection.

Areas of potential historical and archaeological significance in close proximity to cable landing sites are also considered a constraint to selection, due to the possibility of destroying a historic site.

2.3.3 Environmental/Natural Resource Considerations

The landing sites should not be within proximity to rare or endangered species or their habitats in order not to disturb them.

Impacts to shoreline and ocean water quality should be kept to a minimum. Sites which would require extensive ocean anchoring and cable protection work (i.e., shielding/dredging) and/or on-shore excavation in ground conditions which promote soil erosion should be avoided.

2.3.4 Alternative Landing Sites

Two possible landing sites for the Lanai to Oahu segment of the fiber optic cable where underwater geology would be most suitable and economically feasible are located on the southern portion of Lanai: Hulopoe Bay and Manele Bay. Kaumalapau Harbor, located to the west, is not feasible for development. The harbor operates as a commercial facility with large vessels and barges towed by tugboats. The harbor entrance is periodically dredged and vessel traffic may occasionally require the dropping of anchors. Both activities would pose extreme hazards for any fiber optic cable deployed there.

Telecommunications infrastructure that has been installed at the Manele/Hulopoe Bay area is also absent at Kaumalapau Harbor. This includes a shortage of facilities necessary to transmit the fiber optic signal to Lanai City. According to GST, facilities needed would include new telecommunications hardware for signal interpretation, and construction and installation of cable from Lanai City to Kaumalapau Harbor.

Even if it is assumed that physical constraints associated with the harbor crossing could be overcome, an approach through Kaumalapau Harbor would prove cost prohibitive at approximately ±$2-3 million in additional project costs.

The northern coast of Lanai is also not feasible for development. The shoreline along most of the coastline is comprised of rocky cliffs with extensive coral deposits in the nearshore zone. A landing along the rocky cliff line would require considerable trenching or use of explosives. In addition, coral in the nearshore would require extensive excavation which is impractical and environmentally destructive.

Manele Bay is the preferred landing site because it has an extensive offshore sand deposit and no steep ledges. The sand bottom offers optimum conditions for cable routing. In addition, the cable facility would be more compatible with the existing small boat harbor facilities and accessory uses as opposed to siting the cable within the resort-residential surrounding of Hulopoe Bay.

Hulopoe Bay was not selected primarily due to the area's Marine Life Conservation District designation and beach recreational amenities. Although the marine waters off Manele Bay are also designated in the Marine Life Conservation District, the impact of cable installation would be somewhat buffered by the existing Manele Bay Small Boat Harbor activities and facilities. Waters in and around the harbor are anticipated to be of lower quality with less diverse marine communities than waters off Hulopoe Bay, due to the harbor activities.

SECTION 3
CONSTRUCTION ACTIVITIES

3.1 GENERAL

Construction of the project will be accomplished in two phases: the first phase involves all land-side construction activities; and, the second phase involves all work necessary to prepare the landing site and landing the submarine fiber optic cable.

3.2 LAND-SIDE ACTIVITY

The land-side activities will involve the construction of a new manhole at Manele Harbor and approximately 340 feet of underground ducts and cable from the landing site to the new manhole. From the manhole the fiber optic cable will continue within an underground ductline to a second manhole located at the harbor access road (**Figure 3-1**). From the second manhole the fiber optic cable will be located to Lanai City.

Both manholes will be 5' x 10' x 6' deep reinforced concrete. The ductlines connecting the manholes will be comprised of four, 4 inch diameter conduits encased in concrete. Only one ductline will be used. The remaining vacant ductlines will be capped and retained should their future use be necessary.

Traffic will be affected during work operations and may be detoured around construction equipment. Traffic control procedures such as rerouting the traffic onto the shoulder of the road with the aid of temporary traffic control devices (cones) and/or flagmen to direct traffic will be implemented.

3.3 NEARSHORE ACTIVITY

The second phase involves landing the cable, establishing a connection to the ductline and manhole to be constructed at the Manele Small Boat Harbor, and placement of range targets to guide the cable laying ship.

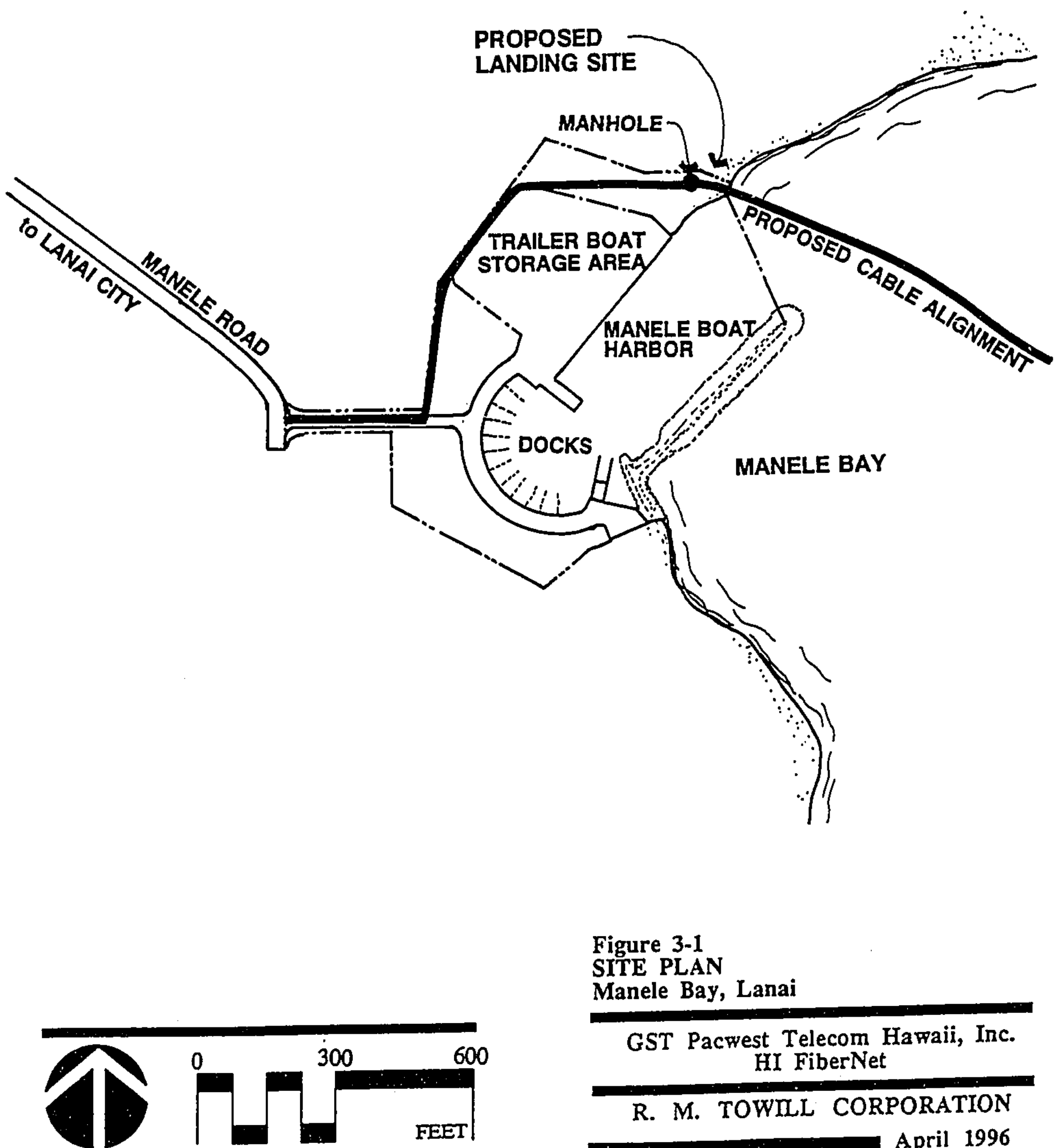

Figure 3-1
SITE PLAN
Manele Bay, Lanai

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION
April 1996

The greatest danger to a cable system is the submarine portion of the route, and this necessitates more construction effort than the landside portion. Protection of the cable and public safety are the major factors for ensuring the fiber optic cable is covered or anchored in nearshore waters. Approximately 50 to 60 feet of water will be required before wave forces diminish to levels where wave action does not affect the cable. Until the cable reaches this depth it must be protected.

The shoreward 100 to 150 meters of cable will be protected by articulated split pipe type armor starting at the shore-end above the high water line. The end of the split pipe will be aligned with the end of the harbor breakwater. The split pipe will protect the cable from wave action and from potential anchor drag damage. Placement of the pipe is non-intrusive, and does not require any excavation. Eventually the cable will be covered by rocks and rubble due to natural wave processes.

Once in the water the cable will be placed over the 10-meter wide rock bench where the cable will then transition to an existing sand channel. A brief study of the ocean bottom along the proposed alignment indicates that immediately offshore of the proposed landing site (base of existing rock revetment) there is hard bottom composed of volcanic rock and corals. The combination of rocks and corals continues approximately 100 to 500 feet oceanward of the proposed landing site. Depths in this area range from ± 3 to ± 18 feet. Through the center of the bay the sand channel provides depths from 40 feet to 60 feet approximately 1,000 feet oceanward.

The specific location of coral formations within the proposed alignment will be identified prior to work. Divers will adjust the cable prior to cutting the floats so as to avoid the coral. It is expected that where coral outcrops cannot be avoided by adjustment of the floats that the cable will be adjusted in the water. The relative flexibility of the articulated split pipe fiber optic cable will allow for pulling the cable around coral heads, thereby preventing potential for damage.

Once the cable is landed from the nearshore area and installed into the ductline, it will be permanently installed into the manhole. To reduce the potential for turbidity due to construction, silt screens or filters will be used within the nearshore construction area. Upon completion of construction activities, the construction crew will make every reasonable effort to return the ground to existing preconstruction contours through use of existing excavated materials or concrete for backfill.

3.4 CABLE LANDING PROCESS

Two range targets (alignment guide) will be placed on land just prior to the landing of the cables to aid in the cable laying process. The range targets will be placed on temporary structures and will be removed following the cable landing. The range targets will not disrupt traffic movements along the existing roadway system or harbor operations.

A cable laying ship provided by the cable vendor will serve as the primary means of laying the fiber optic cable. The following procedures describe the activities involved during the cable landing operations.

The cable ship will approach the landing site utilizing the range targets to align the ship as it approaches the shore. The range targets will be placed by a cable receiving party according to previously surveyed coordinates. Once the ship approaches the shore landing to the minimum depth allowable, it will fix its position relative to the landing site using a combination of Differential Global Positioning System control links to the central navigation system computer and visual point orientation of the in place navigational aids. The ship will not drop anchor or engage main engines with high propeller settings while in shallow waters to avoid any possibility of impacting the bottom conditions and obscuring the visibility for the divers monitoring the activity. As the ship fixes its position, it will begin laying out cable.

The ship will lower a floating rope to a small work boat which will then pull this rope to shore, where the end will be attached to a shore mounted inhaul winch. The other end of the rope will be attached to the end of the fiber optic cable.

The ship will lay cable while its crew attach floats along the cable to support the entire deployed length. As the cable is lowered to the water, it will float, allowing it to be pulled toward shore using a winch and small motor boats.

The cable will be routed to the east of the channel marker RN2 and away from the area of the harbor entrance that requires periodic maintenance dredging by the Small Boat Harbors Department. The actual easement and special positioning will be charted and filed with the Harbors Small Boating Division as-built drawings and submitted to the appropriate agencies for chart updates and notices to mariners.

Upon landing, the cable will be fed into a steel duct line and secured inside the new manhole. When the cable is secured in the manhole, it will be temporarily anchored while the divers readjust the suspension floats in the water to obtain a proper nearshore to shoreline alignment.

Once the cable is aligned, it will be permanently installed in the manhole and the divers will cut the remaining floats away, allowing the rest of the cable to sink to the ocean bottom. There will be no attempt to bury the cable under the water. The surf zone will settle the protected cable to a safe level under the constantly shifting sands and cobbles in the harbor entrance.

3.5 SAFETY AND ENVIRONMENTAL CONSIDERATIONS

During the construction phase on the beach (approximately 7-10 calendar days in November/December 1996), portions of the harbor and the immediate area surrounding the cable landing will be barricaded from public entry. During the construction period, a security guard may be required at night and on weekends to ensure public safety and integrity of the job site.

During the cable laying process (approximately 2 days), the nearshore waters will remain open to boat users but will be monitored by project personnel for ocean activities (surfing, diving, boating, swimming) to ensure the safety of ocean users. The area that will be monitored will be approximately 100-150 feet wide and 1,000-2,000 feet long. The actual area may be more or less depending on the tides. The period when the waters will be monitored is not expected to be more than two days, weather permitting. This short-term monitoring of nearshore water areas will be achieved by publishing a notice to advise mariners that during this time, small craft entering the area will be instructed to use caution and will be directed to proceed around the cable laying ship into the bay area.

All work shall be performed in conformance with all prevailing County, State, and Federal regulations regarding noise and dust control, the disposal of dirty or polluted water and construction debris and other environmental issues which may arise.

3.6 SCHEDULE AND ESTIMATED COST

The installation of interisland cable and cable landing operations is scheduled tentatively during the 4th quarter of 1996. Construction costs for this phase are estimated at +$125,000.

SECTION 4

DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 Climate

Lanai lies on the lee side of the West Maui Mountains and is thus, sheltered from the trade winds. Due to this wind shadow effect, the climate is similar to that of Kona, Island of Hawaii. Rainfall is associated with occasional winter storms and ranges between 15 and 20 inches, but averages less than 15 inches per year. Winds are predominantly light and variable. During daytime, local winds are typically dominated by on-shore sea breezes which move up slope towards Lanai City. At night, winds move down slope and out to sea. This diurnal wind pattern could include calm or near calm conditions approximately 25 percent of the time.

Temperature recordings for the Manele area are not available. Being a sheltered location and at sea level, it is anticipated that temperatures would be moderate in profile and similar to other leeward areas that are also protected from trades. Temperatures at Lanai City, elevation near 1,600 feet, average between 62° and 6° F. Temperatures at the lower elevations would be warmer and at the project site, they are likely to range from about 5 or 6 degrees higher than those at Lanai City.

4.1.2 Topography, Geology, Soils

The landing site contains moderate slopes due to the rocky soils. Where the cable is mounted overhead along Manele Road, the elevation rises quickly to approximately 1,000 feet where it levels off at the Palawai Basin. Beyond this basin are the tops of the single shield volcano, the highest elevation being Mount Lanaihale at 3,370 feet.

Geologically, the area is described as the coastal flank of a single extinct shield volcano. The underlying structure of the land form is rock formed by the cooling of lava flows down the slope from the crater when active. Much of the areas along the southeast and southwest coast of Lanai are characterized by dissected uplands and contains slopes cut by numerous major valleys, with established master drainage patterns.

According to the *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, the landing site contains a combination of very stony land (RVS) and sandy alluvial land (rSL). Very stony land consists of areas where 50 to 90 percent of the surface is covered with stones and boulders. The slopes range from 7 to 30 percent. This soil is underlaid by soft, weathered rock and bedrock. In a few places there is a shallow, clayey soil among the stones and boulders.

Sandy alluvial land consists of recent stream deposits, and is subject to flooding during the rainy season.

Impacts

No long term surface or subsurface impacts are anticipated on the underlying stony and sandy alluvial soils. Placement of the protected cable is non-intrusive, and does not require any excavation. Eventually the cable will be covered by rocks and rubble due to natural processes.

4.1.3 Hydrology

There are no perennial streams in the subject area. The major drainage feature for the area is an unnamed gulch which originates at Palawai Basin and runs alongside Manele Road. During storm conditions, the drain waters are channeled into a sedimentation basin located outside of the parcel, at the northwest end of the harbor. Drain waters flowing beyond the sedimentation basin empties into the harbor mouth at the northeastern end of the parcel.

Groundwater for the area is brackish basal water floating on salt water.

Impacts

No adverse impacts are anticipated on surface water or groundwater since the project will not alter existing drainage patterns or have any long term water requirements.

4.1.4 Terrestrial Flora/Fauna

According to the *Manele Golf Course and Golf Residential Project, Lanai, Hawaii, Final Environmental Impact Statement, October*, by Belt Collins & Associates, the vegetation within the vicinity is kiawe-ilima forest. This vegetation type contains widely scattered kiawe trees with an underlying, well-developed, layer of ilima. The vegetative ground cover also contains primarily piligrass with a scattering of feather fingergrass, buffelgrass, and hairy merremia. Due to the rock and boulder soil type, there is no vegetative cover at the landing site.

The rVS soil type is used for pasture and wildlife habitats. According to the *Final Environmental Assessment, Trilogy Corporation's Manele Bay Passenger Rest Stop*, May 1995, by Chris Hart & Partners, common urban and field birds have been recorded in the Manele-Hulopoe area. The axis deer is also known to frequent the area. Due to the urbanized surroundings at Manele Bay, it is unlikely that endangered or rare animal species will inhabit or frequent the landing site.

Thus, no rare or endangered species of plants are anticipated to be found on the site.

Impacts

The landing site is not anticipated to contain any rare plants or animals. If any rare or endangered flora or fauna are discovered at the landing site, work in the immediate area will cease and the appropriate government agencies will be contacted.

4.1.5 Marine Flora and Fauna

Marine waters off Manele Bay and the adjacent Hulopoe Bay have been designated as a Marine Life Conservation District, managed by the State Department of Land and Natural

Resources. Except for the portion of the east coast between the mouth of Maunalei gulch and Hamaiki Point, all coastal waters are designated Class AA by the State Department of Health.

Sea Engineering carried out a field investigation of proposed nearshore cable routes and landings at Manele Harbor on 13 March 1996 (see Appendix A). The field investigations concentrated on the physical aspects of the ocean bottom that would affect the cable placement and the requirement for cable protection. The following description of the nearshore area of Manele Harbor is based on information provided by Sea Engineering.

The proposed landing site would take advantage of an extensive offshore sand deposit, and only the inshore 100 feet or so would cross hard bottom. Preliminary fathometer runs in the center of the bay showed a relatively flat bottom, indicative of a sand channel, and this was confirmed by a dive to 90 feet in the center of the bay. The sand coverage is extensive and the deposit appears to be relatively thick. Fathometer runs out to the 120 foot depth were made, and the sand appears to continue to at least that depth. The sand bottom offers optimum conditions for cable routing. Also, no steep ledges were noted.

The biological survey at Manele Bay did not find any rare or unusual species or communities. Another protected species, the humpback whale (Megaptera novaeangliae) was not seen offshore of the study area during the period of the field effort.

Impacts

The potential for impact to the shallow marine communities will probably be greatest during the cable laying phase of this project. From the sea, the proposed cable alignment enters the shallows through the western entrance to the bay. The cable is expected to have little negative impact to the shoreside because the majority of the substratum is rock. There will be no attempt to bury the cable under the water. The surf zone will settle the protected cable to a safe level under the constantly shifting sands and cobbles in the harbor entrance. No impacts are therefore anticipated after the cable has been deployed.

Another concern may be with disturbance to threatened or endangered species. Assuming that deployment of the cable occurs during the period of time that humpback whales are in island waters, it is anticipated that the impacts to whales would be minimal. The deployment of the cable from shallow water (i.e., the 60 foot isobath) to shore should not take longer than one day. In general, this deployment is done by bringing the cable laying ship into about the 60 foot isobath; from this point to shore, the cable is buoyed up using floats and small craft are used to maneuver the cable into the appropriate alignment and into shore.

The probable source of local impact to whales would be the production of noise by the cable laying ship and smaller vessels used to bring it ashore. There are variable and conflicting reports as to the impact of vessel traffic on whales. Evidence from the northwest Atlantic and northeast Pacific suggest behavioral changes by whales in response to vessels, but they may show considerable fidelity to specific areas despite vessel traffic (major shipping, trawler activity, etc.; Brodie 1981, Matkin and Matkin 1981, Hall 1982, Mayo 1982). In contrast Jurasz and Jurasz (1980) found a sharp decline in humpback whale numbers in Glacier Bay, Alaska with increases in vessel activity. In a short term study, Bauer (1986) found no correlation between vessel and whale numbers as well as no net movement offshore at Olowalu, Maui in 1983-84. However, a six year study suggested a major offshore movement of mother-calf pods off Maui with increased vessel traffic (Glockner-Ferrari and Ferrari 1985, 1987). This study alone cannot be used to determine whether the observed reductions in sighting around Maui is correlated with vessel traffic; there is no consistent baseline information or comparative studies on humpback whale habitat utilization around Maui which may corroborate the trends reported by Glockner-Ferrari and Ferrari (Tinney 1988).

With respect to the response of individual humpback whales, there is sufficient information to demonstrate that boating and other human activities do have an impact on behavior (Bauer and Herman 1986). Thus it is probably valid to assume that impact to whales could occur if individuals are within several kilometers of the cable deployment. However as noted above the impacts (here noise) are not expected to last for more than one day, and all activities will be concentrated in a very small area. Finally, no known adverse impacts on where reported during the laying of the GTE Hawaiian Tel Interisland cable system.

Sea turtles are permanent residents in inshore Hawaiian habitats thus the potential exists for problems during the construction phase if it entails dredging or causes turbidity. No dredging is proposed. From the sand channel up to the proposed landing special effort will be focussed on minimizing potential for turbidity impacts while installing the cable from the narrow basaltic shelf to the landing.

Any construction activity that generates fine particulate material will lower light levels and in the extreme, bury benthic communities. Sedimentation has been implicated as a major environmental problem for coral reefs. Increases in turbidity may decrease light level resulting in a lowering of primary productivity. When light levels are sufficiently decreased, hermatypic corals (i.e., the majority of the corals found on coral reefs) will eject their symbiotic unicellular algae (zooxanthallae) on which they depend as source of nutrition. However, in nature corals will eject their zooxanthallae and survive (by later acquiring more zooxanthallae) if the stress is not a chronic (long-term) perturbation.

Perhaps a greater threat would be the simple burial of benthic communities that may occur with high sediment loading and concurrent low water movement. Many benthic species including corals are capable of removing sediment settling on them by ciliary action and the production of mucous, but there are threshold levels of deposition where cleaning mechanisms may be overwhelmed and the individual becomes buried.

However, the impact of sedimentation on Hawaiian reefs may be overstated. Sedimentation from land derived sources (usually the most massive source) is a natural event usually associated with high rainfall events. Dollar and Grigg (1981) studied the fate of benthic communities at French Frigate Shoals in the Northwest Hawaiian Islands following the accidental spill of 2200 mt of kaolin clay. These authors found that after two weeks there was no damage to the reef corals and associated communities except where the organisms were actually buried by the clay deposits for a period of more than two weeks.

Water Quality Considerations. With any disturbance to the seafloor, sediment will be generated which will manifest itself as turbidity. This may occur through natural events such as storm surf re-suspending fine material that had previously come into the area through natural events and settled or by human activities including the directing of storm water runoff into the ocean or by underwater construction activities. Underwater construction (principally dredging) will generate fine particulate material that could impact corals. The generation of fine sedimentary material could have a negative impact to corals and other benthic forms if it occurs in sufficient quantity over sufficient time. Studies (e.g., Dollar and Grigg 1981 noted above) have found that the impact must be at a high level and chronic to affect adult corals.

Laying of the cable in shallow water would probably produce little sediment. This statement is supported by the fact that there will be no dredging, trenching, nor any attempt to bury the cable under the water. Instead the cable will be protected from wave action by articulated split pipe in the nearshore area. The small scale and anticipated short duration (approximately 2 days) of the project suggest a minimal impact.

Turbidity is a an optical property that is related to the scattering of light by the suspended particles in the water column. The finer the particles, the longer they may remain in suspension (Ekern 1976) and if fine materials are associated with much water motion (waves, currents) the actual deposition rates in these turbid waters may be quite low. However, if the amount of suspended particles (i.e., turbidity) is great enough to reduce light levels, some impact to corals may occur.

Potential for water quality impacts associated with construction work will be regulated through the Section 401 Water Quality Certification which was granted by the State Department of Health on August 28, 1996. This certification identifies specific methods and measures that will be practiced to mitigate the potential for water quality impacts due to proposed work. These practices will include use of silt screens as well as Best Management Practices to govern work site activities.

4.1.6 Scenic and Visual Resources

Manele Bay is a small indentation in the southern coast of Lanai. It is flanked by rocky bluffs on either side. At the southwest corner are the berthing docks for up to 60 small crafts. A 4.6-acre harbor is protected by a 570-foot long rubble-mound breakwater on the south side. The 10-acre facility contains minimal support facilities and include rest rooms, auto and boat trailer parking, marina, and a launching ramp. The harbor also contains a fueling pier. An existing picnic and rest stop structure is constructed of shade cloth on a galvanized frame. Other views include landscaping for visual relief and vistas of the almost pristine coastal environment. In the future, a one-story rest stop is proposed on the northern side of the docking area.

Impacts

No long-term adverse visual impacts are anticipated on the harbor. Placement of the protected cable is non-intrusive, and does not require any excavation in submerged land. Eventually the cable will be covered by rocks and rubble due to natural processes.

For two days there will be a temporary impact on the coastal views from cable laying activities. During this period, a portion of the harbor's shoreside facilities will be temporarily closed for safety considerations. This portion of the project site will have construction equipment and a silt screen. Following the installation of the optic cable, the beach will be returned to its existing condition.

4.1.7 Historic/Archaeological Resources

The potential for discovery of archaeological resources would be expected within the shoreside areas designated for trenching. The shoreline area has been extensively disturbed during harbor construction activities in 1960 and 1969. Dredged materials from channel excavation placed along the shoreline has subsequently resulted in subsurface disturbance during earthwork to transport and stockpile the dredge spoils. It is therefore expected that most if not all remaining cultural and archaeological resources at the shoreline area would have been destroyed.

According to discussion with Cultural Surveys Hawaii, cultural and archaeological resources within the area mauka of the cable landing may have remaining resources present. An archaeological reconnaissance is proposed to address this concern by examining the area within the cable alignment landward of the shore landing to the location of the harbor entrance road where the cable is proposed to terminate.

Impacts

No short or long term impacts are expected from the installation of the fiber optic cable at the shoreline. An archaeological reconnaissance will be taken along the landside route to ensure appropriate avoidance (by routing the cable around a significant site), or mitigation (data recovery as warranted). The archaeological reconnaissance report will be submitted for coordination with the State Historic Preservation Division, DLNR. Appropriate measures as called for by DLNR will be instituted before any work may proceed.

4.1.8 Beach Erosion and Sand Transport

The marine substrate of the landing primarily consists of rock and basaltic sediments interspersed with coral. A rock revetment shelters the shoreline from waves. Since the cable will be anchored, it will not affect the integrity of the revetment.

Impacts

The proposed project is not expected to impact beach processes. Placement of the protected cable is non-intrusive, and does not require any excavation in submerged land. Eventually the cable will be covered by rocks and rubble due to natural processes.

4.1.9 Nearshore Conditions

The proposed cable landing site is north of the trailer boat storage area. On land, the cable will be installed in an underground cable ducts which avoids any above surface structures or uses. **Figure 4-1** shows the location of these features and the proposed route.

4.2 SOCIO-ECONOMIC ENVIRONMENT

4.2.1 Population

The estimated resident population of Lanai for 1994 is 2,975 (Recorded Telephone Information, State Department of Business, Economic Development, and Tourism). This estimate is projected to increase to 4,968 by 2010 (Unconstrained Forecast, Island Level, Maui County Community Plan Update Program, Socio-Economic Forecast Report, Volume I, Community Resources, Inc., August, 1992). The projected increase of just under 2,000 residents above the 1994 estimated population level, requires that the island's communication system be expanded to meet the anticipated increase in communication needs. Presently, there are no fiber optic cables serving Lanai or Molokai. With the installation of a fiber optic cable system, capacity for additional telephone access will expand dramatically.

Impacts

No adverse impact on existing resident and worker populations of Lanai are expected. Positive impacts include an alternative communications system in case of emergencies.

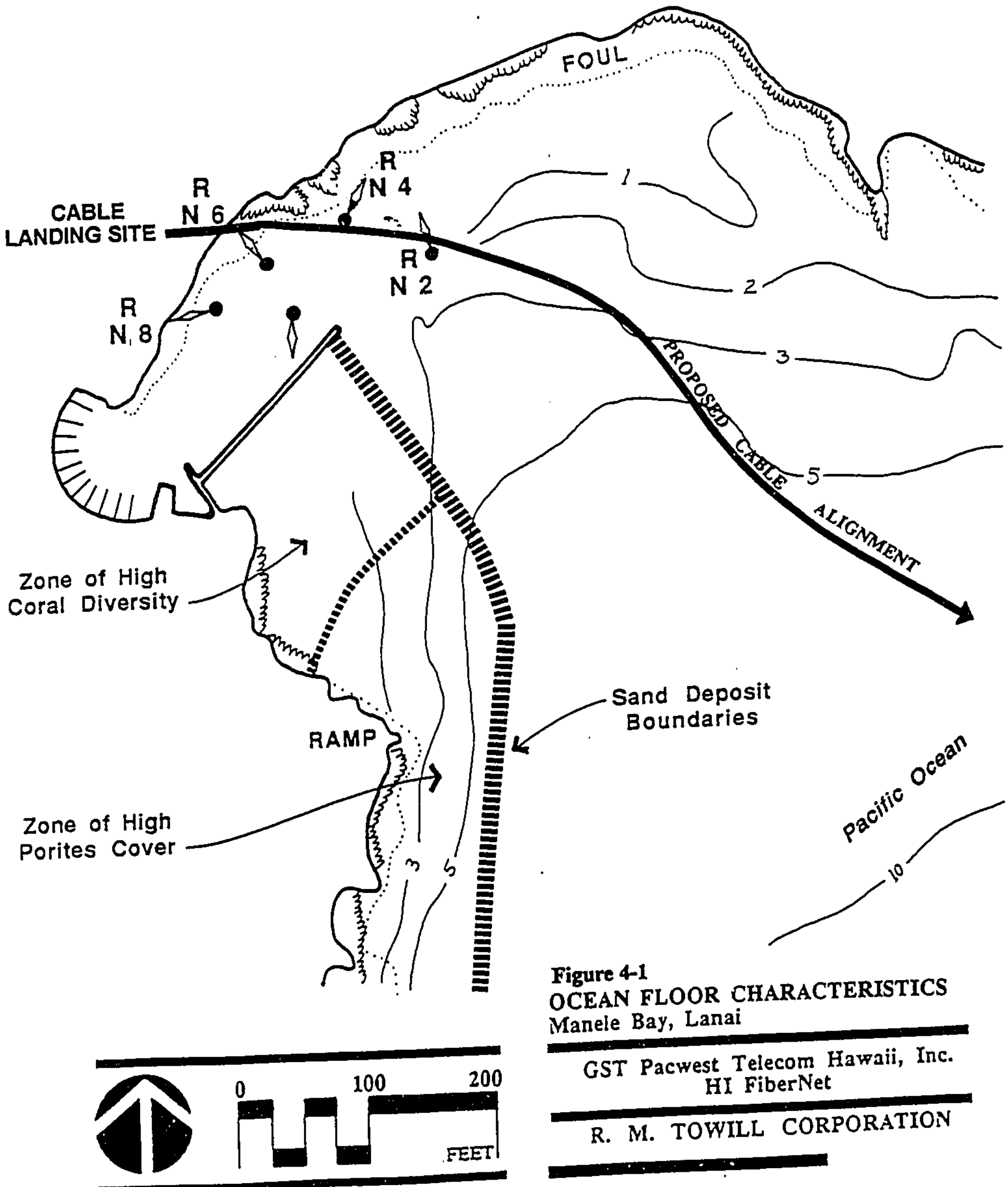

Figure 4-1
OCEAN FLOOR CHARACTERISTICS
Manele Bay, Lanai

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4.2.2 Surrounding Land Use

The property is owned by the State of Hawaii, Department of Transportation. Mauka of the 12-acre State lot are lands owned by Castle & Cooke, Inc.. East of the harbor is the recently completed Manele Bay Hotel which fronts Hulopoe Bay. Lands mauka of the coastal areas are proposed for single-family residential and golf course use.

Impacts

Short term impacts from cable laying activities are anticipated for 2 days. Placement of the protected cable is non-intrusive, and does not require any excavation. Eventually the cable will be covered by rocks and rubble due to natural processes. No long term impacts are expected from the proposed project. The cable route will be underground and within ducts on vacant land or overhead within street right-of-ways. Accordingly, no significant adverse impacts to surrounding uses are anticipated.

4.3 PUBLIC FACILITIES AND SERVICES

4.3.1 Transportation Facilities

The project site is served by Manele Road, a State-owned, two-lane highway which connects to Kaumalapau Highway. Manele Road has a 19-foot wide pavement with 6-foot wide shoulders. Sections of Manele Road are badly worn and require repair and /or repaving.

Impacts

The proposed project is expected to have no major impact on existing traffic. Cable installation will take two days during which equipment will be placed within vacant areas of the Harbor. Sufficient space will be available so that an adequate thoroughfare can be maintained.

4.3.2 Recreational Facilities

The principal recreational amenities in the vicinity of the project site are Manele Bay Small Boat Harbor and the adjacent Hulopoe Beach Park. The harbor is primarily used by residents and recreational fishermen for fishing related activities and picnicking. The neighboring Hulopoe Beach Park is the most popular coastal recreational amenity for both residents and visitors.

Impacts

During the cable laying process (approximately 2 days), the nearshore waters will remain open to boat users but will be monitored by project personnel for ocean activities (e.g., surfing, diving, boating, swimming) to ensure the safety of ocean users. As required, a safety zone surrounding the work area will be established to ensure protection of the public.

The area that will be monitored will be approximately 100 - 150 feet wide and 1,000 - 2,000 feet long. The actual area may be more or less depending on the tides. The period when the waters will be monitored is not expected to be more than two days, weather permitting.

This short-term monitoring of nearshore waters will be achieved by publishing a notice to advise mariners that during this time, small craft requiring access to the small boat harbor will be under direction of project personnel. It is proposed that work will temporarily cease as needed to ensure access to docking facilities. Notice of the proposed work will be provided to adjacent land owners.

All work will be performed in conformance to all prevailing County, State, and Federal regulations regarding noise and dust control, the disposal of dirty or polluted water and construction debris, and other environmental issues that may arise.

SECTION 5

PROBABLE IMPACTS OF THE PROPOSED PROJECT AND MITIGATING MEASURES

5.1 SHORT-TERM IMPACTS

The short-term adverse impacts that cannot be avoided include noise from construction activity, dust, traffic congestion, aesthetics, restricted access, and siltation of nearshore waters. The specific impacts and mitigating measures proposed are described below.

5.1.1 Noise From Construction Activity

During the construction phase of the project, noise is anticipated from heavy equipment for excavation, cable alignment and laying, and backfilling excavated areas. Noise generated from machinery can be mitigated to some degree by requiring contractors to adhere to State and County noise regulations. This includes ensuring that machinery are properly muffled.

A cable laying boat used during the construction period will also be a source of noise. The impact of noise from this vessel is partly mitigated by the distance between it and the shoreline. The noise impact will be temporary in nature and will not continue beyond the construction and cable laying period.

5.1.2 Air Quality

Air quality of the proposed project area is good due to low emission levels and the almost continual presence of tradewinds or on-shore breezes. The major factor affecting air quality in the area will be from the operation of construction equipment for excavation and cable laying. No long term adverse impacts are anticipated.

During the excavation process, loose sand may be cast into the air by wind. The release of sand into the air can be prevented by requiring the contractor to periodically wet down the work area. The areas that are used for the placement of the range targets will also be exposed during the construction period. The target sites should be similarly wetted to control fugitive dust. The work site will be returned to its original state after the cable laying process is completed.

5.1.3 Water Quality

Nearshore waters in the vicinity of the project are rated Class "AA" by the State Department of Health. Shallow waters experience considerable turbidity even when surf is minimal. Offshore waters are very clear with excellent underwater visibility over reef slopes. Water temperature and salinity are normal for ocean water with evidence of fresh water inflow along the shore.

It is anticipated that the nearshore waters may be affected during laying of the cable. Silt screens to lessen turbidity effects will be erected to minimize this impact. Adverse effects due to turbidity can be minimized by leaving a barrier of sand in place at the water's edge until the day of the cable pull. Turbidity is typically only generated on one or two days on a cable pull.

5.2 LONG-TERM IMPACTS

There are no long-term adverse impacts that can be associated with this proposed action. As much as practicable, the project site will be restored to existing conditions after completion of the cable laying activity.

SECTION 6

RELATIONSHIP TO STATE AND COUNTY LAND USE PLANS AND POLICIES

6.1 THE HAWAII STATE PLAN

The Hawaii State Plan (Chapter 226, Hawaii Revised Statutes) provides a guide for the future of Hawaii by setting forth a broad range of goals, objectives, and policies to serve as guidelines for growth and development of the State. The proposed project is generally consistent with the Hawaii State Plan. The following objectives of the State Plan are relevant to the proposed project:

Section 226-10.5: Economy - Information Industry
The proposed project serves to assist in the State's objective of positioning Hawaii as the leader in providing information services in the Pacific. The proposed project will continue the development and expansion of Hawaii's telecommunications infrastructure and will help to accommodate future growth in the information industry.

Section 226-14 Facility Systems - In General
The proposed project supports the State's goals for achieving telecommunications systems necessary for Statewide social, economic, and physical objectives.

Section 226-18: Facility System - Energy/Telecommunications
The proposed project will help to ensure adequate and dependable telecommunication services for Hawaii by promoting efficient management and use of existing and proposed facilities and by promoting installation of new telecommunications cables.

6.2 STATE FUNCTIONAL PLANS

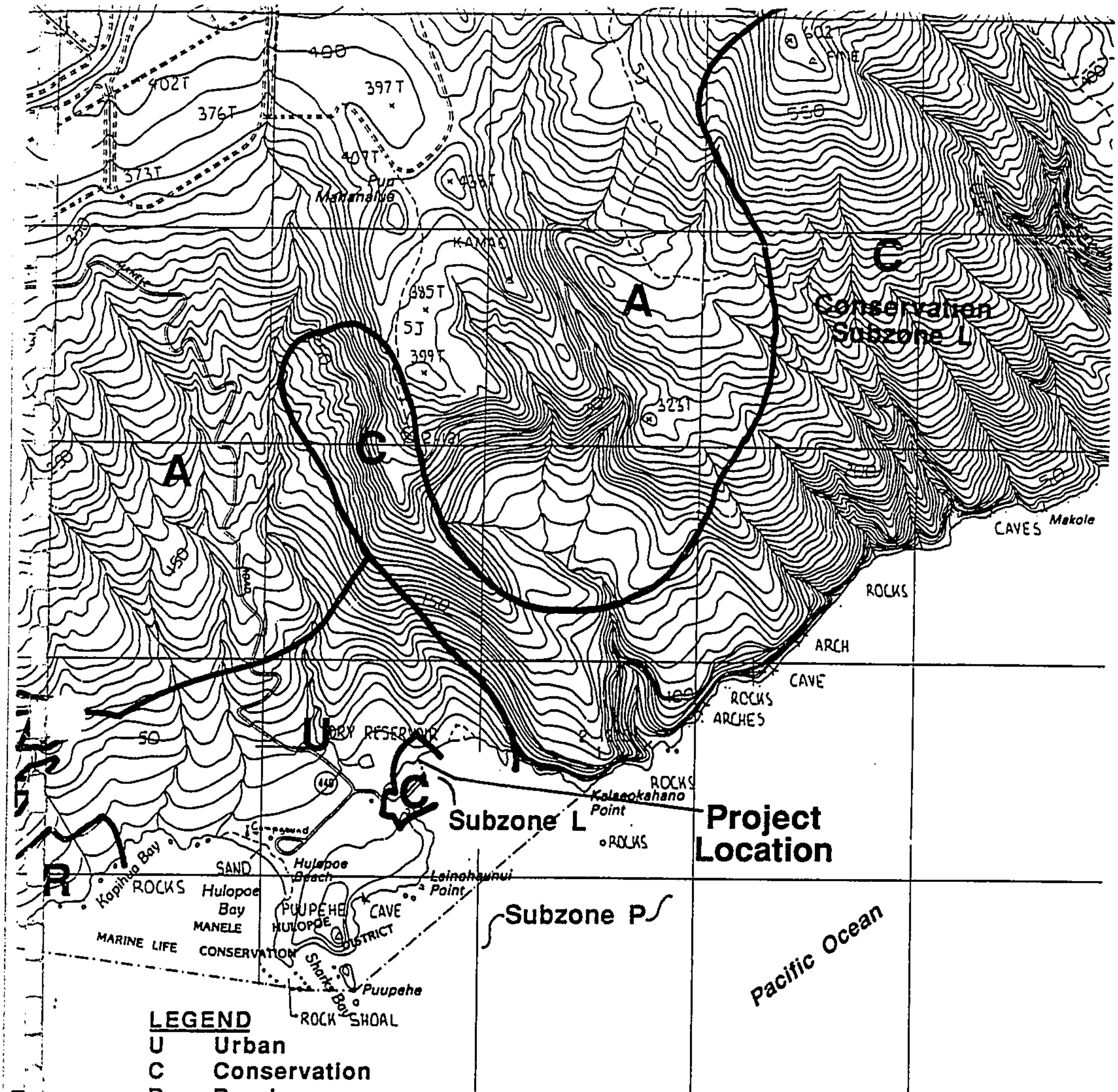
The Hawaii State Functional Plan (Chapter 226) provides a management program that allows judicious use of the State's natural resources to improve current conditions and attend to various societal issues and trends. The proposed project is generally consistent with the State Functional Plans. The following objectives of the State Functional Plans are relevant to the proposed project:

> Education Implementing Action A(4)(c):
> The proposed project will help to ensure adequate telecommunication services necessary for Hawaii's schools objectives.
>
> Education Implementing Action B(3)(d):
> The proposed project serves to promote and expand the appropriate use of telecommunications to deliver distance education as well as enhance the learning process and communication competencies of students.
>
> Education Implementing Action(3)(e):
> The proposed project enables school library media centers to effectively manage and provide access to information and knowledge through telecommunications.

6.3 STATE LAND USE LAW

The State of Hawaii Land Use District classifications designate Manele Bay and the surrounding area as "Conservation", and the surrounding areas as "Rural", "Urban" and "Agricultural" **(Figure 6-1)**. The Conservation District includes lands that are susceptible to floods and soil erosion and lands undergoing major erosion damage requiring corrective actions by county, state, or federal governments.

Due to serious erosion hazard, much of the lands around Lanai's coast have been placed in the Conservation District. A sedimentation basin was constructed immediately to the northwest of the Harbor due to severe non-point source pollution via soil erosion of the mauka lands. The Conservation Subzone designation for the site is Limited. The purpose of this subzone is to limit uses where natural conditions suggest constraints on human activities. However, the physical characteristics of the harbor; gentle slopes, consisting of fill from harbor excavation, and being



LEGEND

U Urban
C Conservation
R Rural
A Agriculture

Conservation District Subzones

P Protective
L Limited

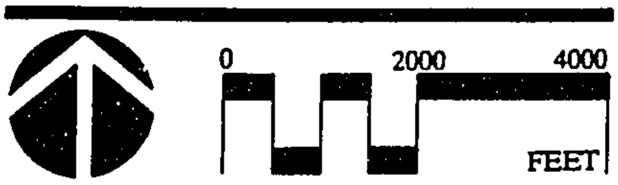


Figure 6-1
STATE LAND USE
Manele Bay, Lanai

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April 1996

partially improved, distinguish the harbor land from those up mauka. The topography of the landing site and the limited amount of earthwork involved with the construction activities should minimize the potential for soil erosion. In addition, the mitigation measures proposed for protecting marine habitats will contribute to mitigating any adverse effects of soil erosion. Thus, the landing site does not appear to suggest that there are any significant constraints due to natural conditions. Appropriate measures will be implemented to guard against permanently injuring marine ecosystems and non-point source pollution due to soil erosion.

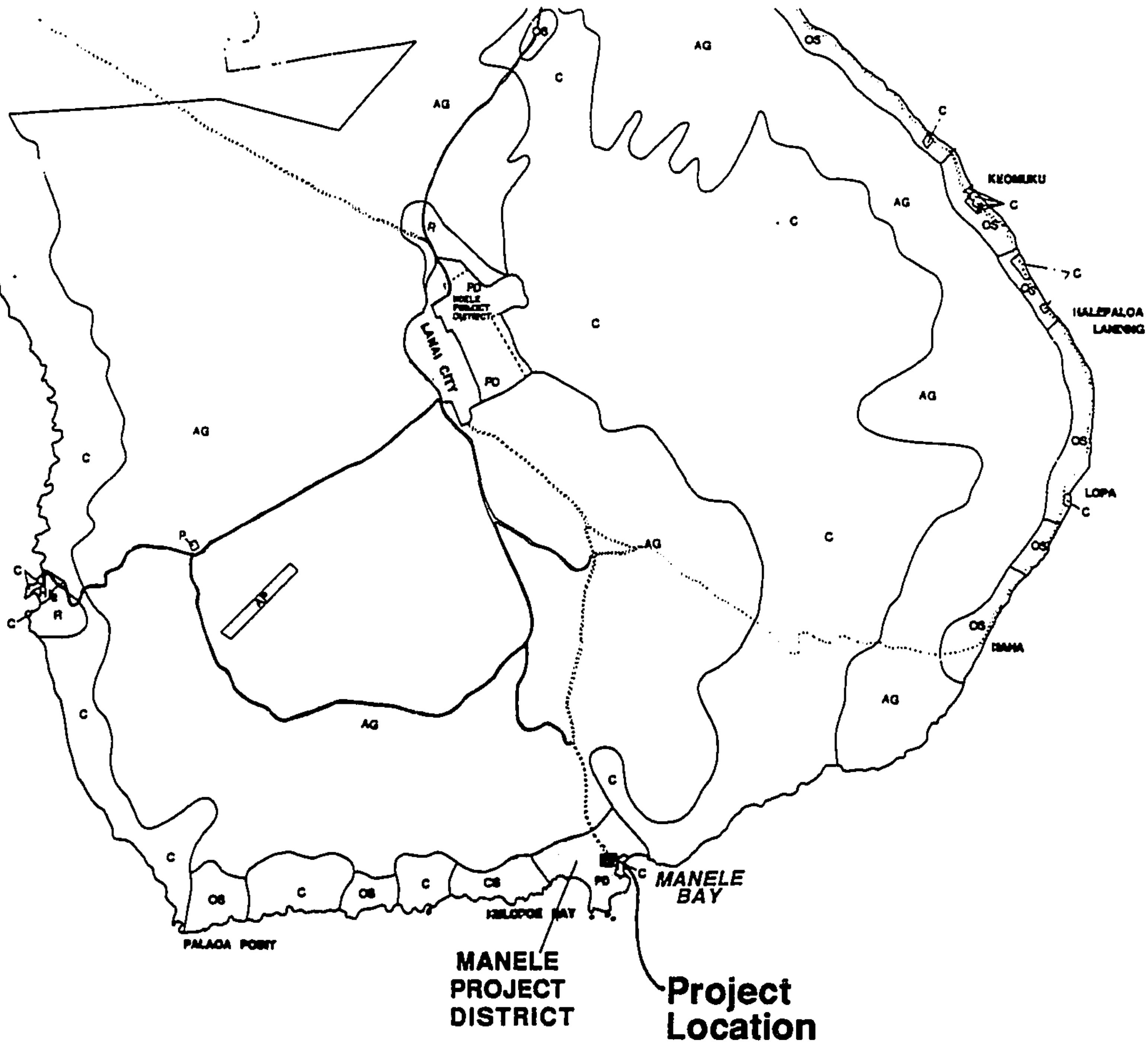
6.4 COUNTY OF MAUI GENERAL PLAN

The General Plan of the County of Maui provides a statement of long range social, economic, environmental, and design objectives and a statement of policies necessary to meet these objectives. A specific objective of the General Plan relating to the proposed project is to provide public utilities which will meet community needs. The proposed project is generally in conformance with the goals and objectives of the County General Plan.

6.5 LANAI COMMUNITY PLAN

The County of Maui has established nine community plan regions to guide each region's growth and development, in accordance with the County's General Plan. The community plan contains objectives and policies with relatively detailed statements to implement such objectives and policies. The community plans were to be updated every 10 years to incorporate new data and analysis. Under the Lanai Community Plan, County of Maui, dated April 1983, no updates have occurred since its inception. However, the Community Plan for Lanai calls for a separate Project District plans for Manele Bay and Koele to be implemented by separate ordinances. Currently, a Community Plan Update for the proposed Lanai Community Plan (dated March 1995), was prepared for the Lanai Planning Commission by the Maui Planning Department.

According to the Community Plan Update, the project site is designated within Project District I (Manele) **(Figure 6-2)**. The Community Plan Update, Project District I Standards, states that "The project district shall include hotel, residential, golf course, limited commercial, open space, park and public marina uses. Limiting commercial use to the hotel, golf clubhouse and Manele



LEGEND

C	Conservation
AG	Agricultural
R	Rural
OS	Open Space
PD	Project District
HI	Heavy Industrial
P	Public/Quasi-Public
AP	Airport

Figure 6-2
LANAI COMMUNITY PLAN
of the COUNTY OF MAUI
Manele Bay, Lanai

Not to Scale

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Small Boat Harbor areas will compliment the objectives of the Manele Hulopoe Marine Conservation District." The fiber optic cable and its alignment to the central office will be consistent with the recommended commercial component of the Project District. Since the cable will be buried below grade, it will not impact present harbor and recreational uses of the area.

The Community Plan does not specifically address the need for additional telecommunications, except indirectly in a recommendation concerning health and public safety. The recommendation of the Community Plan Update is to "support the development of a new public safety facility". The fiber optic cable will permit an alternate telecommunications path to maintain contact with the neighbor islands in case of an emergency (i.e. hurricane).

6.6 COUNTY ZONING

The site is designated within the State Conservation District and is thus, unzoned. Development within this District is subject to State Conservation District Use regulations of DLNR and the County of Maui Building Codes.

6.7 COASTAL ZONE MANAGEMENT, SMA RULES AND REGULATIONS

The County of Maui has designated the shoreline of the Island of Lanai as being within the Special Management Area (SMA) **(Figure 6-3)** and will require an SMA Permit from the Lanai Planning Commission. SMA areas are felt to have a sensitive environment and should be protected in accordance with the State's coastal zone management policies. This section addresses the project's consistency with the objectives and policies of the Coastal Zone Management Program pursuant to the Rules of the Lanai Planning Commission and Chapter 205A, Hawaii Revised Statutes.

Coastal Ecosystems

"Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems."

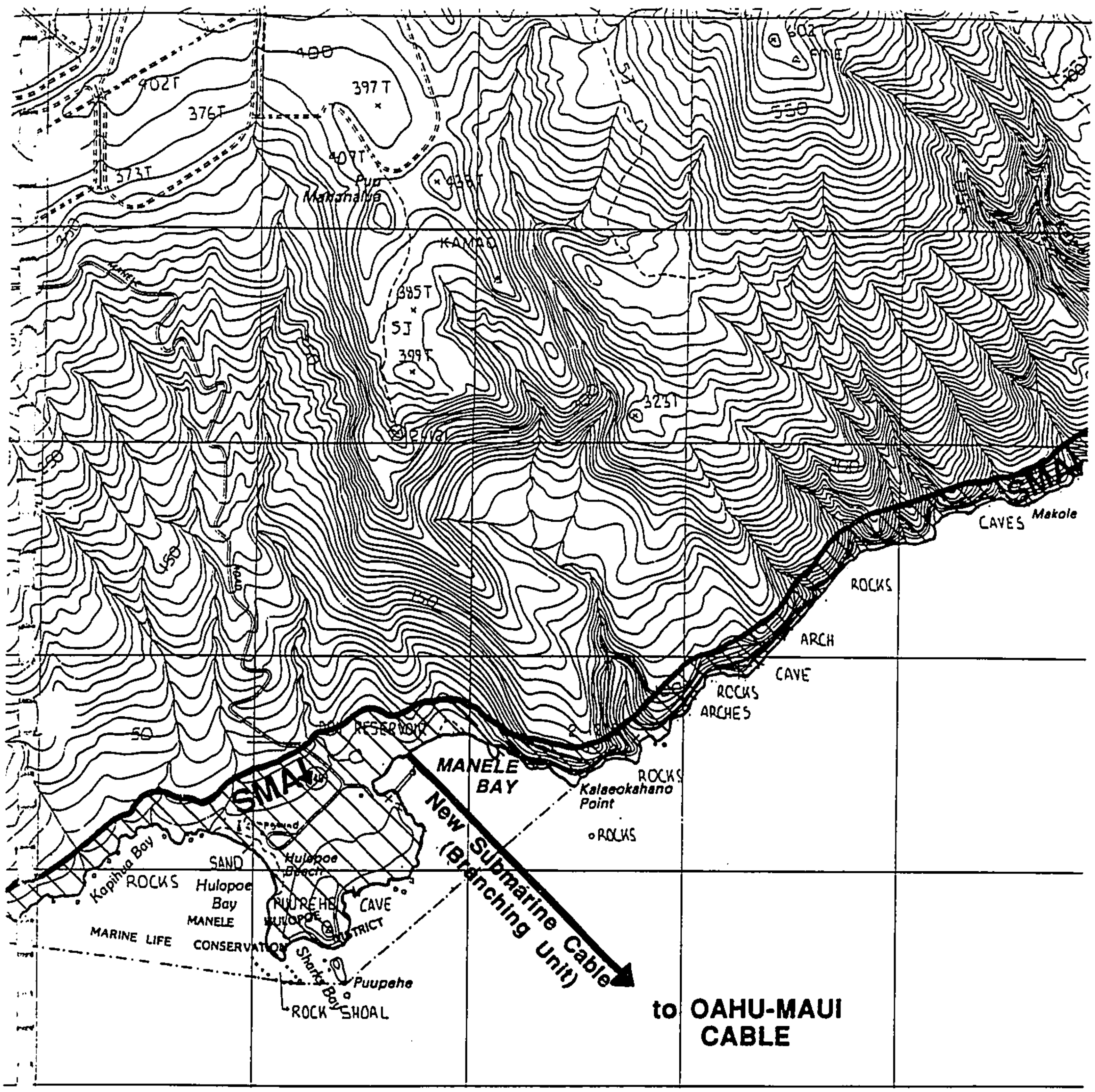
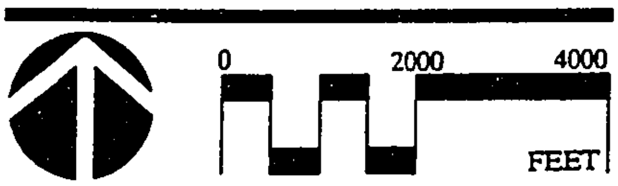


Figure 6-3
SHORELINE MANAGEMENT AREA (SMA) BOUNDARY
Manele Bay, Lanai



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No negative impacts are anticipated as a result of the proposed fiber optic cable. During the construction phase, appropriate mitigation measures will be implemented to minimize disturbance of marine habitats. These include installing silt curtains to contain sediments and turbidity, use of Best Management Practices, and selecting a route that is least subject to erosion which would be a non-point source of pollution. In addition, potential for water quality impacts associated with laying of the cable will be in accordance with applicable provisions of the Water Pollution Control and Water Quality Standards of the State Department of Health and Chapter 20.08 of the Maui County Code.

SECTION 7

ALTERNATIVES TO THE PROPOSED ACTION

7.1 NO ACTION

No action will eliminate the opportunity to provide an alternative fiber optic cable telecommunications provider, which is necessary for a competitive market and reduced telecommunications costs for consumers. Allowing additional competition between interisland communication providers translates into higher quality service. In addition, in case of emergencies, an alternative cable would serve as a backup wired telecommunications system. Finally, without this cable system, fiber optic service to the islands of Molokai and Lanai would not be available. Presently, there are no fiber optic cable systems serving these two islands.

Other losses resulting from this alternative would include:

- Lost employment opportunities which would have been realized in connection with the cable laying procedure, maintenance and operation; and

- Lost tax revenues for State government from the cable vendor, and increased public and private telecommunication usage.

7.2 ALTERNATIVE SITES

Two possible landing sites for the Lanai to Oahu segment of the fiber optic cable where underwater geology would be most suitable and economically feasible are located on the southern portion of Lanai: Hulopoe Bay and Manele Bay. Kaumalapau Harbor, located to the west, is not feasible for development. The harbor operates as a commercial facility with large vessels and barges towed by tugboats. The harbor entrance is periodically dredged and vessel traffic may occasionally require the dropping of anchors. Both activities would pose extreme hazards for any fiber optic cable deployed there.

Telecommunications infrastructure that has been installed at the Manele/Hulopoe Bay area is also absent at Kaumalapau Harbor. This includes a shortage of facilities necessary to transmit the fiber optic signal to Lanai City. According to GST, facilities needed would include new telecommunications hardware for signal interpretation, and construction and installation of cable from Lanai City to Kaumalapau Harbor.

Even if it is assumed that physical constraints associated with the harbor crossing could be overcome, an approach through Kaumalapau Harbor would prove cost prohibitive at approximately ±$2-3 million in additional project costs.

The northern coast of Lanai is also not feasible for development. The shoreline along most of the coastline is comprised of rocky cliffs with extensive coral deposits in the nearshore zone. A landing along the rocky cliff line would require considerable trenching or use of explosives. In addition, coral in the nearshore would require extensive excavation which is impractical and environmentally destructive.

Manele Bay is the preferred landing site because it has an extensive offshore sand deposit and no steep ledges. The sand bottom offers optimum conditions for cable routing. In addition, the cable facility would be more compatible with the existing small boat harbor facilities and accessory uses as opposed to siting the cable within the resort-residential surrounding of Hulopoe Bay.

Hulopoe Bay was not selected primarily due to the area's Marine Life Conservation District designation and beach recreational amenities. Although the marine waters off Manele Bay are also designated in the Marine Life Conservation District, the impact of cable installation would be somewhat buffered by the existing Manele Bay Small Boat Harbor activities and facilities. Waters in and around the harbor are anticipated to be of lower quality with less diverse marine communities than waters off Hulopoe Bay, due to the harbor activities.

7.3 ALTERNATIVE TECHNOLOGY

The following describes alternatives to fiber optic cable technology:

7.3.1 Microwave Radio Systems

The use of additional or modification of existing interisland microwave radio systems is an alternative providing limited service to Maui and the State. However, in comparison with microwave radio systems, fiber optic technology is the only means of providing the bandwidth necessary for interisland digital circuits without distortion in voice and data transmission, and problems with signal strength and reliability.

7.3.2 Satellites

Satellites are not a feasible alternative based on large extreme disadvantages associated with use of satellites which include:

- Transmission delays due to technical and atmospheric limitations involving the distance the radio waves must travel;
- Visual and aesthetic intrusion caused by the need for ground stations and radio antennas which must be constructed to accept the satellite transmissions; and
- Difficulties associated with "double hops" which occur when data must be retransmitted in order to establish a secure voice circuit.

In comparison with satellites, fiber optic technology is the only means of providing the bandwidth necessary for interisland digital circuits without transmission delays and major visual and aesthetic problems.

7.4 RECOMMENDED ACTION

The recommended action is to proceed with establishment of a submarine fiber optic cable system with a landing at the small boat harbor at Manele Bay. From there, the cable will be installed within a utility easement.

SECTION 8

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

No short-term exploitation of resources resulting from development of the project site will have long-term adverse consequences. The appearance of the land portion of the existing site will not be permanently altered. Eventually the cable will be covered by rocks and rubble due to natural processes.

Once construction activities are completed there will be no affect on recreational activities, marine life, or wildlife.

Long-term gains resulting from development of the proposed project include provision of more effective State telecommunications systems (by means of fiber optic cables). The proposed project will enhance economic productivity by increasing telecommunications service options between islands.

SECTION 9

IRREVERSIBLE/IRRETRIEVABLE COMMITMENT OF RESOURCES BY THE PROPOSED ACTION

Development of the proposed project will involve the irretrievable loss of certain environmental and fiscal resources. However, the costs associated with the use of these resources should be evaluated in light of recurring benefits to the residents of the Island of Lanai, the County of Maui, and the State of Hawaii.

It is anticipated that the construction of the proposed project will commit the necessary construction materials and human resources (in the form of planning, designing, engineering, construction labor, landscaping, and personnel for management and maintenance functions). Reuse for much of these materials and resources is not practicable. Although labor is compensated during the various stages of development, labor expended for project development is non-retrievable.

SECTION 10

NECESSARY PERMITS AND APPROVALS

10.1 STATE

Department of Land and Natural Resources

- Conservation District Use Application
- Right-of-Entry
- Establishment of Offshore Easement

Office of State Planning

- Coastal Zone Management Consistency Review

Department of Health

- Section 401, Water Quality Certification

Department of Transportation

- State Highway Rights-Of-Way

10.2 COUNTY OF MAUI

Lanai Planning Commission

- Special Management Area Permit
- Shoreline Setback Variance

10.3 U.S. ARMY COE

Corps of Engineers Section 404/Section 10

10.4 PRIVATE

Access Easement

SECTION 11

CONSULTED AGENCIES AND PARTICIPANTS IN THE PREPARATION OF THE ENVIRONMENTAL ASSESSMENT

11.1 FEDERAL AGENCIES

U.S. Army Corps of Engineers

U.S. Coast Guard

11.2 STATE AGENCIES

Department of Land and Natural Resources

Department of Transportation, Harbors Division

Department of Health

Office of State Planning

Office of Coastal Zone Management

11.3 COUNTY OF MAUI

Department of Planning

11.4 PRIVATE

Manele Harbor Advisory Committee

SECTION 12

COMMENTS AND RESPONSES TO THE DRAFT ENVIRONMENTAL ASSESSMENT

This section contains the comments and responses to comments which were prepared during the Draft Environmental Assessment phase of review.

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI
1580-C Kaahumanu Avenue, Wailuku, Hawaii 96793

LINDA CROCKETT LINGLE
Mayor
HENRY OLIVA
Director
ALLEN SHISHIDO
Deputy Director
(808) 243-7230
FAX (808) 243-7934

'96 AUG 15 P2:35

RECEIVED

August 14, 1996

Mr. David Blane, Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Attention: Don A. Schneider, Planner

Dear Mr. Blane:

SUBJECT: HAWAIIAN ISLAND FIBER NETWORK

We have reviewed the Application and the Environmental Assessment for the above-referenced project and have no objections to the proposed action. Thank you for the opportunity to review and comment on this matter.

If you have additional questions, please contact Patrick Matsui, Chief of Parks Planning and Development, at 243-7387.

Sincerely,

HENRY OLIVA
Director

PTM

c: Patrick Matsui

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Mr. Henry Oliva, Director
Department of Parks and Recreation
County of Maui
1580-C Kaahumanu Avenue
Wailuku, Hawaii 96793

Dear Mr. Oliva:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

Thank you for your letter dated August 14, 1996. We appreciate your review of this important project.

Should you or your staff have any further comments please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 2
To Don Schneider | From Don Hibbard
Fax # 243-7634

AUG 23 P12:33

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION

August 23, 1996

Mr. David W. Blane, Director
Planning Department, County of Maui
250 S. High Street
Wailuku, Maui, Hawaii 96793

LOG NO: 17828
DOC NO: 9608SC05

Dear Mr. Blane:

SUBJECT: **Historic Preservation Review of Shoreline Setback Variance (96/SSV-0006) and Special Management Area Use Permit (96/SM5-0014) Applications for the Submarine Fiber Optic Cable Landing Site Manele, Lanai TMK: 4-9-17: 6**

Thank you for the opportunity to comment on the Shoreline Setback Variance (SSV) and Special Management Area Use (SMA) permit applications made for the proposed submarine fiber optic cable landing site at Manele Bay. The applications depict the cable corridor as running from the northern edge of the trailer boat storage area, south across this lot, over 300 feet or so of ground between the harbor and the access road, to the access road. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was made of the subject parcel.

An archaeological inventory survey was conducted in the Manele area in 1987 (*Archaeological Inventory Survey of the Hulopoe Bay and Manele Bay Areas, Island of Lanai, Hawaii*. 1987. Kaschko & Athens), and a total of 33 historic sites were identified. Our office accepted this report. A coastal habitation complex, SIHP No. 50-40-98-1525, comprising six features, lies above and to the northwest of the harbor. Judging from the survey report (Kaschko & Athens 1987) and the permit application materials, Site -1525 lies approximately 100 - 125 feet *mauka* of the edge of the boat docks, and perhaps 50 - 75 feet *mauka* of the proposed cable corridor as it goes from the harbor property to the harbor access road.

The existing harbor area has been extensively modified for transportation and recreational purposes so it is highly unlikely that any significant historic sites are still present in the harbor region. The only nearby historic site, Site -1525, lies 50 to 75 feet northwest of the proposed cable corridor, and is outside the construction area.

Mr. David W. Blane, Director
Page Two

If all ground alteration work is confined to the areas shown in the permit applications, particularly the ground between the trailer boat storage area and the access road, then we believe that the SSV and SMA permits, if approved, will have "no effect" on significant historic sites.

Should you have any questions, please feel free to call Sara Collins at 587-0013.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

SC:jk

R. M. TOWILL CORPORATION

420 Waiakamilo Rd. #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Hibbard:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

Thank you for your letter dated August 23, 1996. We appreciate your review of this project and your finding of "no effect" on significant historic sites.

Should you or your staff have any further comments please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

'96 AUG 23 P2:14

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
SURVEY DIVISION
P. O. BOX 119
HONOLULU, HAWAII 96810

RESPONSE REFER TO

FILE NO. ______

August 21, 1996

MEMORANDUM

TO: Mr. David W. Blane, Planning Director
Maui County Planning Department

ATTN.: Mr. Don A. Schneider, Staff Planner

FROM: Randall M. Hashimoto, State Land Surveyor

SUBJECT: LD.: 96/SSV-0006 & 96/SM1-0014
TMK: 4-9-017:06
Project Name: Hawaiian Island Fiber Network
Applicant: GST Telecom Hawaii, Inc.

The subject proposal has been reviewed and confirmed that no Government Survey Triangulation Stations and Benchmarks are affected. Survey has no objections to the proposed project.

RANDALL M. HASHIMOTO
State Land Surveyor

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Mr. Randall M. Hashimoto
State Land Surveyor
Survey Division
Department of Accounting and General Services
P. O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Hashmoto:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

Thank you for your letter dated August 21, 1996. We appreciate your review of this important project.

Should you or your staff have any further comments please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793

LAWRENCE MIIKE
DIRECTOR OF HEALTH

LAWRENCE HART, M.D., M.P.H.
DISTRICT HEALTH OFFICER

'96 AUG 14 P12:23

August 12, 1996

Mr. David W. Blane
Planning Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Blane:

Subject: HAWAIIAN ISLAND FIBER NETWORK
TMK: (2) 4-9-017:06
I.D.: 96/SSV-0006 & 96/SMI-0014

Thank you for the opportunity to review and comment on the application. We have the following comments to offer:

Any construction discharge into state waters will require a National Pollutant Discharge Elimination System (NPDES) permit.

If you have any questions, please feel free to call me at 984-8230.

Sincerely,

HERBERT S. MATSUBAYASHI
Chief Sanitarian

HM:km

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Mr. Herbert S. Matsubayashi
Chief Sanitarian
Maui District Health Office
State Department of Health
54 High Street
Wailuku, Hawaii 96793

Dear Mr. Matsubayashi:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

Thank you for your letter dated August 12, 1996. We appreciate your review of this important project. At this time we do not anticipate need for discharges which would trigger the filing of a National Pollutant Discharge Elimination System (NPDES) permit.

Should you or your staff have any further comments please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

Engineers Planners Photogrammetrists Surveyors Construction Managers

OFFICE OF [redacted] PLANNING

[redacted] Department of Business, Economic Development & Tourism

MAILING ADDRESS: P.O. BOX 3540, HONOLULU, HAWAII 96811-3540

Ref. No. P-6222

August 1, 1996

Mr. David W. Blane
Director
Planning Department
County of Maui
250 S. High Street
Wailuku, Hawaii 96793

ATTN: Mr. Don A. Schneider

Dear Mr. Blane:

SUBJECT: Shoreline Setback Variance and Special Management Area for the Submarine Fiber Optic Cable Landing at Manele Bay, Island of Lanai

We are enclosing for your use and reference a copy of the U.S. Army Corps of Engineers letter to R.M. Towill Corporation requesting additional information. Please note that some of the information needs are also relevant to our legislative Coastal Zone Management (CZM) objectives and policies. Therefore, you might want to obtain the information to assure compliance with the CZM law before recommending a final decision on the project.

If you have any questions, please contact Howard Fujimoto of our CZM Program at 587-2898.

Sincerely,

Rick Egged
Director
Office of Planning

Attachment

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Mr. Rick Egged, Director
Office of Planning
State Department of Business, Economic Development & Tourism
P. O. Box 3540
Honolulu, Hawaii 96811-3540

Dear Mr. Egged:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

We have reviewed your comment letter dated August 1, 1996, and have prepared the following reply.

Please find enclosed our response to questions from the U.S. Army Corps of Engineers. We are also working with your staff, Mr. John Nakagawa, to ensure compliance with the Coastal Zone Management (CZM) objectives and polices for Manele Bay, Lanai.

Thank you for this opportunity to respond. Should you or your staff have any further questions please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

Enclosure
BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

DEPARTMENT OF THE ARMY
U S ARMY ENGINEER DISTRICT, HONOLULU
FT SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF

'96 JUL 14 July 20, 1996

Operations Branch

Mr. Brian Takeda
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Takeda:

This is in response to your permit application and recently submitted consolidated Environmental Assessment (EA) for the *Submarine Fiber Optic Cable Landings at Various Locations, State of Hawaii*. Your project includes construction of landings, trenching, and placing communication lines between the islands. Specific landings include: Wailua Golf Course, Kauai; Makaha Beach, Oahu; Keawaula, Oahu; Sandy Beach, Oahu; Mokapu Beach, Maui; Manele Bay, Lanai; Kaunakakai, Molokai; Spencer Beach Park, Big Island.

We have reviewed your application and supporting documentation, and have determined it to be incomplete. Please furnish the following information to this office within 30 days.

1. Please show and describe construction activities within Corps jurisdiction, such as trenching and cable laying below the High Tide Line (not the certified shoreline mean low water mark, as described in the EA).

2. More figures are needed, including bottom profiles that show depth/breadth of trenching and filling, as well as figures like 3-14, General Bottom Profile at Keawaula, Oahu for all sites.

3. Clearly define where special aquatic sites (coral reefs, wetlands, mudflats) are within the scope of the project. Clearly show that there are no practicable alternatives to this method of construction and to the location of work. As my staff discussed with you before, because you propose to trench through special aquatic sites, this project cannot be authorized under the General Permit for Utility Lines.

4. Show location of silt screens for at all sites.

5. Show location of all temporary disposal/sidecast areas. Will there be any return flow?

6. Have you corresponded with the State Historic Preservation Office (SHPO)or any Native Hawaiian groups to determine if there would be adverse impacts to cultural or historic sites? In particular, Manele Bay has known historic resources, the proposed Kaunakakai site has nearby known historic and prehistoric sites, and Spencer Beach is adjacent to Punkohola Heian National Historic Site. Please provide all correspondence with the SHPO to our office.

7. Please contact the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) for an initial review of your proposed project. If the proposed activities may affect any Federally listed or proposed species or critical habitat, the Corps must initiate Section 7 consultation in accordance with the Endangered Species Act. We note that your project may affect endangered/threatened turtles, whales, and water birds and their habitat. Please provide all correspondence with these agencies to our office.

If the SHPO and the NMFS and USFWS determine that there would be no effect on historic sites or endangered species, the Corps may be able to authorize the excavation/fill under nationwide permit 12, for utility line backfill and bedding. Because this work is in navigable waters, we would also need to process a Letter of Permission under Section 10 of the Rivers and Harbors Act, which is an expedited process for those activities with minor impacts.

If there is an effect, or we find it otherwise controversial, we would likely require full public review under the standard individual permit process, for both Section 404 and Section 10 work.

We note that if you were to redesign the project to exclude excavation or fill into waters of the U.S., you would not need authorization under Section 404 of the Clean Water Act or a Section 401 water quality certification; you would only need a Section 10 permit.

Please contact Ms. Terrell Kelley of my staff at (808) 438-9258, ext. 13 if you have any questions regarding this request for additional information. Please refer to file number 960000247 in future correspondance.

Sincerely,

Rosemary C. Hargrave
Acting Chief, Operations Branch

Copies furnished:
National Marine Fisheries Service
U.S. Fish and Wildlife Service
State Department of Health, Clean Water Branch
Office of State Planning

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

August 7, 1996

Ms. Rosemary C. Hargrave, Acting Chief
Operations Branch
CEPOD-ET-PO, Building 230
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

ATTN: Ms. Terrell Kelley

Dear Ms. Hargrave:

SUBJECT: Request for Additional Information for GST Telecom Hawaii, Inc., Hawaiian Island Fiber Network (HI FiberNet)

We have received and reviewed your letter of July 10, 1996, and have prepared the following response:

1) *Construction activities within Corps Jurisdiction (Attachment 1)*

Updated Site Plans have been prepared describing the limits of work including: Mean Higher High Water (MHHW) and Mean Sea Level (MSL). We do not expect trenching will be required below the High Tide Line since the cable below MHHW will be buried using a hydrojet or hand tools such as shovels. Trenching will therefore be limited along the upland sections (between the manhole/ ductlines and the high water mark) to attach the submarine cable to ductlines.

2) *Provide more figures including general bottom profiles for all sites (Attachment 2)*

Attachment 2 describes the bottom profiles for each landing site. The depth, location, and characteristics of the nearshore ocean floor are provided.

3) *Special aquatic sites (Attachment 3)*

Attachment 3 describes the nearshore route the cable will take at each landing site, including areas with coral cover and special aquatic characteristics.

4) *Location of silt screens (Attachment 1)*

Silt screens are specified at all landing sites to reduce potential for turbidity due to construction. The temporary (8 to 12 hour installation period) and small scale of this project, however, suggests that construction related turbidity will be considerably less than would be caused by naturally occurring rough sea conditions.

This was the case for a number of sites during the landing of: the previous GTE Hawaiian Tel, Hawaii Interisland Cable System (HICS) cable at Sandy Beach, Oahu, Mokapu Beach, Maui, and Wailua Golf Course, Kauai; and, AT&T fiber optic cables at Keawaula and Makaha Beach, Oahu.

5) *Temporary disposal/sidecast areas (Attachment 1)*

Trenching will be required to install manholes and/or ductlines. Sand that is excavated during trenching will be temporarily stored adjacent to the worksite for later use as backfill, e.g., 8 to 12 hours during deployment by the cable laying ship. Because of this very short stockpiling period return flow is not expected, e.g., the excavated material will be sand and the elevation of the site will be above tidal influences during site work.

6) *Contact with State Historic Preservation Office (SHPO) or Native Hawaiian Groups or Organizations (Attachment 4)*

Per Attachment 4 various groups and organizations have been or are currently in the process of being contacted. These groups and organizations will also be notified during the Environmental Assessment review phase of this project.

7) *Contact with National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS)*

Mr. Gene Nitta, Pacific Islands Protected Species Program Manager, NMFS, and personnel with USFWS have been contacted and notified concerning this project. Follow up correspondence identifying coordination efforts will be provided upon receipt.

Thank you for this opportunity to respond. We will continue to work with Ms. Terrell Kelley of your office until all project related concerns have been addressed. Should you or your staff have any questions please do not hesitate to contact us at 842-1133.

Very truly Yours,

Brian Takeda
Senior Planner

Attachments
BT/bt
cc Jack Lewis, GST Telecom Hawaii, Inc.
CK RMTC

ATTACHMENTS FOR RESPONSE TO
DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS

GST Telecom Hawaii, Inc.

HAWAIIAN ISLAND FIBER NETWORK

State of Hawaii

August 7, 1996

R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

CONTENTS

ATTACHMENT 1

Description of Construction Activities Within Corps Jurisdiction

Wailua Golf Course, Kauai
Makaha Beach, Oahu
Keawaula, Oahu
Sandy Beach Park, Oahu
Mokapu Beach, Maui
Kaunakakai, Molokai
Manele Bay, Lanai
Spencer Beach, Hawaii

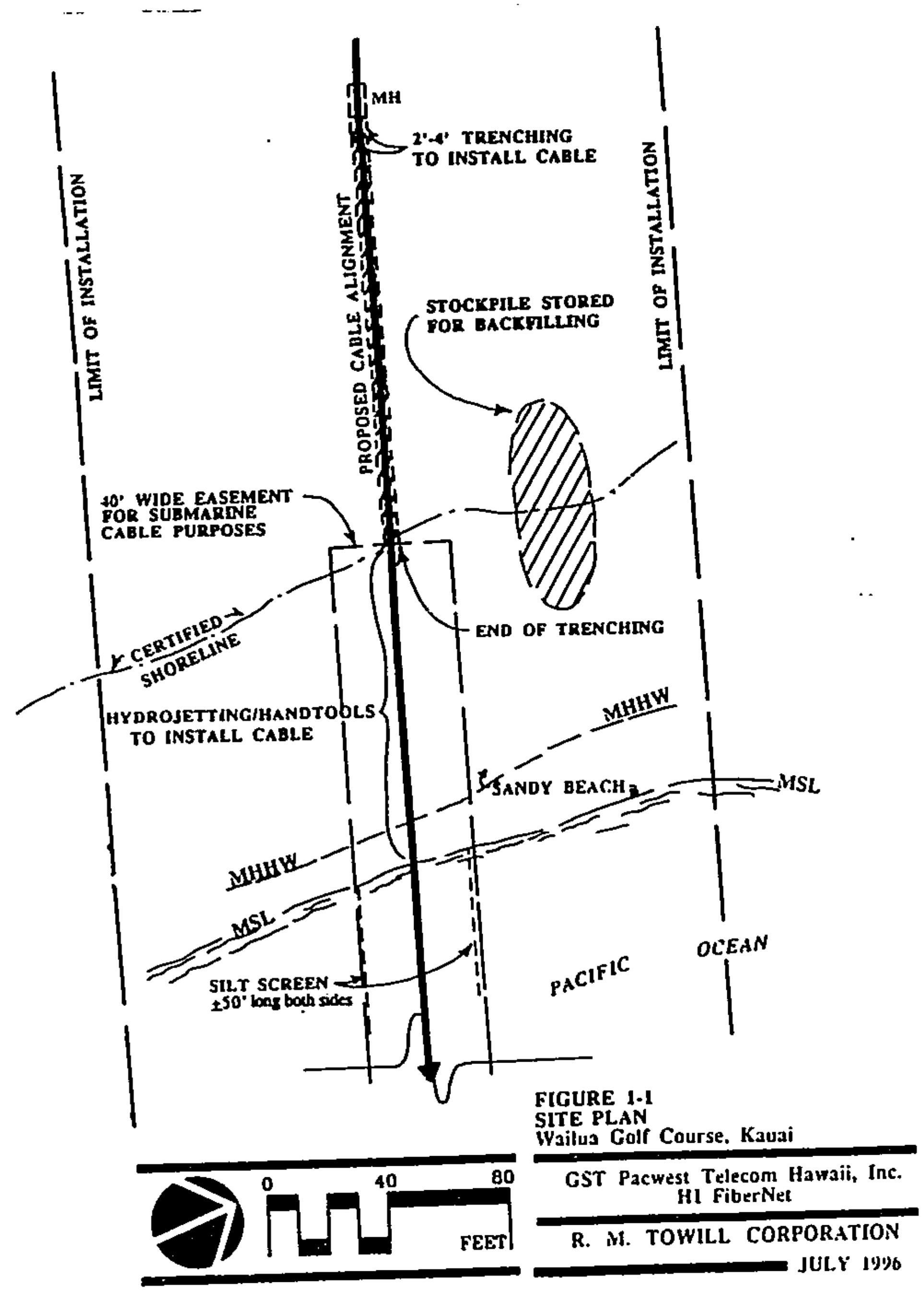


FIGURE 1-1
SITE PLAN
Wailua Golf Course, Kauai

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

JULY 1996

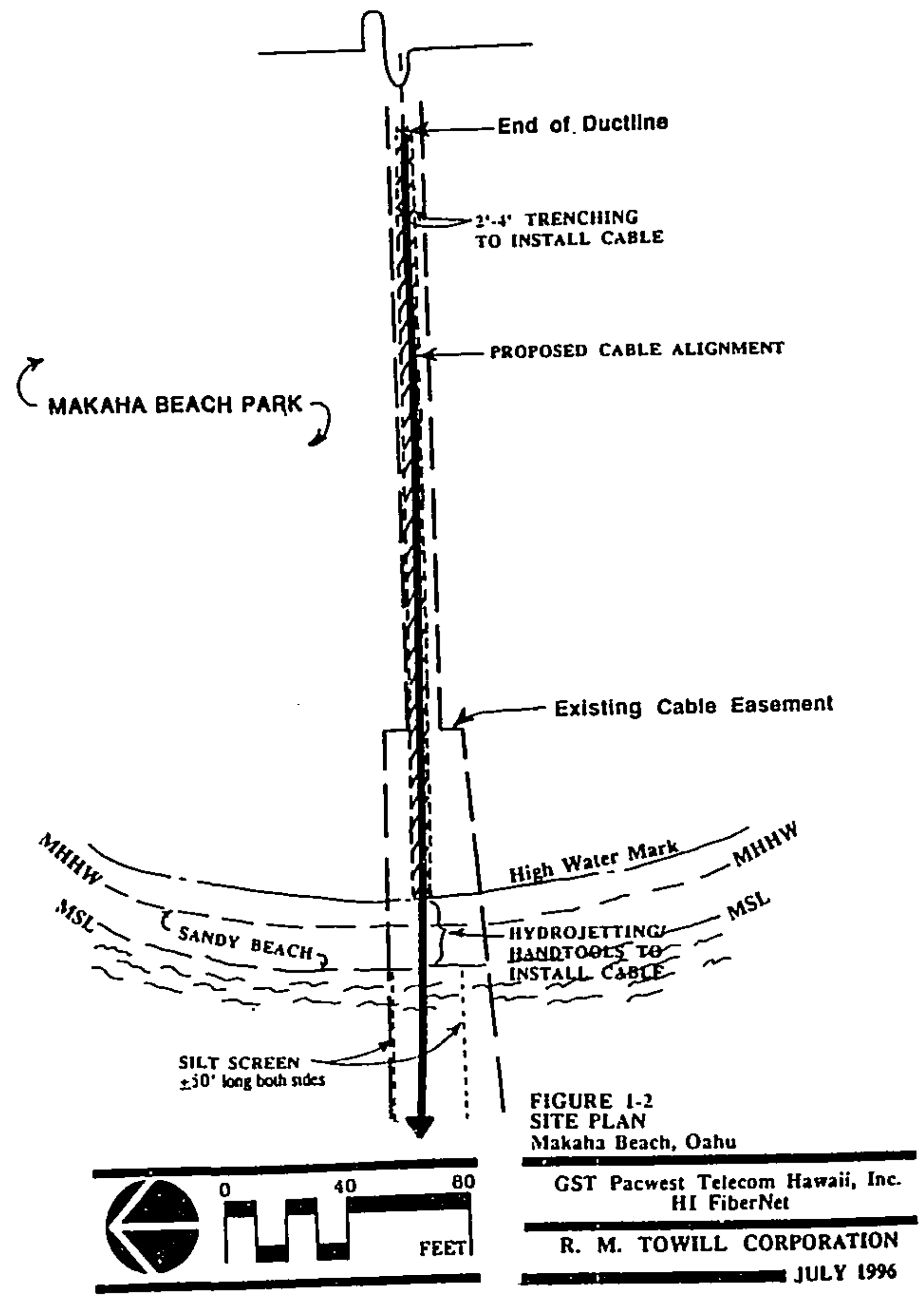


FIGURE 1-2
SITE PLAN
Makaha Beach, Oahu

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

JULY 1996

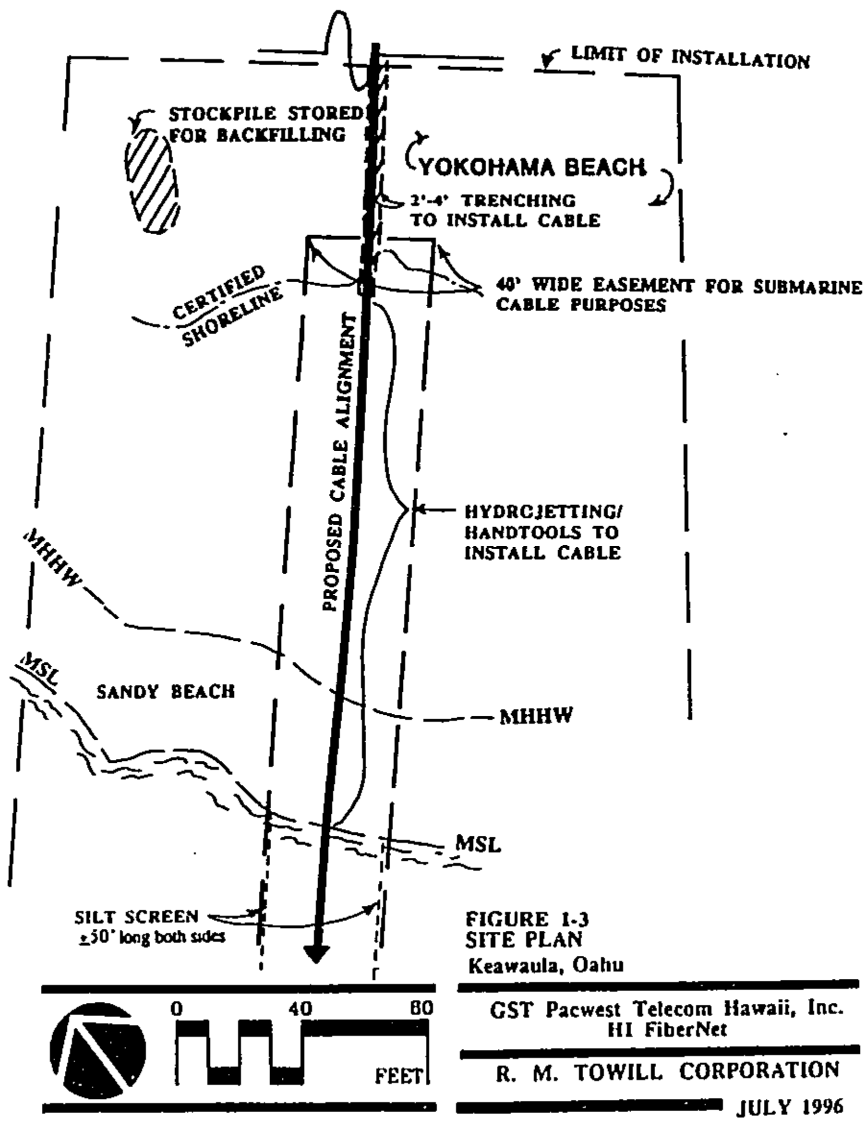


FIGURE 1-3
SITE PLAN
Keawaula, Oahu

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

JULY 1996

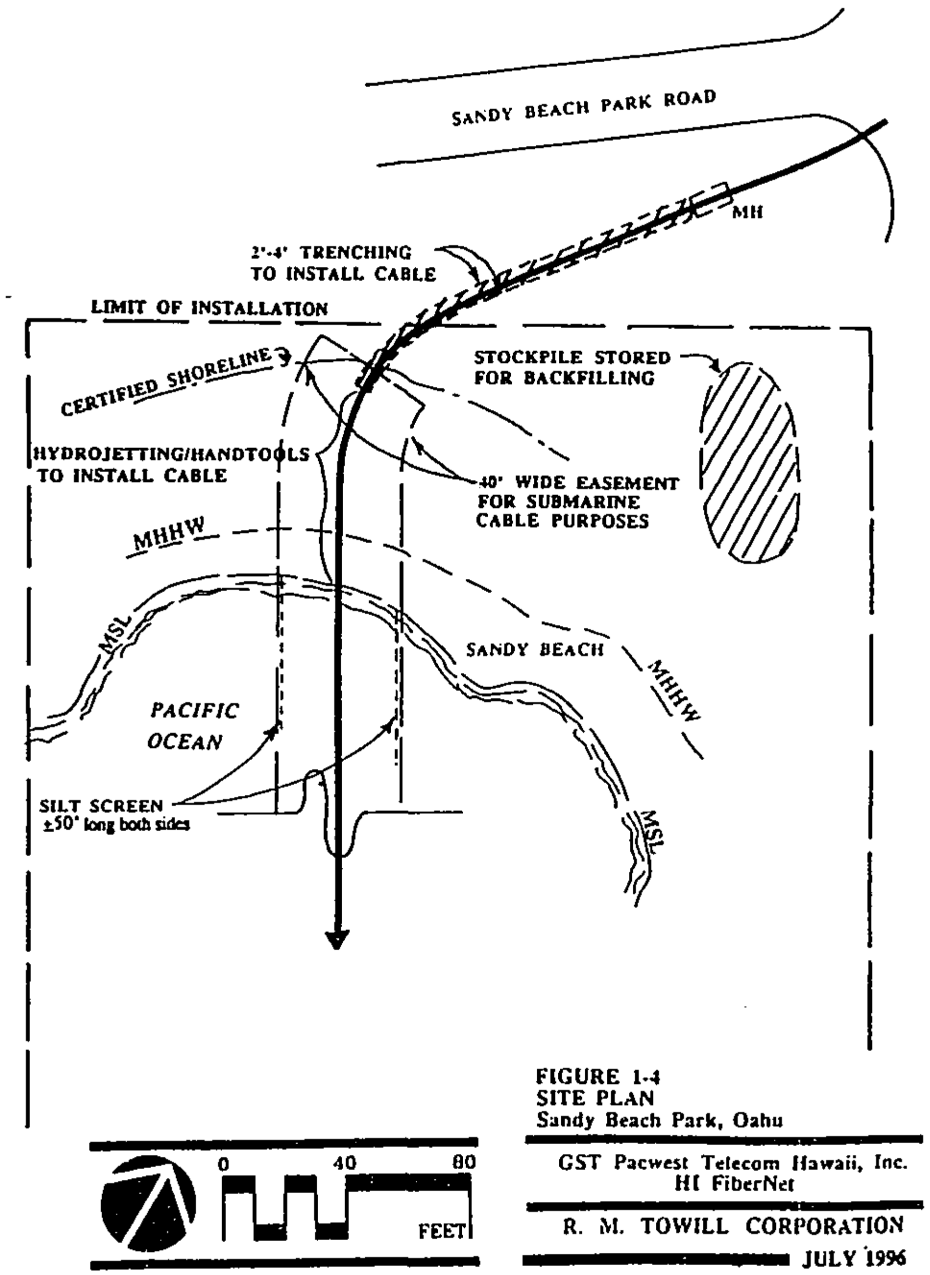


FIGURE 1-4
SITE PLAN
Sandy Beach Park, Oahu

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

JULY 1996

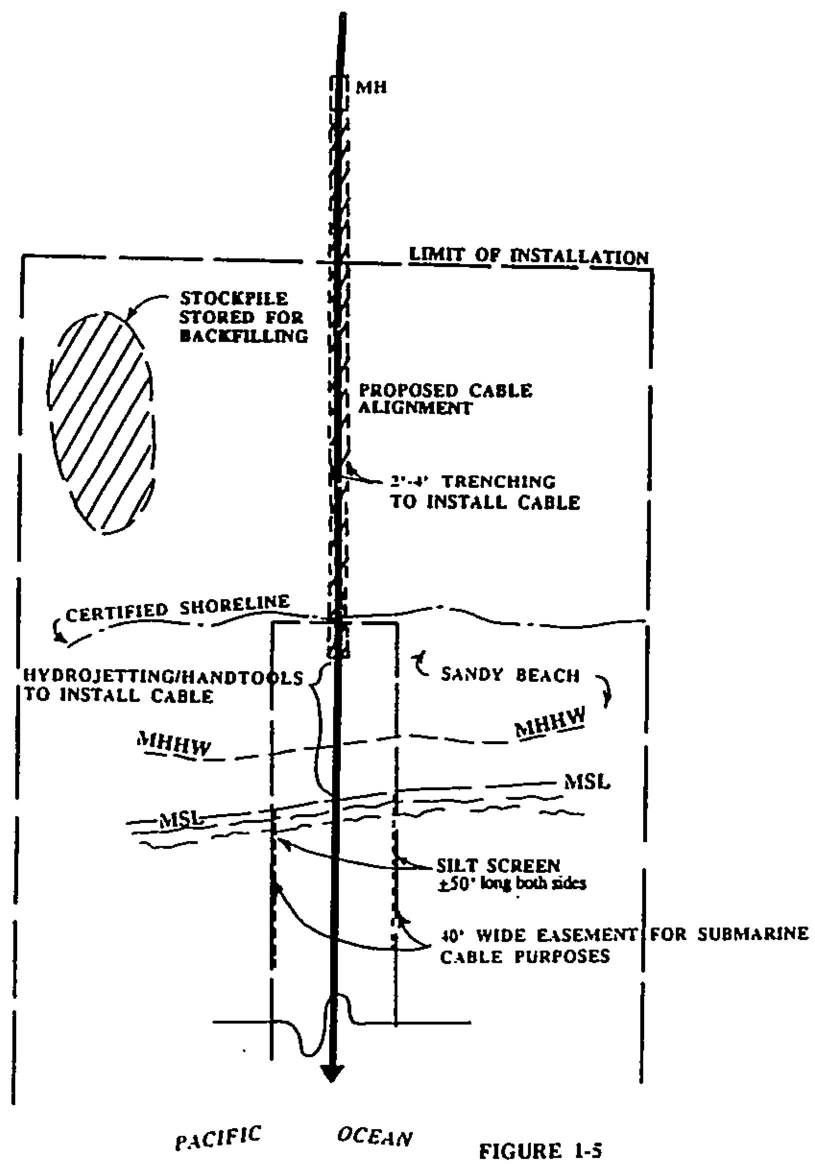
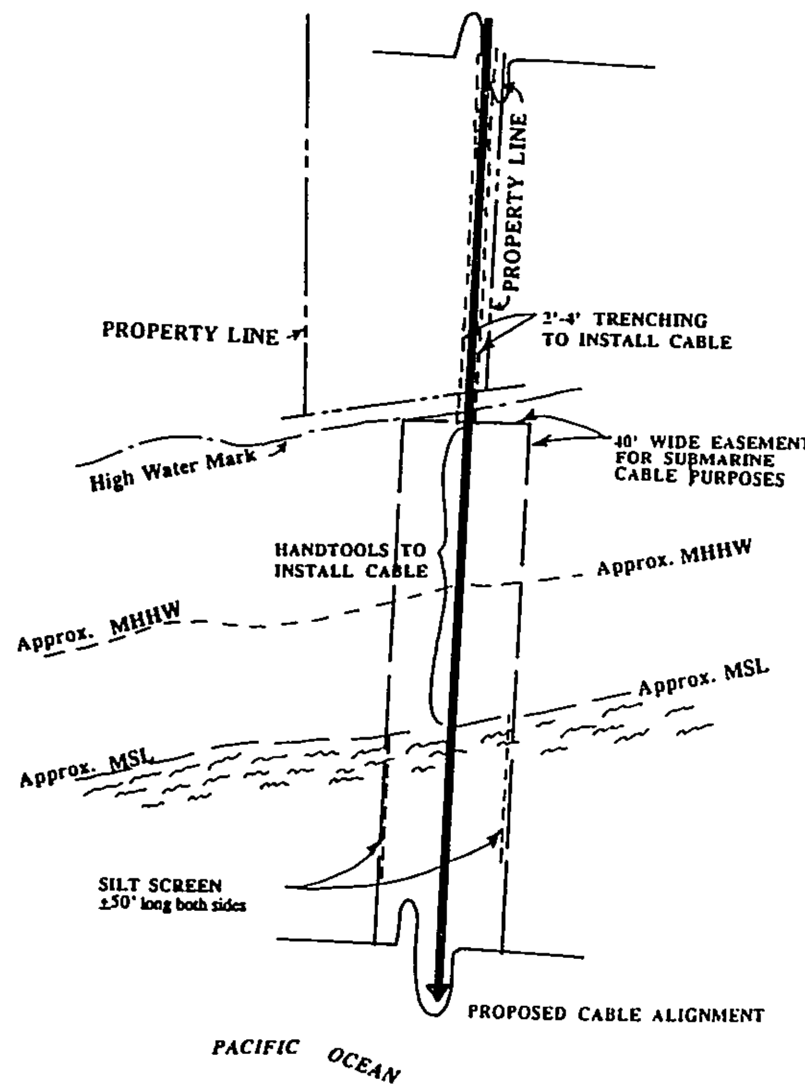


FIGURE 1-5
SITE PLAN
Mokapu Beach, Maui

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION
JULY 1996



NOTE: Mean Higher High Water Line (MHHW) & Mean Sea Level (MSL) to be verified on site.

FIGURE 1-6
SITE PLAN
Kaunakakai, Molokai

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION
JULY 1996

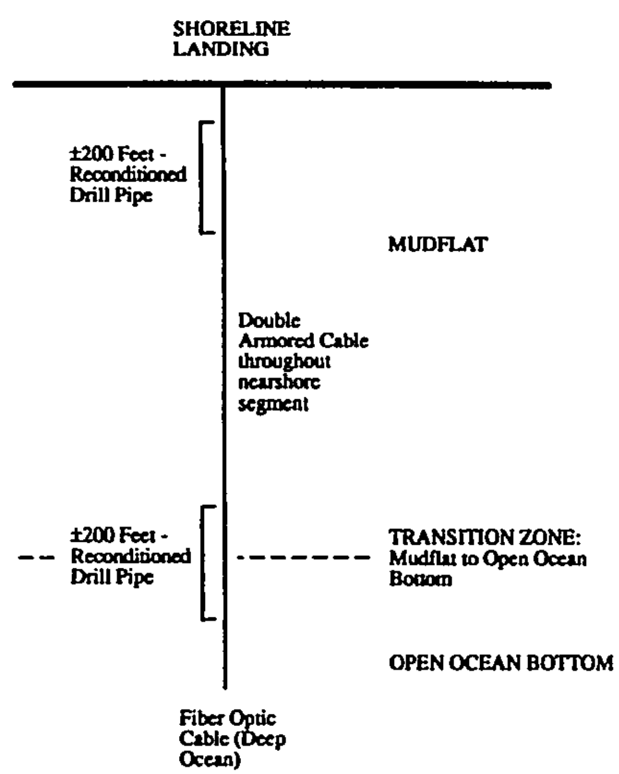
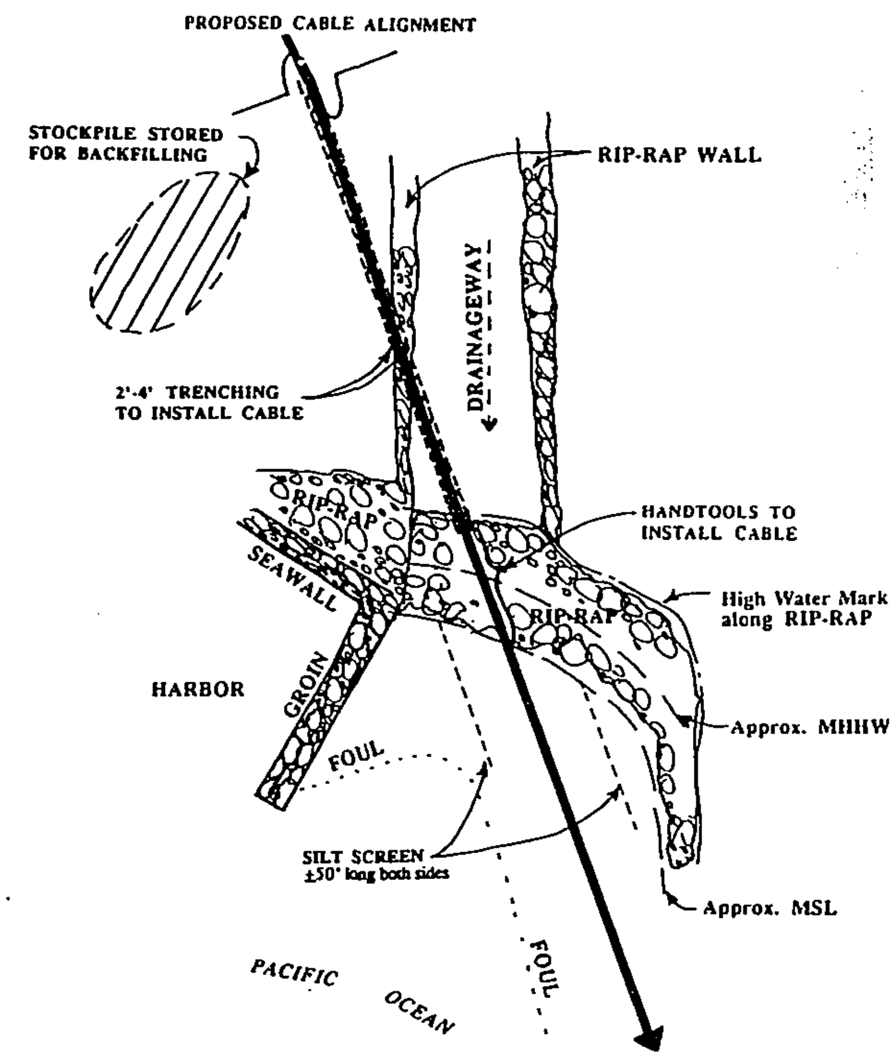


FIGURE 1-6a
CABLE LAYOUT
Kaunakakai, Molokai

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION
JULY 1996



NOTE: Mean Higher High Water Line (MHHW) & Mean Sea Level (MSL) to be verified on site.

0 40 80 FEET

FIGURE 1-7
SITE PLAN
Manele Bay, Lanai

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION
JULY 1996

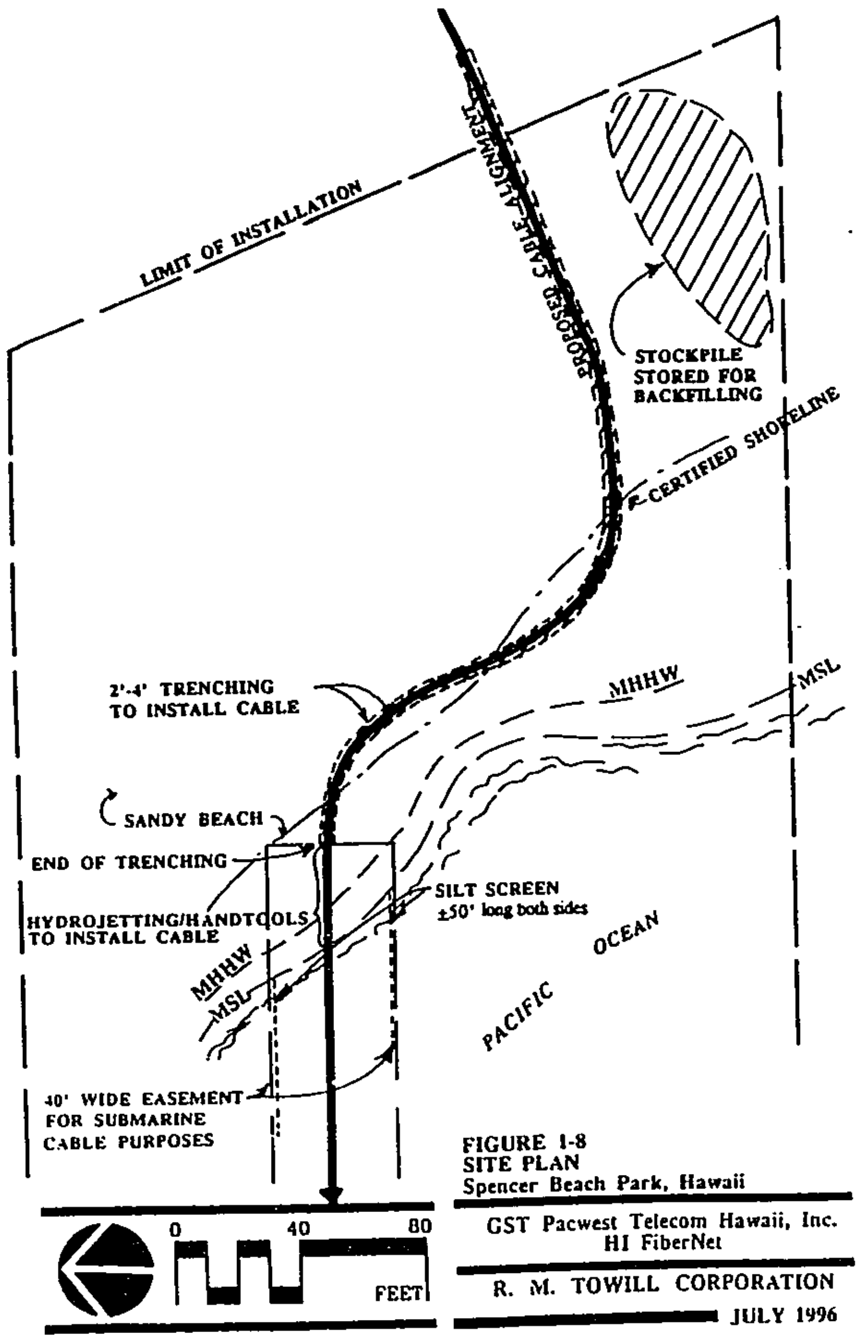


FIGURE 1-8
SITE PLAN
Spencer Beach Park, Hawaii

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION
JULY 1996

ATTACHMENT 2

General Bottom Profile

Wailua Golf Course, Kauai
Makaha Beach, Oahu
Keawaula, Oahu
Sandy Beach Park, Oahu
Mokapu Beach, Maui
Kaunakakai, Molokai
Manele Bay, Lanai
Spencer Beach, Hawaii

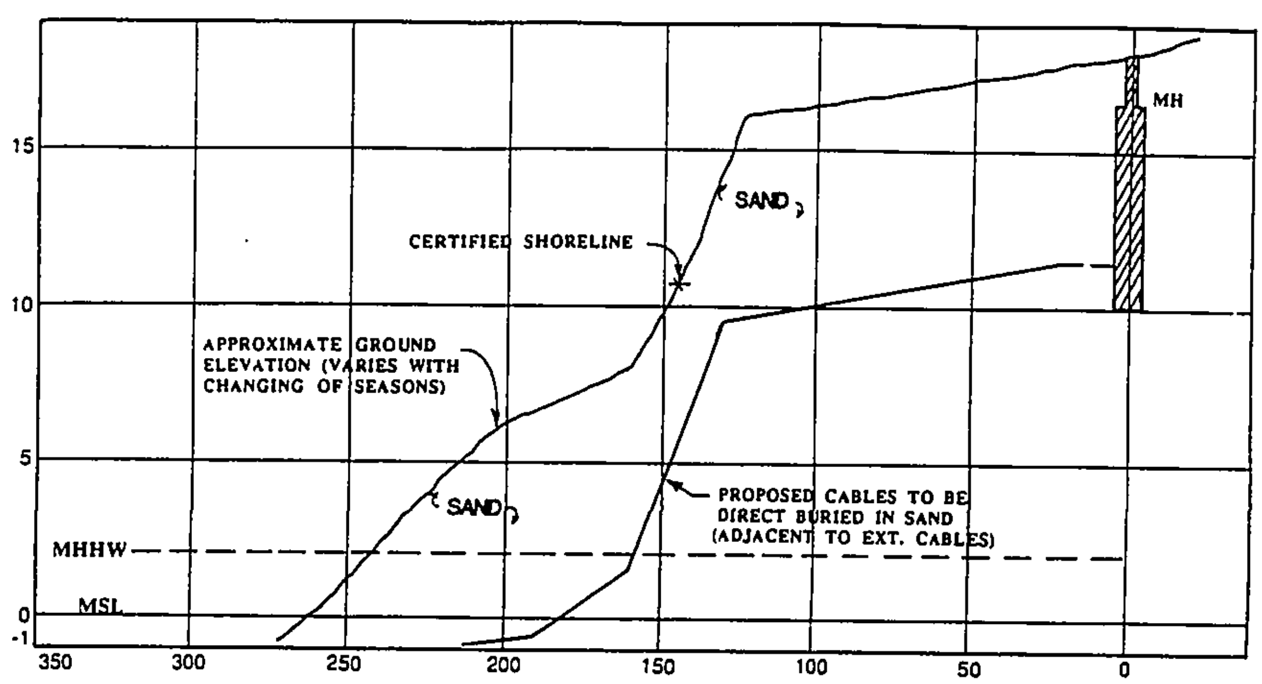


FIGURE 2-1
GENERAL BOTTOM PROFILE
Wailua Golf Course, Kauai

SCALES: HORIZ. 1"=40'
VERT. 1"=4'

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

JULY 1996

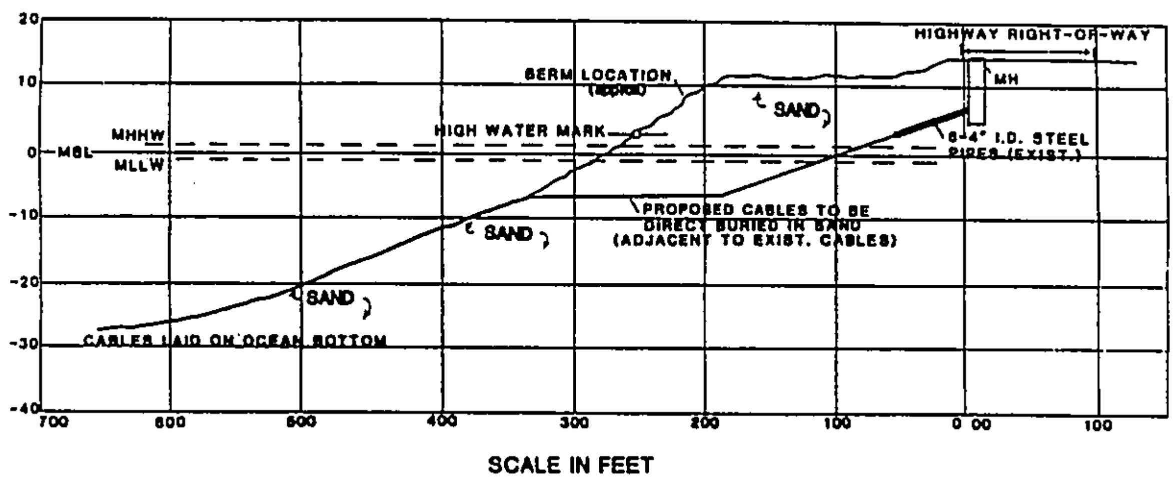


FIGURE 2-2
GENERAL BOTTOM PROFILE
Makaha Beach, Oahu

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

JULY 1996

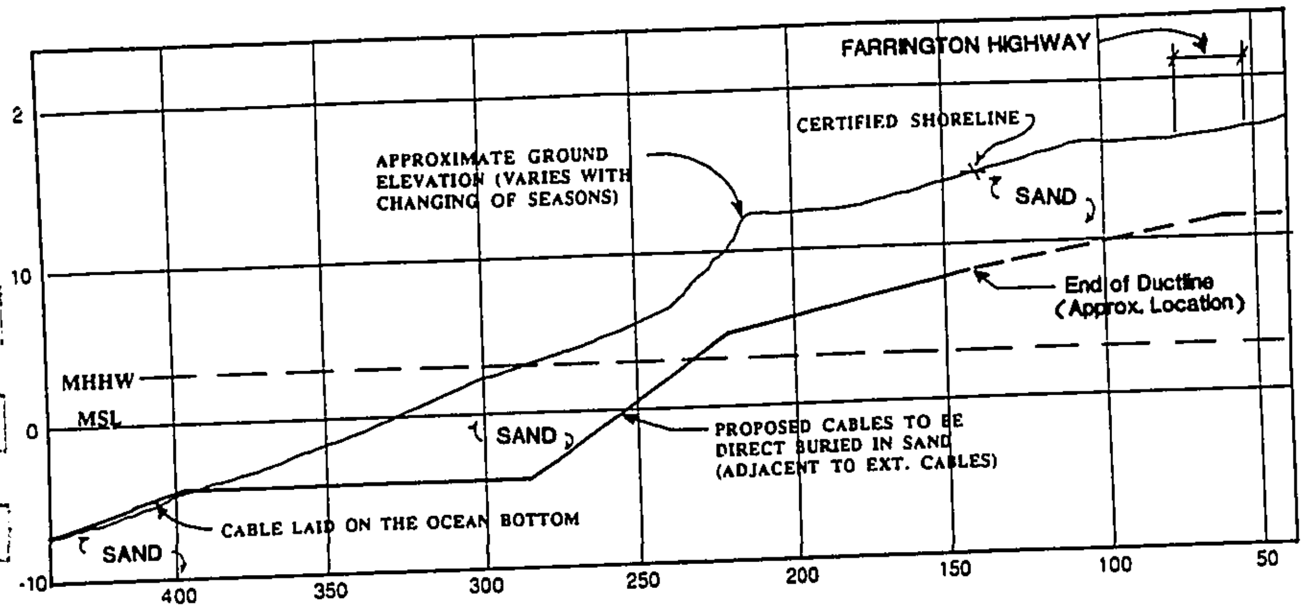


FIGURE 2-3
GENERAL BOTTOM PROFILE
Keawaula, Oahu

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION
JULY 1996

SCALES: HORIZ. 1"=40'
VERT. 1"=8'

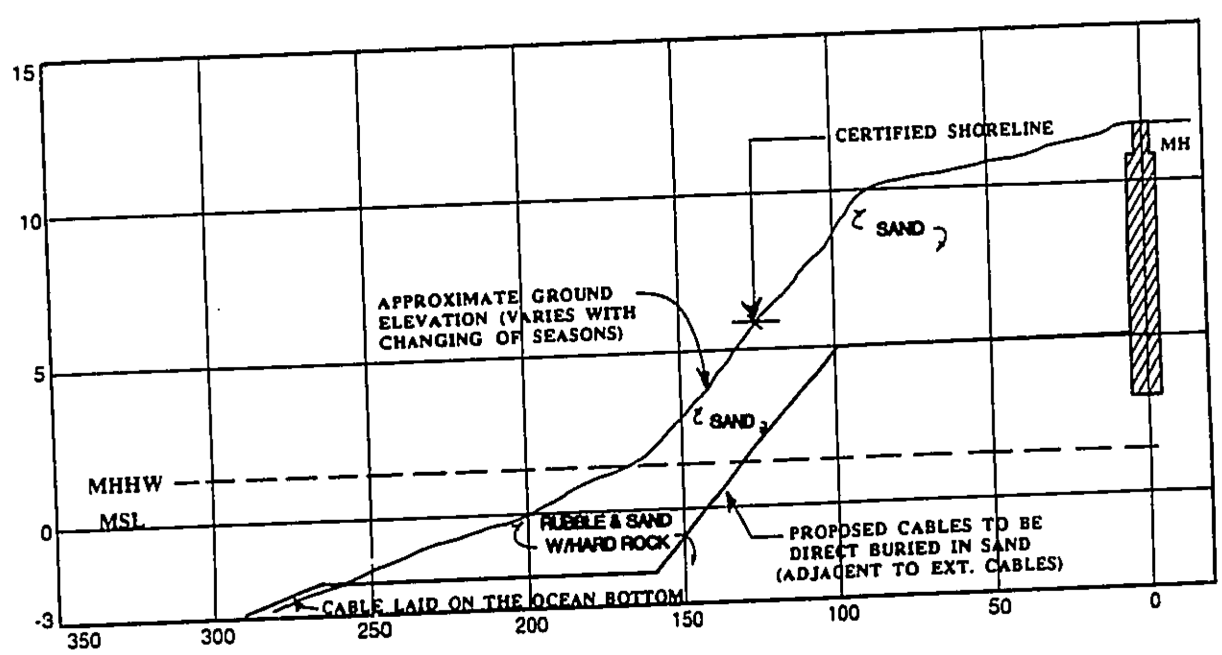


FIGURE 2-4
GENERAL BOTTOM PROFILE
Sandy Beach Park, Oahu

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION
JULY 1996

SCALES: HORIZ. 1"=40'
VERT. 1"=4'

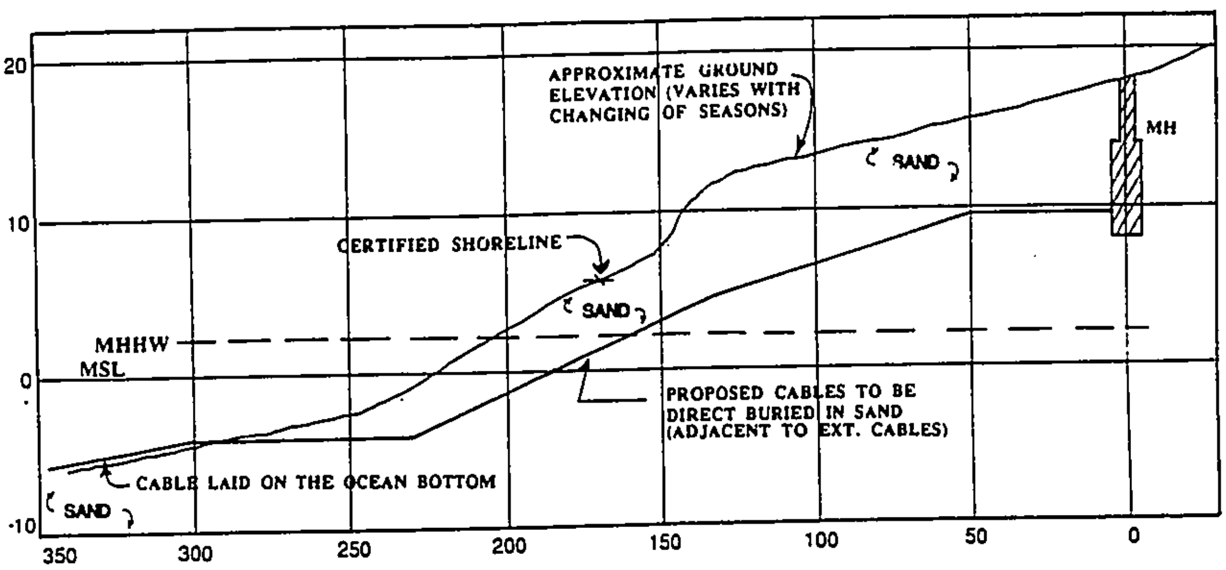


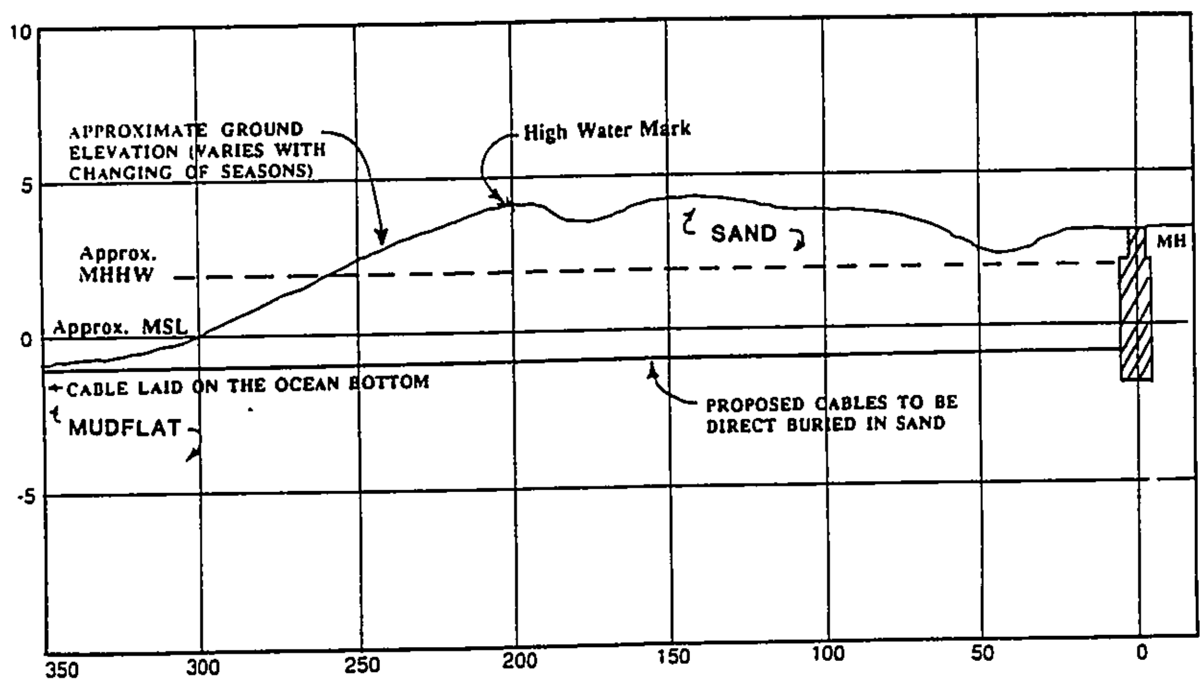
FIGURE 2-5
GENERAL BOTTOM PROFILE
Mokapu Beach, Maui

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

SCALES: HORIZ. 1"=40'
VERT. 1"=8'

JULY 1996



NOTE: Mean Higher High Water Line (MHHW) & Mean Sea Level (MSL) to be verified on site.

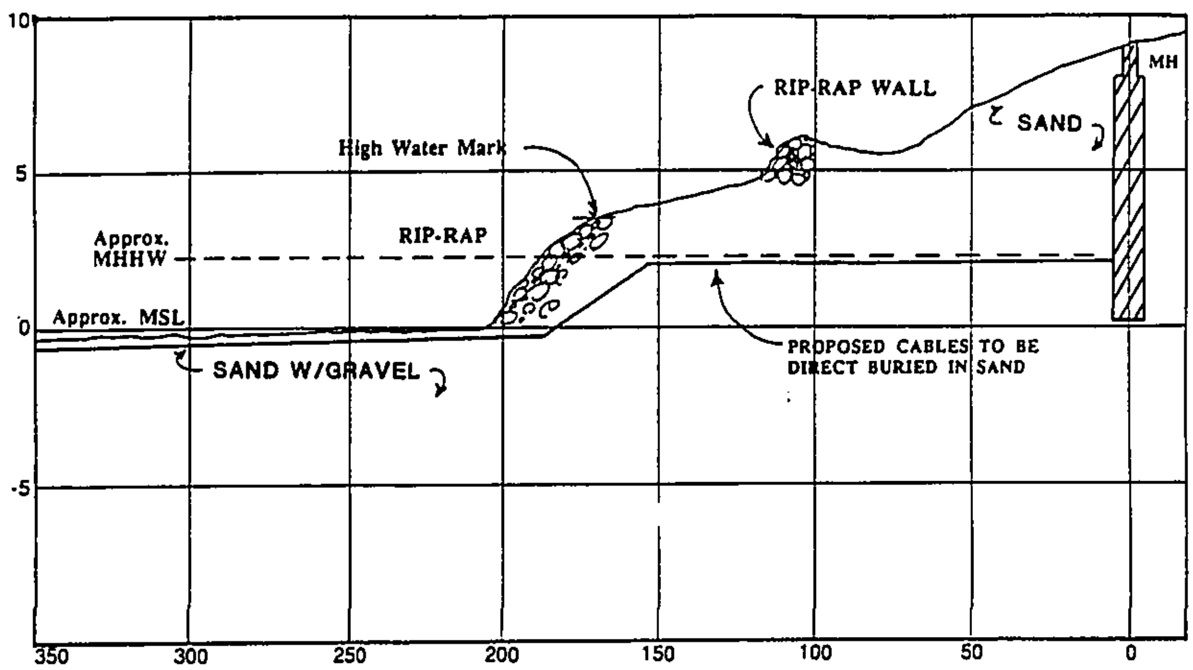
FIGURE 2-6
GENERAL BOTTOM PROFILE
Kaunakakai, Molokai

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

SCALES: HORIZ. 1"=40'
VERT. 1"=4'

JULY 1996



NOTE: Mean Higher High Water Line (MHHW) & Mean Sea Level (MSL) to be verified on site.

SCALES: HORIZ. 1"=40'
VERT. 1"=4'

FIGURE 2-7
GENERAL BOTTOM PROFILE
Manele Bay, Lanai

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

R. M. TOWILL CORPORATION

JULY 1996

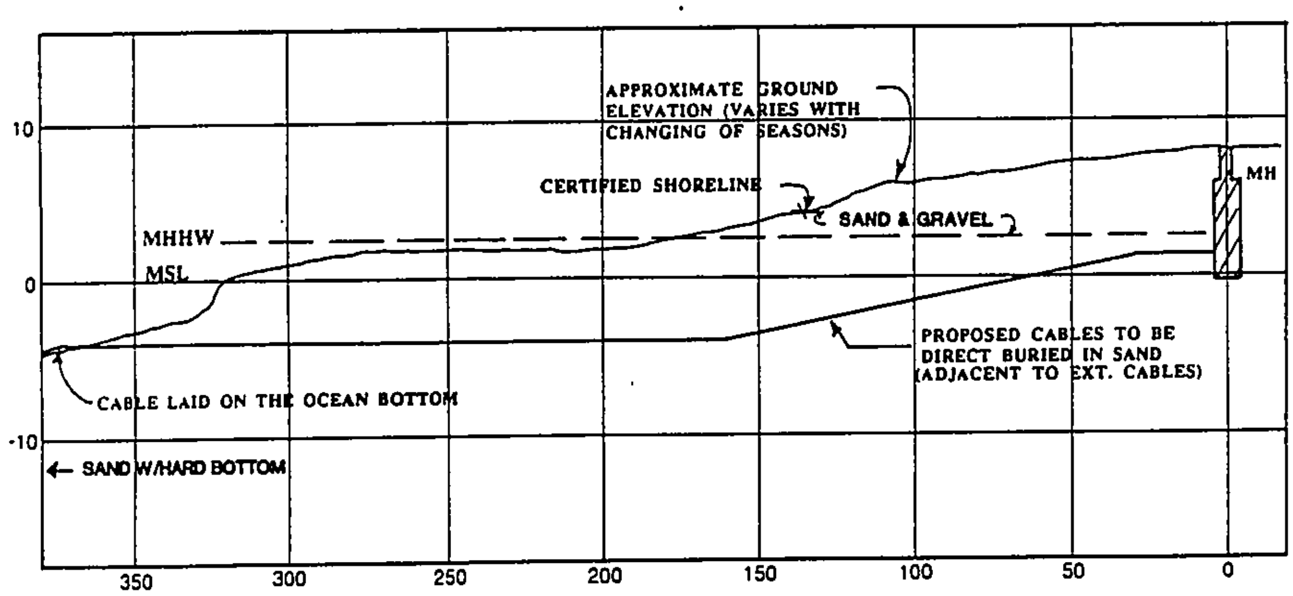


FIGURE 2-8
GENERAL BOTTOM PROFILE
Spencer Beach Park, Hawaii

GST Pacwest Telecom Hawaii, Inc.
HI FiberNet

SCALES: HORIZ. 1"=40'
VERT. 1"=8'

R. M. TOWILL CORPORATION

JULY 1996

ATTACHMENT 3

Special Aquatic Sites

Wailua Golf Course, Kauai
Makaha Beach, Oahu
Keawaula, Oahu
Sandy Beach Park, Oahu
Mokapu Beach, Maui
Kaunakakai, Molokai
Manele Bay, Lanai
Spencer Beach, Hawaii

Special Aquatic Sites

Notice: Please also refer to the specific Draft Environmental Assessment for detailed biological information.

Wailua Golf Course, Kauai

According to a study undertaken by Sea Engineering (1992), the proposed route is located in the only sand channel found that bisects an underwater ledge (60 feet deep) and reef system, and extends into deeper water. This biotope of sand covers the entire project site (**Figure 1-1** and **2-1**). Although the sand deposit was not probed by Sea Engineering, the sand appears to be relatively deep as noted by its relatively rapid burial during installation of the GTE Hawaiian Tel fiber optic cable in 1993. There are no visible outcrops of coral or rock along the route.

Adjacent to either side of the sand channel there are several small deposits on the reef flat off the central and north parts of the golf course, but most terminate on hard bottom or the 60-foot underwater ledge, which parallels much of the windward coast off Kauai.

Makaha Beach, Oahu

The project location is within a portion of Makaha Beach Park. The bottom profile of the nearshore zone is shown in **Figure 2-2**. Within 100 feet of the shoreline the bottom depth is -15 feet and within 200 feet it is -20 feet. The bottom along the -20 foot depth, 200 feet from shore is predominantly sand. There are no visible outcrops of coral or rock along the route.

It is expected that as the cable is laid beyond 200 feet from shore there may be intermittent patches of coral. None of these patches, if present, will be adversely impacted by the proposed project. As with previous cable landings by GTE Hawaiian Tel, AT&T, and Teleglobe Canada, the cable will align itself within the predominantly sand bottom where it will become buried. It is expected that this process would occur within a relatively short period of time lasting from a few days to not more than about a week.

Keawaula, Oahu

The bottom profile of the nearshore zone is provided in **Figure 2-3**. Within 100 feet of the shoreline, the bottom depth is -5 feet, and within 500 feet it is -15 feet. The nearshore bottom is predominantly sand. There are no visible outcrops of coral or rock along the route.

As with the Makaha Beach landing the fiber optic cable is not expected to encounter any significant outcrops of coral or rock. Any patches, if present, will not be adversely impacted due to the proposed alignment of the cable within the predominantly sandy bottom. This was the situation during prior landings executed by AT&T and there are no reasons to expect that a similar landing cannot again be executed by AT&T.

Sandy Beach

The proposed landing site is located at the eastern end of Sandy Beach Park. The beach is composed of medium grained, well sorted, calcareous sand. The nearshore bottom consists of hard rock. There is no fringing reef offshore (Sea Engineering, 1992). **Figure 1-4** and **2-4**, shows the orientation of the proposed cable alignment. Selection of this alignment was based on the following localized factors:

First, this route avoids a 60 foot ledge that parallels much of the Sandy Beach coastline. This ledge has vertical drops of up to 30 feet and presents a major obstacle to cable placement.

Second, the route takes maximum advantage of an existing offshore sand channel. This channel has a finger of sand extending toward the shoreline.

Third, this route makes landfall on the east side of an existing beach cove, which has less inshore vertical relief on the sand than the west side.

Fourth, the route is oriented along an azimuth of 147 degrees relative to true north. This route results in the cable reaching deep water over a shorter distance than a more easterly orientation. Just east of the proposed route, the 60 foot contour curves seaward. The proposed route, therefore is an effort to make use of an existing sand channel which trying to reach deep ocean water as quickly as possible.

Mokapu Beach

Mokapu Beach (**Figure 1-5** and **2-5**) is a short, wide pocket of white sand with beach rock exposed in the center of the beach. The sandy inshore bottom has a gentle slope to the deeper waters offshore. A study of the ocean bottom along the proposed cable alignment at the landing site indicates a continuous sandy ocean bottom from the beach seaward to the 180-foot depth. According to Sea Engineering, 1992, on either side of this location there is also a bench reef which extends to the north and south along the coastline. The proposed location was determined to be the only site which provided an opening through this bench.

The sand is medium to fine grained, with a noticeable increase in silt content closer to shore. The sand deposit appears to be thick and there are few protruding rock outcrops or coral formations in the deposit. There are patchy growths of halimeda, coralline algae, extending seaward from the 90-foot water depth. Although this growth presents a different biological environment, the underlying bottom is still sand.

It is expected that there will no adverse impacts associated with installation of the cable. The offshore sandy ocean bottom from the beach seaward provided a near ideal site during installation of the GTE Hawaiian Tel fiber optic cable. The few instances where there were sporadic outcrops of rock or coral were avoided due to the flexibility of the cable.

Kaunakakai, Molokai

Figure 1-6 and 2-6 shows the ocean bottom characteristics along the proposed cable alignment. Since the detailed description in the Draft Environmental Assessment was completed, new information has been provided by AT&T Submarine Cable Systems (during a submarine route survey along the Kaunakakai alignment), which indicates a lower than expected level of construction effort to install the cable.

The proposed cable will still cross the shallow fringing reef flat before making landfall. At the 100-foot depth approximately ±2,000 feet from shore, the inshore slope begins to shoal up to a fringing reef comprised mostly of what are now mudflats. The sand to hard bottom transition occurs at between 90 to 100 feet. The zone between 90 to 40 feet represents an area of limited coral coverage with a typical vertical relief of ±2 feet. The zone between 40 to 30 feet becomes more irregular with coral interspersed with rock, with a typical vertical relief of 3 feet. At the 30-foot depth there is a distinct shift in the bottom zonation. The bottom becomes flat and scoured, with scattered pieces of coral rubble. This zone extends to the 20 foot depth, and is apparently where the maximum wave induced forces occur. The spur and groove formation typical of the seaward faces of fringing reefs begins at the 20-foot depth. Vertical relief at this location is up to 4 feet.

Due to wave induced forces cable protection will be required in this relatively shallow area (**Figure 1-6a**). Reconditioned drill tubing approximately ±100-200 feet long will be fastened around a double armored cable. The drill tubing will act as a sleeve and will help to anchor the cable to the scoured bottom. The means of securing the drill tubing will be by pneumatic or mechanically driven bolts. This practice will result in minimal environmental impact. At this site, no coral is expected to be displaced in order to site the cable.

The cable will be pulled ashore across the mud flat for a distance of approximately ±2,000 feet. Wherever possible the cable will be pulled using floats. Pulling will be from shore using a winch or similar mechanical means. Once the cable is pulled to

shore it will be secured at the landing site through installation into a duct line emanating from shore. A portion of the cable within this nearshore zone will similarly require protection from storm surges using drill tubing. Installation of this 100 to 200 foot long section of drill pipe will also be by pneumatic or mechanically driven bolts into the underlying hard substrate. No corals are within this immediate section, and therefore will not be impacted by the proposed installation.

In deeper water, cable movement is significantly reduced and the need for wave related abrasion protection is less of a concern. The cable will emerge from the drill pipe at approximately 90 to 100 feet in depth where a hard bottom to sand transition occurs. From that point cable will be laid directly on the ocean floor.

The project Draft Environmental Assessment notes that the proposed action will have little to no impact on marine life. The reef at the nearshore area is covered with a thick layer of fine sediment (mud). This nearshore area is devoid of surface fauna and farther off-shore, the mud/silt bottom is covered with dense seagrass-macroalgal biotype. The wide sediment coverage suggests that the area has been influenced by major storm flows and the resulting sedimentation for many years. It is expected that during cable deployment the cable will sink into this medium where it will disappear from view. The inert nature of the materials comprising the cable, therefore, will not constitute an adverse impact to the environment.

Manele Bay, Lanai

A study of Manele Bay undertaken by Sea Engineering (1996) indicates that the western portion of the harbor is comprised of volcanic rock and corals. The biotope of coral is of high diversity but is primarily concentrated along the western end of the harbor, along the shore and breakwater. (A detailed description of the specific marine organisms within the project area are provided in the Draft Environmental Assessment).

The route that provides the best opportunity to protect existing marine communities is found along the eastern harbor which is primarily sand. According to Sea Engineering (1996),

> "This sand area was created during the dredging of the outer basin of the harbor. Material was removed to the east of the bouy (sic) marked edge of the harbor. The substratum in the dredged area is sand which slopes seaward. Inshore of this is a narrow basaltic shelf that extends from the intertidal to a depth of about 1 meter. This shelf is what is left of the old substratum following the development of the harbor. The top of this shelf was qualitatively surveyed as a possible landing site for the cable. The shelf runs from the intertidal to a depth of about 1 meter approximately 10 meters offshore where a break in the shelf occurs and the depth increases to about 9 meters. The substratum seaward of this shelf break for the first 3 meters is comprised of basalt rock (up to 40 centimeters in diameter and sand); seaward of this it is entirely sand."

This sand channel which runs through Manele Bay has depths from 40 feet to 60 feet approximately 1,000 feet oceanward. Based on the Sea Engineering survey it is proposed that the cable be aligned to avoid the areas of major coral coverage along the western portion of the harbor. The proposed alignment, therefore, will be along the eastern harbor utilizing the existing sand channel. From the sand channel up to the proposed landing special effort will be focussed on minimizing potential for turbidity impacts while installing the cable from the narrow basaltic shelf to the landing. Silt screens, which will be used at all locations, will be installed prior to work. Potential for impacts to water quality will be addressed by use of appropriate Best Management Practices (BMPs) in conjunction with water quality monitoring as prescribed by the Section 401 Water Quality Certification permitting process.

Spencer Beach Park

Figures 1-8 and 2-8 shows the proposed cable route and the characteristics of the surrounding area. The dominant feature of the nearshore area is the fringing reef,

which extends 2,500 feet from shore. As shown in the figures, the reef is cut by a sand channel, which connects the beach to a large offshore sand deposit. The water depth at the seaward limit of the reef is approximately 20 feet with much of the reef within a few feet of the surface. The water depth in the sand channel is typically 10 to 15 feet. There are many large coral formations within this channel. As with the previous GTE Hawaiian Tel fiber optic cable landing, the channel boundaries and the specific location of coral formations within the channel will be identified prior to work. This will be important, as many of the coral formations rise vertically up from the channel bottom to within a few feet of the surface.

Seaward of the fringing reef the bottom is entirely sand, out to at least the 100 foot depth. The proposed cable route is the only location along the coast where large expanses of offshore coral formations do not have to be crossed by the cable. Disadvantages, however, are coral outcrops in the sand channel and a 50 foot wide basalt shelf at the toe of the beach.

The problem of the coral outcrops can be overcome by carefully selecting the initial route and then adjusting the cable prior to cutting the floats so as to avoid the coral. As shown in the figure, the selected route avoids most of the formations in the channel.

It is expected that where coral outcrops cannot be avoided by adjustment of the floats that the cable will be adjusted in the water in the same way that it was during installation of the GTE Hawaiian Tel fiber optic cable. The relative flexibility of the fiber optic cable will allow for pulling the cable around coral heads, thereby preventing potential for damage. Once the cable is routed around the coral heads it will be laid within the sand channel where it will eventually be covered with sand by wave and tidal action.

ATTACHMENT 4

Contact with Organizations and Groups

Wailua Golf Course, Kauai
Makaha Beach, Oahu
Keawaula, Oahu
Sandy Beach Park, Oahu
Mokapu Beach, Maui
Kaunakakai, Molokai
Manele Bay, Lanai
Spencer Beach, Hawaii

Contact with Organizations and Groups

Notice: The following is only a partial list. Please notify us if you wish to obtain further information.

Statewide

Mr. Ross Cordy, Head Archaeologist
State Historic Preservation Division
Department of Land and Natural Resources

Wailua Golf Course, Kauai

Ms. Nancy McMahon, Kauai Archaeologist
State Historic Preservation Division, DLNR

Mr. Rob Colbertson, Chairperson
Sierra Club, Kauai

Mr. Ken Carlson, Nominal Chair
Hawaii's Thousand Friends, Kauai

Ms. Laurie Ho
Garden Island Resource Counsel for Community Development, Kauai

City and County of Honolulu, Oahu Landing Sites

Mr. Tom Dye, Oahu Archaeologist
State Historic Preservation Division, DLNR

Mr. David Frankel, Director
Sierra Club, Hawaii Chapter

Mr. Glen Kila, Chairperson
Waianae Neighborhood Board, No. 24

Mr. Charlie Rogers, Chairperson
Hawaii Kai Neighborhood Board, No. 1

Mokapu Beach, Maui

Ms. Teresa Donham, Maui-Molokai-Lanai Archaeologist
State Historic Preservation Division, DLNR

CORRECTION

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

ATTACHMENT 4

Contact with Organizations and Groups

Wailua Golf Course, Kauai
Makaha Beach, Oahu
Keawaula, Oahu
Sandy Beach Park, Oahu
Mokapu Beach, Maui
Kaunakakai, Molokai
Manele Bay, Lanai
Spencer Beach, Hawaii

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Garden Island Resource Counsel for Community Development, Kauai

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Sierra Club, Hawaii Chapter

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Waianae Neighborhood Board, No. 24

Mr. Charlie Rogers, Chairperson
Hawaii Kai Neighborhood Board, No. 1

Mokapu Beach, Maui

Ms. Teresa Donham, Maui-Molokai-Lanai Archaeologist
State Historic Preservation Division, DLNR

Ms. Carla Flood, President
Kihei Community Association

Mr. Bob Coffey, Chairperson
Sierra Club, Maui

Mr. Ron Tetz, General Manager
Wailea Ekahi Condominium Resort

Mr. Patrick Flinn
Senior Assistant Manager
Stouffer Renaissance Wailea Beach Resort

<u>Kaunakakai, Molokai</u>

Ms. Sarah Collins, Molokai-Lanai Archaeologist
State Historic Preservation Division, DLNR

<u>Individual land owners adjoining the landing site</u>:
- Noburo Kanemitsu
- Lea Lai Harlan Shay
- Thomas Frank Schmidt
- Lawrence Earl Joao, Senior
- William Pai
- James C. Williams
- Graham Davis Monroe
- Molokai Ranch, Ltd.

<u>Manele Bay, Lanai</u>

Ms. Sarah Collins, Molokai-Lanai Archaeologist
State Historic Preservation Division, DLNR

Mr. Randy Coone, Owner
Trilogy Ocean Sports

Mr. Larry Kimble
Lanai Land Company

Robert Herra, Chairperson
Na Ala Hele
DLNR

<u>Spencer Beach Park, Hawaii</u>

Pat McCoy
State Historic Preservation Division
DLNR

Mr. Bryan Harry, Pacific Area Director
National Park Service
Puukohola Heiau

Mr. Gerald Rothstein, Chairperson
Public Access Shoreline Hawaii

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

'96 AUG -8 P2:27

August 1, 1996

96-111/epo

Mr. David W. Blane
Planning Director
County of Maui
Planning Department
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Blane:

Subject: Draft Environmental Assessment and Special Management Area Permit (96/SSV-0005 and 96/SMI-0011)
Submarine Fiber Optic Cable Landings at Kaunakakai, Molokai, and Manele Bay, Lanai
TMK: 5-3-01: 16

Thank you for allowing us to review and comment on the subject permit application. We have the following comments to offer:

1. If the project involves the following activities with discharges into state waters, an NPDES general permit is required for each activity:

   a. Discharge of storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area;

   b. Construction dewatering effluent;

   c. Non-contact cooling water;

   d. Hydrotesting water; and

   e. Treated contaminated groundwater from underground storage tank remedial activity.

2. If there is any type of process wastewater discharge from the activity into State waters, the applicant is required to apply for an individual NPDES permit.

3. The applicant has submitted to the Department of Health a 401 Water Quality Certification (WQC) application for the landing of a submarine fiber optic cable at the Wailua Golf Course of Kauai, Makaha Beach, Keawaula, and Sandy Beach Park of Oahu, Mokapu Beach of Maui, Manele Bay of Lanai, Kaunakakai of Molokai and Spencer Beach Park of Hawaii. The Department is processing the application as expeditiously as possible.

Should you have any further questions regarding this matter, please contact Ms. Hong Chen, Engineering Section of the Clean Water Branch, at 586-4309.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for
Environmental Health

c: CWB

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Mr. Bruce S. Anderson, Ph.D.
Deputy Director for Environmental Health
State Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Anderson:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

We have reviewed your comment letter dated August 1, 1996, and have prepared the following reply.

We acknowledge receipt of our Section 401 Water Quality Certification Waiver (WQC 333), from your Department, which was granted on August 28, 1996. At this time we do not anticipate any further need for discharges which would trigger the filing of a National Pollutant Discharge Elimination System (NPDES) permit.

Thank you for your assistance with this important project. Should you or your staff have any further comments please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

LINDA CROCKETT LINGLE
MAYOR

OUR REFERENCE
YOUR REFERENCE

POLICE DEPARTMENT

COUNTY OF MAUI
55 MAHALANI STREET
WAILUKU, HAWAII 96793
AREA CODE (808) 244-6400
FAX NO. (808) 244-6411

August 6, 1996

HOWARD H. TAGOMORI
CHIEF OF POLICE

LANNY TIHADA
DEPUTY CHIEF OF POLICE

'96 AUG -7 P4:06
RECEIVED

MEMORANDUM

TO : DIRECTOR, PLANNING DEPARTMENT

FROM : HOWARD H. TAGOMORI, CHIEF OF POLICE

SUBJECT : I.D. No.: 96/SSV-0006 & 96/SMI-0014
TMK: 4-9-017: 06
Project Name: HAWAIIAN ISLAND FIBER NETWORK
Applicant Name: GST TELECOM HAWAII, INC.

✓ No recommendation or special condition is necessary or desired.

___ Refer to attachment(s).

Assistant Chief Charles Hall
for: HOWARD H. TAGOMORI
Chief of Police

TO : Howard Tagomori, Chief of Police

Via : Channels

FROM : Duane A.K. Asami, Lieutenant, District II

SUBJECT : Special Management Area Permit

I have reviewed the proposed Special Management Area and Shoreline Setback Variance Application for the submarine fiber optic cable landing site proposed at *Manele* Bay and have no serious concerns. The proposed landing site at *Manele* Bay does appear appropriate based on the criteria articulated in the application. The only questions that I have relative to this project are: 1) Who will be using this new cable; and 2) Where is the alternative landing site.

Since GTE Hawaiian Tel, the major inter-island telephone service provider has its own cable system, will another company provide inter-island service using this new cable? Has any other service provider contracted to use the new cable, or has any service provider expressed any interest?

In reviewing the proposal, I noticed that the proposed landing site and the alternate landing site were drawn on different maps. Furthermore, the maps are significantly different and depict no shared reference points to allow the reader to see where the two landing sites are relative to each other. In fact, it would appear that the proposed landing site (depicted on page 3-11) and the alternate landing site (depicted on page 4-5) may be the same.

In summary, I believe that the proposed submarine fiber optic cable system will benefit the residents of *Lana'i* and may benefit the emergency service providers such as Civil Defense the Police if, in fact, an inter-island telephone service provider will utilize it. I also believe that the proposed site will not adversely impact our operations or the community at large.

Submitted for your information.

Respectfully,

Lt. Duane A.K. Asami, E-3721
07/31/96 at 1830 Hrs.
Commander, D-II - *Lana'i*

R. M. TOWILL CORPORATION

420 Waiakamilo Rd. #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Chief Howard H. Tagomori, Chief of Police
Police Department
County of Maui
55 Mahalani Street
Wailuku, Hawaii 96793

Dear Chief Tagomori:

SUBJECT: Special Management Area Permit and Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

We have received your letter August 6, 1996, and have prepared the following reply.

1. *Who will be using this new cable system?*

The residents, government offices, and businesses of Lanai are the proposed users for the fiber optic cable system. This system will provide general interisland telephone as well as telecommunications services. This includes availability of computer modem connections; telemedicine for emergency and critical care patients; real-time videoconferencing for education, government, and business needs; and, research applications. This system will be run by GST Telecom Hawaii, Inc., which is a State of Hawaii registered public utility company.

2. *Proposed landing site*

The proposed landing site depicted on page 3-11 and page 4-5, are the same location.

Thank you for your comments. We appreciate the review of your staff, Lt. Duane A.K. Asami, Commander, Lanai. If you have any further comments please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

MOLOKAI - LANAI SOIL AND WATER CONSERVATION DISTRICT

P.O. Box 396
Hoolehua, HI 96729
Phone (808) 567-6869
FAX (808) 567-9062

6 August 1996

County of Maui
Planning Department
250 S. High Street
Wailuku, Hi 96793
ATTN: Don A. Schneider

RE: Submarine Fiber Optic Cable Landing at Manele Bay, Island of Lanai - TMK: 4-9-017: 06

Dear Mr. Schneider:

We are in receipt of your request for review of the above-mentioned project.

It was noted that although the plans adequately address the installation of cable, length of routes, construction of terminal building, etc. there is no mention of proposed temporary Best Management Practices to be installed during construction in order to protect the shoreline and surrounding areas.

Thank-you for the opportunity to review this project. Should you have any questions or concerns regarding this matter, please do not hesitate to contact me at the number listed above.

Sincerely,

Malia Pierce
MLSWCD Resource Coordinator

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Ms. Malia Pierce
Resource Coordinator
Molokai-Lanai Soil and Water Conservation District
P.O. Box 396
Hoolehua, HI 96729

Dear Ms. Pierce:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

We have received your comments dated August 6, 1996, and have prepared the following reply.

Practices and measures (e.g., Best Management Practices or BMPs) to address protection of the shoreline and surrounding areas have been developed as part of the Department of the Army permit (Section 404/Section 10); Department of Health, Section 401 Water Quality Certification; and, Coastal Zone Management Federal Consistency Determination permits. We are continuing to work with these agencies to ensure that necessary requirements, including use of appropriate construction practices, will be fulfilled.

Thank you for this opportunity to respond. Should you have any further comments please do not hesitate to contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

4674

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96732-0398 • (808) 871-8461

'96 AUG -6 P2:08
RECEIVED

August 1, 1996

Mr. David Blane
Planning Director
County of Maui
Maui Planning Department
250 So. High Street
Wailuku, HI 96793

Dear Mr. Blane:

Subject: Hawaiian Island Fiber Network
96/SSV-0008 & 96/SM1-0014 (TMK: 4-9-017:06)

Thank you for allowing us to comment on the subject project.

In reviewing the information transmitted and our records, Maui Electric Company (MECO) at this time has no objections to the proposed project.

MECO encourages that the project's consultant meet with us as soon as practical so that we may plan for the project's electrical requirements.

If you have any questions or concerns, please call Fred Oshiro at 872-3202.

Sincerely,

Edward Reinhardt
Manager, Engineering

FO:rt

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

September 20, 1996

Mr. Edward Reinhardt
Engineering Manager
Maui Electric Company, Ltd.
210 West Kamehameha Avenue
P.O. Box 398
Kahului, Hawaii 96732-0398

Dear Mr. Reinhardt:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

Thank you for your comments dated August 1, 1996. We appreciate your review of this important project. Per your request, any electrical requirements will be coordinated with Mr. Fred Oshiro at (808) 872-3202. Should you or your staff have any further comments please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

4344

BENJAMIN J. CAYETANO
GOVERNOR

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

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
JERRY M. MATSUDA
GLENN M. OKIMOTO

IN REPLY REFER TO
STP 8.7455

'96 JUL 24 P12:46

RECEIVED

July 22, 1996

Mr. David W. Blane
Director
Planning Department
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Blane:

Subject: Hawaiian Island Fiber Network
GST Telecom Hawaii, Inc.
Shoreline Setback Variance (96/SSV-0006)
Special Management Area Permit (96-SM1-0014)
TMK: 4-9-17: 06

Thank you for your transmittal of July 12, 1996.

The subject project is not anticipated to have an adverse impact on our State transportation facilities.

We appreciate the opportunity to provide comments.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Mr. Kazu Hayashida
Director of Transportation
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

Thank you for your letter dated July 22, 1996. We appreciate your review of this important project and your finding of no anticipated adverse impact on State transportation facilities.

Should you or your staff have any further comments please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

Engineers Planners Photogrammetrists Surveyors Construction Managers

LINDA CROCKETT LINGLE
MAYOR

RONALD P. DAVIS
CHIEF

HENRY A. LINDO, SR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL
200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561

'96 JUL 17 A10:14

RECEIVED

July 16, 1996

Don A. Schneider
Planner
County of Maui
Planning Department
250 South High Street
Wailuku, Maui, Hawaii 96793

RE: Hawaiian Island Fiber Network; ID: 96/SSV-0006 and 96/SM1-0014; TMK: 4-9-17:06; Applicant: GST Telecom Hawaii, Inc.

Dear Mr. Schneider,

The Department of Fire Control has no objections to the Hawaiian Island Fiber Network project at this time. However, when plans and specifications are submitted to the Land Use and Codes Administration the Fire Prevention Bureau shall review and comment on submittals.

If you have any questions, contact the Fire Prevention Bureau at extension 7566.

Sincerely,

Leonard F. Niemczyk
Captain, FPB

R. M. TOWILL CORPORATION
420 Waiakamilo Rd #411 Honolulu HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Captain Leonard F. Niemczyk
Department of Fire Control
200 Dairy Road
Kahului, Hawaii 96732

Dear Captain Niemczyk:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

Thank you for your letter dated July 16, 1996. We appreciate your review of this important project and your statement of non-objection. We understand that your Department will provide further review comments when our plans and specifications are submitted to the County Land Use and Codes Administration.

Should you or your staff have any questions please contact us at (808) 842-1133.

Sincerely,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

P.01

Post-it® Fax Note 7871 | Date | # of pages ▸ 1
To Robert Vetter | From Sierra Club
Co./Dept. Chester Koga | Co.
Phone # | Phone #
Fax # | Fax #

SIERRA CLUB

MALAMA I KA HONUA

September 19, 1996

David Blane
Maui Planning Department
250 S. High St
Wailuku, HI 96793

Dear Mr. Blane,

The Hawai'i Chapter of the Sierra Club requests that you require more information from GST Pacwest Telecom for the fiber optic cable landing at Manele Bay. This information should be submitted and publicly available prior to any decision on the environmental assessment or any permitting decision.

Since this area is a part of the Manele-Hulopo'e MLCD, there are potential risks to the corals during trenching. It is important for Maui county to consider the impacts on corals. HRS Chapter 205A requires the protection of valuable coastal ecosystems (205A-2(b)(4)(A) and 205A-2(c)(4)(B)). Environmental assessments and environmental impact statements must consider the cumulative impacts of any project, HAR 11-200-12. Trenching activities may damage corals directly or through sedimentation.

It is our understanding that fiber optic cables in Jamaica have caused coral reef damage. We will provide you with details on this at a later date. In the meantime, the applicant should be asked to supply information regarding similar projects in sensitive ecosystems.

It is also critical for the applicant to provide greater detail as to exactly how the cable will be laid (particularly since DLNR will be using the EA or EIS produced for this project to decide whether to grant a CDUA).

Finally, would you kindly have the applicant send us a copy of the next planning documents it submits (revised draft EA, final EA, or draft EIS).

Thank you for the opportunity to comment.

Sincerely,

David Kimo Frankel
Director

cc OEQC

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 1, 1996

Mr. David Kimo Frankel, Director
Sierra Club, Hawaii Chapter
The Arcade Building, Room 201
212 Merchant Street
Honolulu, Hawaii 96803

Dear Mr. Frankel:

SUBJECT: Draft Environmental Assessment (DEA) for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

We have received your comments dated September 19, 1996, and have prepared the following response.

REVISED METHOD STATEMENT OF WORK AT MANELE BAY
We concur with the need to protect corals within the Manele Bay Marine Life Conservation District (MLCD). The description of work in the DEA has been revised through the attached method statement. According to the method statement trenching through corals will not be required. The cable will instead be routed over the existing drainageway to below sea level. Once in the water the cable will be placed over the 10-meter wide rock bench where the cable would then transition to an existing sand channel. It is expected that potential for environmental impacts will be greatly minimized by use of this methodology.

STATEWIDE SYSTEM ASSESSMENT
The potential for cumulative impacts are being addressed through the Conservation District Use Permit process which will review the entirety of the Hawaiian Island Fiber Network (HI FiberNet).

CORAL REEF DAMAGE IN JAMAICA
We would be very interested in reviewing your information concerning coral reef damage in Jamaica. This data, if applicable, could be used to ensure that any work proposed will be undertaken in such a manner as to avoid potential for similar impacts to Hawaii's coral reefs.

Thank you for this opportunity to respond. Per your request we will provide you with a copy of the Final EA when it is available. Should you have any further questions please do not hesitate to contact us directly at (808) 842-1133.

Very truly Yours,

Brian Takeda
Senior Planner

Attachment
BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

Engineers Planners Photogrammetrists Surveyors Construction Managers

GST INTERNATIONAL
91-336 KALAELOA BLVD., SUITE 300
KAPOLEI HI 96707
808-682-8123 808-682-7630 FAX

METHOD STATEMENT FOR FIBER OPTIC CABLE INSTALLATION ON THE MANELE BAY, LANAI SAND CHANNEL BOTTOM OF THE ENTRANCE TO THE SMALL BOAT HARBOR

Landing Shore End:

Above High Water Construction:

The make ready work on the landing will be completed prior to the cable ship's arrival. The site work will include installation of a concrete reinforced manhole and ductline excavation to a point near the certified shoreline. "No excavation will take place seaward of the certified shoreline, which marks the upper limit of the Marine Life Conservation District." A range line marker set will be erected to assist in the accurate placement of the cable.

Nearshore Harbor Lay:

The cable ship will approach Manele Bay from the south southeast and hold position in ten (10) fathoms just north of the R "2" FlR 4s buoy. The ship will maintain position using a combination of Differential Global Positioning System control links to the central navigation system computer and visual point orientation of the in place navigational aids.

The combination of bow thrusters, stern thrusters, and main propulsion engines will hold the ship at the proper angle to maintain location and alignment with a safety factor of the multiple fathometer stations. Radar scans of the shoreline will confirm the alignment accuracy. The ship will not drop anchor or engage main engines with high propeller settings while in shallow waters to avoid any possibility of impacting the bottom conditions and obscuring the visibility for the divers monitoring the activity.

When both the ship and the shore crew are on station and ready, the ship will lower a floating rope to a small workboat (32 feet in length or less) and will then pull this rope to shore, where the end will be attached to a shore mounted inhaul winch. The other end of the reope will be attached to the end of the fiber optic cable.

The ship will deploy approximately one kilometer of double armored eight (8) fiber cable from the ship, attaching floats along the cable to support the entire deployed length. The floating cable will not contact the bottom during the pull. During the pull, three to four small boats (24 feet or less in length) will standby to assist as required and to prevent other vessels from crossing the cable. The cable will then be floated to shore.

The cable will be routed to the east of the channel marker RN2 and away from the area of the Harbor entrance that requires periodic maintenance dredging by the Small Boat Harbors Department. The actual easement and special positioning will be charted and filed with the Harbors Small Boating Division as-built drawings and submitted to the appropriate agencies for chart updates and notices to mariners.

Once the cable end is at the shoreline, it will be inserted into the shore conduit and secured inside the manhole on shore. At this point, the small boats will pull the cable into its final alignment, and after a final check by divers to ensure that the cable is in the sand channel, the floats will be removed, allowing the cable to sink to the bottom along the selected alignment. During this process, divers will ensure that there is sufficient slack at the point 10 to 15 meters off-shore where the cable crosses the 1 to 1.5 meter high ledge and drops into the channel bottom. This ledge is an old dredge cut, and the slack will allow the cable to conform to the bottom rather than spanning across the bottom immediately seaward of the cut.

There will be no attempt to bury the cable under the water. The surf zone will settle the protected cable to a safe level under the constantly shifting sands and cobbles in the harbor entrance.

After the manhole splicing is complete and the cable continuity is checked, the cable ship will move slowly off-shore, deploying cable as she moves. The ship will maintain a constant tension on the cable as the cable is deployed into deeper waters and the cable will have a slight percentage of slack to compensate for settlement and final adjustments by the ocean currents. Typical ship time on station is from four (4) to eight (8) hours.

The shoreward 100 to 150 meters of cable will be protected by split pipe type armor starting at the shore-end above the high water line,. This will place the end of the split pipe approximately in line with the end of the harbor breakwater. The split pipe will protect the cable from wave action and from potential anchor drag damage. The split sections are approximately 0.6 meters long and 0.15 meters in diameter. Each joint is articulated, allowing the split pipe to follow the bottom configuration. Placement of the pipe is non-intrusive, and does not require any excavation. Nearshore, the split pipe can be placed by workmen wading out from shore. Seaward of the ledge, the split pipe will be placed by divers working out of a small boat. Under optimum conditions, all split pipe can be placed on the same day as the pull. However, under adverse conditions, this operation could take up to two (2) days after the pull to complete.

No nearshore marine activities have been scheduled at night. Advance notices will be distributed to the boating community at Manele Bay. No degradation of the quality of marine life in or around Manele Bay is anticipated.

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

'96 AUG 30 P12:35
DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

August 26, 1996

96-120/epo

Mr. David W. Blane
Planning Director
County of Maui
Planning Department
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Blane:

Subject: Draft Environmental Assessment and Special Management Area Permit (96/SSV-0006 and 96/SM1-0014
Submarine Fiber Optic Cable Landings
Manele Bay, Lanai
TMK: 4-9-17: 6

Thank you for allowing us to review and comment on the subject request. We have the following comments to offer:

1. If the project involves the following activities with discharges into state waters, a National Pollutant Discharge Elimination System (NPDES) general permit is required for each activity:

 a. Discharge of storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area;

 b. Construction dewatering effluent;

 c. Non-contact cooling water;

 d. Hydrotesting water; and

 e. Treated contaminated groundwater from underground storage tank remedial activity.

2. If there is any type of process wastewater discharge from the activity into State waters, the applicant is required to apply for an individual NPDES permit.

Mr. David W. Blane
August 26, 1996
Page 2

96-120

3. The applicant has submitted to the Department of Health a 401 Water Quality Certification (WQC) application for the landing of a submarine fiber optic cable at the Wailua Golf Course of Kauai, Makaha Beach, Keawaula, and Sandy Beach Park of Oahu, Mokapu Beach of Maui, Manele Bay of Lanai, Kaunakakai Of Molokai, and Spencer Beach Park of Hawaii. The Department is processing the application as expeditiously as possible.

Should you have any questions regarding this matter, please contact Ms. Hong Chan, Engineering Section of the Clean Water Branch at 586-4309.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for Environmental Health

c: CWB
 MDHO

CORRECTION

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

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

August 26, 1996

96-120/epo

Mr. David W. Blane
Planning Director
County of Maui
Planning Department
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Blane:

Subject: Draft Environmental Assessment and Special Management Area Permit (96/SSV-0006 and 96/SM1-0014
Submarine Fiber Optic Cable Landings
Manele Bay, Lanai
TMK: 4-9-17: 6

Thank you for allowing us to review and comment on the subject request. We have the following comments to offer:

1. If the project involves the following activities with discharges into state waters, a National Pollutant Discharge Elimination System (NPDES) general permit is required for each activity:

   a. Discharge of storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area;

   b. Construction dewatering effluent;

   c. Non-contact cooling water;

   d. Hydrotesting water; and

   e. Treated contaminated groundwater from underground storage tank remedial activity.

2. If there is any type of process wastewater discharge from the activity into State waters, the applicant is required to apply for an individual NPDES permit.

3. The applicant has submitted to the Department of Health a 401 Water Quality Certification (WQC) application for the landing of a submarine fiber optic cable at the Wailua Golf Course of Kauai, Makaha Beach, Keawaula, and Sandy Beach Park of Oahu, Mokapu Beach of Maui, Manele Bay of Lanai, Kaunakakai of Molokai, and Spencer Beach Park of Hawaii. The Department is processing the application as expeditiously as possible.

Should you have any questions regarding this matter, please contact Ms. Hong Chen, Engineering Section of the Clean Water Branch at 586-4309.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for Environmental Health

c: CWB
MDHO

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 4, 1996

Mr. Bruce S. Anderson, Ph.D.
Deputy Director for Environmental Health
State Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Anderson:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

We acknowledge receipt of your comment letters dated August 1 and 26, 1996, and have prepared the following reply.

Thank you for your expeditious review of our Section 401 Water Quality Certification Waiver (WQC 333), which was granted on August 28, 1996. As noted in our October 1, 1996 correspondence we do not anticipate any further need for discharges which would trigger the filing of a National Pollutant Discharge Elimination System (NPDES) permit.

Should you or your staff have any further comments please contact us at (808) 842-1133.

Very truly Yours,

Brian Takeda
Senior Planner

BT/bt
cc Mr. Jack Lewis, GST International, Inc.
CK RMTC

5570

'96 SEP 20 P2:01 **STATE OF HAWAII**
DEPARTMENT OF LAND AND NATURAL RESOURCES
P.O. BOX 621
HONOLULU, HAWAII 96809

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

SEP 18 1996

Ref.:LM-PEM

File No. PM-96-018

Honorable David W. Blane
Planning Director
County of Maui
Planning Department
250 S. High Street
Wailuku, Maui, Hawaii 96793

Dear Mr. Blane:

SUBJECT: Request for Comments - Submarine Fiber Optic Cable Landing at Manele Bay, Island of Lanai, Tax Map Key: 4-9-07:06

We have reviewed the SMA Permit Application and Shoreline Setback Variance for the submarine fiber optic cable landing at Manele Bay, and would like to offer the following comments:

Division of Aquatic Resources

There are several concerns regarding the contents in the subject documents. The proposed action would allow the trenching of nearshore marine habitat (including live coral destruction) and displace recreational and commercial activities associated with Manele Bay (including recreational fishing). The overriding concern is that the proposed use would violate Hawaii Revised Statutes Chapter 190 which authorizes the Department to establish marine life conservation districts (MLCD) for the protection of marine life. Further Hawaii Administrative Rules have been adopted to establish a MLCD at Manele and Hulopoe Bays (Chapter 13-30). This rule prohibits the destruction of live corals, and the altering, destruction, or defacing of the marine substrate.

Honorable David W. Blane
Page 2

Thank you for the opportunity to review and provide comments for the SMA Permit Application and Shoreline Setback Variance for the subject project. Should you have any questions, please contact Patti Miyashiro at 587-0430 of our Land Division in Honolulu.

Aloha,

MICHAEL D. WILSON

c: Maui Land Board Member

0087

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

'96 SEP 26 P3:01

DEPT OF ... RECEIVED

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P.O. BOX 621
HONOLULU, HAWAII 96809

MICHAEL D. WILSON
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT S. COLOMA-AGARAN

SEP 25 1996

Ref.:LM-AJ

Honorable David W. Blane
Planning Director
County of Maui
Planning Department
250 S. High Street
Wailuku, Maui, Hawaii 96793

File No. A134

Dear Mr. Blane:

SUBJECT: Submarine Fiber Optic Cable Landing at Manele Bay, Lania, Hawaiian Island Fiber Network
Request: Special Management Area & Shoreline Setback Variance
Applicant: GST Telecom Hawaii, Inc.

We have additional comments on the subject application to offer.

Division of Aquatic Resources:

Brief Description: Our Division of Land is circulating a request for review and comment from Maui County's Planning Department on a SSV/SMA permit application to lay fiberoptic cable. The applicant hopes to lay submarine cable that would connect all major (inhabited) main Hawaiian Islands except Niihau. For this application the submarine cable would be branched in the channel between Molokai and Lanai, and would pass through Manele Bay (part of the Manele-Hulopoe Marine Life Conservation District) and come ashore in front of Manele harbor.

Comments: There are several concerns regarding the contents in the subject documents. The proposed action would allow the trenching of nearshore marine habitat (including live coral destruction) and displace recreational and commercial activities associated with Manele Bay (including recreational fishing). The overriding concern is that the proposed use would violate Hawaii Revised Statutes Chapter 190 which authorizes the Department to establish marine life conservation districts (MLCD) for the protection of marine life. Further Hawaii Administrative Rules have been adopted to establish a MLCD at Manele and Hulopoe Bays (Chapter 13-30). This rule prohibite the destruction of live corals, and the altering, destruction, or defacing of the marine substrate.

Honorable David W. Blane
Fiber Optic Cable (Lanai)
Page 2

Thank you for the opportunity to review and provide comments for the subject application. Should you have any questions, please contact Al Jodar at 587-0424 of our Land Division in Honolulu.

Aloha,

MICHAEL D. WILSON

I:\[illegible]

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 3, 1996

Mr. Michael D. Wilson, Chairperson
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Wilson:

SUBJECT: SMA/SSV Application and Draft Environmental Assessment (DEA) for Submarine Fiber Optic Cable Landing at Manele Bay, Lanai, GST Telecom Hawaii, Inc.

We have received your comments dated September 18 and 25, 1996, and have prepared the following response.

A meeting with you and your staff was held on September 17, 1996 to discuss concerns expressed by the Division of Aquatic Resources including the appropriateness of permitting a fiber optic cable in the Marine Life Conservation District (MLCD), and the potential for environmental impacts as represented in the Draft EA. Concern was also expressed whether the Lanai community would accept the cable project in the sensitive Manele Bay area. The following actions have taken place since our meeting to address these items.

PERMITTED USES WITHIN THE MLCD
The State has asked the Attorney General (AG) to review and determine whether the proposed activity is consistent with regulations governing uses within the MLCD. It is our understanding that this interpretation will be provided shortly and would form the basis for your Department's position regarding the fiber optic cable landing at this location.

REVISED METHOD STATEMENT OF WORK
Since the initial submittal and publication of the Draft EA, the methodology for installing the cable has been revised as described in the attached method statement. According to the method statement no live coral destruction or other disturbance to existing environmental resources within the Marine Life Conservation District (MLCD) would take place in accordance with Hawaii Revised Statutes (HRS), Chapter 190, and Hawaii Administrative Rules (HAR), Chapter 13-30.

MEETINGS WITH THE LANAI COMMUNITY
On September 19, 1996, GST Telecom Hawaii, Inc., conducted a workshop with the Lanai Planning Commission and members of the public. The purpose of the workshop was to describe the proposed activity and solicit questions and comments. Overall, the project was very well received. Minutes documenting the workshop proceedings will be provided to your Department as soon as they are approved by the Planning Commission.

A September 19, 1996 meeting with the Manele Small Boat Harbor Advisory Committee was also held to describe the project and obtain information concerning potential issues and impacts of the project on recreational and commercial activities associated with Manele Bay. The committee voted at the conclusion of the meeting to issue a letter of support for the proposed project. This letter is now being prepared and will also be forwarded to you shortly.

We understand that the permitting of the fiber optic cable within the MLCD is an issue which must be carefully considered. Every effort will be made to work with your Department, the State Attorney General (AG), and the Lanai Planning Commission, to enable the timely resolution of this matter. Until then, we will look forward to receiving the AG's interpretation and your Department's position regarding this project.

Thank you for this opportunity to respond. Should you have any questions please do not hesitate to contact us at (808) 842-1133.

Very truly Yours,

Brian Takeda

Brian Takeda
Senior Planner

Attachments
BT/bt
cc Mr. Jack Lewis, GST International, Inc.
Mr. Everett Kaneshige, Alston Hunt Floyd and Ing
CK RMTC

Manele Harbor Advisory Committee

October 1, 1996

Mr. Michael D. Wilson, Chairman
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Re: Landing of GST Submerged Fiber Optic Cable in Manele Bay

Dear Mr. Wilson:

On September 19, 1996, the Small Boats Harbor Advisory Committee of Lanai had the opportunity to meet with representatives from GST Telecom Hawaii. GST presented to the Committee its intention to land a submerged fiber optic cable in Manele Bay.

In the opinion of the Committee, the proposed installation of the fiber optic cable will not impact the pristine quality of Manele Bay Small Boat Harbor. The major benefit to the Small Boat Harbor is the addition of the state of the art infrastructure.

The Small Boats Harbor Committee would like this letter to serve as formal acknowledgment of our unanimous support of the GST project.

The Committee looks forward to facilitating GST with their efforts so that the island of Lanai will receive the benefits of fiber optic telecommunication services.

Sincerely yours,

Sherry Menze 10/4/96
Robert Donovan 10/4/96
Jason Pujie 10/3/96
Ken Kauffman 10/3/96
Clarence Lincoln 10/2/96
Ron McOmber 10/3/96

mhacl.n.doc

GSTA INTERNATIONAL

91-238 KALAELOA BLVD., SUITE 208
KAPOLEI, HI 96707
808-682-6123 808-682-7630 FAX

METHOD STATEMENT FOR FIBER OPTIC CABLE INSTALLATION ON THE MANELE BAY, LANAI SAND CHANNEL BOTTOM OF THE ENTRANCE TO THE SMALL BOAT HARBOR

Landing Shore End:

Above High Water Construction.

The make ready work on the landing will be completed prior to the cable ship's arrival. The site work will include installation of a concrete reinforced manhole and ductline excavation to a point near the certified shoreline "No excavation will take place seaward of the certified shoreline, which marks the upper limit of the Marine Life Conservation District." A range line marker set will be erected to assist in the accurate placement of the cable.

Nearshore Harbor Lay:

The cable ship will approach Manele Bay from the south southeast and hold position in ten (10) fathoms just north of the R "2" FIR 4s buoy. The ship will maintain position using a combination of Differential Global Positioning System control links to the central navigation system computer and visual point orientation of the in place navigational aids.

The combination of bow thrusters, stern thrusters, and main propulsion engines will hold the ship at the proper angle to maintain location and alignment with a safety factor of the multiple fathometer stations. Radar scans of the shoreline will confirm the alignment accuracy The ship will not drop anchor or engage main engines with high propeller settings while in shallow waters to avoid any possibility of impacting the bottom conditions and obscuring the visibility for the divers monitoring the activity.

When both the ship and the shore crew are on station and ready, the ship will lower a floating rope to a small workboat (32 feet in length or less) and will then pull this rope to shore, where the end will be attached to a shore mounted inhaul winch. The other end of the reope will be attached to the end of the fiber optic cable.

The ship will deploy approximately one kilometer of double armored eight (8) fiber cable from the ship, attaching floats along the cable to support the entire deployed length. The floating cable will not contact the bottom during the pull. During the pull, three to four small boats (24 feet or less in length) will standby to assist as required and to prevent other vessels from crossing the cable The cable will then be floated to shore.

The cable will be routed to the east of the channel marker RN2 and away from the area of the Harbor entrance that requires periodic maintenance dredging by the Small Boat Harbors Department. The actual easement and special positioning will be charted and filed with the Harbors Small Boating Division as-built drawings and submitted to the appropriate agencies for chart updates and notices to mariners

Once the cable end is at the shoreline, it will be inserted into the shore conduit and secured inside the manhole on shore. At this point, the small boats will pull the cable into its final alignment, and after a final check by divers to ensure that the cable is in the sand channel, the floats will be removed, allowing the cable to sink to the bottom along the selected alignment. During this process, divers will ensure that there is sufficient slack at the point 10 to 15 meters off-shore where the cable crosses the 1 to 1.5 meter high ledge and drops into the channel bottom. This ledge is an old dredge cut, and the slack will allow the cable to conform to the bottom rather than spanning across the bottom immediately seaward of the cut.

There will be no attempt to bury the cable under the water The surf zone will settle the protected cable to a safe level under the constantly shifting sands and cobbles in the harbor entrance.

After the manhole splicing is complete and the cable continuity is checked, the cable ship will move slowly off-shore, deploying cable as she moves The ship will maintain a constant tension on the cable as the cable is deployed into deeper waters and the cable will have a slight percentage of slack to compensate for settlement and final adjustments by the ocean currents. Typical ship time on station is from four (4) to eight (8) hours.

The shoreward 100 to 150 meters of cable will be protected by split pipe type armor starting at the shore-end above the high water line,. This will place the end of the split pipe approximately in line with the end of the harbor breakwater. The split pipe will protect the cable from wave action and from potential anchor drag damage The split sections are approximately 0 6 meters long and 0 15 meters in diameter. Each joint is articulated, allowing the split pipe to follow the bottom configuration. Placement of the pipe is non-intrusive, and does not require any excavation. Nearshore, the split pipe can be placed by workmen wading out from shore Seaward of the ledge, the split pipe will be placed by divers working out of a small boat. Under optimum conditions, all split pipe can be placed on the same day as the pull However, under adverse conditions, this operation could take up to two (2) days after the pull to complete

No nearshore marine activities have been scheduled at night Advance notices will be distributed to the boating community at Manele Bay No degradation of the quality of marine life in or around Manele Bay is anticipated

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

GARY GILL
DIRECTOR

October 1, 1996

Mr. David Blane, Director
Planning Department
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Blane:

Subject: Draft Environmental Assessment for the Submarine Fiber Optic Cable Landing at Manele Bay, Lanai and Kaunakakai, Molokai

Thank you for the opportunity to review the subject document. We have the following comments.

1. According to the draft environmental assessment, Manele Bay has been designated as a Marine Life Conservation District. Please describe the significance of a Marine Life Conservation District. Please show what rules govern activities within the district? How does this project conform with or differ from allowable activities established by the rules?

2. Activities proposed during the cable laying process include trenching and anchoring. Please describe in detail the trenching and anchoring techniques that will be employed. What type of equipment will be used? What is the size of the anchor? How many anchors will be placed over coral? Is blasting going to be conducted?

3. Trench excavation and backfilling operations will generate fine particulate materials that could impact coral. Please estimate the quantity of sediment that would be created and the amount of coral that the trenching activities would impact.

4. Please provide reasons for supporting the determination based on an analysis of the significance criteria in section 11-200-12 of the Hawaii Environmental Impact Statement Rules.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185. Mahalo.

Sincerely,

Gary Gill
Director

c: R.M. Towill
GST

R. M. TOWILL CORPORATION

420 Waiakamilo Rd #411 Honolulu, HI 96817-4941 (808) 842-1133 Fax (808) 842-1937

October 3, 1996

Mr. Gary Gill, Director
Office of Environmental Quality Control
220 South King Street, Fourth Floor
Honolulu, Hawaii 96813

ATTN: Mr. Jeyan Thirugnanam

Dear Mr. Gill:

SUBJECT: Draft Environmental Assessment for Submarine Fiber Optic Cable Landings at Manele Bay, Lanai, and Kaunakakai, Molokai, GST Telecom Hawaii, Inc.

We have received your comments dated October 1, 1996, and have prepared the following response.

1. *Manele Bay, Lanai, Marine Life Conservation District (MLCD)*

The authorization for establishment of MLCDs are by Hawaii Revised Statutes (HRS), Chapter 190. Rules governing the establishment of the MLCD at Manele Bay and Hulopoe Bay, Lanai, are by Hawaii Administrative Rules (HAR), Chapter 13-30.

At this time the State Attorney General has been asked to review and determine whether the proposed activity is consistent with regulations governing uses within the MLCD. It is our understanding that this interpretation will be provided shortly and would form the basis for the Department of Land and Natural Resources (DLNR's) position regarding the proposed fiber optic cable landing at this location.

2. *Activities proposed during the cable laying process*

Manele Bay, Lanai

Please find attached the construction method statement which describes the proposed fiber optic cable installation at Manele Bay. As noted in the method statement no live coral destruction or other disturbance to existing environmental resources within the MLCD would take place in accordance with HRS, Chapter 190, and HAR, Chapter 13-30. Therefore, no blasting within the submerged lands of the MLCD will be permitted.

Kaunakakai, Molokai

Trenching to install the fiber optic cable within the nearshore portion of the landing site will be limited to approximately ±30 feet seaward of the shoreline. Trenching is proposed to be accomplished using a backhoe, shovels, or other means. It is expected that the excavated material will be largely comprised of sand and mud. This material already

surrounds the site and would be allowed to re-enter the open trench upon completion of installation. Potential for water quality impacts associated with this work will be regulated through the Section 401 Water Quality Certification which was granted by the State Department of Health on August 28, 1996.

Portions of the fiber optic cable will be anchored within the rock bottom of the mud flat at various locations along the alignment. This anchorage will be by use of pneumatically or mechanically driven bolts, ±1/2" in diameter by ±10" long, secured into the bolt holes by non-toxic marine epoxy. Once the fiber optic cable is secured it is not expected to remain visible due to the depth of the alluvium over the mud flat.

As with the proposed installation at Manele Bay, Lanai, no blasting is proposed.

3. *Generation of particulate material from trench excavation and backfilling*

Trench excavation is not permitted within the submerged MLCD lands at Manele Bay, Lanai. Trenching in offshore waters at Kaunakakai, Molokai, will be limited to an area ±30 feet seaward of the certified shoreline. The quantity of sediment generated is expected to be approximately ±15 cubic yards. This is the only trenching that is proposed along the 1,000 meter long cable run which crosses the Molokai mud flat.

The Section 401 WQC, described above, identifies specific methods and measures that will be practiced to mitigate the potential for water quality impacts due to proposed work at both sites. These practices will include use of silt screens as well as BMPs (Best Management Practices) to govern work site activities.

4. *HAR, §11-200-12, Hawaii Environmental Impact Statement Rules*

An evaluation of significance criteria per §11-200-12 was undertaken in the course of preparing the subject Environmental Assessments. Please refer to the attached summary and these documents for further detail.

Thank you for this opportunity to comment. Should you have any further questions please contact us at 842-1133.

Sincerely,

Brian Takeda

Brian Takeda
Senior Planner

Attachments
BT/bt
cc Mr. Jack Lewis, GST International, Inc.
Mr. Everett Kaneshige, Alston Hunt Floyd and Ing
CK RMTC

METHOD STATEMENT FOR FIBER OPTIC CABLE
INSTALLATION ON THE MANELE BAY, LANAI
SAND CHANNEL BOTTOM OF THE ENTRANCE
TO THE SMALL BOAT HARBOR

Landing Shore End:

Above High Water Construction.

The make ready work on the landing will be completed prior to the cable ship's arrival. The site work will include installation of a concrete reinforced manhole and ductline excavation to a point near the certified shoreline. "No excavation will take place seaward of the certified shoreline, which marks the upper limit of the Marine Life Conservation District." A range line marker set will be erected to assist in the accurate placement of the cable.

Nearshore Harbor Lay:

The cable ship will approach Manele Bay from the south southeast and hold position in ten (10) fathoms just north of the R "2" FIR 4s buoy. The ship will maintain position using a combination of Differential Global Positioning System control links to the central navigation system computer and visual point orientation of the in place navigational aids.

The combination of bow thrusters, stern thrusters, and main propulsion engines will hold the ship at the proper angle to maintain location and alignment with a safety factor of the multiple fathometer stations. Radar scans of the shoreline will confirm the alignment accuracy. The ship will not drop anchor or engage main engines with high propeller settings while in shallow waters to avoid any possibility of impacting the bottom conditions and obscuring the visibility for the divers monitoring the activity.

When both the ship and the shore crew are on station and ready, the ship will lower a floating rope to a small workboat (32 feet in length or less) and will then pull this rope to shore, where the end will be attached to a shore mounted inhaul winch. The other end of the reope will be attached to the end of the fiber optic cable.

The ship will deploy approximately one kilometer of double armored eight (8) fiber cable from the ship, attaching floats along the cable to support the entire deployed length. The floating cable will not contact the bottom during the pull. During the pull, three to four small boats (24 feet or less in length) will standby to assist as required and to prevent other vessels from crossing the cable. The cable will then be floated to shore.

The cable will be routed to the east of the channel marker RN2 and away from the area of the Harbor entrance that requires periodic maintenance dredging by the Small Boat Harbors Department. The actual easement and special positioning will be charted and filed with the Harbors Small Boating Division as-built drawings and submitted to the appropriate agencies for chart updates and notices to mariners.

Once the cable end is at the shoreline, it will be inserted into the shore conduit and secured inside the manhole on shore. At this point, the small boats will pull the cable into its final alignment, and after a final check by divers to ensure that the cable is in the sand channel, the floats will be removed, allowing the cable to sink to the bottom along the selected alignment. During this process, divers will ensure that there is sufficient slack at the point 10 to 15 meters off-shore where the cable crosses the 1 to 1.5 meter high ledge and drops into the channel bottom. This ledge is an old dredge cut, and the slack will allow the cable to conform to the bottom rather than spanning across the bottom immediately seaward of the cut.

There will be no attempt to bury the cable under the water. The surf zone will settle the protected cable to a safe level under the constantly shifting sands and cobbles in the harbor entrance.

After the manhole splicing is complete and the cable continuity is checked, the cable ship will move slowly off-shore, deploying cable as she moves. The ship will maintain a constant tension on the cable as the cable is deployed into deeper waters and the cable will have a slight percentage of slack to compensate for settlement and final adjustments by the ocean currents. Typical ship time on station is from four (4) to eight (8) hours.

The shoreward 100 to 150 meters of cable will be protected by split pipe type armor starting at the shore-end above the high water line,. This will place the end of the split pipe approximately in line with the end of the harbor breakwater. The split pipe will protect the cable from wave action and from potential anchor drag damage. The split sections are approximately 0.6 meters long and 0.15 meters in diameter. Each joint is articulated, allowing the split pipe to follow the bottom configuration. Placement of the pipe is non-intrusive, and does not require any excavation. Nearshore, the split pipe can be placed by workmen wading out from shore. Seaward of the ledge, the split pipe will be placed by divers working out of a small boat. Under optimum conditions, all split pipe can be placed on the same day as the pull. However, under adverse conditions, this operation could take up to two (2) days after the pull to complete.

No nearshore marine activities have been scheduled at night. Advance notices will be distributed to the boating community at Manele Bay. No degradation of the quality of marine life in or around Manele Bay is anticipated.

Summary Evaluation of Proposed Fiber Optic Cable Landings at Manele Bay, Lanai, and Kaunakakai, Molokai, According to Significance Criteria of HAR §11-200-12

October 3, 1996

An exhaustive evaluation of the following significance criteria per §11-200-12 was undertaken in the course of preparing the subject Draft and Final Environmental Assessments (Final EA to be published shortly). Please also refer to these documents for further detail.

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

The proposed project will not require the irrevocable loss or destruction of Hawaii's natural or cultural resources. Concerns relating to this item are addressed in the subject Environmental Assessment.

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

The proposed project will not affect the range of beneficial uses of the environment. The work proposed involves the installation of utility infrastructure which will be a short-term event at the shoreline lasting approximately 1-day. Once installed the cable will remain unobtrusive and buried within a utility easement. Future uses of the environment, therefore, will not be curtailed.

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

The proposed project is consistent with the State's long-term environmental polices and goals for protection and conservation of Hawaii's resources. Please refer to Sections 2, 3, 4, 5, and 7 of the Environmental Assessments.

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

The proposed project is consistent with the State's goals for facility systems (§226-14 and 18) and the economy (§226-10.5).

The applicant, GST Telecom Hawaii, Inc., is a public utility company registered in the State of Hawaii. The proposed action will enable a second interisland telecommunications provider to promote both improved and expanded services as well as competitive pricing.

5. Substantially affects public health.

No impacts on public health are expected. The cable itself is constructed of inert materials including optical quality glass fiber strands, steel, plastic, and polypropylene. No transmission of electricity will be required through the cable. The primary medium utilized will be electronically pulsed light signals.

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

No adverse secondary impacts are expected. The only effect will be to enable a public utility licensed telecommunications company to operate a second interisland fiber optic cable system. Operation of this system will result in an enhanced and competitively priced telecommunications service.

7. Involves a substantial degradation of environmental quality.

Per the Draft and Final Environmental Assessments, no substantial degradation of environmental quality is expected.

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

The proposed project is a major commitment involving capital costs in excess of +$20 million. No other commitments which would result in environmental degradation are expected.

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

The proposed project has been extensively reviewed by various Federal and State environmental agencies including Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Service, State Office of Coastal Zone Management, and the State Department of Health. No rare, listed threatened or endangered species will be affected by the proposed activity.

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

Based on environmental review of the proposed activity, no detrimental impacts on air, noise, or water quality are expected.

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

The proposed project has been sited based on thorough review of criteria necessary for the installation of a fiber optic cable. The proposed action is not expected to affect or be affected by damage from the above.

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

The fiber optic cable when installed will be buried. No scenic vistas or view planes will be affected by the proposed activity. All work will be limited in scope and short-term in duration.

13. Requires substantial energy consumption.

The proposed project does not require substantial or significant consumption of energy.

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Appendix A
INVESTIGATION OF POTENTIAL FIBER OPTIC CABLE LANDING SITES
Kaunakakai, Molokai and Manele Bay, Lanai

INVESTIGATION OF POTENTIAL FIBER OPTIC CABLE LANDING SITES

KAUNAKAKAI, MOLOKAI AND MANELE BAY, LANAI

Prepared By:

Sea Engineering, Inc.
Waimanalo, Hawaii

March 1996

AN ANALYSIS OF POTENTIAL LANDING SITES

FOR FIBER OPTIC CABLES

KAUNAKAKAI HARBOR, MOLOKA'I AND

MANELE HARBOR, LANA'I

Prepared For:

Sea Engineering, Inc.
Makai Research Pier
Makapuu Point
Waimanalo, Hawaii

By:

Richard Brock, Ph.D.
Environmental Assessment Co.
1820 Kihi Street
Honolulu, Hawaii 96822

March 1996

EAC Report No. 96-01

FIBER OPTIC CABLE LANDING SITES: KAUNAKAKAI AND MANELE HARBORS

R.E. Brock
March 1996

INTRODUCTION:

As part of the expanding telecommunications network, Sea Engineering, Inc. was contacted to examine possible shallow-water routes for the landings of two fiber optic cables, one at Kaunakakai Harbor, Moloka'i and the second at Manele Harbor, Lana'i. A number of parameters are considered in the selection of the most appropriate route for a cable landing through the nearshore environment. Among these are the proximity of shoreside infrastructure, access to the shoreline and with the shallow underwater segment, the physical structure of the seafloor, degree of exposure to occasional storm generated surf and the impacts that could occur to marine communities in the proposed path of the cable. This report focuses on the development of marine communities in the vicinity of the two proposed cable landing routes and discusses possible impacts that could occur if the project is to proceed as well as mitigative measures that may be considered.

MATERIALS AND METHODS:

In general marine communities in the vicinity of each proposed cable route from shore to a minimum depth of 25m were assessed.

The quantitative sampling of macrofauna of marine communities presents a number of problems; many of these are related to the scale on which one wishes to quantitatively enumerate organism abundance. Marine communities in the areas surveyed here may be spatially defined in a range on the order of a few hundred square centimeters (such as the community residing in a _Pocillopora meandrina_ coral head) to major biotopes covering many hectares. Recognizing this ecological characteristic, we designed a sampling program that attempted to delineate all major extant communities in the limits of the study areas and to quantitatively describe these communities. Thus a number of methods were used.

To obtain an overall perspective on the extent of the major communities or "zones" occurring in the study area, divers examined the bottom features in each study area from shore seaward to at least the 25m isobath (the outer limits for this study). This exercise allowed the qualitative delineation of major biotopes or zones based partially on the presence of large structural elements (e.g., amount of sand, hard substratum, fish abundance, coral coverage or dominant coral species). Within each of these, stations were established and quantitative studies were conducted, including a visual enumeration of fish, counts along benthic transect lines and cover estimates in benthic quadrats. Besides these quantitative measures, a qualitative reconnaissance was made in the vicinity of each station by swimming and noting the presence of species not encountered in the transects. All assessments were carried out using SCUBA.

The locations of stations were subjectively chosen as being representative of a given biotope. Immediately following station selection, a visual census of fishes was undertaken to estimate their abundance. These censuses were condiucted over a 4 x 25m corridor and all fishes within this area to the water's surface were counted. Data collected included the number of individuals of each species as well as an estimate of individual lengths of all fishes seen; the length data were later utilized in estimating the standing crop of fishes present at each station using linear regression techniques (Ricker 1975, Brock and Norris 1989). A single diver equipped with SCUBA, transect line, slate and pencil would enter the water, count and note all fishes in the prescribed area (method modified from Brock 1954). The 25m transect line was paid out as the census progressed, thereby avoiding any previous underwater activity in the area which could frighten wary fishes.

Fish abundance and diversity is often related to small-scale topographical relief over short linear distances. A long transect may bisect a number of topographical features (e.g., cross coral mounds, sand flats and algal beds), thus sampling more than one community and obscuring distinctive features of individual communities. To alleviate this problem, a short transect (25m in lenght) has proven adequate in sampling many Hawaiian benthic communities (Brock and Norris 1989).

Besides frightening wary fishes, other problems with the visual census technique include the underestimation of cryptic species such as moray eels or puhis (family Muraenidae) and nocturnal species, e.g., squirrelfishes or ala'ihis (family Holocentridae), aweoweos or bigeyes (family Priacanthidae), etc. This problem is compounded in areas of high relief and coral coverage affording numerous shelter sites. Species lists and abundance estimates are more accurate for areas of low relief, although some fishes with cryptic habits or protective coloration (e.g., the nohus or rockfishes, family Scorpaenidae; the flatfishes or paki'is, family Bothidae) might still be missed.

Obviously, the effectiveness of the visual census technique is reduced in turbid water and species of fishes which move quickly and/or are very numerous may be difficult to count and to estimate sizes. Additionally, bias related to the experience of the diver conducting counts should be considered in making any comparisons between surveys. In the present study, one individual (Brock) carried out all of the visual censuses. In spite of these drawbacks, the visual census technique probably provides the most accurate nondestructive method available for the assessment of diurnally active fishes (Brock 1982).

After the assessment of fishes, an enumeration of epibenthic invertebrates (excluding corals) was undertaken using the same transect line as established for fishes. Exposed invertebrates usually greater than 2cm in some dimension (without disturbing the substratum) were censused in a 4 x 25m area. As with the fish census technique, this sampling methodology is quantitative for only a few invertebrate groups, e.g., some of the echinoderms (some sea urchins and sea cucumbers). Most coral reef invertebrates (other than corals) are cryptic or nocturnal in their habits making accurate assessment of them in areas of topographical complexity very difficult. This, coupled with the fact that the majority of these cryptic invertebrates are small, necessitates the use of methodologies that are beyond the scope of this survey (see Brock and Brock 1977). Recognizing constraints on time and the scope of this survey, the invertebrate censusing technique used here attempted only to assess those few macroinvertebrate species that are diurnally exposed.

Exposed sessile benthic forms such as corals and macrothalloid algae were quantitatively surveyed by use of quadrats and the point-intersect method. The point-intersect technique only notes the species of organism or substratum type directly under a point. Along the previously set fish transect line, 50 such points were assessed (once every 50cm). These data have been converted to percentages. Quadrat sampling consisted of recording benthic organisms, algae and substratum type present as a percent cover in six one-meter square frames placed at five-meter intervals along the transect line established for fish censusing (at 0, 5, 10, 15, 20 and 25m).

If macrothalloid algae were encountered in the 1 x 1m quadrats or under one of the 50 points, they were quantitatively recorded as percent cover. Emphasis was placed on those species that are visually dominant and no attempt was made to quantitatively assess the multitude of microalgal species that constitute the "algal turf" so characteristic of many coral reef habitats.

During the course of the fieldwork notes were taken on the number, size and location of any green sea turtles and other threatened or endangered species seen within or near to the study area. With green turtles, efforts were made to record the size (straight line capapace length) of the individuals seen as well as the presence of tags, tumors or any deformities. We also attempted to note the presence of appropriate resting and foraging areas for green turtles.

RESULTS AND DISCUSSION:

1. Kaunakakai Harbor Corridor

Two general cable alignments were proposed for the Kaunakakai Harbor area. The first of these approximately follows the eastern edge of the harbor entrance channel emerging at the pier island and the second lies about 300m to the east crossing the emergent coral reef east of the small vessel section of the harbor coming ashore at Kaunakakai town.

The biological fieldwork for Kaunakakai Harbor was carried out on 8 March 1996. The qualitative survey extended from the "Red No. 2" bouy situated on the eastern side of the harbor just seaward of the pier island to approximately the 24m isobath more than 900m from the seaward side of the pier island. In the harbor, most of the survey effort concentrated along the eastern side which is consistent with one of the proposed cable alignments. Along the proposed second alignment 300m to the east, qualitative surveys were carried out from the seaward side of the emergent reef crest to a point more than 680m seaward.

The harbor entrance channel faces directly southwest and is cut into a shallow extensive reef flat that fronts Kaunakakai. The crest of this reef flat lies close to the zero tide mark so that on low tide some of it appears above the water's surface. The pier island lies at the seaward end of a 500m long mole that services the area and the reef crest is situated about 300m seaward of the pier island. The entrance channel creates a break in the reef crest that is more than 200m in width. Depth of the channel inside of the reef crest is close to 10m in the areas surveyed by this study. The floor of the entrance channel is sand with some coralline rubble. Seaward of the reef crest water depth rapidly increases, dropping from about 10m to more than 24m creating a deep "moat" that generally parallels the reef. The seaward side of this "moat" is bounded by a large elongate mound of coralline rubble which varies in width from about 50 to more than 200m. This mound has an orientation that roughly parallels the reef crest and it continues to the east at least as far as the second proposed cable alignment more than 300m to the southeast. Seaward of the rubble mound, sand substratum is again encountered at a 24m depth which gentle slopes seaward to greater depths outside of the range of this study.

In this harbor entrance environment three zones or biotopes were recognized; these are the biotope of sand, the rubble/coral mound biotope and the biotope of high coral cover found primarily along the sides and protected shallows of the harbor. The biotope of sand as well as the rubble/coral biotope continue uninterrupted to the area of the second proposed cable alignment about 300 m to the southwest. Also present in this latter area are the biotope of sand and rubble as well as the biotope of spurs and grooves. The approximate boundaries of these biotopes is given in Figure 1.

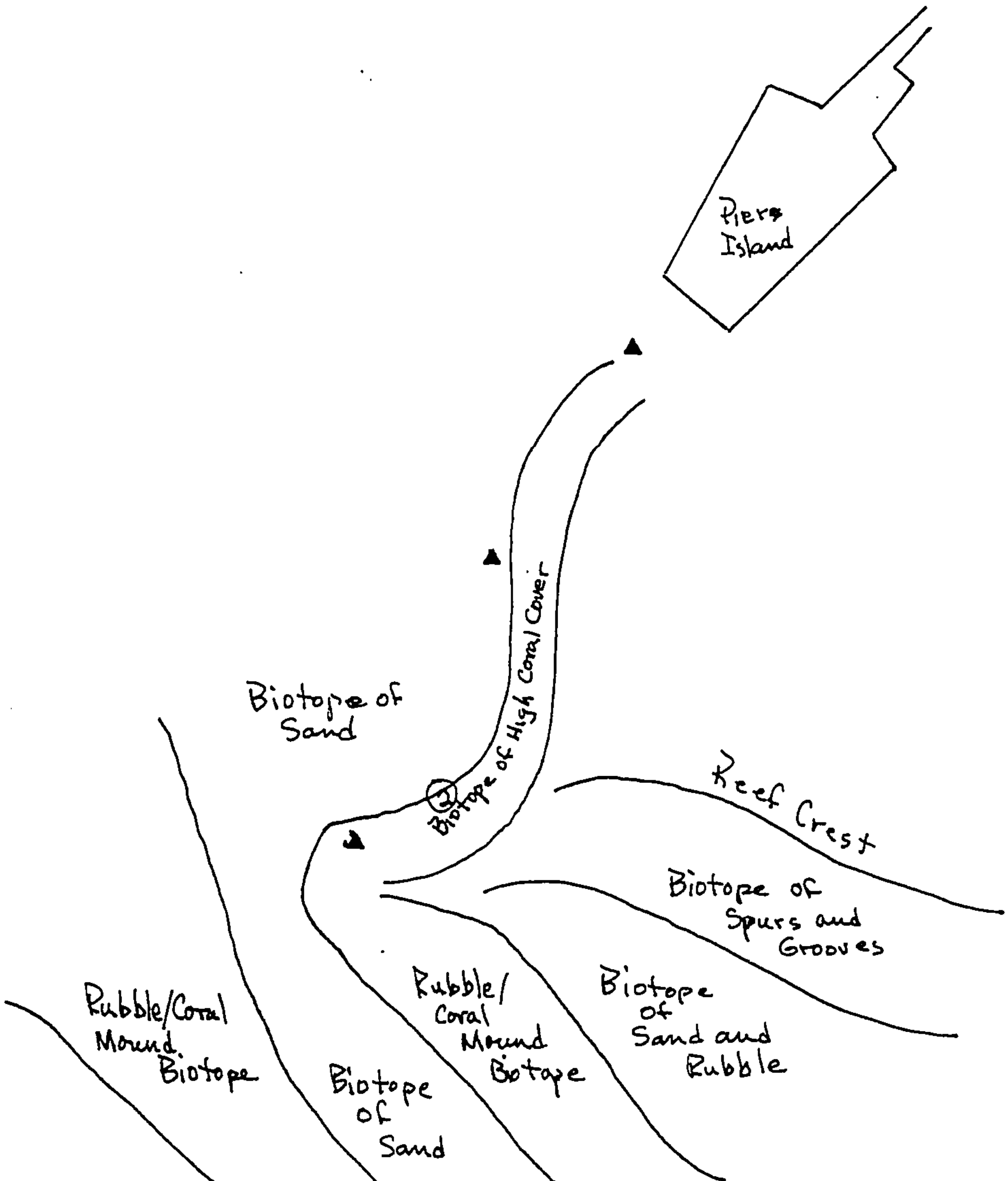
It should be noted that the boundaries of each zone or biotope are not sharp but rather grade from one to another; these are ecotones or zones of transition. Biotopes were delimited by physical characteristics including water depth, relative exposure to wave and current action, and the major structural elements present in the benthic communities. The latter include the amount of sand, hard substratum, and vertical relief present as well as the biological attributes of relative coral coverage, fish abundance, and dominant species of the coral community. Biotopes were named for distinctive features of each as shown in Figure 1.

The Biotope of Sand

The biotope of sand lies principally seaward of the project site as well as in the harbor entrance channel. At the outer depth limits of this study, the biotope of sand is bisected by a large elongate mound of coral rubble as noted above (the rubble/coral mound biotope). As the name implies, the substratum in the biotope of sand is dominated by sand. Because of its shifting nature, the benthic species found in sand habitats are generally adapted for life on an unstable and frequently abrading environment. Many species that are found in this habitat will bury into the sand to avoid predators and the abrasion that occurs with storm waves. Thus many species in the sand biotope are cryptic and difficult to see; among those are many of the molluscs and crustaceans such as the kona crab (Ranina ranina). Hence, without considerable time spent searching in the sand many species in the sand habitat will not be seen. The biotope of sand is best developed at greater depths; where it enters the shallow water, many of the characteristic species become less abundant.

Because of constraints with bottom time at the depth of which the best biological development in the biotope of sand is

FIGURE 1. Map of Kaunakakai Harbor, Moloka'i and environs showing some of the harbor bouys and biotopes (lettered) defined in the area. Also shown are the locations of the two quantitative stations (numbered) established to sample representative areas within biotopes. The biotopes are lettered where A = the biotope of sand, B = the rubble/coral mound biotope, C = the biotope of high coral coverage, D = the biotope of sand and rubble and E = the biotope of spurs and grooves. Scale: 1cm = 49m.


Piers Island
Biotope of High Coral Cover
Biotope of Sand
Reef Crest
Biotope of Spurs and Grooves
Rubble/Coral Mound Biotope
Biotope of Sand and Rubble
Rubble/Coral Mound Biotope
Biotope of Sand
2
1

found, we did not quantitatively sample this biotope but rather carried out a qualitative reconnaissance of the habitat in waters from 10 to 25m in depth. Species noted in this overview of the biotope include a number of molluscs: the helmet shell (Cassis cornuta), augers (Terebra crenulata, T. maculata and T. inconstans), the leopard cone (Conus leopardus) and flea cone (Conus pulicarius) as well as the sea hare (Brissus sp.), starfish (Mithrodia bradleyi), brown sea cucumber (Bohadschia vitiensis), opelu or mackeral scad (Decapterus macarellus), leatherback or la'i (Scombroides laysan), nabeta (Hemipteronotus umbrilatus), omilu (Caranx melampygus) the goby-like fish (Parapercis schauslandi), uku or snapper (Aprion virescens), the nightmare weke (Upeneus arge) and the weke or white goatfish (Mulloides flavolineatus). With greater effort many more fish and invertebrate species species would be encountered in this biotope.

The Rubble/Coral Mound Biotope

As mentioned above a large elongate mound of coral rubble lies seaward of the harbor entrance channel. This mound appears to have an orientation that approximately parallels the reef crest and is situated from 390 to 420m seaward of it. This mound is situated on a sand/rubble substratum that is about 24-26m in depth and rises more than 8m. The width of the mound varies from about 50 to more than 200m and it parallels the reef spanning the area at least from the harbor entrance away to the southeast for more than 400m. We did not attempt to determine the overall dimensions of this mound. It appears to be an extensive feature. The rubble/coral mound biotope also occurs on the seaward side of of the main reef platform to the southeast of the harbor entrance channel. In this area it is more than 100m in width and, again, approximately parallels the shallow reef crest (see Figure 2-A). Two hypotheses may be put forward to explain the presence of this biotope. The first is that it is very similar in appearance to the rubble/coral mound biotope found seaward of the Kewalo Landfill in Honolulu. In this latter location, these rubble mounds have been attributed to the dumping of dredge tailings from harbor maintenance operations years ago. The second hypothesis is that the rubble/coral mounds offshore of Kaunakakai Harbor are the result of occasional storm surf impinging on this reef and breaking up corals. Contributing to the breakup of coral in the vicinity of the harbor mouth could be the fact that barge-tug operations will take up their tows (shorten the tow cable) just outside of the harbor and in doing so, the cable may drag across the substratum destroying coral colonies in its path. None of these hypotheses is mutually exclusive and the rubble mounds may be the result of all three factors.

Marine communities are not well-developed on the top of this mound. Coral communities are reasonably developed along the seaward edge of the mound and to a lesser extent, on the shoreward edge. In these areas, coral cover may locally exceed 80 percent over scales of 5 to 25 m^2 where the corals have "cemented" the rubble forming a near-continuous hard substratum. Between these areas of higher coral cover, coralline rubble and sand dominate the substratum affording little vertical relief and shelter for fishes. Thus overall mean cover along these facies is closer to 5 percent. Benthic communities are much less developed across the top of the rubble mound and cover has an overall average of less than 2 percent although there are areas where it may locally exceed 20 percent. In the area directly fronting the harbor entrance channel, corals are virtually absent from the top of this mound. Where encountered, dominant coral species on the top of the mound are Pocillopora meandrina and Porites lobata.

Because of the relatively high diversity of fishes and invertebrates, a quantitative station was established along the seaward facing slope of the coral rubble mound in the vicinity of the second proposed cable alignment. This station is approximately 580m seaward of the reef crest on proposed cable alignment no. 2 in 21m of water (see Figure 2-A). The substratum at this station is comprised of coralline rubble with areas of consolidation due to coral growth. The transect was carried out at the top of this rubble mound, along the seaward side; some topographical relief is present due to small coral colonies (to 0.5m in height) and larger blocks of dead coral (up to 0.5 by 1m in dimensions). These topographical features are spaced from 8 to 30m apart, thus most of the substratum affords little cover for fishes. The transect covered one small area of principally encrusting coral growth.

The results of the quantitative survey of station 1 are given in Table 1. The quadrat survey noted eight coral species having a mean coverage of 29.4 percent. Dominant coral species include Porites compressa, Montipora patula and Montipora verrucosa. The macroinvertebrate census noted seven species including the boring bivalve Lithophaga sp., a pair of banded shrimps (Stenopus hispidus), the polychaete (Lomia medusa), the banded urchin (Echinothrix calamaris), black urchin (Tripneustes gratilla), starfish (Linckia multiflora) and sea cucumber (Holothuria atra). The results of the fish census at station 1 are given in Appendix A (transect 2). In total, 29 species of fishes (441 individuals) were encountered at this station. The most abundant species included the red squirrelfish or ala'ihi (Adioryx xantherythrus), the milletseed butterfly fish or lau wiliwili (Chaetodon miliaris) and the blacklip butterfly fish or kikakapu (Chaetodon kleinii). The biomas of fish was estimated to be 152 g/m^2 and the species that contributed most heavily to this were the black triggerfish or humuhumu 'ele'ele (Melichthys niger - 23% of the

TABLE 1. Summary of the benthic survey conducted in the rubble-/coral mound biotope approximately 900m seaward of the pier island at Kaunakakai Harbor, Moloka'i on 8 March 1996. Results of the 6m^2 quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Pact C. A short summary of the fish census is given in Part D. Water depth is 21m; mean coral coverage is 29.4 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Sponges						
Spirastella coccinea				0.5		
Corals						
Porites lobata	4		6		0.1	
P. compressa	19	1				
Pocillopora meandrina			0.5	2.8	0.5	1.8
Montipora verrucosa	21	64	2	0.5		
M. flabellata	3			0.5		
M. patula	12	26	2			
M. verrilli			0.5			
Pavona varians	9					
Sand			6	7	29	48.2
Rubble	18	9	73	82.7	64.4	38
Hard Substratum	14		10	6	6	12

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	2
P. compressa	2
Pocillopora meandrina	2
Montipora verrucosa	12
M. patula	8
Sand	14
Rubble	52
Hard Substratum	8

(TABLE CONTINUED ON NEXT PAGE)

I. INTRODUCTION

This report describes the findings of field investigations of proposed nearshore cable routes and landings at Kaunakakai, Molokai and Manele Harbor, Lanai. The work was completed by a two man team, an ocean engineer from Sea Engineering, and Dr. Richard Brock, a marine biologist. Sea Engineering's work concentrated on the physical aspects of the ocean bottom that would affect the cable placement and the requirement for cable protection. Dr. Brock's work was oriented toward a description of the benthic communities and the potential impacts of cable placement. Dr. Brock's report is included as an appendix to this one; cetain portions of his report have also been utilized in the main body of this report.

The vicinity of the proposed fiber optic cable shore landing at Kaunakakai Harbor, Molokai was investigated on March 8, 1996. Positioning was by means of a hand held GPS, upgraded to receive the U.S. Coast Guard differential beacon, giving an overall positioning accuracy of ±10 meters or better.

The proposed Manele Bay cable landing site was investigated on March 13, 1996, using the same personnel and methods as for the Kaunakakai Harbor site.

II. KAUANAKAKAI, MOLOKAI

Bottom Description

Figure 1, taken from NOAA Chart #19353 shows details of the harbor entrance channel and immediate vicinity. Bathymetry on this chart does not extend beyond the area shown, and the next larger scale chart shows insufficient detail for this area. Figure 1 is therefore a combination of the detailed NOAA chart and our annotated positioning notes. The starting and ending points of all dives were determined with the DGPS, and the locations are shown on Figure 1.

Two general cable alignments were investigated. Alternative 1 approximately follows the eastern edge of the harbor entrance channel, eventually making landfall at the Pier Island. Alternative 2 is located approximately 300 meters to the east, and would cross the shallow fringing reef flat making landfall in the vicinity of the Pau Hana Inn.

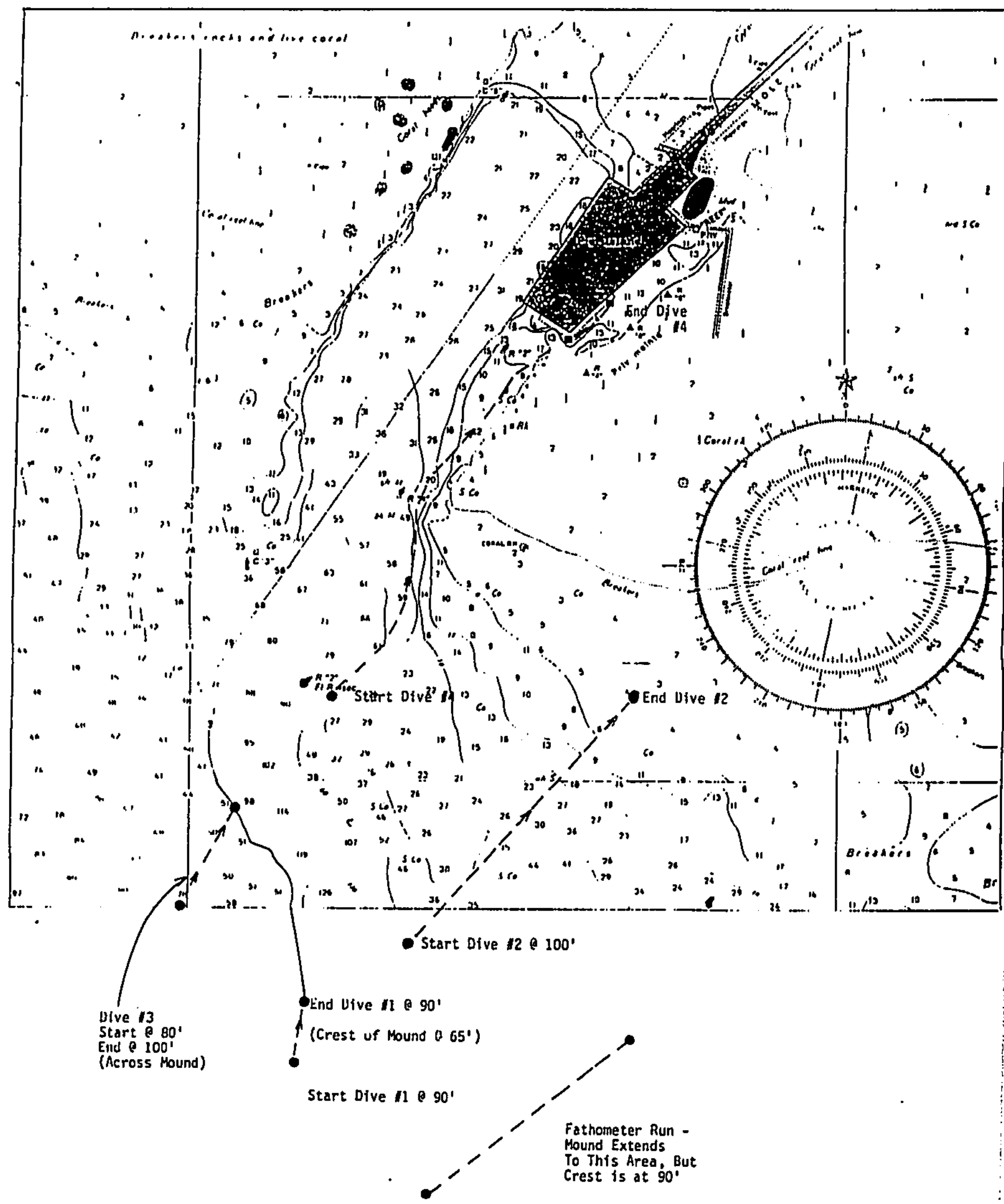


Figure 1. Kaunakakai Harbor (Scale 1:5,000: Water Depths in Feet)

One of the significant features affecting both route alternatives is an offshore mound, which is actually an extension of the shallow bottom to the west of the entrance channel. The deep entrance channel makes a 45 degree bend to the east just seaward of the R"2" buoy. The shallower adjacent bottom contours west of the channel parallel this bend, and further offshore are aligned almost parallel to the coastline. This bottom feature therefore appears as a mound or obstruction to potential cable approaches which would be perpendicular to the coastline. The bottom both offshore and inshore of the mound is deeper and consists of flat featureless sand. The mound consists of hard substrate, with coral and coral rubble coverage. The mound is an extensive feature, extending across the entrance channel and well to the east beyond alternative 2. The shallow bathymetry of the mound is apparent on Figure 1.

Dive #1 was made on the mound east of the entrance channel, along the proposed alternative 2 approach. The dive started at the transition from sand to hard bottom on the seaward side of the mound, at a depth of 90 feet. Typical vertical relief of the seaward slope and the crest of the mound is 2 feet. Photo 1 was taken at the crest of the mound at a depth of 60 feet. The inshore face of the mound is slightly steeper than the offshore face, and is typified by small ledges, such as that shown in Photo 2. Vertical relief is on the order of 3 feet. The transition back to sand bottom on the inshore side occurs at the 90 foot depth.

The second dive was made on approximately the same approach alignment, starting at the 100 foot depth where the inshore slope begins to shoal up to the fringing reef. The sand to hard bottom transition occurs at a depth of between 90 and 100 feet. Photo 3, taken at a depth of 40 feet, shows the coral coverage and the typical 2 foot vertical relief representative of the zone between 90 and 40 feet. Photo 4, taken at 35 feet, shows the increasing irregularity of the bottom and the typical vertical relief of 3 feet. Photo 5 was taken at a slope break at a depth of 32 feet. Inshore of this point, the bottom slope flattens out, and the vertical relief decreases. Although there is less coral coverage, there are still scattered coral formations in this area with vertical relief of 3 feet (see Photo 6 for example). At the 30 foot depth, there is a distinct shift in bottom zonation. The bottom becomes flat and scoured, with scattered pieces of coral rubble, as shown in Photo 7. This zone extends in to the 20 foot depth, and is apparently where the maximum wave induced forces occur. The spur and groove formation typical of the seaward faces of fringing reefs begins at the 20 foot depth. Vertical relief is up to 4 feet, and Photo 8 shows a typical view. Photo 9 shows typical bottom conditions in 5 feet of water, inside the surf zone.

The third dive was made on the outer mound on proposed route alternative 1. The transition from sand to hard bottom occurs at the 90 foot depth. Photo 10 shows the outer slope of the mound at 70 feet, and is typical of the entire outer slope of the mound, which crests at a water depth of 48 feet. Vertical relief is typically only 1 foot. The inshore slope of the mound consists of rubble and limestone, with vertical relief up to 2 feet.

The fourth dive was made along the east side of the channel, and extended from just seaward of the R"2" buoy to the Pier Island. The channel bottom through this area is flat sand, bordered by steep coral covered walls rising to a shallow reef shelf on the east side of the channel. The depth of the transition from the sand channel bottom to the coral covered walls is 40 to 45 feet between R"2" and R"4". Photo 11 shows the channel wall in the vicinity of R"2". Photo 12 shows a typical view of the shelf midway between R"2" R"4". The depth of the shelf is about 15 feet. The topography of the shelf is very irregular, with vertical relief up to 6 feet. Photo 13, taken at a depth of 45 feet in the vicinity of R"4", shows the remnant of a tow bridle or anchor line wrapped around a small irregularity on the channel bottom. Photos 14 and 15 show two typical views of the steep channel walls in the vicinity of R"4". At R"4", the depth of the channel bottom decreases to approximately 30 feet, and that of the reef shelf to approximately 5 feet. A large anchor is wedged into the channel wall just inboard of R"4".

From R"4", the dive followed the east wall of the channel toward the small craft channel. This channel is approximately 12 feet deep, with a steep ledge up to the 2 foot deep shelf to the east. Photo 16 shows the very irregular reef shelf in this area.

Photo 17 shows the revetment on the east side of the Pier Island. The revetment is built on a limestone shelf, which can be seen paralleling the revetment in the photo. The shelf is approximately 10 feet wide, then gives way to a steep drop to the channel bottom. At the southeast corner of the Pier Island the ledge is not present, and the revetment rocks extend down to the channel bottom.

Conclusions

Either of the selected route alternatives will have to cross the outer mound. Reconaissance runs to determine the limits of the mound were made using the dive vessel's fishing fathometer. The mound is present, as shown by the bathymetry on Figure 1, along the entrance channel centerline, with the crest of the mound at a water depth of 40 feet. East of route alternative 2 (see Figure 1) the mound is still present, but it is narrower, with a deeper crest (90 feet). A cable landing even further to the east would probably avoid the mound.

Cable protection in the relatively shallow water on the crest of the mound may be required for either alternative. Along alternative 2, the inshore bottom is irregular, and may require an additional long span of cable protection (see dive #2, Figure 1). The Kaunakakai area is protected by the island of Lanai from waves aproaching from the south and southeast, but is exposed to wave approach from the southwest. Both Kona storm and hurricane waves approach from this direction, and the design wave height at this site could be significant.

The proposed route for alternative 1, which involves anchoring the cable on the shallow reef shelf, does not appear to be practical because of the steep channel walls and extensive encrusting coral coverage. Additionally, the shallow shelf fronting the exposed reef flat has heavy coral growth and is very irregular. Working on the shallow reef crest may be difficult.

The best alternative might be to route the cable along the east side of the entrance channel, carefully placing it right at the sand/coral transition. The route would run from R"2" to R"4", and then up the east side of the small boat channel. The cable could be routed over to the Pier Island revetment at any desired point. Cable protection against wave action would probably not be required on this route, but harbor operations would pose a definite threat to the cable.

A major concern requiring further clarification is the high possibility of cable damage due to either emergency ship anchoring in the entrance channel, or more likely, damage due to the bridles and tow cables of the tugs and barges as they shorten up their tow prior to entering the harbor. Damage from this source is not limited only to the harbor channel. For example, several oceanographic instrumentation arrays have been lost in the vicinity of the Sand Island Ocean Outfall diffuser, which is located 8,000 feet west of the Honolulu Harbor entrance channel. Abrasion marks caused by tow wires dragging across the exposed diffuser pipe bells in 235 feet of water have been observed. The practicality of the route described above is totally dependent upon being able to determine, with a high degree of certainty, that ship and tug operations will not impact the cable.

Should the Kaunakakai area not be suitable for a shore landing, there are two other possibilities, both located to the west, as shown in Figure 2. There is a small serpentine channel located approximately 3.5 miles west of Kaunakakai. The channel provides access to the shore through the reef, and is readily visible from the air. The only available bathymetric details of the channel are shown in the figure. Another channel through the reef is located at Kolo Harbor, approximately 10 miles west of Kaunakakai. Figure 3 shows

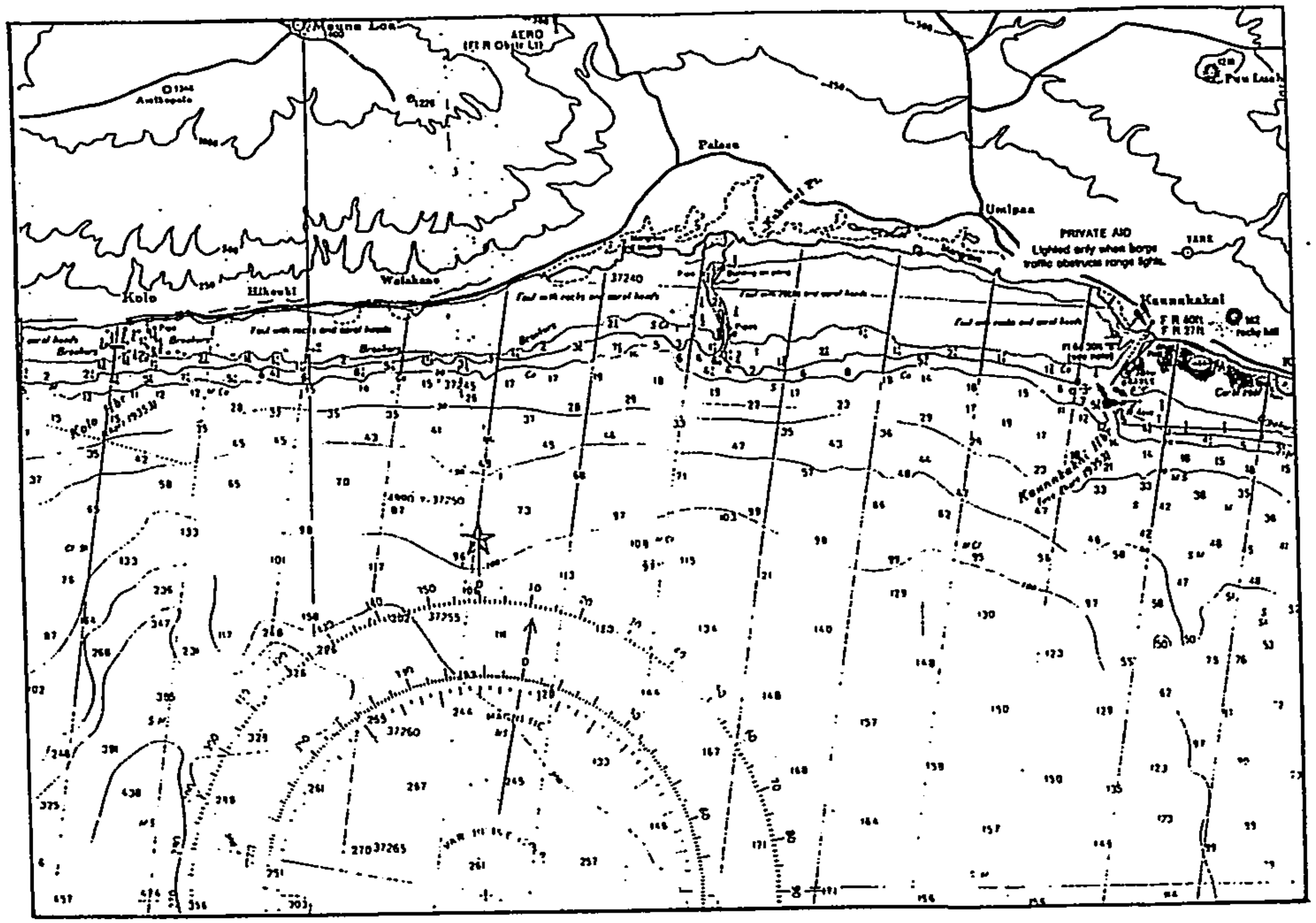


Figure 2. South Coast Moloka'i SOUNDING IN FATHOMS - Scale 1:80,000

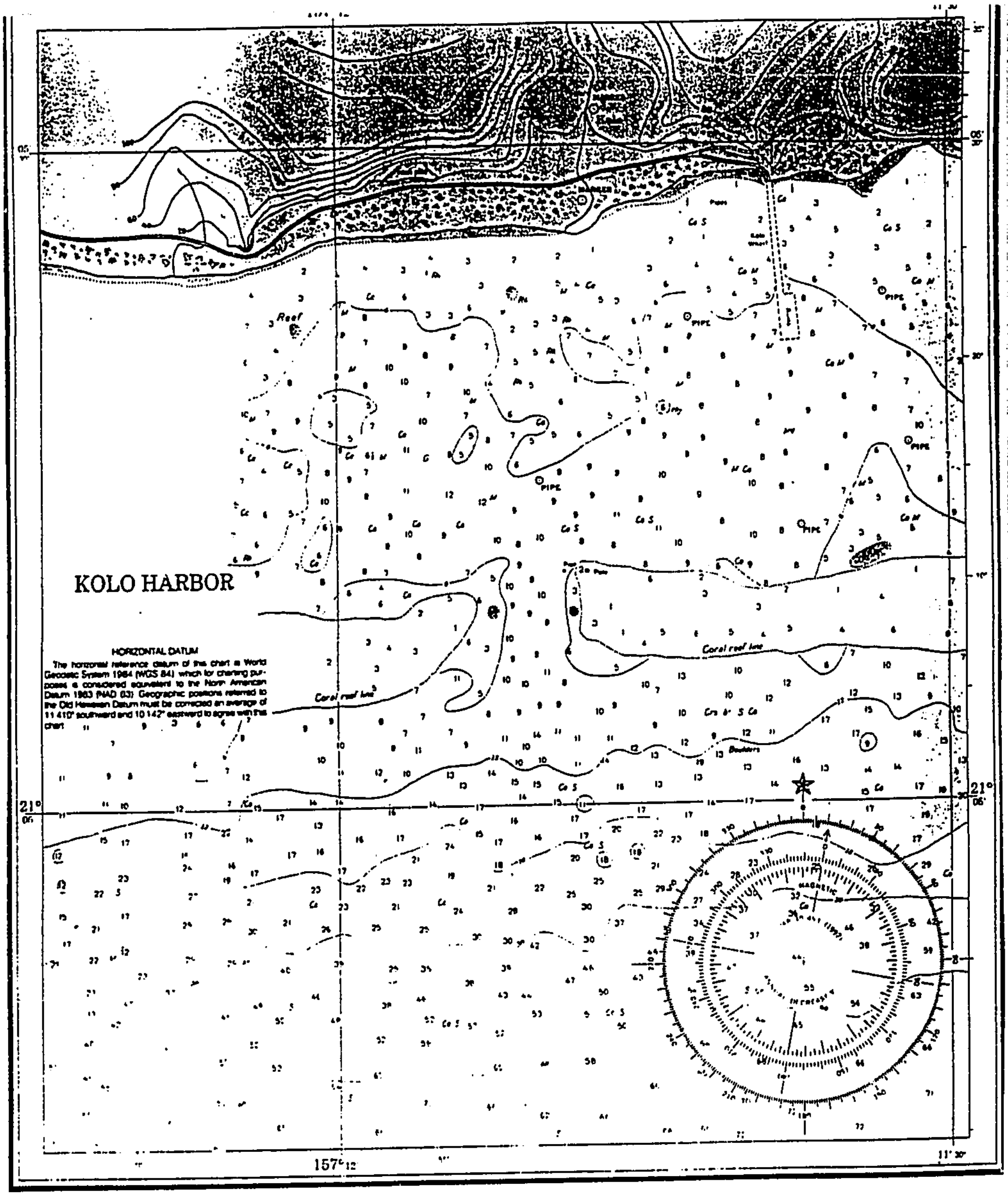


Figure 3. Kolo Harbor. Depths in Feet

the detailed bathymetry of the harbor.

III. MANELE HARBOR, LANAI

General Description

Preliminary fathometer runs in the center of the bay showed a relatively flat bottom, indicative of a sand channel, and this was confirmed by a dive to 90 feet in the center of the bay. The sand coverage is extensive and the deposit appears to be relatively thick. Fathometer runs out to the 120 foot depth were made, and the sand appears to continue to at least that depth. No steep ledges were noted. The sand bottom offers optimum conditions for cable routing.

The boundaries of the sand channel were mapped using the hand held DGPS, and were superimposed on a nautical chart of the bay (Figure 4). The diving investigations were concentrated on the western side of the bay in the vicinity of the proposed cable landing.

Brock delineated three major biological zones, or biotopes, and these are described thoroughly in the appendix. They were the biotope of sand, the biotope of high Porites (finger coral) cover, and the biotope of high coral diversity. These biotopes are also superimposed on Figure 4.

The biotope of high Porites cover lies off the remnants of an old loading ramp. The transitition from sand to coral bottom occurs at approximately the 65 foot depth. Photo 18, taken at a depth of 25 feet shows typical bottom conditions. The coral cover is extensive, and the bottom is undulating with vertical relief on the order of 3 feet. The bottom becomes more irregular in shallow water near the shoreline, with vertical relief increasing to 5 feet. At the shoreline, a near vertical ledge rises from the 14 foot depth to the waterline, as shown in Photo 19. The ledge continues above the waterline, as shown in Photo 20, which also shows the remnants of the ramp.

The nearshore band of coral coverage is continuous along the western side of the bay, but the zonation changes in the northwest corner near the breakwater. Brock defined this zone as a biotope of high coral diversity. The bottom becomes very irregular, with numerous interspersed pockets of sand. The sand areas have no particular orientation, and since they

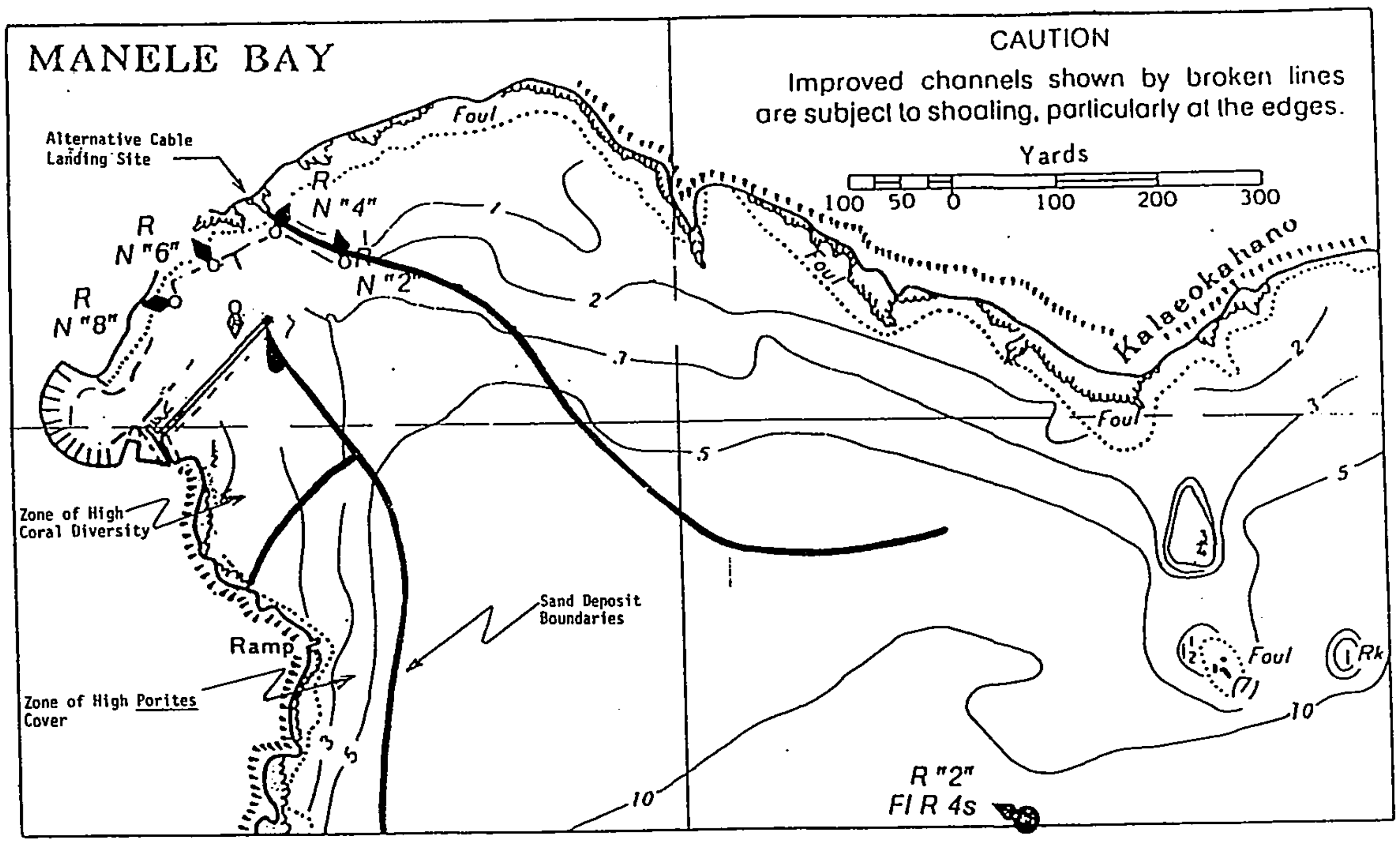


Figure 4. Manele Bay

all abruptly dead end, do not provide a possible cable route through this area. The sand pockets are typically 5 to 10 feet below the ridges of surrounding hard bottom, and the diverse coral growth occurs on the tops and sides of these ridges. This inner zone ia apparently a popular snorkeling area. One tour boat has a temporary mooring in one of the sand pockets, and was present with a tour group during the morning of our reconnaissance. Individual snorkelers were also observed entering the water from the proposed cable landing area near the culvert. Photo 21, taken at a depth of 30 feet, shows the transition from sand to the diverse coral bottom. The height of the ledge is approximately 7 feet. The next four photos, 21-25, show typical views of the zone of high coral diversity, and illustrate the irregular bottom topography.

The bottom just offshore of, and parallel to, the breakwater was investigated to see if it offered a possible cable route. Along the outer half of the breakwater, the diverse coral zone extends up to the breakwater rocks. Inshore, there is a narrow band of basalt rocks, and the bottom topography is more regular.

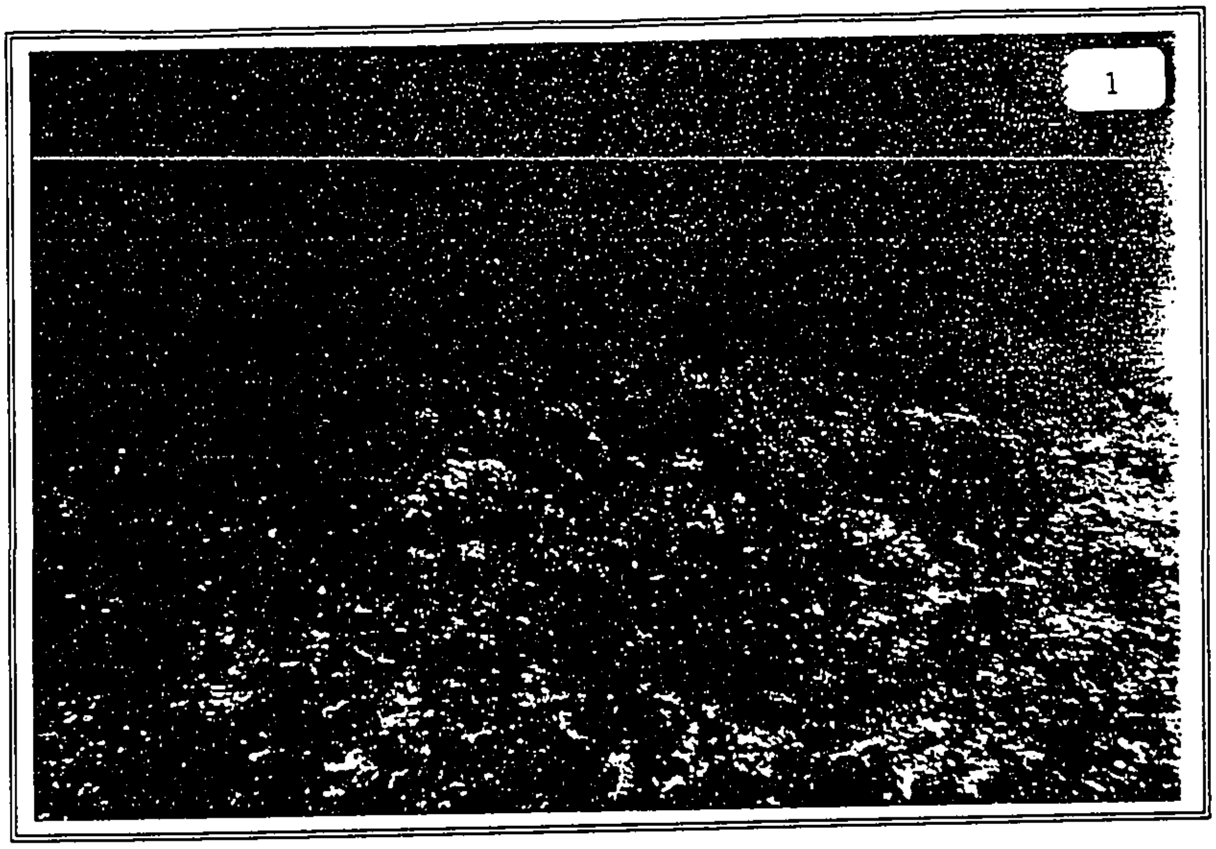
The east side of the entrance channel was also investigated for a possible cable route. The sand bottom extends slightly east of the small boat channel, and a cable could be routed to avoid the channel and still cross little or no hard bottom. Photos 26 and 27 show views from the water of this approach. There is a shallow basalt shelf within the small shoreline embayment that is approximately 100 feet wide. A three foot ledge (Photo 28) marks the transition from the offshore sand bottom to the shelf.

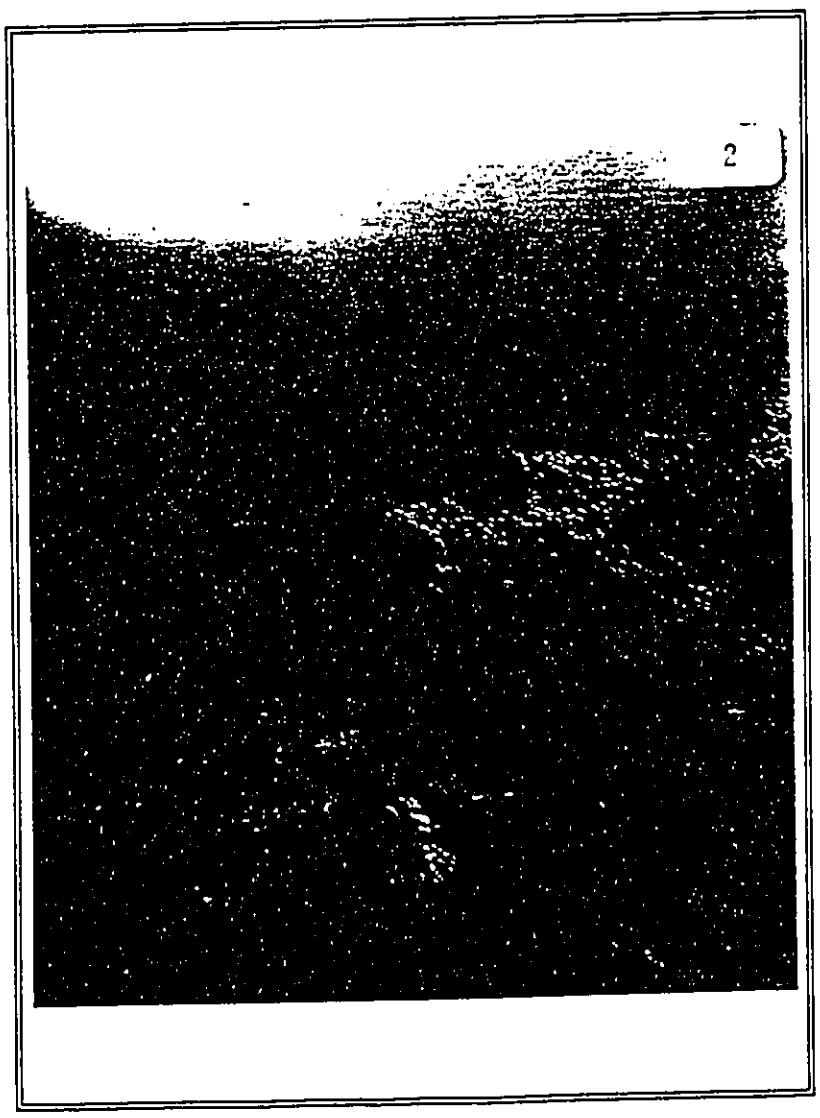
Conclusions

The proposed cable landing on the northwest side of Manele Bay does not appear to be feasible. The cable would cross a highly diverse and heavily used coral area. The 10 foot vertical relief would result in the cable being suspended across the deeper sand pockets, with subsequent visual impact. Excavation of the coral ridges would almost certainly not be allowed in this area. Aesthetic and environmental issues would be exacerbated since the entire bay lies within a Marine Life Conservation District. From an engineering perspective, properly protecting the suspended cable would be difficult.

Considering marine issues only, the best cable landing site is just northeast of the small boat harbor. A landing at this site would take advantage of the extensive offshore sand deposit, and only the inshore 100 feet or so would cross hard bottom. This recommended shore landing point is shown on Figure 4. The cable could be routed on the north side of the channel, outboard of buoys RN "2" and RN "4", and would therefore be out of the entrance channel and potential impacts from future dredging operations.

Another landing site that would avoid crossing the irregular coral bottom would be on the tip of the existing breakwater. However, this site has several disadvantages. The cable would have to be pulled up to the crest of the breakwater, and then run shoreward along the crest. This might present a physically difficult landing. Also, any shifting of the breakwater rocks during storms could put the cable at risk.



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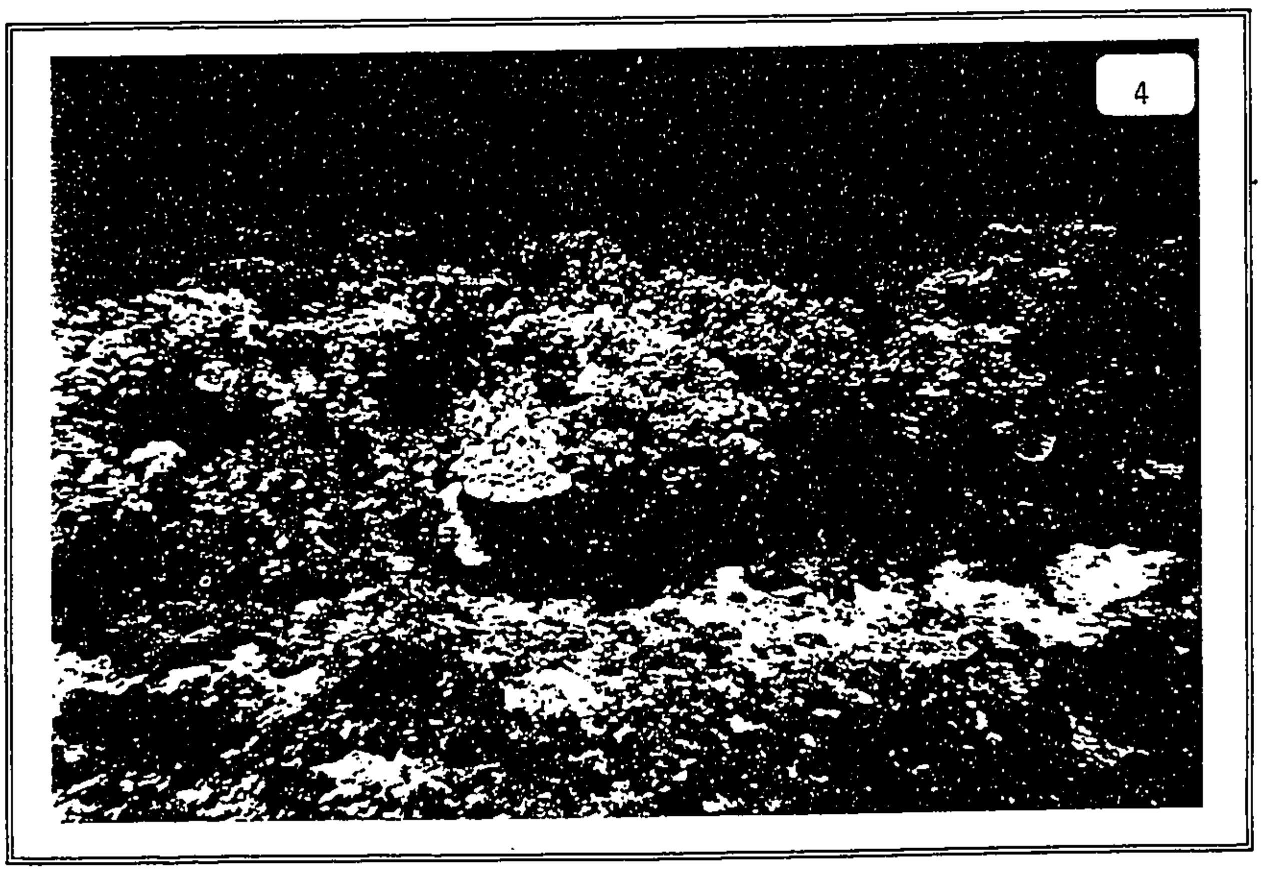
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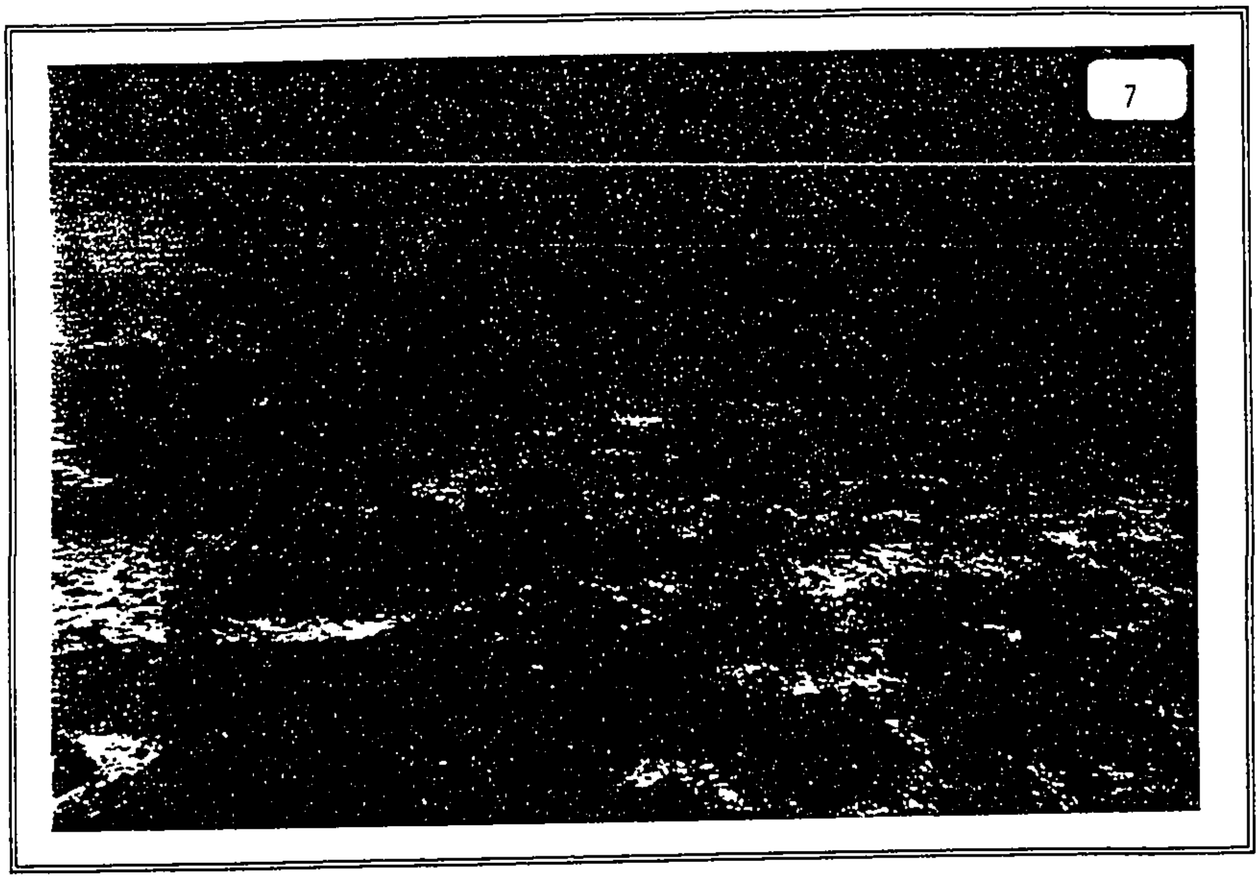
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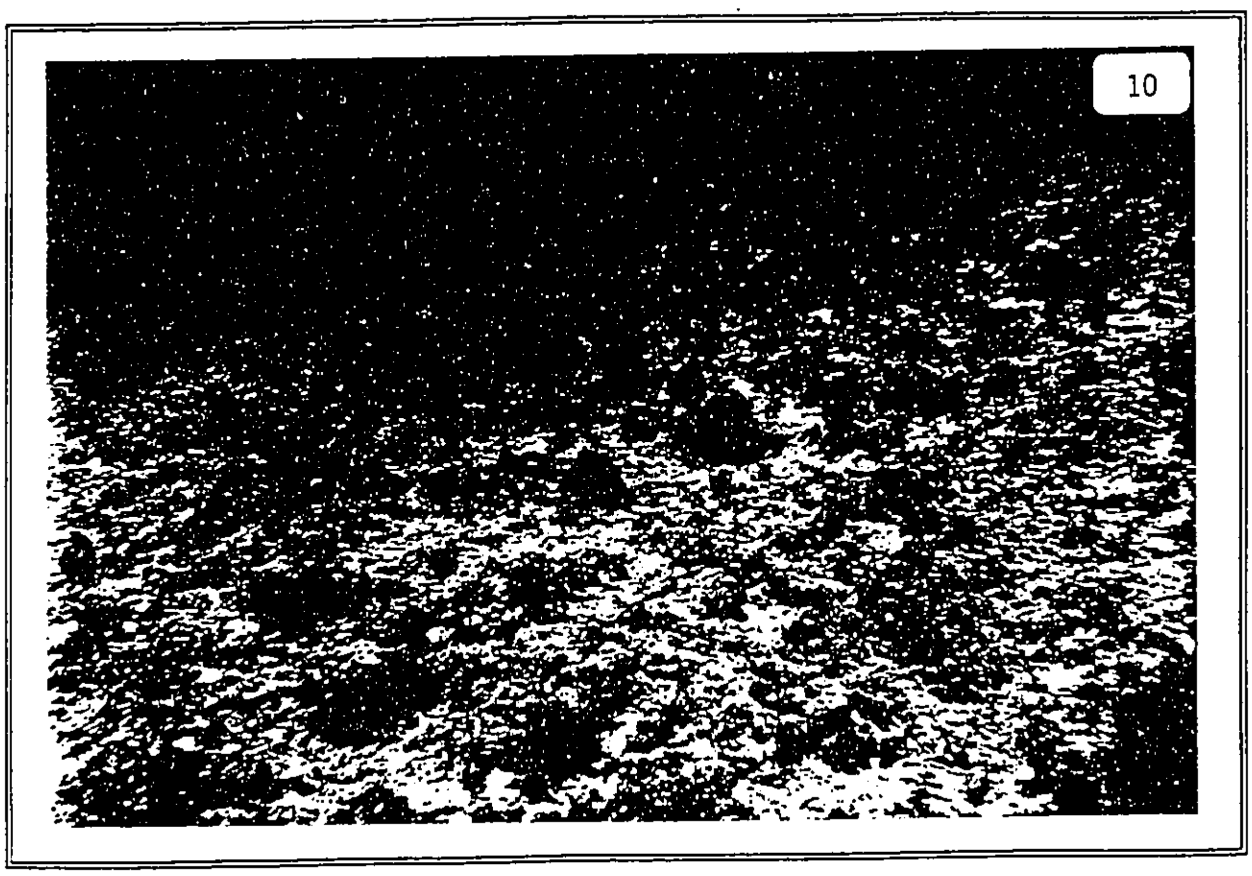
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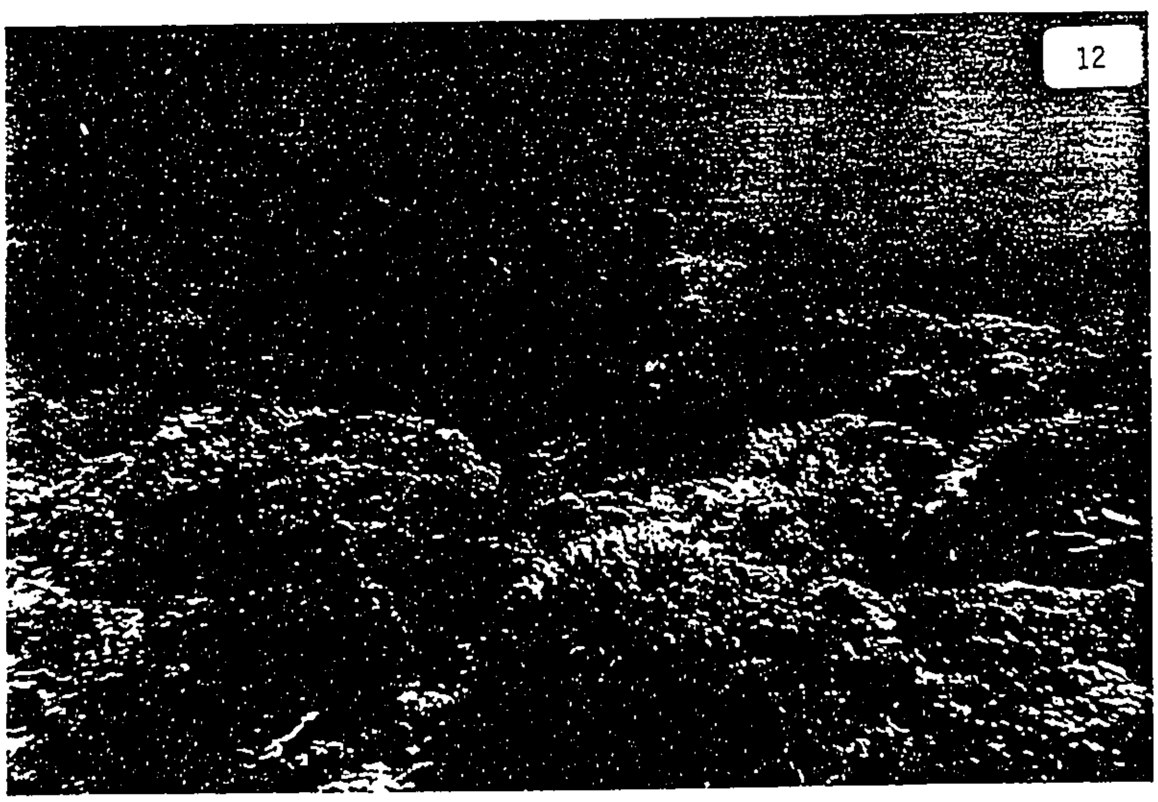
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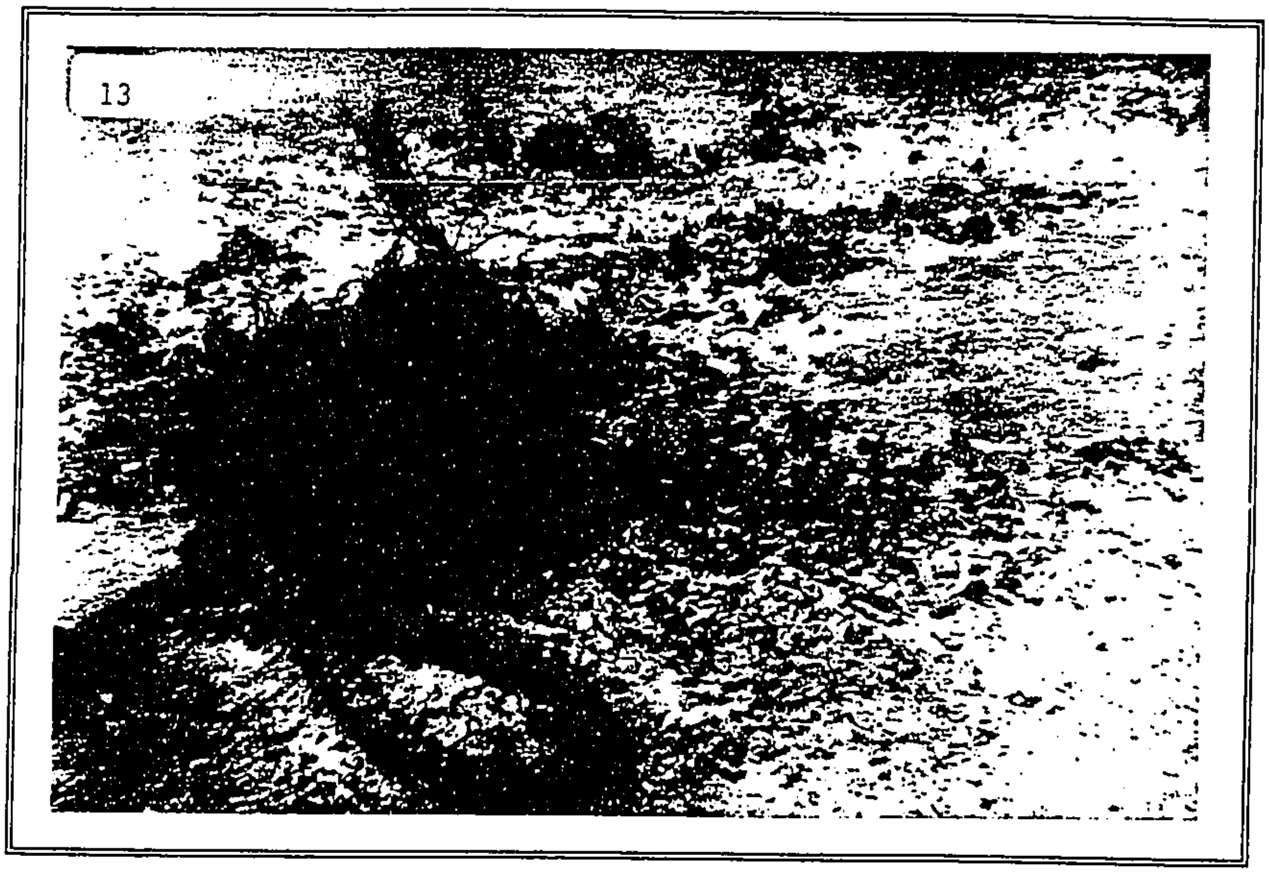
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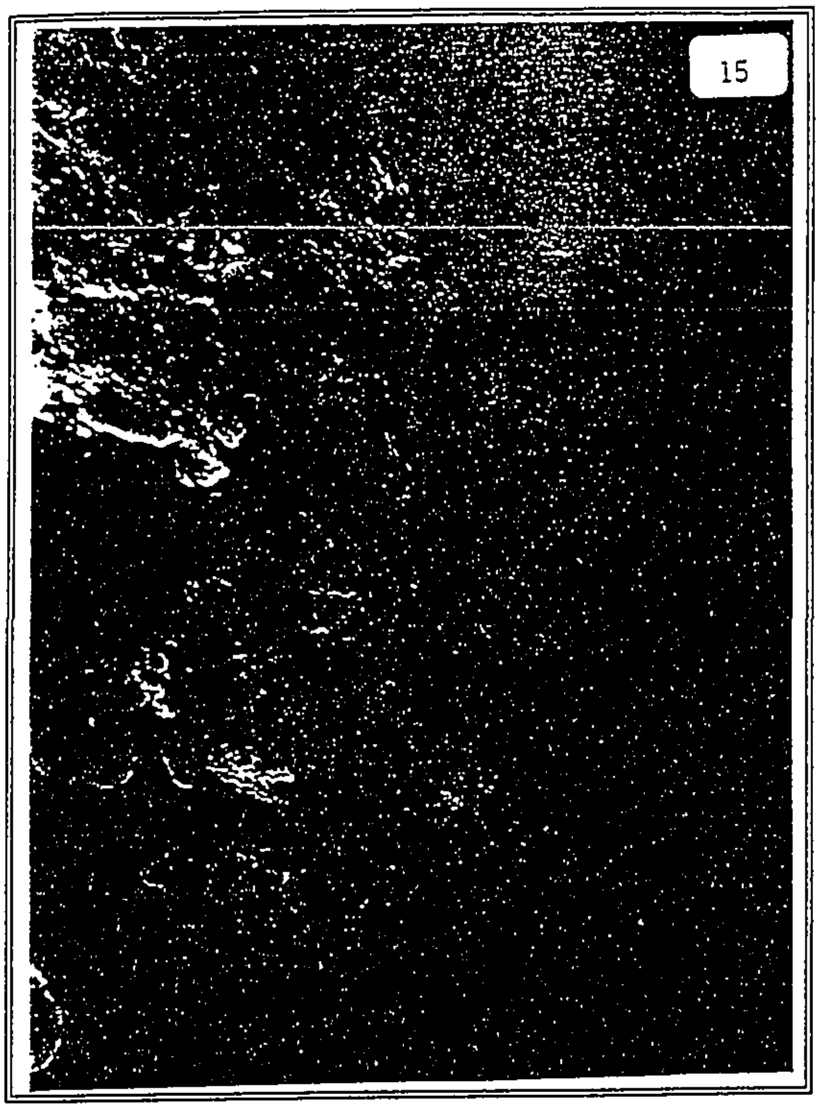
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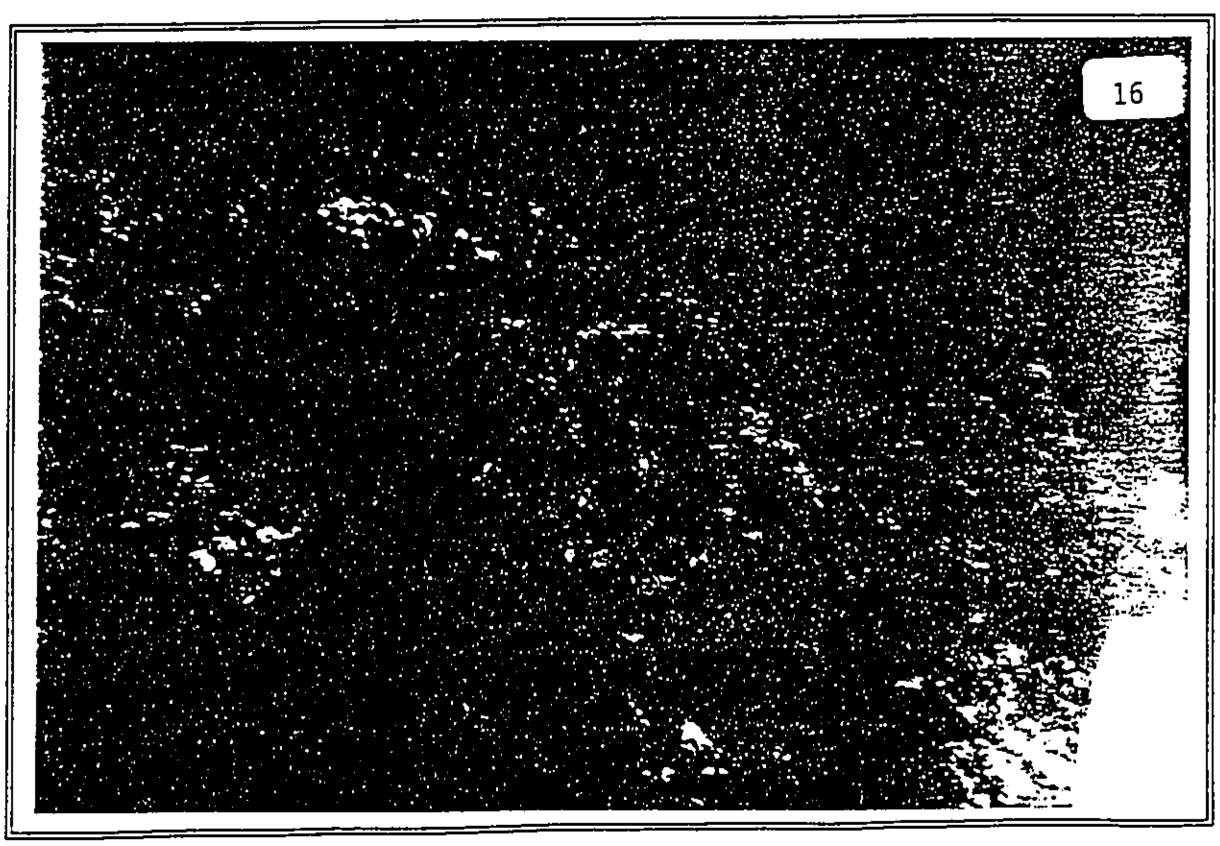
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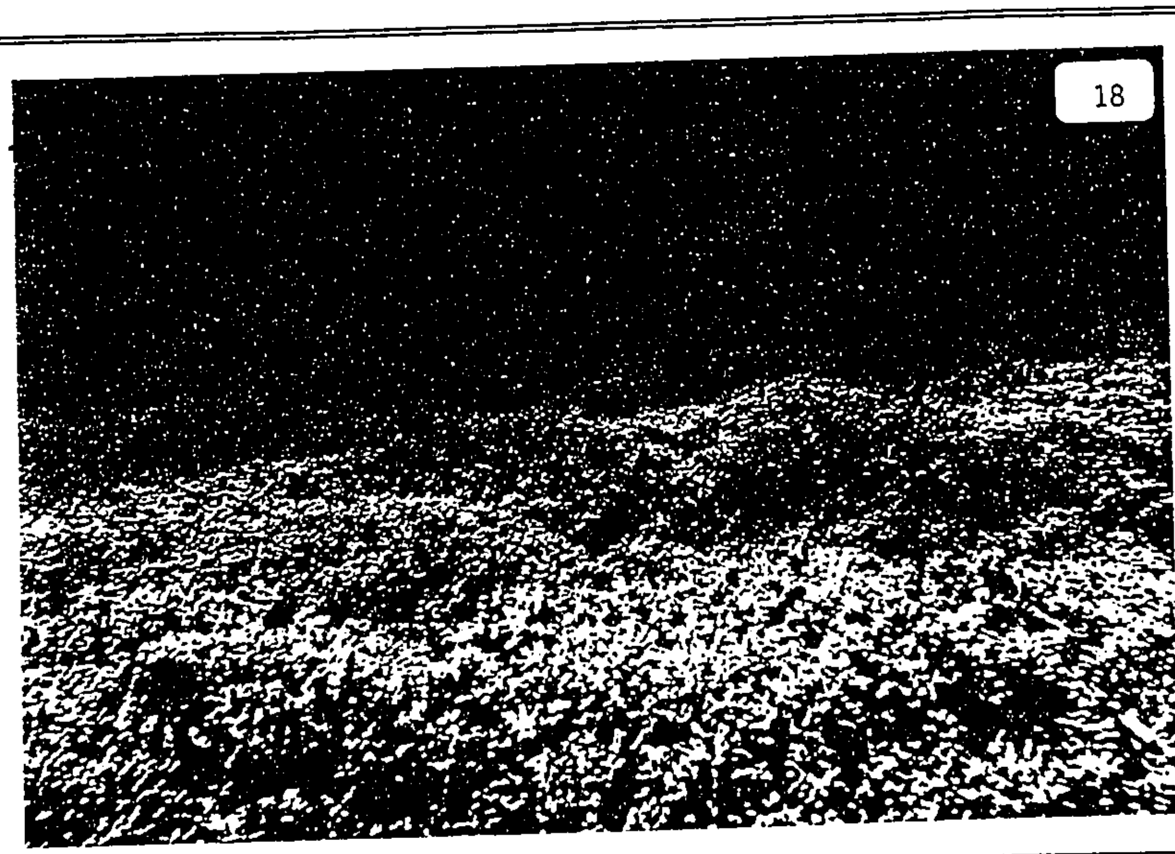
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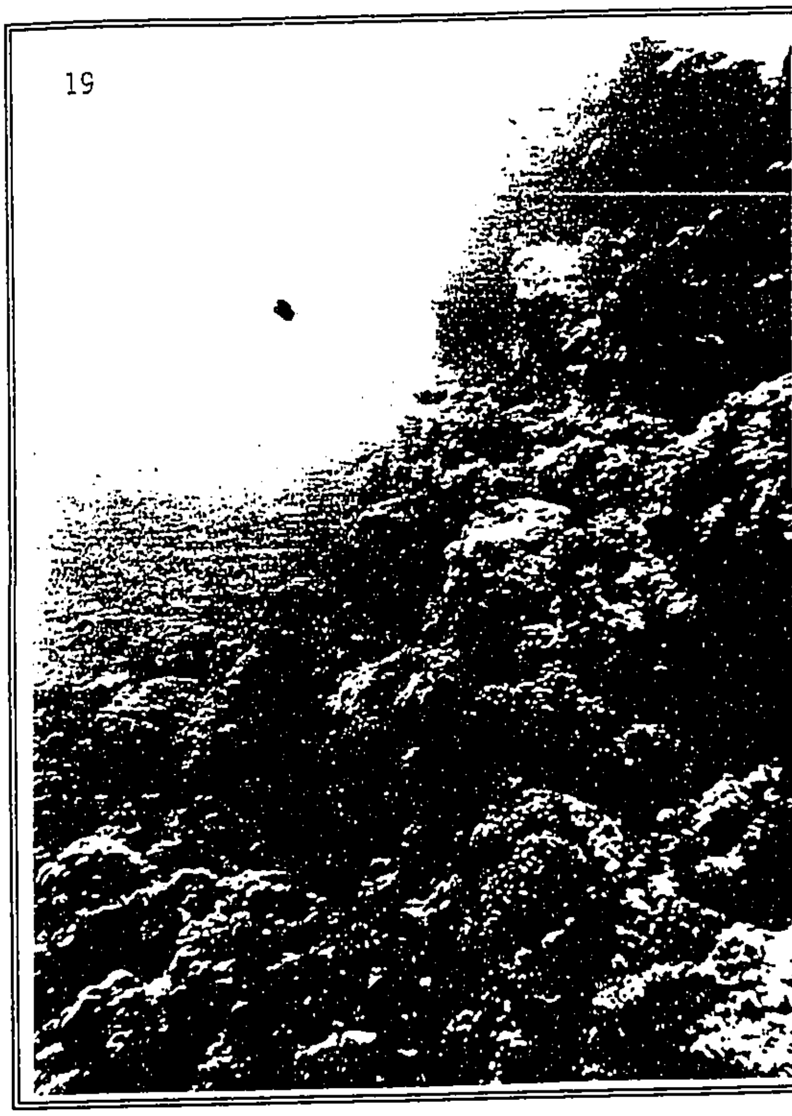

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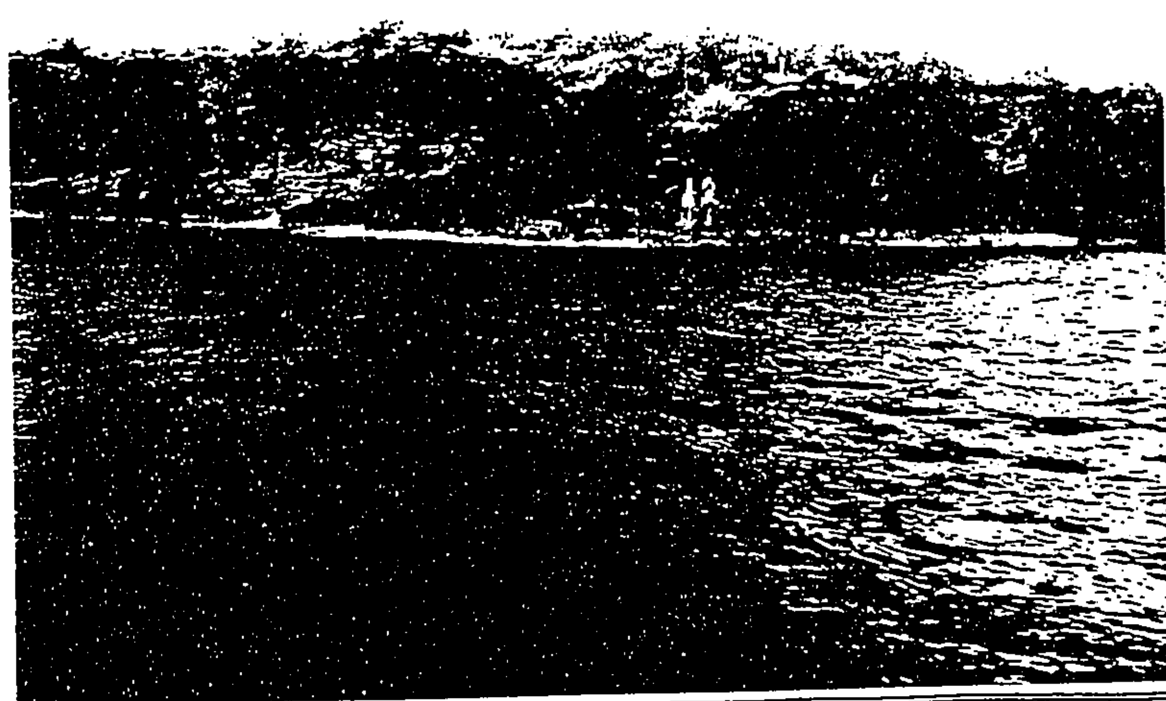

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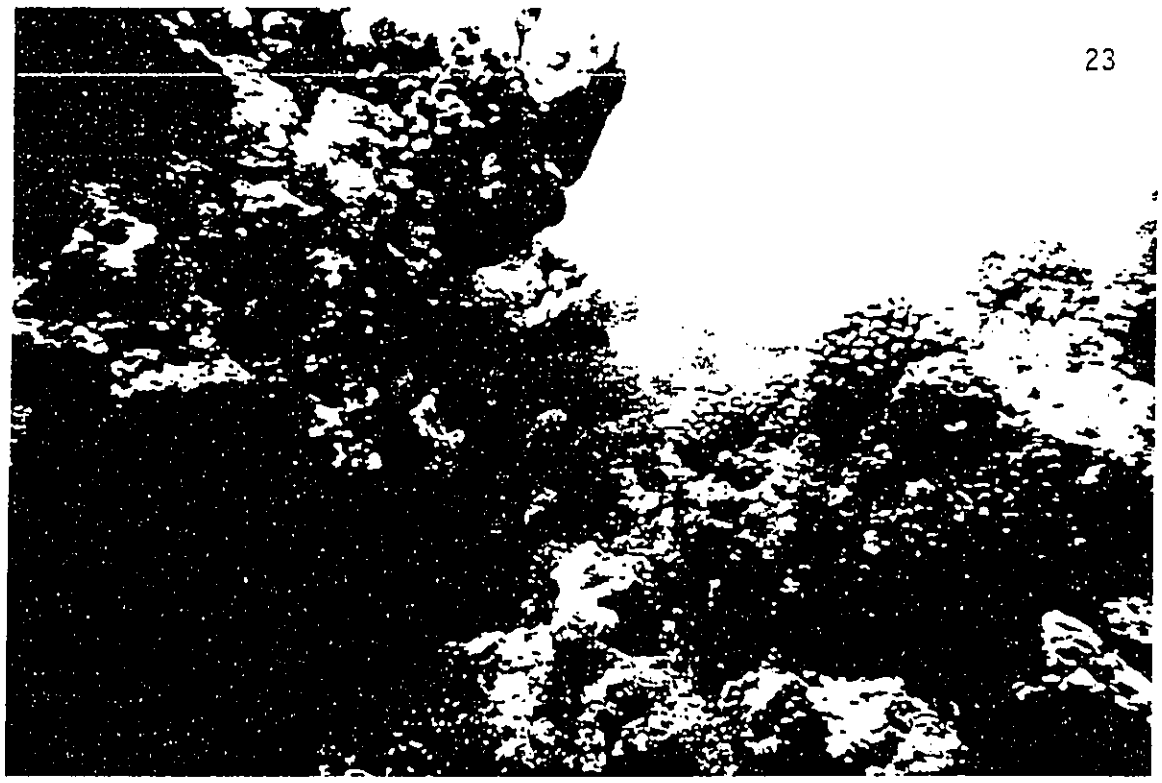
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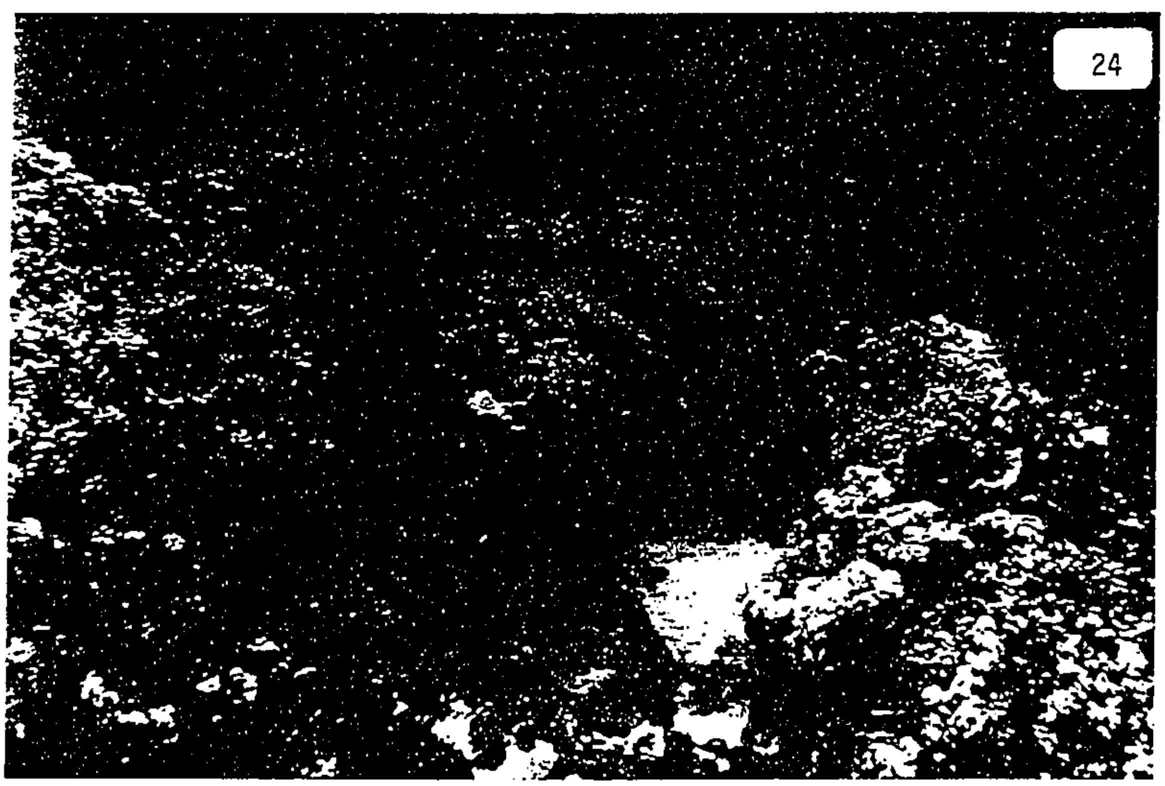
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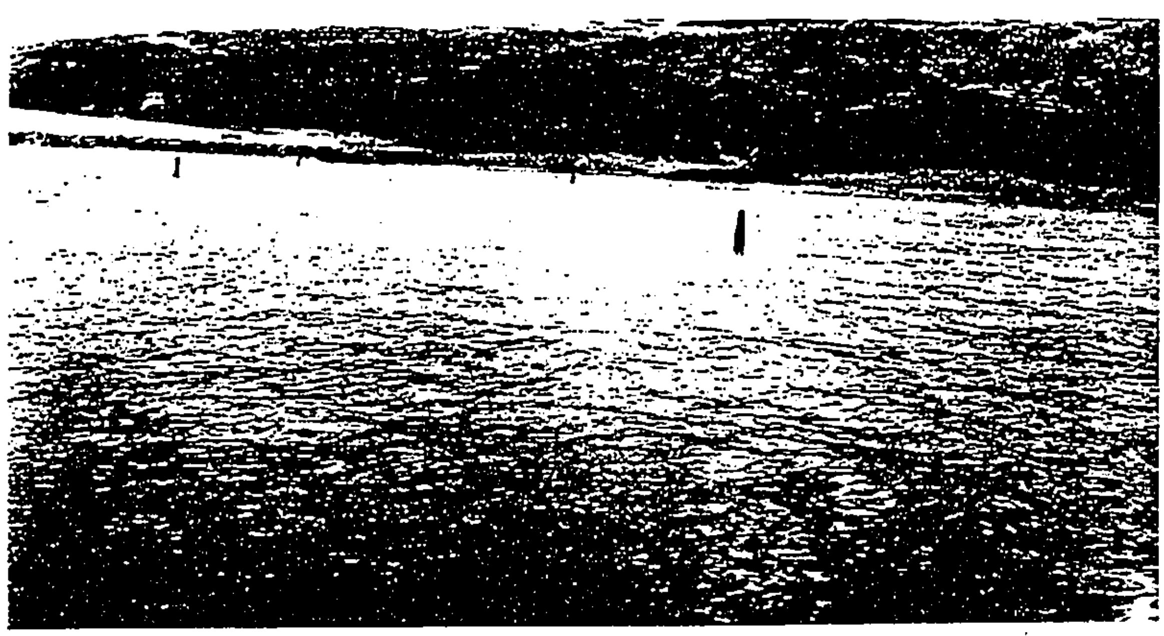

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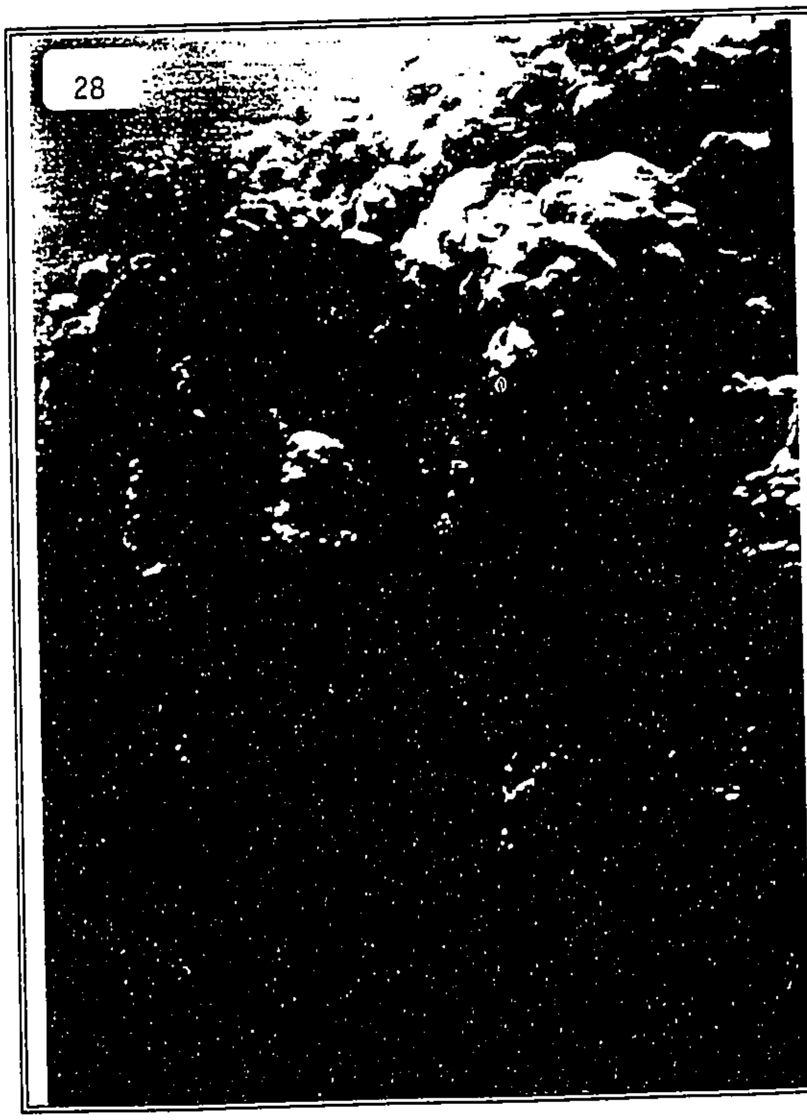


TABLE 1. Continued.

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Lithophaga sp.	1
Phylum Arthorpoda	
Stenopus hispidus	2
Phylum Annelida	
Lomia medusa	1
Phylum Echinodermata	
Echinothrix calamaris	1
Tripneustes gratilla	3
Linckia multiflora	1
Holothuria atra	2

D. Fish Census (4 x 25m)

29 Species
441 Individuals
Estimated Biomass = 152 g/m^2

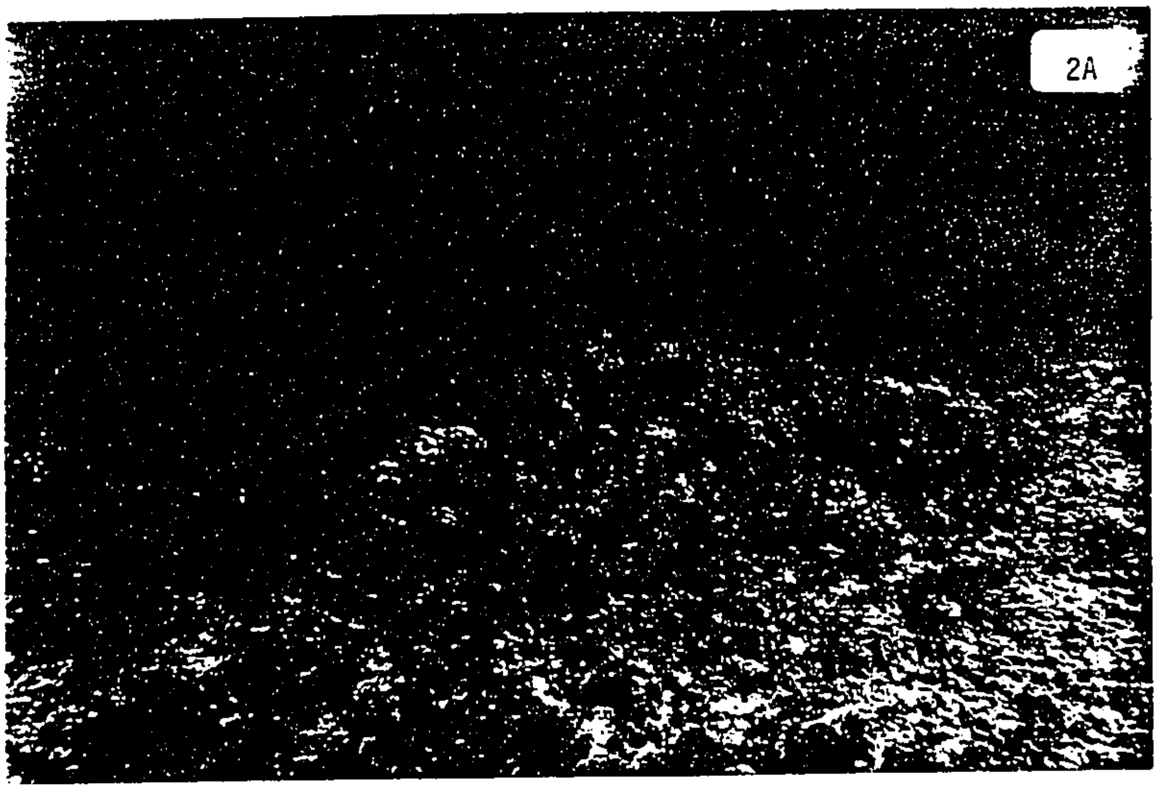


FIGURE 2. Photographs the some of the important biotopes along the proposed cable alignment 300m south of Kaunakakai Harbor. A - the rubble/coral mound biotope along the seaward edge, 20m, B - biotope of sand and rubble, depth 10m, C - biotope of spurs and grooves seaward of the reef crest, depth 5m.


2B


2C

total), the orangebar surgeonfish or na'ena'e (Acanthurus olivaceus - 18% of the total) and the ala'ihi (Adioryx xantherythrus - 19% of the total). In the vicinity of this station were seen the redlip parrotfish or palukaluka (Scarus rubroviolaceus), the goldring surgeonfish or kole (Ctenochaetus strigosus), the eye-stripe surgeonfish or palani (Acanthurus dussumieri), the la'i (Scombroides laysan), yellowmargin moray or puhi paka (Gymnothorax flavimarginatus), spiny lobster or 'ula (Panulirus marginatus), the octopus or he'e (Octopus cyanea) and corals (Montipora verrilli, Porites (Synarea) convexa, Pocillopora eydouxi and Povana duerdeni).

The Biotope of Sand And Rubble

This biotope lies between the rubble/coral mound biotope and the biotope of spurs and grooves seaward of the reef crest southeast of the harbor (see Figure 1) and is a transition between these two major biotopes. The biotope of sand and rubble is situated at water depths from 6 to 10m and forms a band that approximately parallels the shore. The mix of sand and rubble is a substratum that does not allow for much benthic community development to occur. As a result, there are very few corals present (>>0.1%) and little or no cover for fishes and there are few visually apparent species to be seen (see Figure 2-B). Among the species encountered in this biotope were a few small nabeta (Hemipteronotus umbrilatus), the sea cucumber (Holothuria atra), mantis shrimp (Gonodactylus maculatus), and the sidespot goatfish or malu (Parupeneus pleurostigma). No quantitative studies were performed in this biotope.

This biotope is probably present as a result of the considerable amount of loose coralline material in the waters seaward of the Kaunakakai reef flat and the usual wave action that impinges in this area.

Biotope of Spurs and Grooves

The biotope of spurs and grooves is a characteristic feature of the seaward edge of emergent coral reefs. This formation is nature's response to wave action and it serves to effectively dissipate wave energy. This biotope fronts the Kaunakakai reef southeast of the harbor (see Figure 1). The substratum of the biotope of spurs and grooves is limestone that forms ridges or fingers that extend seaward for distances between 5 to 30m and these ridges rise from 0.5 to 1.8m (see Figure 2-C). Distances between ridges are from 1-2m up to 20m; the intervening channel floors are comprised primarily of limestone with some coral. Coral development is greatest on the ridges where cover may exceed 50 percent; overall through the biotope of spurs and grooves the mean coral cover is estimated to be about 35 percent. The dominant coral species in this biotope are Porites lobata and Pocillopora meandrina.

A qualitative reconnaissance was made through this biotope rather than carrying out a quantitative survey because of the difficulty in keeping a transect line in place due to wave activity. Coral species encountered in the qualitative reconnaissance Porites lobata, Pocillopora meandrina as the most abundant, with Montipora verrucosa, M. verrilli, M. flabellata, Pavona varians, P. duerdeni, Leptastrea purpurea being less abundant. Other species of corals seen include Pocillopora molokaiensis, Cyphastrea ocellina and Leptastrea bottae. The biotope of spurs and grooves affords considerable cover for fishes. Where this cover is well developed more species will be seen and where the wave surge is greater will be a characteristic assemblage of surgeonfishes and wrasses. Fishes commonly seen in the biotope of spurs and grooves that are of commercial and recreational importance include the eye-stripe surgeonfish or palani (Acanthurus dussumieri), the yellowfin surgeonfish or pualo (A. mata and A. xanthopterus), the whitespotted surgeonfish or 'api (A. guttatus), the brown surgeonfish or ma'i'i'i (A. nigrofuscus), the bluelined surgeonfish or maiko (A. nigroris), the orangebar surgeonfish or na'ena'e (A. olivaceus), the white-bar surgeonfish or maiko'iko (A. leucopareius), the convict tang or manini (A. triostegus), the achilles tang or paku'iku'i (A. achilles), the orangespine unicornfish or umaumalei (Naso lituratus), the bluespine unicornfish or kala (N. unicornis), the goldring surgeonfish or kole (Ctenochaetus strigosus), the chub or nenue (Kyphosus biggibus), the undulate moray eel or puhi laumilo (Gymnothorax undulatus), the brick soldierfish or menpachi (Myripristes amaena), the scorpionfish or nohu (Scorpaenopsis diabolus), the cardinal fish or 'upapalu (Apogon kallopterus), the blackside hawkfish or hilu piliko'a (Paracirrhites forsteri), the sidespot goatfish or malu (Parupeneus pleurostigma), the whitesaddle goatfish or kumu (P. porphyreus), the manybar goatfish or moano (P. multifasciatus), the blue goatfish or moano kea (P. cyclostomus), the yellowstripe goatfish or weke (Mulloides flavolineatus), the yellowfin goatfish or weke'ula (M. vanicolensis), butterfly fishes or kikakapu (various species of Chaetodon), the sargeant major or mamo (Abudefduf abdominalis), the ringtail wrasse or po'ou (Cheilinus unifasciatus), the tableboss or a'awa (Bodianus bilunulatus), the cigar wrasse or kupoupou (Cheilo inermis), the yellowstripe wrasse or hilu (Coris flavovittata), the stareye parrotfish or ponuhunuhu (Calotomus carolinus), the bulletnose parrotfish or uhu (Scarus sordidus), the spectacled parrotfish or uhu'ahu'ula and uhu uliuli (S. perspicillatus), the redlip parrotfish or palukaluka (S. rubroviolaceus), and the black triggerfish or humuhumu'ele'ele (*Melichthys niger*). Other species not seen as often include the mullet or ama'ama or 'anae (*Mugil cephalus*), the milkfish or awa'awa (*Chanos chanos*), small jacks or papio (various species of *Caranx*), the blue trevelly or omilu (*Caranx melampygus*), the bonefish or 'oio (*Albula vulpes*), the barracuda or kaku (*Sphyraena barracuda*), the bigeye or aweoawo (*Priacanthus cruentatus*) and others. Commercially important invertebrates include the slipper lobster or 'ula papa (*Paribaccus antarcticus*), the spiny lobster or 'ula (*Panulirus penicillatus* and *P. marginatus*), the octopus or he'e (*Octopus cyanea*), and brown cowry (*Cypraea mauritiana*). Besides these species of commercial and recreational interest, there are many other fish and invertebrate species found in this biotope.

Inshore of the biotope of spur and grooves is the reef crest which is comprised primarily of coralline algae which accreates calcium carbonate much like a coral creating a near solid pavement. Also present in the reef crest area are other macrothalloid algal species or limu. This zone was not examined in any detail in this study.

Biotope of High Coral Cover

This biotope is best developed in areas that are somewhat protected from the prevailing seas. In the study area, the biotope of high coral cover occurs along the eastern edge of the harbor entrance channel at depths from about 1 to 10m and is restricted to the area roughly between the outermost and innermost bouys (see Figure 1). The high coral coverage in this biotope is probably the result of dredging the harbor entrance channel creating an area of hard substratum that is protected from most surf action. Thus the biotope follows the sloping channel wall as well as the shallow water inshore of the wall. The substratum of this biotope is comprised primarily of living corals (see Figures 3-A and B).

Because of the high coral coverage present in this biotope as well as the numerous green sea turtles, a quantitative station was established approximately 20m east of the outermost bouy marking the eastern edge of the entrance channel and proceeding in a direction approximately parallel to the harbor entrance channel. The transect was carried out at a depth ranging from 3 to 4 m. The results of the quantitative survey carried out at station 2 are presented in Table 2. The quadrat survey noted 8 species of corals having a mean coverage of 85.2 percent. The dominant coral species is *Montipora verrucosa*. The high coverage affords considerable cover for macroinvertebrates, thus the count in this area found only four species: the horn shell (*Cerithium sinense*), the rock oyster (*Spondylus tenebrosus*), the banded

TABLE 2. Summary of the benthic survey conducted in the biotope of high coral cover approximately 20m shoreward of Red Bouy No. 4 along the eastern side of Kaunakakai Harbor on 8 March 1996. Results of the $6m^2$ quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Pact C. A short summary of the fish census is given in Part D. Water depth is 3-4m; mean coral coverage is 85.2 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number 0m	5m	10m	15m	20m	25m
Corals						
Porites lobata		9	1			
P. evermanni		1.5			4	
P. compressa		3		12	1	17
Pocillopora meandrina	1		2	2	2	2
Montipora verrucosa	61	42	74.5	83	81	61
M. patula		12	7	3	9	2
M. flabellata						14
Pavona varians						4
Sand	4		3			
Rubble	27	11.5	2			
Hard Substratum	7	21	9		3	

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	2
P. compressa	8
Montipora verrucosa	64
Pavona duerdeni	2
Sand	2
Rubble	6
Hard Substratum	16

(TABLE 2 CONTINUED ON NEXT PAGE)

TABLE 2. Continued.

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Cerithium sinense	1
Spondylus tenebrosus	1
Phylum Echinodermata	
Echinothrix calamaris	1
Holothuria verrucosa	1

D. Fish Census (4 x 25m)

20 Species
109 Individuals
Estimated Biomass = $36 g/m^2$

FIGURE 3. Photographs from the eastern side of Kaunakakai Harbor. A - biotope of high coral cover showing the dominance of plate-like Montipora verrucosa, depth 10m, B - another view of the biotope of high coral cover showing the diversity of coverage by live coral, depth 3m, C - green sea turtle with tumors (fibropapolomas) on the eye (towards the camera) and trailing edge of the front flipper. Shell length estimated at 60cm.


3b


3C

urchin (Echinothrix calamaris) and the brown sea cucumber (Holothuria verrucosa). The results of the fish census are given in Appendix A (transect 1). Twenty fish species (109 individuals) were censused at this station. The most abundant species were the damselfish (Chromis vanderbilti), the brown surgeonfish or ma'i'i'i (Acanthurus nigrofuscus), and the saddleback wrasse or hinalea lauwili (Thalassoma duperrey). The standing crop of fishes at this station was estimated to be 36 g/m^2 and the species contributing most heavily to this were six small blue trevelly or omilu (Caranx melampygus - 38% of the total), and a single bulletnose parrotfish or uhu (Scarus sordidus) that comprised 21 percent of the total weight at this station.

We carried out a qualitative survey of the entrance channel wall from the seaward bouy to the pier island. During this roughly linear swim, we encountered eight individual green sea turtles (Chelonia mydas). We estimated the straight line carapace lengths of each as follows: one individual at 50cm, one individual at 60cm, four individuals at 75cm, one female at 80cm and a second female at 120cm. The latter two were mature individuals and the remainder were juveniles. Two of the eight turtles had tumors (fibropapolomas); both of these individuals were estimated to have a straight line carapace length of 60cm and 75cm (see Figure 3-C). None of the turtles appeared to carry any tags or other deformities.

Hawaiian green sea turtles are a threatened species. The eight individuals seen underwater were all resting which is their usual mode during most of the day. We estimate that the population using this biotope on 8 March was probably close to 16 individuals. Typically green sea turtles select resting areas during the day on or under coral colonies. These resting habitats range in depth from about 5m to over 30m. In the present case all of the resting habitat being utilized by green sea turtles in the biotope of high coral cover is in water less than 10m of depth. Under the cover of darkness these turtles will leave their resting areas to forage in usually shallow water close to shore. As adults green sea turtles are herbivorous feeding on seaweed or limu (Balazs,1980, Balazs et al. 1987). We did not identify any particular area that had an abundance of limu in the vicinity of this resting area. The foraging area is probably just shoreward of the reef crest fronting much of Kaunakakai. Algal development is usually high in this habitat.

During the course of this survey several humpback whales were seen offshore of the Kaunakakai Harbor study area. The humpback whale (Megaptera novaeangliae) is a protected species under the Endangered Species Act. This whale will frequent Hawaiian waters during the winter months from about December through April as part of their annual migration. In general, their distribution in Hawaii appears to be limited to the 180m (100 fathom) isobath and in shallower waters Nitta and Naughton 1989).

In summary, the nearshore biological survey of the eastern side of Kaunakakai Harbor entrance channel to and including the area 300m to the east noted exceptional coral growth both in the biotope of spurs and grooves just seaward of the fringing reef as well as in the biotope of high coral cover along the eastern edge of the harbor entrance channel. The fish communities are relatively well developed in the biotope of spurs and grooves and there appears to be a major green sea turtle resting habitat in the biotope of high coral cover. Biological communities in the biotope of sand as well as in the rubble/coral mound biotope do not have a similar degree of development in the area examined by this study.

2. Manele Harbor, Lana'i Corridor

Manele Harbor was developed in the early 1960's to service small vessels on the island of Lana'i. The harbor is situated at the head of Manele Bay in the northwestern corner and is comprised of a basalt rock mole serving as a wave protected barrier (approximately 140m long) with the area between the mole and shore being dredged to accept vessels. Manele Bay faces to the southeast; the substratum through the middle part of the bay is sand that forms a pie-shaped wedge pointing towards shore. The entrance channel to the harbor utilizes this deeper sand (about 7m) which extends shoreward to the eastern edge of the mole. As a result, very little dredging for the entrance channel was necessary during the construction of the harbor.

Our survey of Manele Bay was undertaken on 13 March 1996. Our charge with this landing site was to generally describe the biological zonation present in the bay and make recommendations as to possible cable landing routes with the least impact to the extant marine communities.

As noted above, biotopes in Manele Bay were delimited by swimming and qualitatively examining the general area. Our focus in this study was primarily in the western portion of the bay extending from the harbor mole seaward to approximately the 25m isobath. In general where hard substratum is encountered in Manele Bay corals are well developed if protected from occasional storm generated surge. Where exposure to storm generated surf is greater such as along some of the outer portions of the bay around the emergent rocks on the eastern side, corals are kept at a earlier point in successional development and cover is less.

The qualitative examination of the western part of Manele Bay noted three major zones or biotopes. These are the biotope of sand, the biotope of high _Porites_ cover and the biotope of high coral diversity. Across much of the central part of Manele Bay is the biotope of sand. This biotope slopes seaward from the point of our deepest dives (25m). The biotope of sand occurs across most of the mouth of the bay and continues shoreward as a pie-shaped wedge as noted above. The western side of the bay is quite protected from storm surf and hard substratum is dominated by a mix of two _Porites_ species forming the biotope of high _Porites_ cover. Inshore of this and adjacent to the mole is the biotope of high coral diversity.

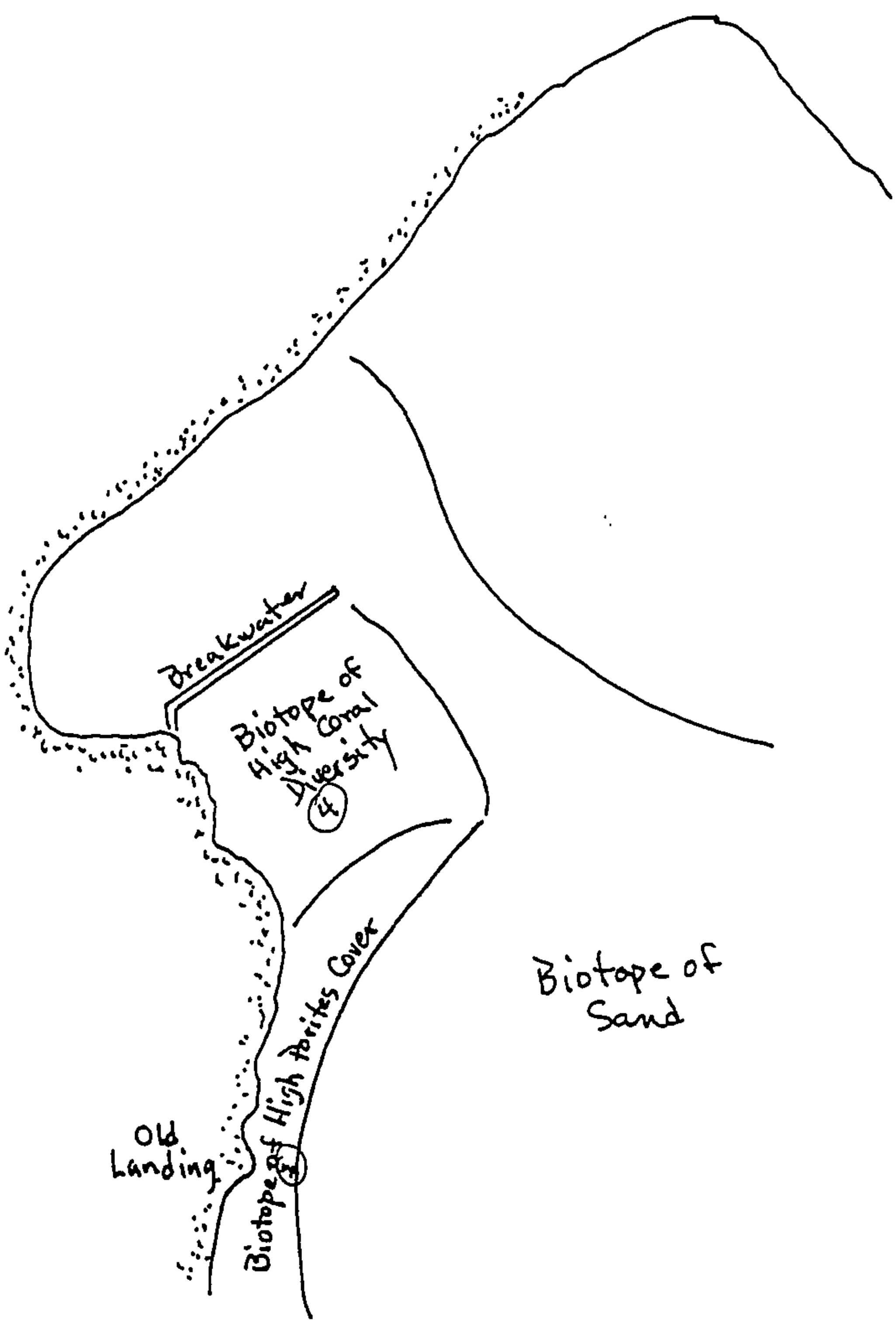
It should be noted that the boundaries of each zone or biotope are not sharp but rather grade from one to another; these are ecotones or zones of transition. Biotopes were delimited by physical characteristics including water depth, relative exposure to wave and current action, and the major structural elements present in the benthic communities. The latter include the amount of sand, hard substratum, and vertical relief present as well as the biological attributes of relative coral coverage, fish abundance, and dominant species of the coral community. Biotopes were named for distinctive features of each as shown in Figure 4.

Biotope of Sand

As the name implies, the substratum in the biotope of sand is dominated by sand. Because of its shifting nature, the benthic species found in sand habitats are generally adapted for life on an unstable and frequently abrading environment. Many species that are found in this habitat will bury into the sand to avoid predators and the abrasion that occurs with storm waves. Thus many species in the sand biotope are cryptic and difficult to see; among those are many of the molluscs and crustaceans such as the kona crab (_Ranina ranina_). Hence, without considerable time spent searching in the sand many species in the sand habitat will not be seen. The biotope of sand is best developed at greater depths; where it enters the shallow water, many of the characteristic species become less abundant.

Because of constraints with bottom time at the depth of which the best biological development in the biotope of sand is found, we did not quantitatively sample this biotope but rather carried out a qualitative reconnaissance of the habitat in waters from 4 to 25m in depth. Species noted in this overview of the biotope include a number of molluscs: the augers (_Terebra crenulata_, _T. maculata_ and _T. inconstans_), the leopard cone (_Conus leopardus_) and flea cone (_Conus pulicarius_) as well as the sea

FIGURE 4. Map of Manele Bay, Lana'i showing the approximate boundaries of the three biotopes or zones defined in this study (lettered) of the western part of the bay. Also shown are the locations of the two quantitative stations (nmbered) established to sample representative areas within biotopes. The biotopes are lettered where A = the biotope of sand, B = the biotope of high _Porites_ cover, and C = the biotope of high coral diversity. Scale: 1cm = m.


Breakwater
Biotope of High Coral Diversity
4
Biotope of Sand
Old Landing
Biotope of High Porites Cover

hare (Brissus sp.), starfish (Mithrodia bradleyi), brown sea cucumber (Bohadschia vitiensis), flying fish or malolo (Parexocoetus brachypterus), halfbeak or ihe'ihe (Euleptorhamphus viridis), opelu or mackeral scad (Decapterus macarellus), leatherback or la'i (Scombroides laysan), nabeta (Hemipteronotus umbrilatus), yellow jack or pa'opa'o (Gnathanodon speciosus) the goby-like fish (Parapercis schauslandi), uku or snapper (Aprion virescens), the nightmare weke (Upeneus arge) and the goby or o'opu (Gnatholepis anjerensis). With greater effort many more fish and invertebrate species species would be encountered in this biotope.

The Biotope of High Porites Cover

As noted above, sand dominates the middle section of Manele Bay. Approaching the western edge this sand gives way to a bank of coral; seaward of the old landing on the western side of the bay this coral is met with at a depth of about 20m. Inshore of this the depth of the sand-coral interface decreases to a minimum of about 12m. The coral bank varies in width from about 25 to about 75m (see Figure 4). In the inner bay the biotope of high Porites cover merges with the biotope of high coral diversity which is situated in shallower water.

The biotope of high Porites cover is comprised primarily of Porites lobata and P. compressa. Cover in this biotope is locally high, approaching 100 percent over areas of 20 to 100m^2 (see Figure 5-A). Water depth in this biotope ranges from about 7 to 20m.

A quantitative station (station 3) was established in the biotope of high Porites cover east of the old landing. The results of this survey are given in Table 3. The quadrat survey noted two algal species (Desmia hornemannii and Porolithon onkodes) having a mean coverage of 6.4 percent, six coral species (Porites lobata, P. compressa, Montipora verrucosa, M. patula, Pocillopora meandrina and Pavona varians) having a mean coverage of 66.8 percent. The macroinvertebrate census noted the drupe shell (Drupa morum), the black sea urchin (Tripneustes gratilla), the slate pencil urchin (Heterocentrotus mammillatus) and the black sea cucumber (Holothuria atra). The results of the fish census are given in Appendix A. Twenty-one species (344 individuals) were censused in this transect. The most abundant fishes were the damselfishes (Chromis verator and C. agilis), the bulletnose parrotfish or uhu (Scarus sordidus), the brown surgeonfish or ma'i'i'i (Acanthurus nigrofuscus), the goldring surgeonfish or kole (Ctenochaetus strigosus) and the yellow tang or lau'ipala (Zebrasoma flavescens). The biomass of fishes at this station was estimated to be 73 g/m^2. The species that contribut-

TABLE 3. Summary of the benthic survey conducted in the the biotope of high *Porites* cover approximately 45m offshore ofthe old landing situated on the west side of Manele Bay, Lana'i on 13 March 1996. Results of the $6m^2$ quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 7-11m; mean coral coverage is 66.8 percent (quadrat method).

A. Quadrat Survey

Species	Quadrat Number					
	0m	5m	10m	15m	20m	25m
Algae						
Desmia hornemannii	2	4	3	2	2.5	4
Porolithon onkodes				12	7	2
Corals						
Porites lobata	17	9	2			
Porites compressa	74	62	85	21	14	86
Montipora verrucosa	1	3				
Montipora patula	3	6	1		4.5	0.5
Pocillopora meandrina	1			1	2	0.5
Pavona varians				4	3.5	
Sand	2	6				
Hard Substratum		10	9	60	66.5	7

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	6
Porites compressa	60
Montipora verrucosa	2
Sand	2
Hard Substratum	30

TABLE 3 CONTINUED ON NEXT PAGE

TABLE 3. Continued.

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Drupa morum	1
Phylum Echinodermata	
Tripneustes gratilla	15
Heterocentrotus mammillatus	3
Holothuria atra	2

D. Fish Census (4 x 25m)

21 Species
344 Individuals
Estimated Biomass = $73 g/m^2$

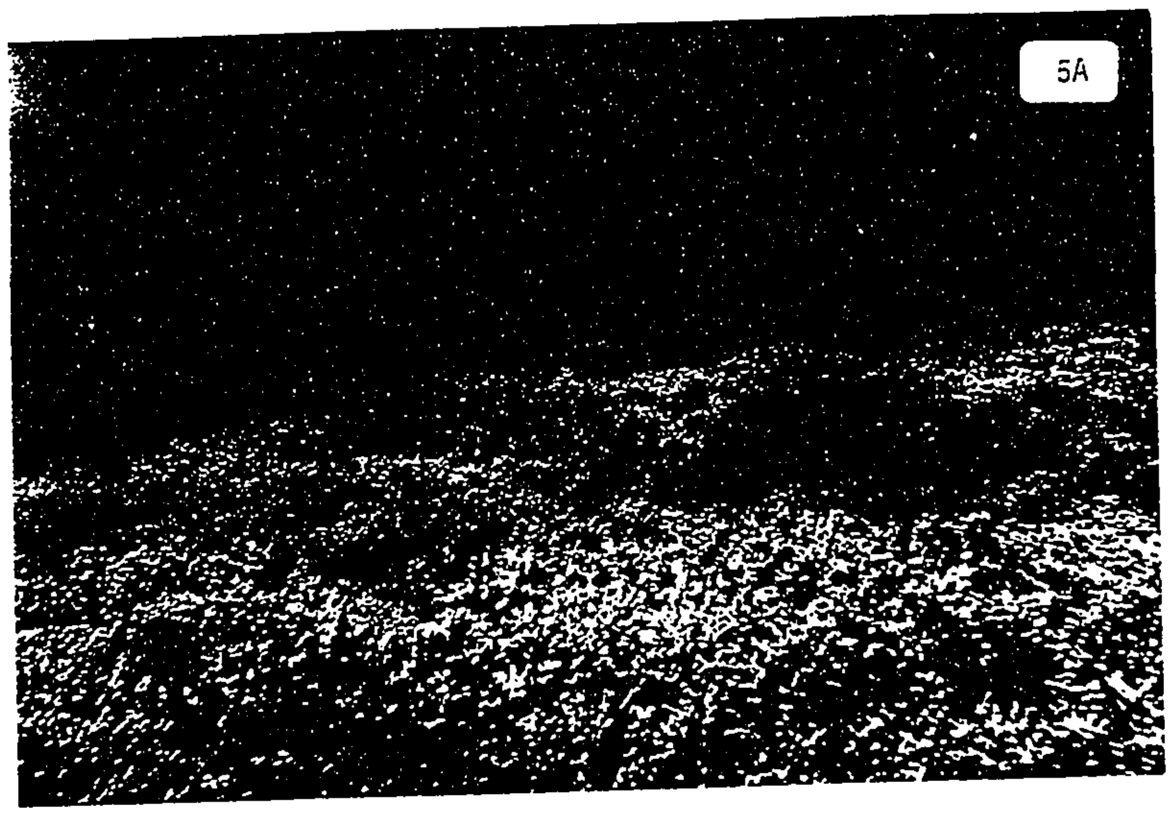
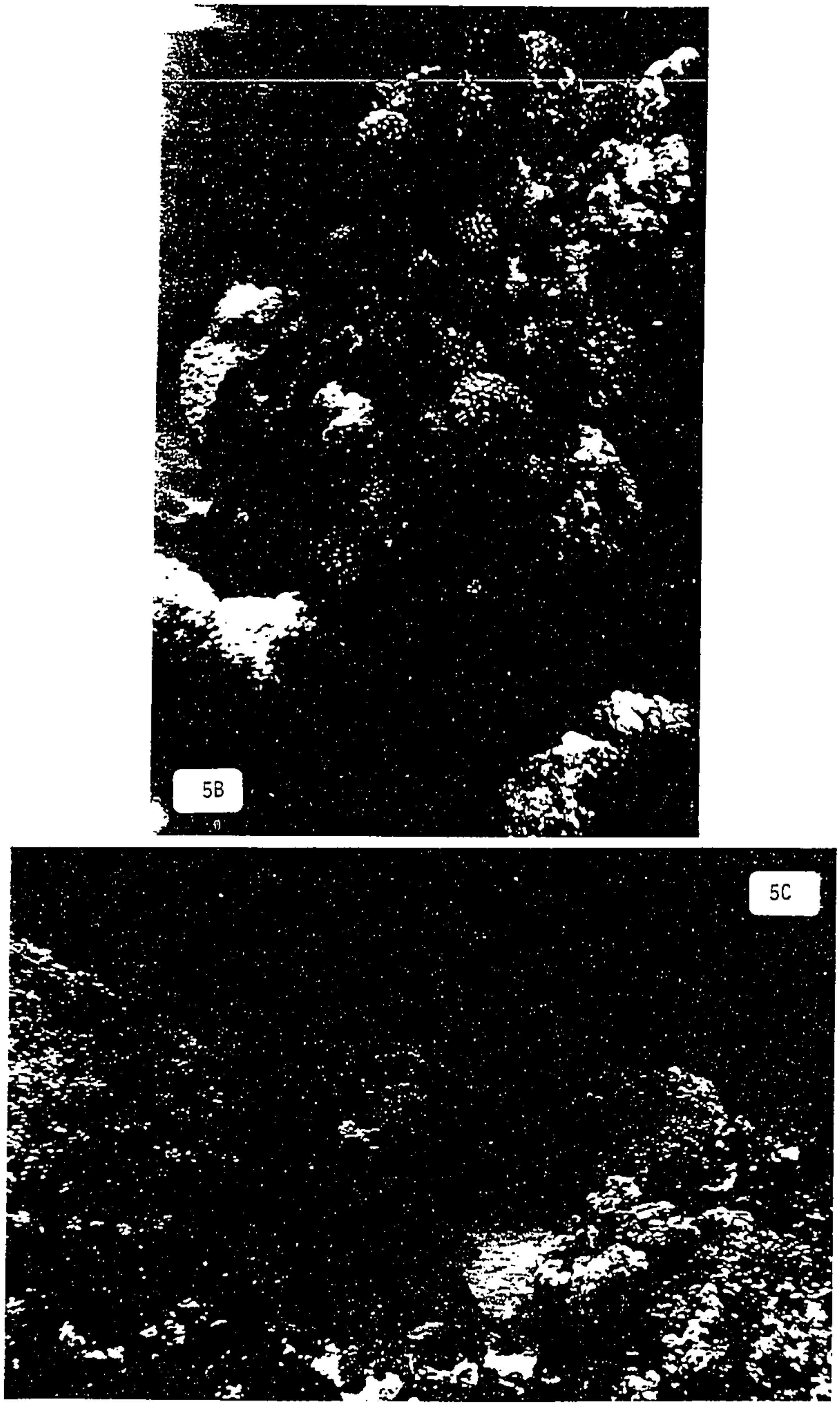


FIGURE 5. Photographs from the biotopes in the western side of Manele Bay, 13 March 1996. A - biotope of high Porites cover, depth 10m in the area fronting the old boat landing, B - biotope of high coral diversity, depth 5m showing a mix of Porites lobata and Pocillopora meandrina, C - biotope of high coral diversity depth 6m showing the highly irregular topography that typifies this biotope.


5B
5C

ed most heavily to this standing crop include the uhu (*Scarus sordidus* - 57% of the total) and the kole (*Ctenochaetus strigosus*) that comprised 11 percent of the total.

In the vicinity of this station were seen the brick soldierfish or menpachi (*Myripristes amaenus*), the blue goatfish or moano kea (*Parupeneus cyclostomus*), the trumpetfish or nunu (*Aulostomus chinensis*), the orangespine surgeonfish or umaumalei (*Naso lituratus*), the whitebar surgeonfish or maiko'iko (*Acanthurus leucoparieus*), the convict tang or manini (*A. triostegus*), the christmas wrasse or awela (*Thalassoma trilobatum*), the yellowtail wrasse or hinalea aki'lolo (*Coris gaimard*), the chub or nenue (*Kyphosus bigibbus*) and the emperor or mu (*Monotaxis grandoculis*). Also seen were the corals *Fungia scutaria* and *Montipora verrilli* as well as a small octopus or he'e (*Octopus cyanea*). Also seen was a small green sea turtle or honu (*Chelonia mydas*) that had an estimated straight line carapace length of 55cm. There was no evidence of any deformities, tumors or tags on this individual which was resting on the coral substrate adjacent to the transect.

The Biotope of High Coral Diversity

The biotope of high coral diversity is situated in the western corner of Manele Bay seaward of the harbor breakwater extending from shore to more than 100m offshore where the biotope of sand or the biotope of high *Porites* cover is encountered. The biotope of high coral diversity has a very rugose substratum with numerous large holes or small channels spread through it. The scale of these holes or channels is from 1.5 to 10m across and they are from 2 to 35m in length with no particular orientation. The hole or channels are spaced from 2 to about 35m apart and their depths range from 2 to 5m. Between these features are knolls with high coral coverage. The highly irregular topography affords considerable cover for fishes and invertebrates (see Figures 5-B and C).

The coral and fish communities are well-developed in this biotope. As a result, dive tours bring their visitors to this part of the bay for snorkeling. Often present in this part of Manele Bay is the well-known pod of spinner porpoises (*Stenella longirostris*) that rest during daylight hours along the sheltered coves and bays of this coastline (personal observations). About 1400 hours on 13 March we noted about 30 porpoises passing through the outer portion of Manele Bay apparently heading west.

We established a quantitative station just inshore of a temporary mooring used by the snorkel tour boats to sample the fish and benthic communities of the area. The water depth at this station ranged from 2 to 5m and the station was situated about in the middle of the biotope. The substratum was very irregular with holes and small channels on scales as described above. The results of the benthic survey are presented in Table 4. The quadrat survey noted two macroalgal species (Halimeda opuntia and Porolithon onkodes) with a mean coverage of 1.9 percent, three soft coral species (Anthelia edmondsoni, Palythoa tuberculosa and Zoanthus pacificus) having a mean coverage of 0.1 percent and ten coral species (Porites lobata, P. compressa, P. evermanni, P. (Synarea) convexa, Montipora patula, M. verrucosa, Pocillopora meandrina, Pavona duerdeni, and Leptastrea purpurea) with a mean coverage of 28.0 percent. Many of the hemispherical coral colonies (such as Porites lobata and P. evermanni) have diameters exceeding 2m suggesting that they have ages close to 100 years. The invertebrate census did not find many species, probably due to their cryptic nature and the large amount of cover available. Species seen include the drupe shell (Drupa morum), the spiny lobster or 'ula (Panulirus penicillatus), the slate pencil urchin (Heterocentrotus mammillatus) and the black sea cucumber (Holothuria atra).

The results of the fish census carried out at station 4 are given in Appendix A. In total, 32 species (449 individuals) were censused having an estimated biomass of 504 g/m^2. The most abundant species in the transect area were the yellowstripe goatfish or weke (Mulloidichthys flavolineatus), the damselfish (Chromis vanderbilti), the convict tang or manini (Acanthurus triostegus), the brown surgeonfish or ma'i'i'i (A. nigrofuscus), the bulletnose parrotfish or uhu (Scarus sordidus), the goldring surgeonfish or kole (Ctenochaetus strigosus) and the yellow tang or lau'ipala (Zebrasoma flavescens). The species contributing the most to the estimated standing crop of fishes at this station were the weke (Mulloidichthys flavolineatus - 53% of the total), the uhu (Scarus sordidus - 13% of the total), the chub or nenue (Kyphosus biggibus - 6%) and the orangespine surgeonfish or umaumalei (Naso lituratus) making up 6 percent of the total weight at this station.

A qualitative swim was made along the seaward side of the mole or breakwater that serves to protect Manele Harbor. Along the outer two-thirds of this breakwater coral coverage was close to 80 percent over the boulders and there were numerous commercially and recreationally important fishes present. Among these were the yellowfin goatfish or weke'ula (Mulloides vanicolensis), the whitespoted surgeonfish or 'api (Acanthurus guttatus), the whitebar surgeonfish or maiko'iko (A. leucoparieus), uhu (Scarus sordidus), uhu 'uliuli and uhu ahu'ula (S. perspicillatus), nenue (Kyphosus biggibus), aholehole (Kuhlia sandvicensis) as well as others. The highly prized limpet or 'opihi is also present but at very low densities (approximately 1/30m^2 on the basalt rock

TABLE 4. Summary of the benthic survey conducted in the the biotope of high coral diversity approximately 80m offshore of the mole forming the breakwater for the Manele Harbor on the west side of Manele Bay, Lana'i on 13 March 1996. Results of the $6m^2$ quadrat sampling of the benthic community (expressed in percent cover) are given in Part A; a 50-point analysis is presented in Part B and counts of invertebrates in Part C. A short summary of the fish census is given in Part D. Water depth 2-5m; mean coral coverage is 28.0 percent (quadrat method).

A. Quadrat Survey

	Quadrat Number					
Species	0m	5m	10m	15m	20m	25m
Algae						
Halimeda opuntia		0.5				
Porolithon onkodes	7			4		
Soft Corals						
Anthelia edmondsoni			0.1			
Palythoa tuberculosa						0.5
Zoanthus pacificus						0.2
Corals						
Porites lobata	2	25	12		9	
Porites compressa	1	2	3	8		
Porites evermanni		3			3	
Porites (Synarea) convexa		2				
Montipora patula	2	4	15		11	
Montipora verrucosa			3.5			
Pocillopora meandrina	12	8	2	2.5	3	3.5
Pavona varians	6	2	0.5	4.5		
Pavona duerdeni			1	3		14
Leptastrea purpurea					1.3	
Hard Substratum	70	53.5	62.9	78	72.7	81.8

TABLE 4 CONTINUED ON NEXT PAGE

TABLE 4. Continued.

B. 50-Point Analysis

Species	Percent of the Total
Corals	
Porites lobata	8
Porites compressa	2
Porites evermanni	4
Montipora verrucosa	4
Montipora patula	4
Montipora flabellata	2
Pocillopora meandrina	4
Pavona varians	4
Hard Substratum	68

C. Invertebrate Census (4 x 25m)

Species	Number
Phylum Mollusca	
Drupa morum	2
Phylum Arthropoda	
Panulirus penicillatus	1
Phylum Echinodermata	
Heterocentrotus mammillatus	1
Holothuria atra	1

D. Fish Census (4 x 25m)

32 Species
449 Individuals
Estimated Biomass = 504 g/m^2

substrate).

An objective of this study was to determine possible cable alignments through the nearshore environment with least possible impact to marine communities. As noted above, passage through a sand biotope presents a route with low possible impact insofar as nearshore marine species are concerned. Thus an effort was made to delineate possible routes through sand habitats. One such route lies just east of the Manele Harbor entrance channel where a fiber optic cable could be run from sea to shore across sand and only cross about 10m of hard substratum right along the shoreline.

This sand area was created during the dredging of the outer basin of the harbor. Material was removed to the east of the bouy marked edge of the harbor. The substratum in the dredged area is sand which slopes seaward. Inshore of this is a narrow basaltic shelf that extends from the intertidal to a depth of about 1m. This shelf is what is left of the old substratum following the development of the harbor. The top of this shelf was qualitatively surveyed as a possible landing site for the cable. The shelf runs from the intertidal to a depth of about 1m approximately 10m offshore where a break in the shelf occurs and the depth increases to about 9m. The substratum seaward of this shelf break for the first 3m is comprised of basalt rock (up to 40cm in diameter and sand; seaward of this it is entirely sand.

Benthic communities are reasonably developed on the top of this shallow shelf. Several coral species are commonly seen including Porites lobata, Pocillopora meandrina, Monitpora verrucosa and Montipora patula. The dominant coral species is P. lobata and the average cover in this area is about 30-35 percent (at a distance of 5m from the shore). Closer to shore (where depth decreases) the coral cover decreases. A number of common reef fish species were seen in this area including the saddleback wrasse or hinalea lauwili (Thalassoma duperrey), the yellowtail wrasse or hinalea 'akilolo (Coris gaimard), the peral wrasse or 'opule (Anampses cuvier), the brown surgeonfish or ma'i'i'i (Acanthurus nigrofuscus), the whitebar surgeonfish or maiko'iko (A. leucoparieus), the convict tang or manini (A. triostegus), the bulletnose parrotfish or uhu (Scarus sordidus), the palenose parrotfish or uhu (S. psittacus), the orangespine surgeonfish or umaumalei (Naso lituratus), the blackspot sargeant or kupipi (Abudefduf sordidus), the ornate butterfly fish or kikakapu (Chaetodon ornatissimus), the four-spot butterfly fish or lau hau (C. quadrimaculatus) and the doublebar goatfish or munu (Parupeneus bifasciatus). Among the exposed macroinvertebrates seen were the durpe shell (Drupa morum), the cone shell (Conus lividus), the green sea urchin (Echinometra mathaei) and the boring black urchin (E. oblongata).

About a mile seaward of Manele Bay several humpback whales were seen on the 13 March survey.

POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Possible Cable Landing Routes

As noted above, the cable route with the least biological impact is one where the cable does not require trenching through or crossing hard substratum. Coral reef communities show much greater development on hard substratum relative to sand substratum. Sand and/or soft bottom areas do not provide the stable substratum necessary for the successful survival of many coral reef benthic species. Placing a cable across a sand bottom will usually result in the cable being covered by the natural movement of sand thus burying it which affords a degree of protection. Little impact will occur to benthic species living on shifting sand bottoms with cable deployment. Thus from a biological standpoint, the cable route with the least impact in shallow marine communities is one crossing sand. Knowing this, the preferred strategy to decrease biological impact is to select the route with the greatest amount of sand. This is the strategy used in this study.

With the objective of keeping as much of the cable alignment in a sand biotope, we considered a number of alternative routes for each location. In the case of the Manele Harbor cable landing we recognized four possible alternatives: (1) landing the cable at the old landing site on the west side of the bay, (2) at the base or landward side of the breakwater or mole for the harbor, (3) at the seaward end of the mole and (4) outside but parallel to the eastern side of the harbor entrance channel. At Kaunakakai Harbor we recognized two possible cable landings: (1) crossing the shallow reef approximately 300m to the east of and parallel to the harbor entrance channel, (2) along the eastern edge of the harbor entrance channel. The potential impacts of placing a cable through these routes are discussed below.

Impacts with Construction

The potential for impact to the shallow marine communities will probably be greatest with the construction phase of this proposed project. From the sea, the proposed cable alignment enters the shallows at both sites through the biotope of sand. As a substrate to support marine communities, sand is inappropriate for many coral reef forms because many species require a stable bottom (e.g., corals and many of the associated invertebrates). Thus the species usually encountered in sand areas are usually those that are adapted to exist in an ever-changing, moving substratum. Similarly, much of the benthic production on coral reefs occurs on hard substratum, (i.e., macroalgae require a solid substratum for attachment). Because sand substrates are subject to movement, they may abrade and scour organisms on this substratum. Thus the characteristics of most species encountered in Hawaiian sand communities are (1) that they typically burrow into the substrate to avoid scouring, (2) that they frequently occur low in abundance which may be related to food resources, and (3) that they are mobile because of the shifting nature of the substratum and potential for burial. Since these forms are motile, deployment of the cable across such a substratum presents little chance of negative impact to resident species because they would probably "just move out of the way as the cable was deployed". Additionally since the substratum shifts, it is probable that the deployed cable will "sink into" the substrate. Personal observations made on other deployed cables shows them to often be partially buried by the natural movement of the sand.

As the cable is brought into the shallows there are areas where it would cross hard substratum and present a greater opportunity for impact to benthic and fish communities. The construction techniques selected to protect the cable will play a large role in the range of impacts possibly encountered; at one end of the spectrum would be the development of a channel using blasting and dredging techniques in which the cable is laid and covered with stone and tremie concrete and at the other would be the "no action" alternative. The construction of a trench could entail the use of dynamite and dredging. Impacts to marine communities with these activities will include those associated with shock waves (from dynamite), removal of benthic communities in the trench path, and the generation of turbidity which may impact surrounding communities.

With any construction is the concern are over possible impacts to corals because of their sessile nature and usual slow growth characteristics. One potential impact to corals would be the removal of the entire benthic community in the alignment path by trenching. Because of this, it is recommended that the cable be encased in pipe to protect it rather than allow trenching to be done. It is recognized that some minor amount of trenching may be necessary at the point where the cable comes ashore (at the air/water interface).

Besides trenching and backfilling, other deployment methods for cables in shallow water range from just laying the cable directly on the substratum without any specific attachment, to placing it inside of a protective pipe that is bolted to the substratum. In the case of leaving the cable loose and exposed over hard substratum, lateral movement may serve to abrade corals and other attached biota as well as the outer layer(s) of the cable. It is assumed that movement in the cable due to wave action is undesirable. The use of a protective pipe in which the cable is run could serve as a means of protecting the cable through the shallow subtidal region if the protective pipe is bolted to the substratum. This strategy has been used at the Natural Energy Laboratory of Hawaii facility at Keahole Point, Hawaii to secure pipes coming ashore through a subtidal region that is frequently subjected to extreme high energy conditions. Bolting a pipe to the substratum significantly reduces the impact to benthic communities over the alternative of trenching and backfilling. This alternative may provide low impact to marine communities but it will have an obvious visual impact to any underwater observer. If the trenching and backfilling strategy is used, the tremie concrete cap will probably be colonized by corals, algae and other benthic forms. Studies on substrate selection in Hawaiian coral larvae have shown concrete to be second only to limestone/coral as an appropriate substratum for settlement (Fitzhardinge and Bailey-Brock 1989).

If the cable is to be protected by use of steel pipe that is deployed over the hard substratum in water less than 25m of depth, how much coral would potentially be covered or overshadowed by the deployed pipe? Table 5 presents a synopsis of the amount of coral that is estimated to be actually covered by the protective pipe assuming that (1) a protective pipe is used through these shallow environments and (2) the outside diameter of this pipe is 15cm. In the four Manele Bay sites, no more than $4.2m^2$ of living coural would be covered and at Kaunakakai, the estimated maximum is $12.7m^2$ of living coral covered by the pipe (Table 5).

The amount of direct impact to corals appears relatively small but there are other factors that should be considered in proposing the most appropriate alignment. Among these considerations are the possibility of disturbance to the deployed cable by routine harbor maintenance activities (i.e., cable breakage), the visual impact of the deployed cable in some coral reef habitats used for "fish watching", and the impacts of cable deployment/construction on shallow marine communities.

Any underwater construction activity will generate fine particulate material that serves to lower light levels and in the extreme, bury benthic communities. In all likelihood, the deployment of fiber optic cables at Kaunakakai Harbor and Manele Harbor will be protected by a metallic pipe sheath. This pipe sheath will be laid over the substratum and in the case of sand, will probably "sink into" or be partially covered by the shifting sand. On hard substratum, the pipe casement may similarly be

TABLE 5. Table estimating the amount of living coral on hard substratum (expressed in square meters) along several possible alignments at Kaunakakai Harbor, Moloka'i and Manele Harbor, Lana'i that would be overlain assuming that the cable is sheathed in a protective pipe with a diameter of 15cm. Calculations are derived from field estimates of the linear distance traversed in each biotope as well as coral coverage and the amount of hard substratum present in each of the different biotopes crossed.

Island and Location	Mean Percent Coral Cover	Distance Traversed on Hard Substrate	Estimated Area of Coral Covered (m^2)
Manele Bay Lana'i			
1. From Sand Channel to Old Boat Landing (west side of bay)	66.8%	40m	$4.0m^2$
2. From Sand Channel to Base of Mole	28%	100m	$4.2m^2$
3. Up Sand Channel to End of Mole	80%	5m	$0.6m^2$
4. Along Eastern Side of Entrance Channel Directly to Shore	20%	10m	$0.3m^2$
Kaunakakai Harbor, Moloka'i			
1. Across Emergent Reef 300m East of Harbor Directly to Shore	29.4% 35%	172m 98m	Total=$12.7m^2$
2. Along Eastern Side of Harbor Entrance to Pier Island	29.4%	157m	$6.9m^2$

laid over the substratum and may or may not be bolted down to the bottom. Bolting may create a small amount of sedimentation through the drilling of bolt holes.

Sedimentation has been implicated as a major environmental problem for coral reefs. Increases in turbidity may decrease light level resulting in a lowering of primary productivity. When light levels are sufficiently decreased, hermatypic corals (i.e., the majority of the corals found on coral reefs) will eject their symbiotic unicellular algae (zooxanthallae) on which they depend as source of nutrition. However, in nature corals will eject their zooxanthallae and survive (by later acquiring more zooxanthallae) if the stress is not a chronic (longterm) perturbation.

In the case of bolting a pipe casement to the seafloor, very little sediment would be generated. The impact of sedimentation on Hawaiian reefs may be overstated. Sedimentation from land derived sources (usually the most massive source) is a natural event usually associated with high rainfall events. Dollar and Grigg (1981) studied the fate of benthic communities at French Frigate Shoals in the Northwest Hawaiian Islands following the accidental spill of 2200mt of kaolin clay. These authors found that after two weeks there was no damage to the reef corals and associated communities except where the organisms were actually buried by the clay deposits for a period of more than two weeks.

Fishery Considerations

Manele Bay is part of a state designated Marine Life Conservation District or MLCD. Two bays, Manele and Hulopoe, comprise the MLCD. An imaginary line drawn from Pu'u Pehe Rock at the western tip of the bay to Kalaeokahano Point on the east form the seaward boundary of the Manele Bay portion of the MLCD. Manele Bay forms "Subzone B" of the MLCD where fishing by any legal method is authorized except with spear, net or trap. Fishermen are usually present around the Manele Small Boat breakwater or along the shoreline side of the harbor; the most common gear seen is hook and line and many of the commonly sought inshore species are caught there including goatfishes, wrasses, jacks, squirrelfishes, surgeonfishes. Seasonal runs of juvenile bigeye scad or hahalalu (Selar crumenophthalmus) often bring many people to the harbor where they line the harbor's edges to catch these fish. There are not many points around Lana'i where the shoreline is in easy access via vehicle. Manele Harbor is one such site and thus may account for the number of fishermen seen around the harbor.

Fishermen are also seen on the Kaunakakai Harbor pier island. Casual conversations with fishermen suggest that some fishing is undertaken in the waters offshore and east and west of the harbor entrance although no fishing activity was noted in these waters during our short period of field work (8 March 1996). Species taken just seaward of the reef flat again include squirrelfishes, jacks, goatfishes, surgeonfishes, parrotfishes as well as the occasional pelagic species such as the kawakawa (Euthynnus affinis) and fishing methods probably include spearing, netting, trapping as well as hook and line methods.

Deployment of a cable through the inshore waters at eight of these sites is an event that would probably be restricted to a period of one to four days during which time men and vessels would be in the area to pull the cable ashore. It is only during this period of time that local fishing activities may be somewhat curtailed, otherwise the deployed cable should have no negative impact to fishermen using the area or to the resource.

Water Quality Considerations

With any disturbance to the seafloor, sediment will be generated which will manifest itself as turbidity. This may occur through natural events such as storm surf resuspending fine material that had previously come into the area through natural events and settled or by human activities including the directing of storm water runoff into the ocean or by underwater construction activities. Underwater construction (principally dredging and blasting) will generate fine particulate material that could impact corals. Additionally, the use of explosives such as dynamite may temporarily increase the levels of nitrates in the water column. The generation of fine sedimentary material could have a negative impact to corals and other benthic forms if it occurs in sufficient quantity over sufficient time. Studies (e.g., Dollar and Grigg 1981 noted above) have found that the impact must be at a high level and chronic to affect adult corals.

It is expected that the small scale of the "in water" work associated with the deployment of the proposed cable would produce little, if any, sediment. This statement is supported by the fact that if the selected cable route runs through sand, little opportunity for the generation of sediment will occur. Other than a possible minimal transitory increase in local turbidity due to deployment of the cable, the deployment and subsequent operation of the cable should not result in any change to the water chemistry of the nearshore waters.

These data suggest that the deployment of the proposed fiber optic cable through the nearshore environment should have a transitory impact, if any, only during the actual deployment process.

Route Recommendations

Manele Bay, Lana'i

Coral communities are well-developed on the west side of Manele Bay (Figure 5-A) and this is probably related to the relatively high degree of protection of the area from most storm surf. The inshore western corner of this coral reef is utilized by dive tour operations, in part, due to the diversity of corals and fish present. A surface mounted fiber optic cable crossing through this area would not be aesthetically pleasing or the most appropriate route from the standpoint of coral community (Figure 5-B and C). As such the proposed landing the cable at the old ship landing on the west side of the bay as well as the proposed landing at the base of the harbor breakwater would not be recommended.

If the cable were to be routed alongside of the harbor entrance channel it could be landed either at the seaward end of the harbor breakwater or on the shoreline just east of the harbor. Both of these proposed routes will potentially expose the cable to damage during periodic harbor maintenance dredging operations. The potential for damage would probably be greater if the cable is landed on the seaward end of the breakwater relative to the shoreline landing just east of the harbor. However, both of these proposed landing sites allows the cable to be situated in sand to within 10m of where it would exit the ocean thus reducing the potential for impact to coral communities. Everything else being equal, the routing of the cable as far east in the large sand area as is possible and bringing it ashore just east of the harbor may be the route with the least potential for biological impact in Manele Bay.

Kaunakakai Harbor, Moloka'i

Two possible routes have been mentioned for the Kaunakakai Harbor cable landing; one of these is coming ashore by crossing the shallow reef about 300m east of the Kaunakakai Harbor pier and the second route approximately follows the eastern edge of the entrance channel and exiting the water perhaps on the pier island.

A primary consideration at Kaunakakai is the protection of the cable from possible damage due to periodic maintenance dredging as well as from barge and tug operations where they drop the towing cable to shorten it up prior to entry into the harbor.

During this operation the steel towing cable may fall to the seafloor and drag across the bottom. If the fiber optic cable is in the path of the dragging cable, it could be damaged. A fiber optic cable coming ashore using either route could be potentially exposed to dragging towing cables. The proposed fiber optic cable alignment following the eastern edge of Kaunakakai Harbor entrance channel would also be exposed to possible damage from maintenance dredging operations.

From a biological standpoint, the deployment of the cable on the sand substratum along the eastern side of the Kaunakakai Harbor entrance channel would be best. This proposed route would avoid crossing any significant amount of coral and would lie primarily in sand. The proposed route approximately 300m to the east would cross areas of greater coral development and because of the exposed nature of the site to storm surf, the cable would probably have to be secured to the substratum.

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APPENDIX A. Results of the quantitative visual censuses conducted at two locations offshore of Kaunakakai Harbor, Moloka'i on 8 March 1996 (T-1 and T-2) and two locations offshore of Manele Harbor, Lana'i on 13 March 1996 (T-3 and T-4). Each entry in the body of the table represents the total number of individuals of each species seen; totals are presented at the foot of the table along with an estimate of the standing crop (g/m^2) of fishes present at each location.

FAMILY AND SPECIES	STATION NUMBER 1	2	3	4
HOLOCENTRIDAE				
Adioryx xantherythrus	135			
AULOSTOMIDAE				
Aulostomus chinensis				1
APOGONIDAE				
Apogon kallopterus	9			
SERRANIDAE				
Pseudanthias thompsoni	14			
CARANGIDAE				
Caranx melampygus		6		
LUTJANIDAE				
Alphareus furcatus				1
MULLIDAE				
Parupeneus multifasciatus	19	5	2	1
Mulloidichthys flavolineatus				43
KYPHOSIDAE				
Kyphosus bigibbus				8
CHAETODONTIDAE				
Forcipiger flavissimus				1
F. longirostris				1
Chaetodon auriga		1		
C. kleini	43			
C. ornatissimus			4	2
C. multicinctus			10	2
C. unimaculatus	4	2		1
C. quadrimaculatus		1		1
C. miliaris	31			

APPENDIX A. Continued.

FAMILY AND SPECIES	STATION NUMBER 1	2	3	4
POMACANTHIDAE				
Centropyge potteri	4		8	
POMACENTRIDAE				
Dascyllus albisella	28			
Plectroglyphidodon johnstonianus	1		2	1
Chromis vanderbilti		32	14	37
C. hanui	12		9	
C. agilis		1	53	
C. verator			26	
Stegastes fasciolatus				8
Abudefduf abdominalis				15
CIRRHITIDAE				
Paracirrhites arcatus	7	1		3
P. forsteri		1		
LABRIDAE				
Labroides phthirophagus		1	1	
Bodianus bilunulatus	1			
Pseudocheilinus octotaenia	3		2	
P. tetrataenia	2			
Thalassoma duperrey	4	13	11	23
T. ballieui		1		
Gomphosus varius		8	1	4
Pseudojuloides cerasinus	4			
SCARIDAE				
Scarus perspicillatus	13			
S. sordidus	5	1	39	35
S. psittacus	1			
BLENNIIDAE				
Exallis brevis				1
ACANTHURIDAE				
Acanthurus triostegus				53
A. achilles			2	5
A. leucoparieus		1		
A. nigrofuscus	15	23	22	42
A. nigroris	12	3	18	13
A. olivaceus	7			

APPENDIX A. Continued.

FAMILY AND SPECIES	STATION NUMBER 1	2	3	4
ACANTHURIDAE (Cont.)				
<u>A. dussumieri</u>		3		1
<u>A. mata</u>		1		
<u>Ctenochaetus strigosus</u>	19	4	78	90
<u>Naso hexacanthus</u>	20			
<u>N. lituratus</u>				7
<u>Zebrasoma flavescens</u>			38	42
ZANCLIDAE				
<u>Zanclus cornutus</u>	1			1
BALISTIDAE				
<u>Melichthys niger</u>	21			
<u>M. vidua</u>				1
<u>Sufflamen bursa</u>	5		1	
TETRAODONTIDAE				
<u>Arothron meleagris</u>				1
CANTHIGASTERIDAE				
<u>Canthigaster jactator</u>	1		3	4
Total Number of Species	29	20	21	32
Total Number of Individuals	441	109	344	449
Estimated Standing Crop (g/m^2)	152	36	73	504

Appendix B
METHOD STATEMENT
Manele Bay, Lanai

GST INTERNATIONAL

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METHOD STATEMENT FOR FIBER OPTIC CABLE INSTALLATION ON THE MANELE BAY, LANAI SAND CHANNEL BOTTOM OF THE ENTRANCE TO THE SMALL BOAT HARBOR

Landing Shore End:

Above High Water Construction:

The make ready work on the landing will be completed prior to the cable ship's arrival. The site work will include installation of a concrete reinforced manhole and ductline excavation to a point near the certified shoreline. "No excavation will take place seaward of the certified shoreline, which marks the upper limit of the Marine Life Conservation District." A range line marker set will be erected to assist in the accurate placement of the cable.

Nearshore Harbor Lay:

The cable ship will approach Manele Bay from the south southeast and hold position in ten (10) fathoms just north of the R "2" FIR 4s buoy. The ship will maintain position using a combination of Differential Global Positioning System control links to the central navigation system computer and visual point orientation of the in place navigational aids.

The combination of bow thrusters, stern thrusters, and main propulsion engines will hold the ship at the proper angle to maintain location and alignment with a safety factor of the multiple fathometer stations. Radar scans of the shoreline will confirm the alignment accuracy. The ship will not drop anchor or engage main engines with high propeller settings while in shallow waters to avoid any possibility of impacting the bottom conditions and obscuring the visibility for the divers monitoring the activity.

When both the ship and the shore crew are on station and ready, the ship will lower a floating rope to a small workboat (32 feet in length or less) and will then pull this rope to shore, where the end will be attached to a shore mounted inhaul winch. The other end of the reope will be attached to the end of the fiber optic cable.

The ship will deploy approximately one kilometer of double armored eight (8) fiber cable from the ship, attaching floats along the cable to support the entire deployed length. The floating cable will not contact the bottom during the pull. During the pull, three to four small boats (24 feet or less in length) will standby to assist as required and to prevent other vessels from crossing the cable. The cable will then be floated to shore.

The cable will be routed to the east of the channel marker RN2 and away from the area of the Harbor entrance that requires periodic maintenance dredging by the Small Boat Harbors Department. The actual easement and special positioning will be charted and filed with the Harbors Small Boating Division as-built drawings and submitted to the appropriate agencies for chart updates and notices to mariners.

Once the cable end is at the shoreline, it will be inserted into the shore conduit and secured inside the manhole on shore. At this point, the small boats will pull the cable into its final alignment, and after a final check by divers to ensure that the cable is in the sand channel, the floats will be removed, allowing the cable to sink to the bottom along the selected alignment. During this process, divers will ensure that there is sufficient slack at the point 10 to 15 meters off-shore where the cable crosses the 1 to 1.5 meter high ledge and drops into the channel bottom. This ledge is an old dredge cut, and the slack will allow the cable to conform to the bottom rather than spanning across the bottom immediately seaward of the cut.

There will be no attempt to bury the cable under the water. The surf zone will settle the protected cable to a safe level under the constantly shifting sands and cobbles in the harbor entrance.

After the manhole splicing is complete and the cable continuity is checked, the cable ship will move slowly off-shore, deploying cable as she moves. The ship will maintain a constant tension on the cable as the cable is deployed into deeper waters and the cable will have a slight percentage of slack to compensate for settlement and final adjustments by the ocean currents. Typical ship time on station is from four (4) to eight (8) hours.

The shoreward 100 to 150 meters of cable will be protected by split pipe type armor starting at the shore-end above the high water line,. This will place the end of the split pipe approximately in line with the end of the harbor breakwater. The split pipe will protect the cable from wave action and from potential anchor drag damage. The split sections are approximately 0.6 meters long and 0.15 meters in diameter. Each joint is articulated, allowing the split pipe to follow the bottom configuration. Placement of the pipe is non-intrusive, and does not require any excavation. Nearshore, the split pipe can be placed by workmen wading out from shore. Seaward of the ledge, the split pipe will be placed by divers working out of a small boat . Under optimum conditions, all split pipe can be placed on the same day as the pull. However, under adverse conditions, this operation could take up to two (2) days after the pull to complete.

No nearshore marine activities have been scheduled at night. Advance notices will be distributed to the boating community at Manele Bay. No degradation of the quality of marine life in or around Manele Bay is anticipated.