DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
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FRANK F. FASI
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LORETTA K.C. CHEE
DEPUTY DIRECTOR

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93/SMA-072(JT)

March 9, 1994

Director
Office of Environmental Quality
Control (OEQC)
220 S. King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Sir:

CHAPTER 343, HRS
Environmental Assessment/Determination
Negative Declaration

Recorded Owner	:	State of Hawaii
Applicant	:	GTE Hawaiian Tel
Agent	:	R. M. Towill Corporation
Location	:	Keawaula to Mokuleia, Oahu
Tax Map Key	:	8-1-1: por. 7; 6-9-01; 6-9-03; & 6-9-04
Request	:	Special Management Area Use Permit
Proposal	:	Installation of an Underground Fiber Optic Telecommunications Cable
Determination	:	A Negative Declaration Is Issued

Attached and incorporated by reference is the Environmental Assessment prepared by the applicant for the project. Based on the significance criteria outlined in Chapter 200, State Administrative Rules, we have determined that preparation of an Environmental Impact Statement is not required.

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

Very truly yours,

Donald Clegg

DONALD A. CLEGG
Director of Land Utilization

DAC:ak
Attachment
G:gteaccep.jht

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1994-03-23-OA-FEA- GTE Hawaiian Tel Fiber Optic Telecommunications Cable, Keawaula to Mokuleia

FINAL ENVIRONMENTAL ASSESSMENT for the

GTE HAWAIIAN TEL FIBER OPTIC TELECOMMUNICATIONS CABLE FROM KEAWAULA TO MOKULEIA

ISLAND OF OAHU

FEBRUARY 1994

PREPARED FOR:
GTE Hawaiian Tel

RMTC
R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941
(808) 842-1133 ◦ Fax: (808) 842-1937

FINAL

ENVIRONMENTAL ASSESSMENT
FOR
GTE HAWAIIAN TEL
FIBER OPTIC TELECOMMUNICATIONS CABLE
FROM KEAWAULA TO MOKULEIA

ISLAND OF OAHU, HAWAII

Prepared for:

GTE HAWAIIAN TEL
1177 Bishop Street
Honolulu, Hawaii 96813

February 1994

Prepared by:

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

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PROJECT SUMMARY

Project:	GTE Hawaiian Tel Fiber Optic Telecommunication System from Keawaula to Mokuleia
Applicant:	GTE Hawaiian Tel 1177 Bishop Street Honolulu, Hawaii 96813 Contact: Joel Peterson Phone no.: 831-4072
Accepting Authority:	City and County of Honolulu Department of Land Utilization
Tax Map Keys:	8-1-01:07 (por.); 6-9-03:05 (por.); 6-9-01:04 (por.); 6-9-02:01 (por.),13 (por.); 6-9-04:06, 07, 13, 14, 17
Location:	Keawaula, Kuaokala, Kaena, Mokuleia, Island of Oahu
Owner:	State of Hawaii
Agent:	R. M. Towill Corporation 420 Waiakamilo Road, Suite 411 Honolulu, Hawaii 96817 842-1133 Attn: Chester Koga
Existing Land Uses:	Access easement for Air Force; Open grazing area; Undeveloped open
State Land Use District:	Conservation and Agricultural
Development Plan Land Use Designation:	8-1-01:07 Preservation; 6-9-04:06 (Parks & Recreation); 6-9-04:07 (Preservation & Parks & Recreation)
County Zoning Designation:	8-1-01:07 (P1); 6-9-03:05 (P1); 6-9-02:13 (P1); the remainder are P2

SECTION 1
INTRODUCTION

GTE Hawaiian Tel proposes to install a fiber optic telecommunication cable from Keawaula to Mokuleia on the western end of the island of Oahu. The project involves the installation of a single continuous underground PVC ductline that will be approximately 28,000 lineal feet and measure four inches in diameter. The ductline will begin where the Kaena Point Tracking Station (KPTS) access road meets Farrington Highway, and continues along the mauka shoulder of the access road in an uphill direction to the 1,200 foot elevation (see Figure 1).

At this point, the line will traverse in a descending northwesterly direction along an existing dirt road parallel to the existing coaxial cable that runs along the ridge line toward Manini Pali which is a ridge overlooking the beach on the Mokuleia side of Kaena Point. Approximately 15,000 feet of ductline will be installed along the Kaena Point Tracking Station access road to Manini Pali over mild to moderately sloping ground. Beyond this point, the ductline will traverse down the steep grade to the base of the mountain. The ductline will then continue along the mauka shoulder of Farrington Highway and east toward Camp Erdman. The new cable will be linked to existing Hawaiian Tel Company facilities in the vicinity of Camp Erdman.

1.1 Purpose and Objectives

The purpose of the project is to increase system integrity and to ensure additional path diversity. Nearly all interstate and international communications entering and leaving the State of Hawaii over submarine fiber optic cables are at the Makaha and Keawaula cable stations. Satellite communications links are provided by the GTE Spacenet (Contel) earth station, the Kapolei earth station, and the AT&T earth station. All of these facilities are served by one facility route that goes from Aiea through Pearl City along the Waianae Coast to the Northwest end of the island where the AT&T Keawaula

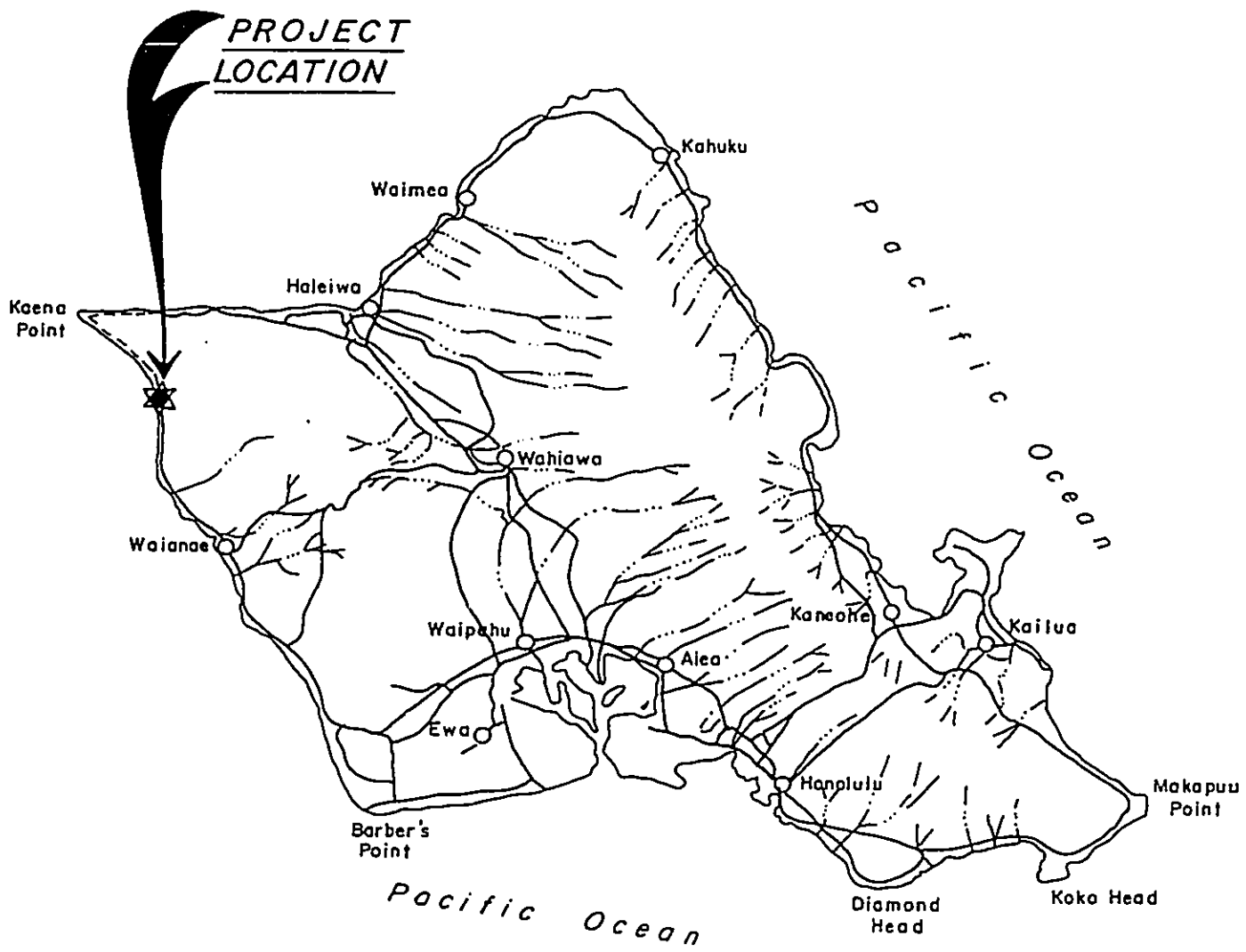

Figure 1
LOCATION MAP
GTE HAWAIIAN TEL
Fiber Optic Telecommunications Cable Keawaula to Mokuleia, Oahu

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located.

Although AT&T has its own fiber optic facility, it follows the same route as GTE Hawaiian Tel's. Therefore, a major catastrophe such as an earthquake, a major inundation from a hurricane such as Iniki, or a construction accident along this facility route has the potential of destroying most of the interstate and international communications from the State of Hawaii to the rest of the world.

A diverse fiber route that traverses Kaena point to Wahiawa and continuing on to Honolulu would enhance GTE Hawaiian Tel's ability to avoid such a disaster and other legal and economic consequences that may result from such a disaster.

The Makaha and Keawaula cable stations provide the only fiber optic facilities for interstate and international communication traffic along this route. The objective of the proposed project is to offer a secure protection system by providing redundancy for all existing and anticipated communication requirements for the state that traverse this route.

The purpose of this Environmental Assessment (EA) is to describe the installation of the approximately four-mile long GTE Hawaiian Tel fiber optic cable. This EA contains an assessment of the potential environmental impacts associated with the construction and installation activities along the proposed route, the operation, and the maintenance of these fiber optic cables.

1.2 Project Location

The project site is located on the westernmost end of the island of Oahu and the proposed route traverses the ahupuaas of Kahanahaiki on the south, Kuaokala at the highest elevation, and Kaena on the northern tip of the island (see Figure 2).

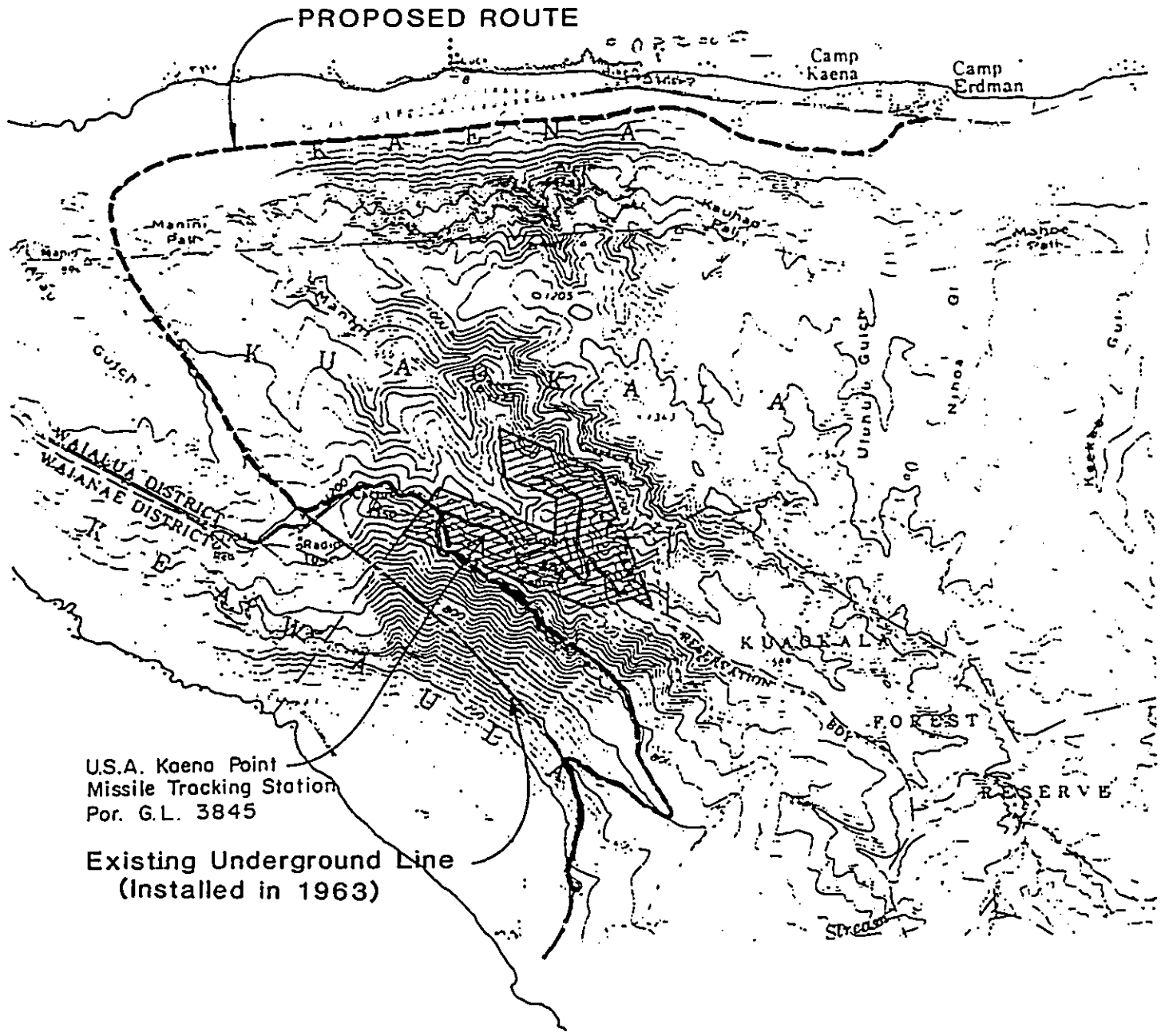

Figure 2
PROPOSED ROUTE
GTE HAWAIIAN TEL
Fiber Optic Telecommunications Cable Keawaula to Mokuleia, Oahu

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SECTION 2
PROJECT BACKGROUND

2.1 Cable Technology

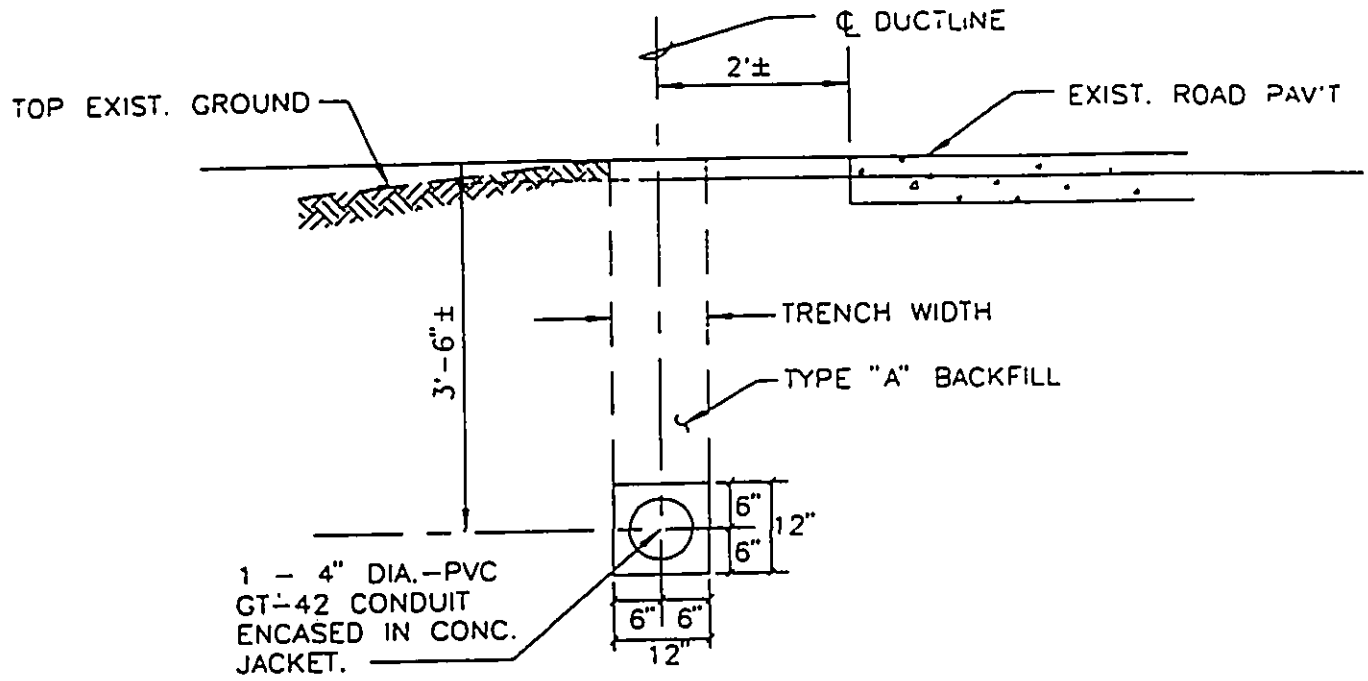
The following is a discussion of existing telecommunications cable technology and how the determination was made to use fiber optics.

2.1.1 Copper and Fiber Optic Cables

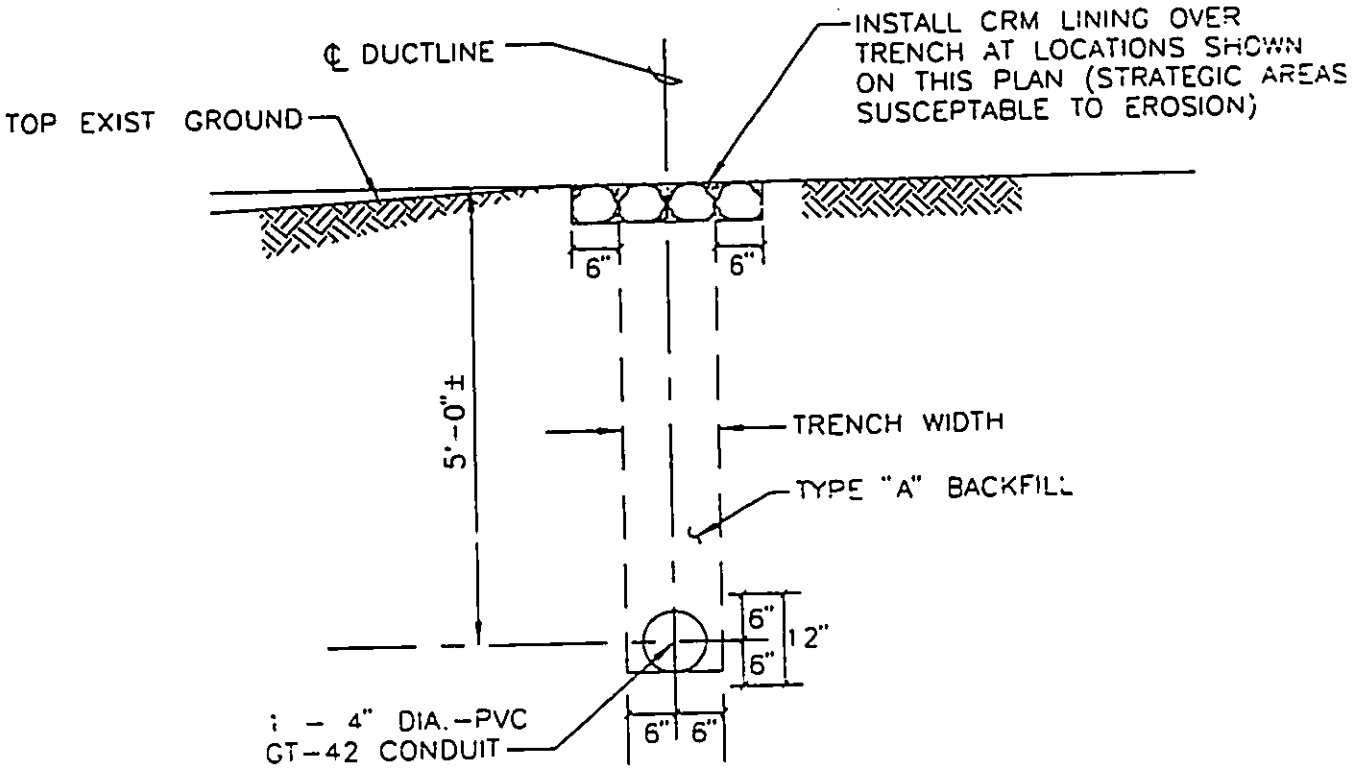
The alternative to fiber optic cable is copper wire cable. Copper wire cables function using a large number of plastic-coated copper wires housed within a plastic or synthetic outer casing. If necessary, steel or other protective materials would be added to ensure strength and resistance to abrasion 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.

Copper wire cable will also require the use of a repeater to boost the electrical signal over long distances to ensure adequate signal strength at the receiving station. Repeaters are necessary approximately every 6,000 feet and require a high voltage power source to operate. Repeater dimensions for a 1,200 voice circuit are approximately 1 to 2 feet in diameter by 3 feet long. Thus, 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 48 fiber optic strands and would be housed in a plastic and steel casing no more than approximately 4 inches in diameter (see



TRENCH ALONG KAENA PT. TRACKING STATION ROAD AND ALONG FARRINGTON HIGHWAY



TRENCH SECTIONS AT STEEP SLOPES

Figure 3
TYPICAL TRENCH SECTIONS
GTE HAWAIIAN TEL
Fiber Optic Telecommunications Cable Keawaula to Mokulela, Oahu

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Figure 3). Like copper cable, steel or other protective materials would be added as needed for strength. Every two pairs of fiber optic strands would be capable of handling approximately 32,000 voice circuits, for a combined total on the order of 384,000 voice circuits (2 strands = 1 pair, 48 strands = 24 strands working plus 24 strands protection. 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 1/2-inch diameter cable versus a 10-foot diameter cable;

- Sensitive areas that might otherwise be disturbed because of larger equipment and increased mobilization and noise problems would be greatly reduced;

- Length of time on site would be greatly minimized. Sensitive military communication tracking systems, public or open space areas would not require a lengthy stay by the construction team and therefore would minimize any hardships upon area users; and,

- The need for future capacity will be met. The proposed cable has a projected 20-year plus service life and is designed to meet GTE Hawaiian Tel's projections for growth. This is based on GTE Hawaiian Tel's best forecasting capability and is itself an effort to minimize need for additional cables and

unnecessary disturbance to the environment.

2.2 Cable Route

2.2.1 Existing Communication Line

An underground blast resistant coaxial communication cable extending from Makaha Submarine Cable Station to Honolulu via Kaena Point was installed by GTE Hawaiian Tel (then known as "Hawaiian Telephone Company, Limited") in 1963. This coaxial cable was installed for the purpose of providing defense communications and additional communication circuits between Hawaii and the West Coast. The alignment of this underground cable is shown in Figure 2. Hawaiian Telephone formally requested an easement for the communication cable line from the State of Hawaii beginning in 1963. However, the easement was not formally consumated.

2.3 Overhead versus Underground

Consideration was given to building the communication cable above ground along the entire four-mile route. The overhead construction alternative would mean a cost savings of nearly 300 percent. However, maintenance of an overhead facility would be more costly due to the fact that the line will be exposed to climatic changes and potential disasters. The chances of needing to repair or replace the overhead facility would be greater due to constant exposure to the natural elements.

On the other hand, once installed, an underground fiber optic facility would require far less maintenance since it will not be exposed to wind, rain and other extreme climatic conditions. Maintenance costs will thus be minimal if the fiber optic line is placed underground. A coaxial copper communication cable was installed about 30 years ago by GTE Hawaiian Tel in the same area, and maintenance of this line has in fact been minimal.

Therefore, while initial installation costs for an above ground communication line may be less than an underground line, the costs of maintaining the overhead facility will

likely be higher than an underground line. Moreover, the overhead facility will result in a visual intrusion to the hillside and hilltop pasture areas. Therefore, all in all, the underground facility is the preferred alternative.

SECTION 3
CONSTRUCTION ACTIVITIES

3.1 GENERAL

Construction of the project will include all construction work necessary to prepare the approximately 4-mile route for installation of the fiber optic cable beginning where the Kaena Point Tracking Station (KPTS) access road meets Farrington Highway, and continues along the mauka shoulder of the access road in an uphill direction to the 1,200 foot elevation (see Figure 1). The line will be buried 36- to 48-inches below the surface of the ground (see Figure 3). From there, it will descend in a northwesterly direction along an existing dirt road parallel to the existing coaxial cable that runs along the ridge line toward Manini Pali, a ridge overlooking the beach on the Mokuleia side of Kaena Point.

Approximately 15,000 feet of ductline encased in concrete will be installed along the KPTS access road to Manini Pali over mild to moderately sloping ground. Beyond this point, the ground slopes steeply down the ridge to the base of the mountain. This steep segment of ductline (approximately 2,000 lineal feet) is inaccessible to heavy equipment and will not be encased in concrete. In lieu of concrete jacketing, sections of the ductline may be secured to the ground with straps and bolted to concrete blocks.

The ductline will then continue toward Farrington Highway from the upland slopes, then east towards Camp Erdman along the mauka shoulder of Farrington Highway. This last segment of ductline along the highway, approximately 11,000 lineal feet in length, will be encased in a concrete jacket. The new cable will be linked with existing facilities in the vicinity of Camp Erdman.

Concrete handholes, 3-feet by 5-feet minimum dimensions, will be installed along the ductline at approximately 1,000-foot intervals except in instances where the ductline exhibits a severe change in direction or descends steeply from the ridge.

Impacts and Mitigation

Areas affected by the construction shall be restored to near original condition. Concrete rubble masonry (CRM) lining and anchor blocks may be constructed at strategic locations along the conduit descending from steep slopes to protect the trench from erosion.

3.2 Schedule and Estimated Cost

Construction and installation of the proposed fiber optic cable are scheduled to begin July 1994, with a construction period expected to occur over a six-month period. Estimated cost of construction is approximately $4.9 million.

3.3 Safety Considerations

Roadside construction will entail taking precautions to ensure that traffic flow for the Air Force Tracking Station ongoing operations will not be disrupted. This will include placement of traffic safety cones around the construction trenches as installation work progresses, ensuring that one lane is always open.

The approximately 2,000 foot long segment of the new ductline that will traverse the Waianae Mountain ridge between the Manini Pali and the Mokuleia side of the route is steep and inaccessible to heavy equipment. Because of this the fiber optic line will not be encased in concrete. In lieu of concrete jacketing, sections of the ductline may be secured to the ground with straps and bolted to concrete blocks.

Construction work at and in the vicinity of the YMCA's Camp Erdman will be scheduled during periods when children and youths are not utilizing the camp grounds. If such is not possible, strict safety measures will be exercised, including alerting camp management of the

construction schedule in the vicinity, providing a cordon around the construction site with barricades, tape and guardrails.

SECTION 4
DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 Climate

The project site is located on the westernmost tip of Oahu, adjacent to coastal areas within the Farrington Highway right-of-way and the Waianae Mountain Range. The average annual temperature is 75 degrees F, with northeasterly tradewinds from the ocean at speeds of 18 to 23 miles per hour. The average annual rainfall is 20 inches.

4.1.2 Topography, Geology and Soils

The project site covers approximately 28,000 lineal feet along Kaena Point and encompasses several soil classifications:

4.1.2.1 Soil Associations

According to the August 1972, U.S. Department of Agriculture, Soil Conservation Service publication, "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii," soil associations along the project alignment consist of the following:

Lualualei-Fill Land-Ewa Association. Deep, nearly level to moderately sloping, well-drained soils that have a fine textured or moderately fine textured subsoil or underlying material, and areas of fill land, on coastal plains;

Tropohumults-Dystrandepts Association. Gently sloping to very steep, well-drained soils

that are underlain by soft weathered rock, volcanic ash, or colluvium, on narrow ridges and side slopes;

Rock Land-Stony Steep Land Association. Steep to precipitous, well-drained to excessively drained, rocky and stony land; and

Kaena-Waialua Association. Deep, mainly nearly level and gently sloping, poorly drained to excessively drained soils that have a fine-textured to coarse-textured subsoil or underlying material, on coastal plains and talus slopes and in drainageways.

4.1.2.2 Soil Types

Soil types along the project alignment involve rock lands and several soil classifications (Figure 4):

Rock Lands. Stony steep land (rSY), consists of boulders and stones deposited by water and gravity on side slopes of drainageways. The slope ranges from 40 to 70 percent. Elevations range from 100 to 1,500 feet. The annual rainfall amounts to 20 to 80 inches.

This type of land is used for wildlife habitat and recreation. The natural vegetation consists of kiawe, koa haole, and grasses.

Rock land (rRK), is made up of areas where exposed rock covers 25 to 90 percent of the surface. It occurs on all five islands. The rock outcrops and very shallow soils are the main characteristics. The rock outcrops are mainly basalt and andesite. This land type is nearly level to very steep. Elevations range from nearly sea level to more than 6,000 feet. The annual rainfall amounts to 15 to 60 inches.

Rock land is used for pasture, wildlife habitat, and water supply. The natural vegetation at the lower elevations consists mainly of kiawe, klu, piligrass, Japanese tea, and koa haole.

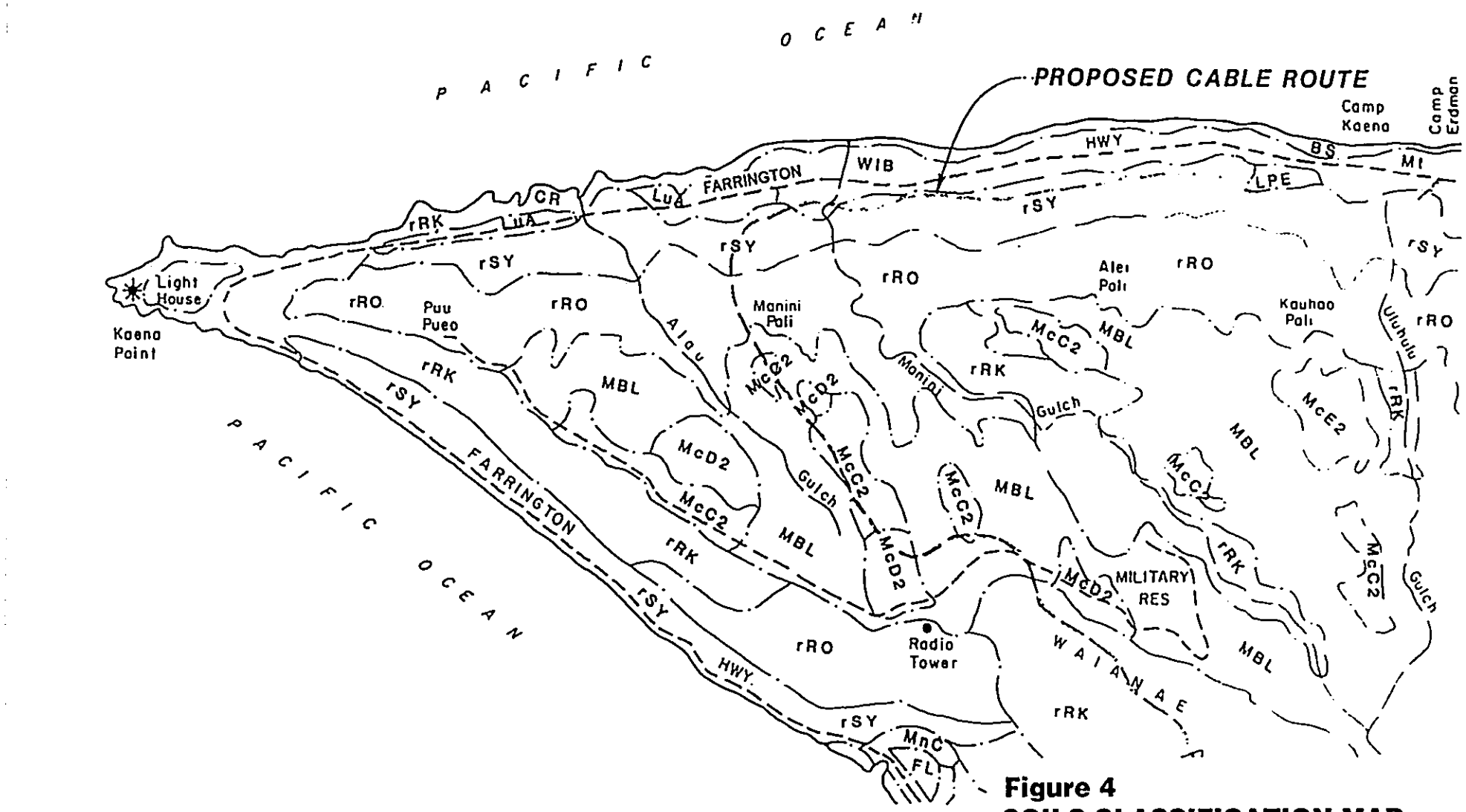

Figure 4
SOILS CLASSIFICATION MAP
GTE HAWAIIAN TEL
Fiber Optic Telecommunications Cable Keawaula to Mokuleia, Oahu

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Lantana, guava, Natal redrop, and molasses grass are dominant at the higher elevations. This land type is also used for urban development.

Rock Outcrop (rRO), consists of areas where exposed bedrock covers more than 90 percent of the surface. It occurs on all five islands. The rock outcrops are mainly basalt and andesite. This land type is gently sloping to precipitous. Elevations range from nearly sea level to 10,000 feet.

This land type is not suited to farming. It is used for water supply, wildlife habitat, and recreation.

Lualualei Series. This series consists of well-drained soils on coastal plains, alluvial fans, and on talus slopes of Kauai, Oahu, Molokai, and Lanai. These soils develop in alluvium and colluvium. They are nearly level and gently sloping. Elevations range from 10 to 125 feet. In most places the annual rainfall amounts to 18 to 30 inches. Most of the rainfall occurs during storms in the period from November to April. There is a prolonged dry period in summer. The mean annual soil temperature is 75 degrees F. Lualualei soils are geographically associated with Honouliuli, Jaucas, and Kekaha soils.

These soils are used for sugarcane, truck crops, pasture, wildlife habitat, urban development, and military installations. The natural vegetation consists of kiawe, koa haole, bristly foxtail, uhaloa, and fingergrass.

Lualualei, extremely stony clay, 3 to 35 percent slopes (LPE), occurs on the talus slopes of Kaena Point, Oahu. In most places the soil is moderately sloping to steep, and is similar to Lualualei clay, 0 to 2 percent slopes, except that there are many stones on the surface and in the profile. It is impractical to cultivate this soil unless the stones are removed. Runoff is medium to rapid, and the erosion hazard is moderate to severe.

Lualualei clay, 0 to 2 percent slopes (LuA), occurs on alluvial fans. In a representative

profile the surface layer, about 10 inches thick, is very dark grayish-brown, very sticky and very plastic clay that has prismatic structure. The next layer, 37 to more than 42 inches thick, is also similar with prismatic structure but with gypsum crystals. The soil is underlain by coral, gravel, sand, or clay at depths below 40 inches. This soil cracks widely upon drying. It is neutral in the surface layer and medium acid to moderately alkaline in the underlying layers.

Permeability and runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.4 inches per foot. In places roots penetrate to a depth of 5 feet or more.

Mahana Series. The Mahana series consists of well drained soils on the uplands of Oahu and Kauai. The soils are developed in volcanic ash and are gently sloping to very steep. Elevations range from 1,000 to 3,000 feet. The annual rainfall amounts to 30 to 45 inches. The mean annual soil temperature is 67 degrees F. Mahana soils are geographically associated with Kolekole soils on Oahu.

These soils are used for pasture, woodland, wildlife habitat, irrigated sugarcane, and water supply. The natural vegetation consists of puakeawe, aalii, rice grass, molasses grass, silver oak, yellow foxtail, lantana, joee, Japanese tea, passion flower, and associated plants.

Mahana silty clay loam, 12 to 20 percent slopes (McD2), has a profile like Mahana silt loam, 6 to 12 percent slopes, except for the texture of the surface layer which has mostly been removed by erosion. Runoff is rapid, and the erosion hazard is severe.

Mahana-Badland complex (MBL) consists of Mahana soils and Badland. Mahana soils make up to 40 to 70 percent of the acreage and Badland 30 to 60 percent. The Mahana soils are similar to Mahana silt loam, 6 to 12 percent slopes, except that the texture is silty clay loam and the soils are moderately steep to very steep. Runoff is medium to very rapid, and the erosion hazard is moderate to very severe.

Waialua Series. The Waialua series consists of moderately well drained soils on alluvial fans on Oahu. These soils develop in alluvium weathered from basic igneous rock. They are nearly level to steep. Elevations range from 10 to 100 feet. The annual rainfall amounts to 25 to 50 inches, most of it occurs between November and April. The mean annual soil temperature is 73 degrees F. Waialua soils are geographically associated with Honouliuli, Kaena, and Kawaihapai soils.

These soils are used for sugarcane, truck crops, orchards, and pasture. The natural vegetation is swollen fingergrass, koa haole, and uhaloa.

Waialua stony silty clay, 3 to 8 percent slopes (W1B), has a profile like Waialua silty clay, 0 to 3 percent slopes, except that there are sufficient stones to hinder tillage but not enough to make intertilled crops impractical. Runoff is slow and the erosion hazard is slight. Workability is slightly difficult.

Each of the above soil characteristics will be taken into consideration during the design and installation of the cable. Soils will be stabilized as necessary in accordance with sound engineering and construction practices. All equipment necessary to install the cable will be removed upon completion of work.

4.1.3 Hydrology

Manini Stream is an intermittent stream and crosses a portion of the proposed alignment (Figures 2 & 5). The stream will require crossing in order to install the fiber optic cable. A trench is proposed to be dug perpendicular to the stream, and the cable, housed in PVC ductline, will be installed to a depth of approximately 5 to 7-feet below the stream bed. If necessary, a portion of the stream will be temporarily realigned around the work site to ensure dry working conditions and noninterruption of stream flow during periods of rainfall. Following all site work, Manini Stream will be returned to existing preconstruction contours. No adverse impacts are anticipated since Manini Stream is intermittent, the work can be

accomplished within a relatively short period of time (less than 30-days), the scale of work will be small, and there will be no lasting impacts.

Two perennial streams are located outside the project site. Makua Stream, located on the Waianae side of Oahu, is approximately 1.4 miles south of the cable terminus at Kaena Point State Park. Makaleha Stream, located on the Mokuleia side of Oahu, is approximately 3.8 miles east of the cable terminus at Camp Erdman (Hawaii Stream Assessment, DLNR 1990). Neither stream will be affected by the proposed activity.

There are no wetlands in the project area.

4.1.4 Avifaunal and Feral Mammal Resources

In August 1993, an avifaunal and feral mammal survey of the project site was undertaken. The study indicates a relative lack of native or endemic species. Possible explanation for this include: seasonal variations affecting reproductive habits and available food supplies; migratory habits; and the tendency of exotic species to prosper at one time, only to later disappear or become a less significant part of the ecosystem. Taking the above explanations into account, the study provides the following conclusions:

- The present environment provides a limited range of habitats which are utilized by the typical array of exotic birds one would expect at this elevation and in this type of environment. Some species were unaccounted for but this may have been due to the limited time frame of the survey and the fact that some species typically have localized populations that may or may not be found on this property. No unusual sightings of introduced birds were obtained on this survey.

- The only migratory shorebird observed on the survey was the Pacific Golden Plover. Because of the timing of the survey only a few plover were seen. A

little later in August/September many more plover are expected in the pastureland and other open habitats along the proposed route.

- No waterbirds were found and none are expected given the absence of suitable habitat within the study area.

- No seabirds were noted. The white-tailed Tropicbird and laysan Albatross would ordinarily occur in this area.

- No endemic or endangered land birds were recorded on the survey. The only species that may forage at this site is the native owl, Pueo. This species is listed as endangered on Oahu.

- Cattle and horses can be found grazing in the pasture areas at the top of the ridge in conjunction with ranching activities on State lands;

- During the brief survey no unusual mammal activity was recorded.

- No particularly special or unusual wildlife habitats were found on this survey. The areas directly touched by the proposed transmission line route are generally disturbed and dominated by introduced vegetation. Native resident bird communities were not found along the proposed alignment.

The results of the study suggest there is little potential for adverse impacts to fauna. No rare or endangered species were noted during the site survey and therefore, would not be subject to destruction or loss of habitat. Almost all of the species in the area are introduced and widely scattered in the Kaena State Park area, and throughout Oahu. Any resulting disturbances would only be temporary, occurring during the construction phase of the project. Once construction is complete practically all terrain will be returned to existing conditions. Small utility boxes/controls will remain following cable deployment to ensure proper

functioning of the fiber optic cable. The utility boxes will be relatively small at three feet by five feet square, and are not anticipated to result in adverse impacts

4.1.5 Botanical Resources

Field studies to assess the botanical resources along the proposed telecommunications line were conducted in August 1993 by Char and Associates. The objectives of the survey were to: 1) describe the major vegetation types along the corridor; 2) search for threatened and endangered species as well as rare and vulnerable plants; and 3) identify areas of potential environmental concerns and propose appropriate mitigation measures.

The study methodology included a search of pertinent literature and aerial photographs, a walk-through survey of the corridor, and documentation of findings and recommendations. A complete copy of the botanical study can be found in this document as Appendix B.

Existing Vegetation

Shrubs of koa-haole (Leucaena leucocephala), an alien species from the Neotropics introduced before 1837 (Waner et al. 1990), form a somewhat dense cover on the leeward slopes facing Keawa'ula Bay. In most places with shallow soil, Guinea grass (Panicum maximum) is abundant and forms a dense, almost mono-dominant cover beneath the koa-haole shrubs.

Shrubs of a'ali'i (Dodonaea viscosa), a native species, form small thickets here and there throughout the koa-haole shrubland.

Unfortunately, a recent fire burned large portions of these leeward slopes, leaving behind blackened but still standing plants. Some of the patches of native plants may not recover from the effects of the fire.

Koa-haole/buffel grass mixed shrubland and grassland occurs on soils mapped as stony steep land (rSY) on the lower windward slopes of the pali, and on Lualualei clay, 1 to

2% slopes (LuA), on the alluvial fans behind the coast (Foote et al. 1972). The unpaved road which follows along an old railroad bed for the most part, is on Lualualei clay.

Scrub pasture vegetation occurs on the plateau area. Soils on the plateau belong to the Mahana soil series; these are well-drained soils found on the uplands of Kauai and Oahu (Foote et al. 1972). The silk oak trees and Christmas berry shrubs rapidly drop out as the corridor heads toward Manini Pali. The low scrub on the plateau is composed of shrubs such as lantana, koa-haole, guava (Psidium guajava), and a mix of grass species which include molasses grass (Melinis minutiflora), Guinea grass, pangola grass (Digitaria pentzil), Bermuda grass (Cynodon dactylon), and buffel grass which becomes more common as the corridor approaches the pali.

The coastal cliff mixed shrubland occurs on dry coastal cliffs with the rocky cliff faces sparsely vegetated, about 20 to 30% cover. This vegetation type occurs in the steep crevice of the cliff as the corridor quickly descends toward the coast on the Mokuleia side. The rocks are often gray, lichen-covered where they are exposed to the prevailing winds. The vegetation is dominated by native species, and is inaccessible to most grazing animals.

Findings and Recommendations

The corridor passes through koa-haole shrubland on the leeward slopes facing Keawaula Bay; scrub pasture vegetation which is still used for grazing cattle and horses on the plateau area; coastal cliff mixed shrubland on the upper portions of Manini Pali; and koa-haole/buffel grass mized shrubland and grassland on the lower windward slopes of Mokuleia. The field study focused more intensively on the vegetation types found on the windward side as several endangered species are known from the Manini Gulch to Kaena Point area. However, no threatened and endangered species (U. S. Fish and Wildlife Service 1989, 1990, 1991, 1992) or rare and

vulnerable plants (Wagner et al. 1990) were found within the telecommunications line corridor during the field studies). In the area of the pali, the proposed fiber optic cable will follow within the corridor previously disturbed by the existing underground line, which was installed in 1963. This disturbed area is dominated by buffel grass and koa-haole shrubs, while the surrounding rocky cliff faces support native vegetation.

Given the findings above and the limited nature of the project, the proposed fiber optic line should not have a significant negative impact on the botanical resources. There are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed project. The areas disturbed by the installation of the transmission line should be allowed to revegetate naturally; the introduced grasses should be able to cover most of the disturbed areas fairly quickly during the rainy season.

4.1.6 Scenic and Visual Resources

Views of Kaena Point, including coastal views of Waianae and Mokuleia beach are provided along portions of the alignment. The proposed cable will be sited subsurface within this alignment and will have no visual impact.

4.1.7 Historic/Archaeological Resources

An archaeological study of the project site was commissioned to assess potential for impacts to sensitive areas. The field investigation and literature research were completed in August 1993, and it was determined that the proposed terrestrial fiber optic cable project will be relatively free of adverse impact to archaeological resources, except for the following area of particular archaeological concern:

4.1.7.1 P.D. Pringle Wagon Road

After traversing approximately 3.3 km west of Camp Erdman, the alignment turns SSW ascending the Manini Pali just east of Alau Gulch. On this ascent, the proposed

alignment impacts a steep 4-wheel drive road and an even steeper slide course just to the east. These "visually impressive" (Cultural Surveys Hawaii, 1993) constructions are understood to be remnants of a wagon road and cable system developed by C.D. Pringle in the early 1920's to deliver pineapples grown on the Kuaokala plateau to the O.R.&L. railroad for shipment. While these are twentieth century constructions that at present are not found on the State Register of Historic Sites under Criterion A, "site reflects major trends or events in the history of the state or nation," the pineapple boom of the 1920's, Criterion B "site is associated with the lives of persons significant in our past" - built by C.D. Pringle and Waka Dayasho, and Criterion C "site is an *excellent example of site type*" - *agricultural tramway.*

Impacts and Mitigation Measures

The presently installed cable line already impacts the Pringle site and it does not seem unreasonable that the proposed GTE telecommunications cable follow this alignment if the work is done by hand and an effort is made to retain both the structural integrity and aesthetic appearance of these features. An alternative means of protecting the site would be on-site archaeological monitoring when heavy equipment is in the area of the slide to ensure that no further damage is done. This matter will be coordinated with the State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources (DLNR) in advance of installation of the fiber optic cable.

4.1.7.2 Others

Two other sites have been identified on the Waianae side of the proposed project route. One is designated as Site 23 of the Keawaula Complex and as a "possible heiau" (Yent 1991:15). Another is a designated prehistoric cultural deposit, the "Keawaula Dune" Site 50-80-03-2802. Both are located in the vicinity of the Kaena Point Tracking Station Access Road, makai of the proposed route of the fiber optic cable.

Impacts and Mitigation Measures

Based on field examination by Cultural Surveys Hawaii (August, September 1993) of the present conditions relative to the proposed cable route, it was concluded that as long as the cable route remains on the mauka side of the Tracking Station Access Road, the buried layer of the archaeological sites would not be adversely impacted. In any case, construction activities will be closely coordinated with the State Historic Preservation Division of the DLNR to ensure that these sensitive sites will not be impacted. Further, workers will be instructed that if any human remains are encountered, all work in that immediate area should be immediately stopped and the SHPD should be promptly notified.

4.1.8 Noise

Noise will be temporarily generated from diesel generators, hand tools, and use of earthmoving equipment. It is not expected that these sources will have adverse impacts since most of the project site is located atop the west Waianae Mountain Range, and therefore, isolated from residential dwellings. Once installation of the cable is completed, equipment and personnel will be removed and the site will be returned to its existing conditions.

4.1.9 Air Quality Impacts

Air quality is excellent due to ocean breezes and tradewinds over the project site. The major factor affecting air quality will be use of diesel generators, earthmoving equipment and other construction related vehicles which will release engine exhausts to the environment. It is not expected that this will adversely affect air quality. Use of internal combustion engines will be governed by use of appropriate pollution control devices in accordance with federal, state and county requirements.

4.2 SOCIO-ECONOMIC ENVIRONMENT

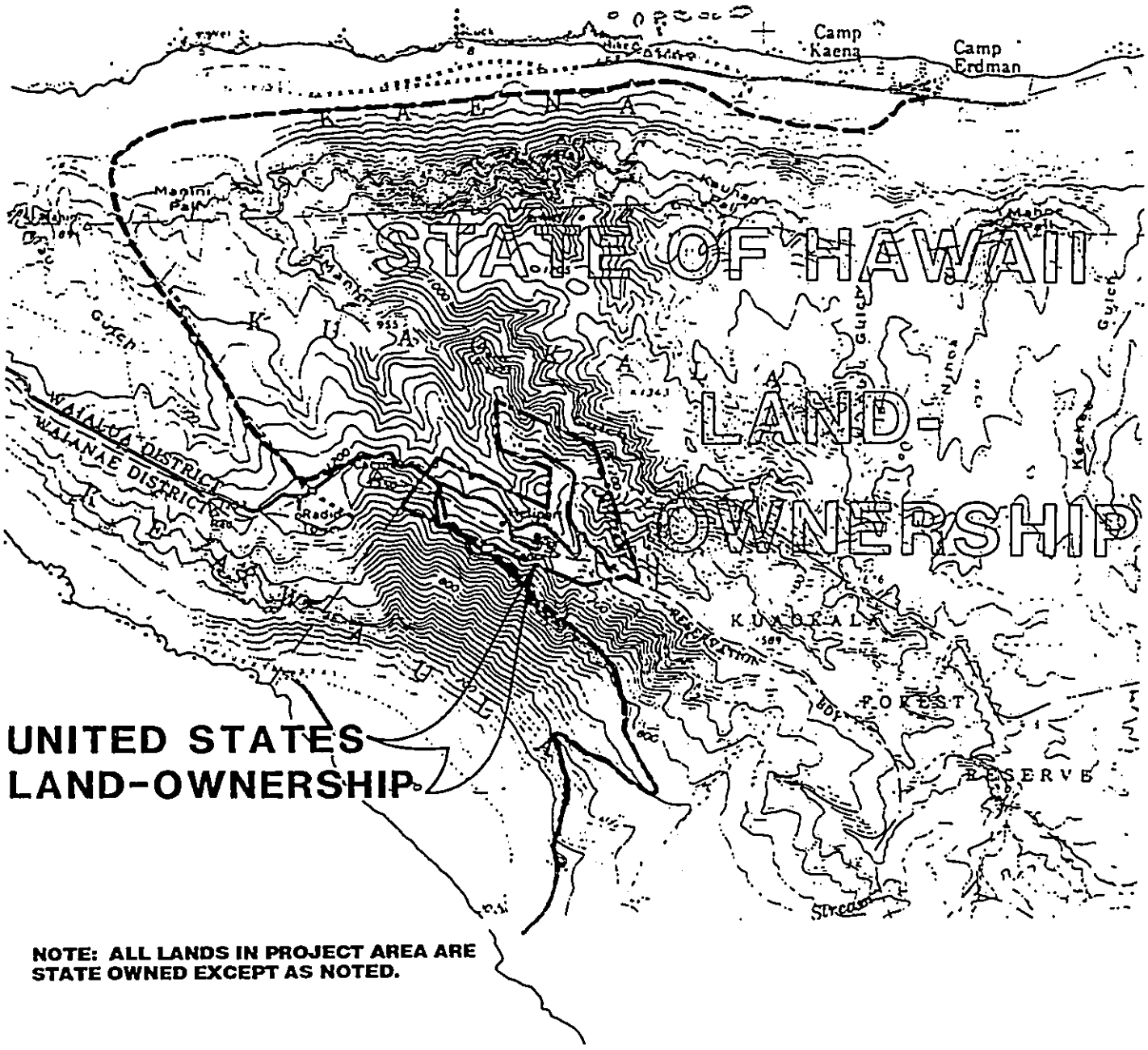
4.2.1 Population

According to the 1990 U.S. Census the population of the Waianae and Mokuleia region is 14,000 (State of Hawaii Data Book, 1991). This represents an approximate 20 percent increase from 1980, when the population was 11,278 (State of Hawaii Data Book, 1984). The proposed project is not anticipated to impact this area population. The primary impact will instead affect the broader population of the State by ensuring increased interstate and international telecommunications reliability with Hawaii.

4.2.2 Land Ownership and Surrounding Land Use

The majority of the project area is owned by the State of Hawaii with a section at the top of the ridge under U. S. Government (federal) jurisdiction for the Air Force Tracking Station. Two parcels -- Tax Map Key no. 6-9-04:08 and 6-9-04:11 are under private ownership. The former is owned by James and Victoria Lyman, and the latter is owned by David and Jane Lee. The two privately owned properties are located in the vicinity of Camp Erdman, mauka of the State right-of-way.

Surrounding land uses include the Kaena Point NAR which is used for natural area reserve management; the Kaena Point State Park which is used for recreation and beach uses; and undeveloped open areas used for grazing and conservation land purposes. It is not anticipated that any of these areas will be affected by the proposed activity. The project will be of short duration, will not involve construction of a permanent above ground facility, and when complete will return most of the existing ground to original conditions.



NOTE: ALL LANDS IN PROJECT AREA ARE STATE OWNED EXCEPT AS NOTED.

Figure 5
LAND OWNERSHIP MAP
GTE HAWAIIAN TEL
Fiber Optic Telecommunications Cable Keawaula to Mokuleia, Oahu

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FEET

R. M. TOWILL CORPORATION
NOVEMBER 1993

4.3 PUBIC FACILITIES AND SERVICES

4.3.1 Transportation Facilities

Farrington Highway, the only major road in the project area, is bisected by Kaena Point. Through vehicle travel from Mokuleia to Waianae is not possible since paved roads do not continue through the Kaena Point area. In 1971, the State Department of Transportation developed plans for a two-lane road around Kaena Point, but later abandoned plans after an extremely negative public reception.

The mountainous portions of the proposed cable alignment cannot be accessed by motor vehicles. The project site is atop the westernmost segment of the Waianae Mountain Range, and is intended to remain buried with little requirement for maintenance and access. Should maintenance be required, access will be provided via the Kaena Point Tracking Station Road, which is located on slopes immediately mauka of Kaena Point State Park. Access to the interior sections of the cable would require hiking or helicopter assisted means.

Dillingham Airfield is located west of Camp Erdman. The airfield is on long term lease to the state Department of Transportation for civilian operations. Most aircraft using the field are small general aviation aircraft, with shared usage by sailplanes, skydivers, and occasional military aircraft. According to the Directorate of Facilities Engineering, U.S. Army Support Command, Hawaii, no military safety zones have been developed for the airfield and no AICUZ (Aircraft Installation Compatible Use Zones) noise zones have formally been adopted (Mokuleia Development Proposal EIS, May 8, 1987). The proposed project will have no impact on continued airfield operations.

4.3.2 Recreational Facilities

The following recreational facilities are located in the vicinity of the proposed cable alignment:

Kaena Point State Park "wraps" around Kaena Point and includes coastal areas on both the Waianae and Mokuleia sides of Oahu. Emphases is currently on improving the Waianae side of the park due to more favorable beach and camping facilities (Mokuleia Development Proposal, EIS, May 1987). The proposed cable alignment will primarily traverse the upper portions of the park, from the Kaena Point Tracking Station Road to the 1,200 foot elevation around Manini Pali.

The Kaena Point Natural Area Reserve (NAR) is located on 12 acres within the Kaena Point State Park. The purpose of the facility is to "preserve in perpetuity specific land and water areas which support communities, as relatively unmodified as possible, of the natural flora and fauna, as well as geological sites, of Hawaii" (Hawaii Revised Statues, 195-1). The proposed cable alignment is not anticipated to require crossing within this area.

Camp Harold Erdman is a popular YMCA facility widely used for summer camp. Additional uses throughout the year includes leadership training, retreats, conferences, and other workshop activities. Activities along the beach include swimming, fishing, diving, sailing, picnicking, camping, and other beach related activities.

The proposed cable will be within the Kuakokala Game Managment Area. The proposed cable, however, will not impact activities in the game management area except during period of construction.

SECTION 5

RELATIONSHIP TO STATE AND COUNTY LAND USE PLANS AND POLICIES

5.1 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 information services in the Pacific Rim. The proposed project will continue 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.

5.2 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 educational institutions.

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.

5.3 STATE LAND USE LAW

The State Land Use classifications of the project site are Conservation and Agricultural (see Figure 7). No land use change is required for the cable installation. Construction activity within Conservation-designated land will require a Conservation District Use Permit.

5.4 CITY AND COUNTY GENERAL PLAN

The General Plan of the City and County of Honolulu provides a statement of long range social, economic, environmental, and design objectives for the island of Oahu and a statement of policies necessary to meet these objectives. A specific objective of the General Plan relating to the proposed project is the maintenance and expansion of existing utilities systems. The proposed project is generally in conformance with the goals and objectives of the County General Plan.

5.5 CITY AND COUNTY DEVELOPMENT PLAN (see Figure 6)

The land use designation of all but two of the project site parcels is Preservation with the exception of Tax Map Key numbers 6-9-04:06 and 6-9-04:07. The former is designated Parks and Recreation, and the latter is designated Preservation and Parks and Recreation. No land use change is required for the proposed cable installation.

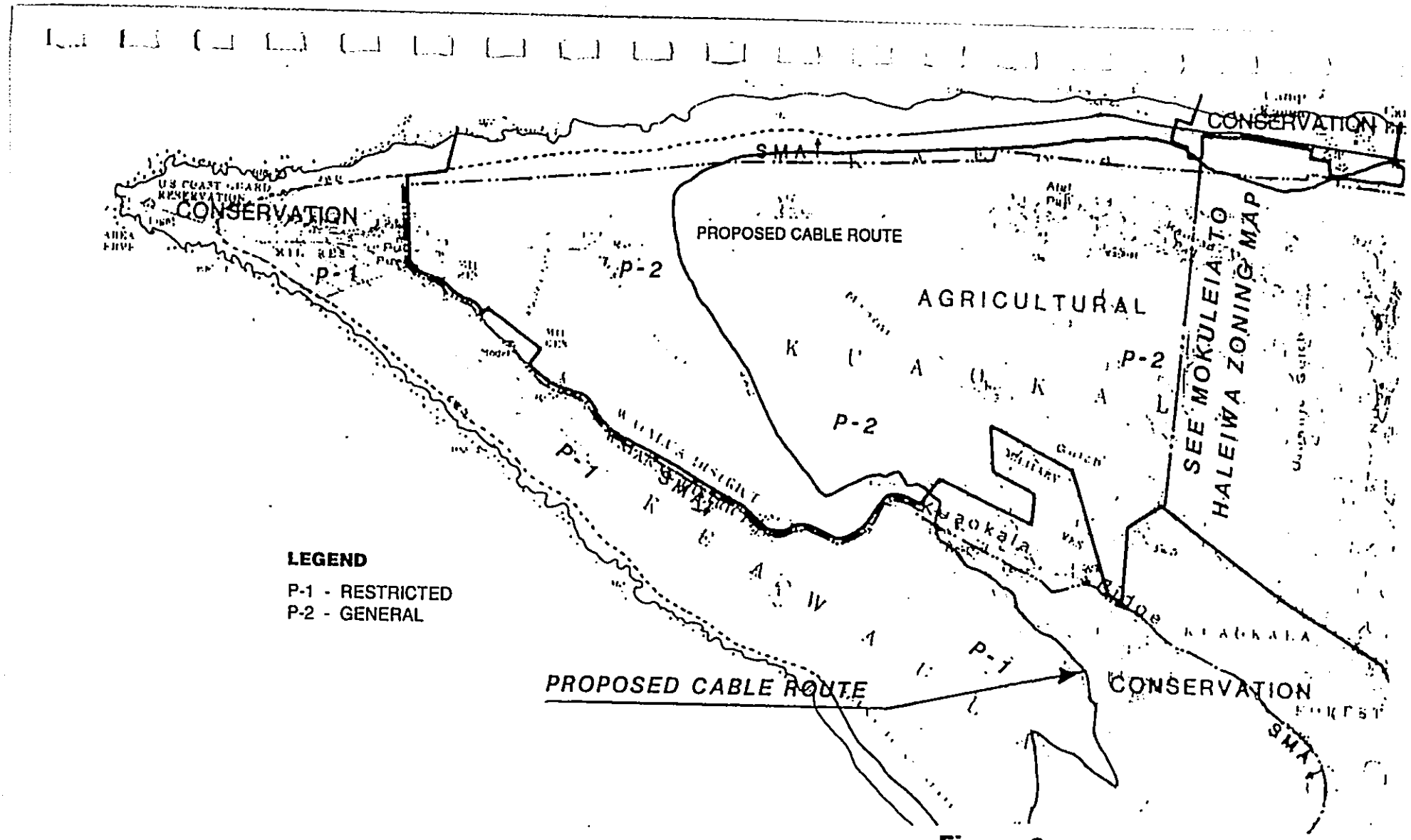

Figure 6
DEVELOPMENT PLAN AND ZONING MAP
GTE HAWAIIAN TEL
Fiber Optic Telecommunications Cable Koawaula to Mokuleia, Oahu

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NOVEMBER 1993

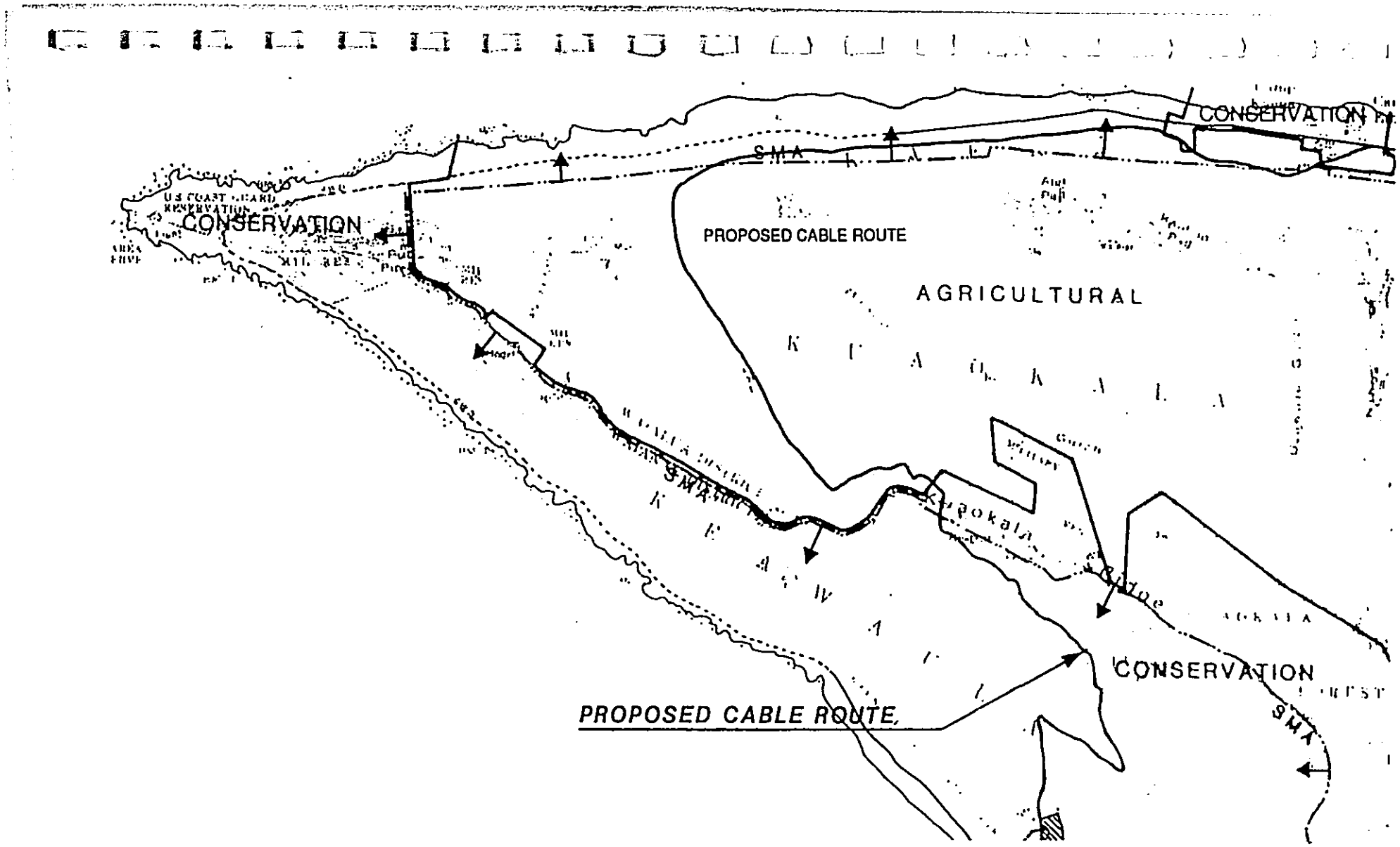

Figure 7
LAND USE DISTRICTS AND SMA MAP
GTE HAWAIIAN TEL
Fiber Optic Telecommunications Cable Keawaula to Mokuleia, Oahu

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FEET

R. M. TOWILL CORPORATION
NOVEMBER 1993

5.6 CITY AND COUNTY ZONING

Tax Map Key numbers 6-9-02:05, 6-9-02:13 and 8-1-01:07 are zoned restricted preservation ("P1"), and the remainder are zoned general preservation ("P2") (see Figure 6). No zoning change is required for the proposed cable installation.

5.7 Special Management Area

The City and County of Honolulu has designated the shoreline and certain inland areas of Oahu as being within the Special Management Area (SMA). SMA areas are felt to have a sensitive environment and should be protected in accordance with the State's coastal zone management policies. The project area is within the SMA Boundary as defined by the City and County of Honolulu (see Figure 6). An SMA permit will be sought from the City and County of Honolulu for the proposed fiber optic cable.

5.8 Stream Channel Crossings

Manini Stream crosses a portion of the proposed alignment. A Stream Channel Alteration Permit (SCAP) will be sought from the State Division of Water Resource Management of the DLNR for the crossing of this intermittent stream.

SECTION 6
ALTERNATIVES TO THE PROPOSED ACTION

6.1 NO ACTION

The no action alternative will contribute to exposing existing transpacific telecommunications facilities to potential catastrophic failure. A primary disadvantage of this alternative would be that, without the development of a terrestrial fiber optic system, GTE will not be able to meet the transpacific traffic needs. Losses resulting from this alternative would include:

* Lost employment opportunities that would have been realized in connection with the cable installation procedure, maintenance and operation; and,

* Lost tax revenues for City and State governments from the cable vendor, and increased demand for public and private telecommunication usage.

6.2 ALTERNATIVE ROUTES

A. Following the Entire Existing Coaxial Cable Route. Consideration was given to utilizing the Waianae segment of the route of the existing coaxial cable. The existing cable was installed in 1963, prior to the enactment of State of Hawaii environmental review requirements. The existing line traverses the slopes of the mountainside leading up to the Air Force Tracking Station near what was uncovered in 1991 as a possible heiau (Yent 1991:15). Due to the archaeological sensitivity of the Waianae hillside, this segment of the proposed fiber optic cable will be laid alongside the Air Force Tracking Station access road instead.

B. Around Kaena Point. Because the proposed telecommunications cable is intended to strengthen the transpacific communications link, running the new line around Kaena Point would appear to be an ideal location rather than inland of the coast. However, access to the edge of the island around Kaena Point is neither practical nor feasible for

construction equipment. Access was attempted in the past. However, due to erosion and high waves, the road was destroyed.

6.3 ALTERNATIVE TECHNOLOGY

The following describes the alternatives to fiber optic cable technology:

6.3.1 Satellites

Satellites are not a feasible alternative based on the large capacity requirements projected. Satellite service also has high initial costs and inherent signal delays that will adversely affect high speed data services.

6.3.2 Microwave Radio Systems

The use of additional or modification of Hawaiian Tel's existing microwave radio systems is not a feasible alternative due to its capacity limitations compared to fiber systems and the higher maintenance costs.

6.4 RECOMMENDED ACTION

The recommended action is to proceed with the establishment of an underground fiber optic telecommunications cable system that will traverse the western tip of the island of Oahu, beginning in Keawaula and travelling mauka along the Kaena Point Tracking Station access road, and continuing along in an uphill direction to the 1,200 foot elevation. The line will traverse in a descending northwesterly direction along an existing dirt road parallel to the existing coaxial cable that runs along the ridge toward Manini Pali which is a ridge overlooking the beach on the Mokuleia side of Kaena Point. The line will traverse down the steep grade to the base of the mountain, then continue along the mauka shoulder of Farrington Highway and east toward Camp Erdman.

SECTION 7

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 along the approximately 4-mile long corridor of the existing site will not be altered.

Once construction activities are completed there will be no effect on wildlife, existing botanical, or historical resources.

Long-term gains resulting from development of the proposed project include provision of more effective trans-Pacific and statewide telecommunications systems (by means of fiber optic cable). The proposed project will maintain and enhance economic productivity by increasing telecommunications service between Hawaii, the continental United States and the rest of the world.

SECTION 8

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 region, the State of Hawaii and the City and County of Honolulu.

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 9

NECESSARY PERMITS AND APPROVALS

9.1 FEDERAL

U. S. Army Corps of Engineers

- Corps of Engineers Section 404

9.2 STATE

Department of Land and Natural Resources

- Conservation District Use Permit
- *Right-of-Entry*
- Establishment of Easement
- Stream Channel Alteration Permit

Office of State Planning

- Coastal Zone Mangement Certificate

Department of Health

- Section 401

9.3 CITY AND COUNTY OF HONOLULU

Department of Land Utilization

- Special Management Area Permit

SECTION 10
DETERMINATION

In accordance with the provisions set forth in Chapter 343, Hawaii Revised Statutes, and the significance criteria in Section 11-200-12 of Title 11 Chapter 200, this assessment has preliminarily determined that the project will have no significant adverse impact to water quality, air quality, existing utilities, noise, archaeological sites, or wildlife habitat, and that an Environmental Impact Statement is not required. All anticipated impacts will be temporary and the environmental quality of the area will return to preconstruction conditions. Therefore, it is anticipated that a negative declaration will be issued for this project.

SECTION 11

CONSULTED AGENCIES AND PARTICIPANTS IN THE PREPARATION OF THE ENVIRONMENTAL ASSESSMENT

11.1 FEDERAL AGENCIES

U.S. Army Corps of Engineers

Air Force

11.2 STATE AGENCIES

Department of Land and Natural Resources

- Forestry and Wildlife
- Conservation and Environmental Affairs
- Land Management Division

Department of Health

Department of Business and Economic Development

11.3 CITY AND COUNTY OF HONOLULU

Department of Land Utilization

11.4 INDIVIDUALS AND GROUPS

- AT&T
- Hawaiian Electric
- Waianae Neighborhood Board

11.5 Comments Received on Draft Environmental Assessment

- See following pages.

94-00073

OFFICE OF STATE PLANNING

Office of the Governor

MAILING ADDRESS: P.O. BOX 3540, HONOLULU, HAWAII 96811-3540
STREET ADDRESS: 250 SOUTH HOTEL STREET, 4TH FLOOR
TELEPHONE: (808)587-2846, 587-2800

FAX: Director's Office 587-2848
Planning Division 587-2824

Ref. No. C-438

December 30, 1993

The Honorable Donald A. Clegg
Director
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Subject: Draft Environmental Assessment, GTE Hawaiian Tel Fiber Optic Telecommunications Cable from Keawaula to Mokuleia, Oahu

We have reviewed the referenced document and have the following comments.

Water quality, coastal water quality in particular, is a leading environmental issue. A relevant statutory Coastal Zone Management (CZM) policy as expressed in Chapter 205A, HRS, is to "Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs."

As discussed in the document, the installation of the fiber optic cable may require a temporary diversion of Manini Stream and construction of a trench under the stream. Measures should be considered to minimize the potential influx of sediment laden runoff into the stream that might be generated by construction activities.

Additionally, a Coastal Zone Management Federal Consistency Approval will be required as a prerequisite to the Department of the Army's Permit.

Thank you for the opportunity to comment on this draft environmental assessment. If you have any questions, please contact Harold Lao at 587-2883.

Sincerely,

Harold S. Masumoto
Director

R. M. TOWILL CORPORATION

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

February 1, 1994

RMTC 1-16924-0-D

Mr. Harold S. Masumoto, Director
Office of State Planning
P.O. Box 3540
Honolulu, Hawaii 96811-3540

Dear Mr. Masumoto:

SUBJECT: Draft Environmental Assessment (EA), GTE Hawaiian Tel Fiber Optic Telecomunications Cable from Keawaula to Mokuleia, Oahu, Hawaii

Your letter of December 30, 1993, relating to the above document was forwarded to us by the Department of Land Utilization. We would like to take this opportunity to address your concerns as follows:

1. As stated in the Draft EA, the proposed fiber optic cable will be place under the stream bed of Manini Stream. This stream is dry for most of the year. Care will be taken to minimize work during periods of rain to minimize sediment transport to the ocean. The work on the stream is being coordinated with the Army Corps of Engineers and the Department of Land and Natural Resources.

2. We have submitted our Coastal Zone Management Federal Consistency Approval documents to your office for review. We look forward to hearing from you on this matter.

Thank you for your comments. Should you have further questions or concerns, please do not hesitate to call on me.

Very truly yours,

Chester T. Koga

Chester T. Koga, AICP
Project Planner

cc: GTE Hawaiian Tel
Dept. of Land Utilization

94-0015

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

REPLY TO
ATTENTION OF
Operations Division

January 5, 1994

Mr. Donald A. Clegg
Director
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

This is in response to your request for comments on the Environmental Assessment (EA) for the GTE Hawaiian Tel Fiber Optic Telecommunications Cable project, Keawaula to Mokuleia, Oahu. The EA was reviewed by our office in November 1993. The applicant's agent was advised that the work qualifies for Corps nationwide authorization under 33 CFR 330, Appendix A, Paragraph B.12. for utility line backfill and bedding. The authorization will be issued upon receipt of the required Section 401 Water Quality certification and the Coastal Zone Management certification.

We appreciate the opportunity to participate in your Special Management Area review process. If you have any questions, please contact Ruby Mizue at 438-9258, extension 14, and refer to File No. NW 94-007.

Sincerely,

for Michael T. Lee
Chief, Operations Division

R. M. TOWILL CORPORATION

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

February 1, 1994

RMTC 1-16924-0-D

Mr. Michael T. Lee, Chief
Operations Division
Department of the Army
U.S. Army Engineering District
Fort Shafter, Hawaii 96858-5440

Dear Mr. Lee:

SUBJECT: Draft Environmental Assessment (EA), GTE Hawaiian Tel Fiber Optic Telecomunications Cable from Keawaula to Mokuleia, Oahu, Hawaii

Your letter of January 5, 1994, relating to the above document was forwarded to us by the Department of Land Utilization.

Please note that a Corps Nationwide permit has been requested. Both the Section 401 Water Quality Certification and Coastal Zone Management Certification have been filed with the State Department of Health and Office of State Planning, respectively.

Thank you for your comments. Should you have further questions or concerns, please do not hesitate to call on me.

Very truly yours,

Chester T. Koga

Chester T. Koga, AICP
Project Planner

cc: GTE Hawaiian Tel
Dept. of Land Utilization

Division of Forestry and Wildlife

MEMORANDUM: January 6, 1994

TO: Roger C. Evans, OCEA

FROM: Michael G. Buck, Administrator

SUBJECT: SMA - Fiber Optic Cable Keawaula to Mokulea
File No. 94-394

We have reviewed File No. 94-394 and have the following comments:

1) According to the applicant's map, the west portion of the subject project is within the Kuaokala Game Management Area. No mention was made in the applicant's EA.

2) Feral pigs are known to roam in the area, although none were sighted during the mammal resource inventory survey.

3) The type of vegetation within the area is indicative of a very dry landscape. We recommend that a fire contigency plan be submitted prior to any construction.

4) The south portion of the project closely parallels the access which leads into the Kuaokala and Mokuleia Forest Reserves. We recommend that this access road remain open during the construction period so that the public can use the Kuaokala/Mokuleia Forest Reserves.

5) Any questions that need to be rectified should be addressed to Mr. Herbert Kikukawa, Oahu District Manager, at 587-0166.

cc: Oahu DOFAW

'94 JAN 25 AM 8:17
DEPT OF LAND UTILIZATION
CITY & COUNTY OF HONOLULU

C&CDLU
Attn: Joan Takano
F.Y.I.

RECEIVED
'94 JAN 14 PM 3:20
DLNR
OCEA

R. M. TOWILL CORPORATION

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

February 1, 1994

RMTC 1-16924-0-D

Mr. Michael G. Buck, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Buck:

SUBJECT: Draft Environmental Assessment (EA), GTE Hawaiian Tel Fiber Optic Telecomunications Cable from Keawaula to Mokuleia, Oahu, Hawaii

Your letter of January 5, 1994, relating to the above document was forwarded to us by the Department of Land Utilization. We would like to take this opportunity to address your concerns as follows:

1. We will correct the EA to note that the proposed fiber optic cable will be within the Kuaokala Game Management Area.

2. We will consult with Mr. Kikukawa to develop an acceptable fire contingency plan.

3. At the present time we do not anticipate any road closures. Access to this area will be open. Should we find that closure of the area is required because of health and safety reasons, we will consult with your office.

Thank you for your comments. Should you have further questions or concerns, please do not hesitate to call on me.

Very truly yours,

Chester T. Koga

Chester T. Koga, AICP
Project Planner

cc: GTE Hawaiian Tel
Dept. of Land Utilization
Office of Conservation and Environmental Affairs

'94-004 PC

JOHN WAIHEE
GOVERNOR OF HAWAII

KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER II
DONA L. HANAIKE

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

January 14, 1994

Joan Takano
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

LOG NO: 10413
DOC NO: 9401TD08

Dear Ms. Takano:

SUBJECT: **Environmental Assessment, SMA -- Fiber Optic Cable: Keawaula to Mokuleia (93/SMA-072(JT))**
Keawa`ula, Wai`anae and Ka`ena, Waialua, O`ahu
TMK: 8-1-1:por. 7; 6-9-3:por. 5; 6-9-1:por. 4; 6-9-2:por. 1, por. 13; 6-9-4:6, 7, 13, 14, and 17

We apologize for our late response to this environmental assessment. In our opinion there are no historic preservation issues that would trigger the EIS process for this project. However, the proposed project has the potential to adversely affect three significant historic sites. These include 50-80-03-4703, the Pringle tramway, which we concur is significant for criteria A, B, and C; 50-80-03-2805, the Keawa`ula Complex; and 50-80-03-2802, the Keawa`ula Dune site. In order to ensure that this proposed project has "no adverse effect" on historic sites the following conditions should be attached to any approved SMA permit:

1) Construction excavation activities either beneath or makai of Farrington Highway within 100 feet of the intersection of Farrington Highway and the Ka`ena Point Tracking Station Road must be preceded by successful completion of a Data Recovery Plan for Site 50-80-03-2802 approved by the Historic Preservation Division of the Department of Land and Natural Resources.

2) No construction activities will take place on the makai side of the Ka`ena Tracking Station Road within 100 feet of the intersection of this road and the existing cable easement to avoid impacting site 2805.

3) All excavated areas within 100 feet of the intersection of the Ka`ena Tracking Station Road and the existing cable easement will be restored to original condition to ensure that erosion will not damage site 2805.

4) All construction activities within 100 feet of site 50-80-03-4703 must be monitored by a qualified archaeologist, who will be consulted by construction personnel in order to minimize adverse effects of construction activities on site -4703.

5) All excavated areas within 100 feet of site 50-80-03-4703 must be restored to original condition under the direction of the qualified archaeological monitor to avoid further damage to the site.

If you have any questions please call Tom Dye at 587-0014.

Sincerely,

Ross Cordy

for DON HIBBARD, Administrator
State Historic Preservation Division

TD:jt

c: Roger Evans, Administrator (OCEA)

R. M. TOWILL CORPORATION

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

February 1, 1994

RMTC 1-16924-0-D

Mr. Don Hibbard, Administrator
Division of Historic Preservation
Department of Land and Natural Resources
33 South King Street, 6th Floor
Honolulu, Hawaii 96809

Dear Mr. Hibbard:

SUBJECT: Draft Environmental Assessment (EA), GTE Hawaiian Tel Fiber Optic Telecomunications Cable from Keawaula to Mokuleia, Oahu, Hawaii

Your letter of January 14, 1994, relating to the above document was forwarded to us by the Department of Land Utilization. We would like to take this opportunity to address your concerns as follows:

1. Current plans for the installation of the fiber optic cable is on the shoulder of the Waianae side of the Kaena Point Tracking Station road from the intersection at Farrington Highway to the tracking station.

2. We do not anticipate any work in the makai side of Farrington Highway.

3. We do not anticipate any work between the Kaena Point Tracking Station road and the existing easements toward the west of the road.

4. We are current developing plans to avoid the Pringle tramway. If we find that this is not technically possible, we will consult with a qualified archaeologist to review construction plans and have that person available during construction to minimize adverse effects and to supervise restoration, if required.

February 1, 1994

Thank you for your comments. Should you have further questions or concerns, please do not hesitate to call on me.

Very truly yours,

Chester T. Koga

Chester T. Koga, AICP
Project Planner

cc: GTE Hawaiian Tel
Dept. of Land Utilization
Office of Conservation and Environmental Affairs

REFERENCES

1. GTE Hawaiian Tel Interisland Fiber Optic Cable System: Environmental Assessment, R. M. Towill Corporation, 1993.

2. AT & T Keawaula Station: Environmental Assessment, R. M. Towill Corporation, 1991.

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5. Hawaii State Plan, Chapter 226

6. Atlas of Hawaii, Second Edition. Department of Geography, University of Hawaii, 1983.

7. *Archaeological Investigations at Kaena Point (State Site No. 50-80-03-1183)*, Martha Yent, 1991, regarding other historical/archaeological sites in the area.

8. *Botanical Assessment Survey Fiber Optic Transmission Line Keawaula to Mokuleia*, Char & Associates, August 1993.

9. *Avifaunal and Feral Mammal Survey of a Proposed Route for GTE Hawaiian Tel Fiber Optic Transmission Line Keawaula to Mokuleia, Oahu*, Phillip L. Bruner, August 1993.

10. *Archaeological Assessment of the Proposed GTE Fiber Optic Transmission Line Alignment at Kaena and Kuaokala, Waialua District, and Keawaula, Waianae, Oahu*, Cultural Surveys Hawaii, August 1993.

APPENDIX A:

BOTANICAL ASSESSMENT SURVEY

BOTANICAL ASSESSMENT SURVEY
FIBER OPTIC TRANSMISSION LINE
KEAWA'ULA TO MOKULE'IA, ISLAND OF O'AHU

by

Winona P. Char

CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: R.M. Towill Corporation

August 1993

BOTANICAL ASSESSMENT SURVEY
FIBER OPTIC TRANSMISSION LINE
KEAWA'ULA TO MOKULE'IA, ISLAND OF O'AHU

INTRODUCTION

GTE Hawaiian Tel proposes to construct an underground fiber optic transmission line from Keawa'ula to Mokule'ia, near Camp Erdman. The proposed line will follow adjacent to an existing underground transmission line for a greater portion of its length. On the Keawa'ula (leeward) side, the proposed line passes through koa-haole shrubland. On the plateau area where there a number of military communication facilities, the line will cross under scrub pasture land. The line then drops into a small ravine at Manini Pali. The steep cliff faces on the pali support a low, windswept mixed native shrubland. At the base of the pali and on to its terminus near Camp Erdman, the underground line passes through a mixed koa-haole shrubland and buffel grass grassland.

Field studies to assess the botanical resources along the proposed transmission line were conducted on 13 to 14 August 1993. The primary objectives of the botanical assessment survey were to: 1) describe the major vegetation types along the corridor; 2) search for threatened and endangered species as well as rare and vulnerable plants; and 3) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator

with other studies conducted in the general area. A recent black and white aerial photograph and topographic maps were studied to determine vegetation cover patterns, terrain characteristics, access, boundaries, and reference points. The Keawa'ula (leeward slopes) and the plateau areas were easily accessed from the paved road which services the military facilities. On the Mokule'ia (windward) side, a dirt road follows close to the proposed and existing line up to the base of Manini Pali. From the base of the pali, a much overgrown pathway follows the existing line upslope, along a ravine, and then onto the scrub-covered plateau. Areas which were less disturbed, such as the pali or cliff areas, were surveyed more intensively as sensitive native plant communities, and rare plants are more likely to occur in such places.

A walk-through survey method was used. A corridor 100 feet wide was surveyed; the existing underground line, which is marked by yellow posts, served as the center line along most of the corridor. Notes were made on plant associations and distribution, substrate types, topography, exposure, drainage, moisture gradients, grazing damage, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium (University of Hawai'i, Manoa -- HAW), and for comparison with the most recent taxonomic treatment.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. A survey taken at a different time of the year, and under varying environmental conditions would no doubt yield slight variations in the species list, especially of the weedy, annual plants.

DESCRIPTION OF THE VEGETATION

Four vegetation types are recognized along the underground transmission line corridor and are discussed in more detail below. The

scientific names used in the report follow Lamoureux (1988) for the ferns and Wagner et al. (1990) for the flowering plants.

The vegetation types on the Mokule'ia side of the corridor were of particular interest since at least four federally and state listed endangered plant species are known from the Manini Gulch to Ka'ena Point area. These plants are the 'awiwi (Centaurium sebaeoides), 'akoko (Chamaesyce celastroides var. kaenana), Achyranthes splendens var. rotundata (no common name), and Dielliea falcata (no common name). The 'awiwi and 'akoko are found in the coastal dry shrublands, while the Achyranthes occurs on the rocky pali face, and the Dielliea is found within dry forests (Wagner et al. 1990; U.S. Fish and Wildlife Service 1991). However, none of these particular plants were found during our field studies. A list of all the native species inventoried along the transmission line corridor is presented in Table 1 at the end of this section on the vegetation description.

Koa-haole Shrubland

Shrubs of koa-haole (Leucaena leucocephala), an introduced or alien species from the Neotropics before 1837 (Wagner et al. 1990), form a somewhat dense cover on the leeward slopes facing Keawa'ula Bay. In most places with shallow soil, Guinea grass (Panicum maximum) is abundant and forms a dense, almost monodominant cover beneath the koa-haole shrubs. Rocky outcroppings are frequent, and these support a sparse vegetation usually composed of small shrubs such as 'ilima (Sida fallax), hairy abutilon (Abutilon grandifolium), 'uhaloa (Waltheria indica), and hoary abutilon (Abutilon incanum). Natal redtop grass (Rhynchelytrum repens) may form small patches on some of the areas with rocky outcroppings or stony soils.

Shrubs of a'ali'i (Dodonaea viscosa), a native species, form

small thickets here and there throughout the koa-haole shrubland. Other native species found here in scattered patches include large, old wiliwili trees (Erythrina sandwicensis); shrubs of the fragrant-flowered alahe'e (Canthium odoratum); low, scrambling 'ilihe'e shrubs (Plumbago zeylanica); and a few rounded shrubs of naio or false sandalwood (Myoporum sandwicense).

Unfortunately, a recent fire has burned large portions of these leeward slopes, leaving behind blackened but still standing plants. Some of the patches of native plants may not recover from the effects of the fire.

Koa-haole/Buffel Grass Mixed Shrubland and Grassland

This vegetation type occurs on soils mapped as stony steep land ("rSY") on the lower windward slopes of the pali, and on Lualualei clay, 1 to 2% slopes ("LuA"), on the more or less level alluvial fans behind the coast (Foote et al. 1972). The unpaved road, which follows along an old railroad bed for the most part, is on Lualualei clay. This soil is very sticky and very plastic when wet; it has a high shrink-swell potential, forming many deep cracks when drying out.

Low thickets of koa-haole shrubs, 3 to 6 ft. tall, and fairly large expanses of buffel grass form a mosaic or patchwork of shrubland and grassland. In most places, the shrubland occurs on the rockier soils and boulder-strewn areas along the corridor. Buffel grass (Cenchrus ciliaris) forms a dense mat, about 2 to 3 ft. tall, between the koa-haole shrubs.

The composition of the grassland is a little more variable than the shrubland. Buffel grass forms the most abundant cover, although in places with somewhat deeper soil and moister conditions, as in swale areas and small gullies, Guinea grass and

California grass (Brachiaria mutica) are locally abundant. Scattered throughout the grassland are patches of smaller shrubs or forbs such as 'ilima, virgate mimosa (Desmanthus virgatus), false mallow (Malvastrum coromandelianum), and Jamaican vervain (Stachytarpheta jamaicensis) which is seasonally abundant.

Other plants observed in this mixed shrubland and grassland vegetation type include native species such as naio, 'ilie'e, 'uhaloa, alahe'e, nehe (Lipochaeta lobata), koali (Ipomoea indica), pa'uoHi'iaka (Jacquemontia ovalifolia), and huehue (Cocculus trilobus). Among the other introduced species are klu (Acacia farnesiana), lantana (Lantana camara), Glycine wightii, indigo (Indigofera suffruticosa), Senna pendula, and cow pea or wild bushbean (Macroptilium lathyroides).

Scrub Pasture Vegetation

Scrub pasture vegetation occurs on the plateau area. Soils on the plateau belong to the Mahana soil series; these are well-drained soils found on the uplands of Kaua'i and O'ahu (Foote et al. 1972). Along the proposed corridor, these soils are often eroded with the surface layer absent, exposing the dark red to dusky red silt loam subsoil. Where the corridor follows along the paved road to the Ka'ena Point tracking station, there are scattered stands of ironwood trees (Casuarina equisetifolia) and Christmas berry thickets (Schinus terebinthifolius). By the cattle pens and a high voltage box, the corridor makes a turn and follows along a cattle fence towards Manini Pali. Around the cattle pens is an open scrub with trees of silk oak (Grevillea robusta) and Christmas berry shrubs forming roughly 30 to 40% cover.

The silk oak trees and Christmas berry shrubs rapidly drop out as the corridor heads toward Manini Pali. The low scrub on the plateau is composed of shrubs such as lantana, koa-haole, guava (Psidium guajava), and a mix of grass species which include

molasses grass (Melinis minutiflora), Guinea grass, pangola grass (Digitaria pentzii), Bermuda grass (Cynodon dactylon), and buffel grass which becomes more common as the corridor approaches the pali. Smaller herbs and forbs commonly include Spanish clover (Desmodium incanum), partridge pea (Chamaecrista nictitans), Cuba jute (Sida rhombifolia), nettle-leaved vervain (Stachytarpheta urticifolia), and apple of Sodom (Solanum linnaeanum). A few native species such as a'ali'i (Dodonaea viscosa) and 'ulei (Osteomeles anthyllidifolia) shrubs are found in this vegetation type.

Coastal Cliff Mixed Shrubland

This is the most interesting of the vegetation types along the corridor as it is dominated largely by native species, and, because of its steepness, is has been inaccessible to most grazing animals.

The coastal cliff mixed shrubland occurs on dry coastal cliffs with the rocky cliff faces sparsely vegetated, about 20 to 30% cover. The rocks are often gray, lichen-covered where they are exposed to the prevailing winds. The low (1 to 3 ft. tall), windswept vegetation consists of rounded shrubs of naio, alahe'e, Christmas berry, and koa-haole; and smaller shrubs or subshrubs of 'ilima, 'ilie'e, 'ahinahina (Artemisia australis), 'aweoweo (Chenopodium oahuense), and ko'oko'olau (Bidens amplectens). Sheltered crevices provide habitat for the diminutive kumu-niu fern (Doryopteris decipiens) and the succulent-leaved spur flower (Plectranthus parviflorus). Tufted clumps of the kawelu or 'emoloa grass (Eragrostis variabilis) are also commonly seen swaying in the tradewinds. A few small Java plum trees (Syzygium cumini) and Christmas berry shrubs , 5 to 6 ft. tall, are found near the base of the pali.

TABLE 1. List of the native plant species found along the proposed Keawa'ula to Mokule'ia fiber optic transmission line corridor, O'ahu.

Scientific name	Common name	[1] Status	[2] Vegetation type k	k/g	s	c
FERNS						
SINOPTERIDACEAE (Cliffbrake Fern Family)						
Doryopteris decipiens (Hook.) J. Sm.	kumu-niu	E	-	-	-	+
FLOWERING PLANTS						
MONOCOTS						
POACEAE (Grass Family)						
Eragrostis variabilis (Gaud.) Steud.	'emoloa, kawelu	E	-	-	-	+
Panicum torridum Gaud.	kakonakona	E	-	+	-	-
DICOTS						
ASTERACEAE (Sunflower Family)						
Artemisia australis Less.	'ahinahina	E	-	-	-	+
Bidens amplectens Sherff	ko'oko'olau	E	-	-	-	+
Lipochaeta lobata (Gaud.) DC.	nehe	E	-	+	-	-
CHENOPODIACEAE (Goosefoot Family)						
Chenopodium oahuense (Meyen) Aellen	'aheahea, 'aweoweo	E	-	-	-	+
CONVOLVULACEAE (Morning-glory Family)						
Ipomoea indica (J. Burm.) Merr.	koali	I	-	+	-	-
Jacquemontia ovalifolia ssp. sandwicensis (A. Gray) K. Robertson	pa'uoHi'iaka	E	-	+	-	-

TABLE 1. (continued)

Scientific name	Common name	[1] Status	[2] Vegetation type k	k/g	s	c
FABACEAE (Pea Family)						
Erythrina sandwicensis Degener	wiliwili	E	+	+	-	-
LAMIACEAE (Mint Family)						
Plectranthus parviflorus Willd.	spur flower	I	+	+	-	+
MALVACEAE (Mallow Family)						
Sida fallax Walp.	'ilima	I	+	+	+	+
MENISPERMACEAE (Moonseed Family)						
Cocculus trilobus (Thunb.) DC.	huehue	I	-	+	-	-
MYOPORACEAE (Naio Family)						
Myoporum sandwicense A. Gray	naio, false sandalwood	I	+	+	-	+
PIPERACEAE (Pepper Family)						
Peperomia leptostachya Hook. & Arnott	'ala'ala wai nui	I	-	+	-	-
PLUMBAGINACEAE (Leadwort Family)						
Plumbago zeylanica L.	'ilie'e, hilie'e	I	+	+	-	+
ROSACEAE (Rose Family)						
Osteomeles anthyllidifolia (Sm.) Lindl.	'ulei, u'ulei	I	-	-	+	-
RUBIACEAE (Coffee Family)						
Canthium odoratum (G. Forster) Seem.	alahe'e, walahe'e	I	+	+	+	+
SAPINDACEAE (Soapberry Family)						
Dodonaea viscosa Jacq.	a'ali'i	I	+	-	+	-

TABLE 1. (continued)

Scientific name	Common name	1 Status	2 Vegetation type k	k/g	s	c
STERCULIACEAE (Cacao Family)						
Waltheria indica L.	'uhaloa, hi'aloa, kanakaloa	I	+	-	+	-

1 Status
E = endemic = native only to the Hawaiian Islands
I = indigenous = native to the Hawaiian Islands and also elsewhere throughout the Pacific

2 Vegetation type
k = Koa-haole Shrubland
k/g = Koa-haole/Buffel Grass Mixed Shrubland and Grassland
s = Scrub Pasture Vegetation
c = Coastal Cliff Mixed Shrubland

DISCUSSION AND RECOMMENDATIONS

The proposed fiber optic transmission line follows along an already existing underground transmission line, for the most part. The new line will also be placed underground. A botanical assessment survey along a 100-foot wide corridor was conducted by two botanists in August 1993.

The corridor passes through koa-haole shrubland on the leeward slopes facing Keawa'ula Bay; scrub pasture vegetation which is still used for grazing cattle and horses on the plateau area; coastal cliff mixed shrubland on the upper portions of Hanini Pali; and koa-haole/buffel grass mixed shrubland and grassland on the lower windward slopes of Mokule'ia. The field study focused more intesively on the vegetation types found on the windward side as several endangered species are known from the Hanini Gulch to Ka'ena Point area. However, no threatened and endangered species (U.S. Fish and Wildlife Service 1989, 1990, 1991, 1992) or rare and vulnerable plants (Wagner et al. 1990) were found within the transmission line corridor during our field studies. In the area of the pali, the proposed transmission line will follow within the corridor previously disturbed by the existing underground line, which was put in about the mid-1960s. This disturbed area is dominated by buffel grass and koa-haole shrubs, while the surrounding rocky cliff faces support native vegetation.

Given the findings above and the limited nature of the project, the proposed fiber optic transmission line should not have a significant negative impact on the botanical resources. There are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed project. The areas disturbed by the installation of the transmission line should be allowed to revegetate naturally; the introduced grasses should be able to cover most of the disturbed areas fairly quickly during the rainy season.

LITERATURE CITED

Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens. 1972. Soil survey of the islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C.

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APPENDIX B:

AVIFAUNAL AND FERAL MAMMAL SURVEY

AVIFAUNAL AND FERAL MAMMAL SURVEY OF A PROPOSED ROUTE FOR GTE HAWAIIAN TEL FIBER OPTIC TRANSMISSION LINE KEAWAULA TO MOKULEIA, OAHU

Prepared for

R.M. Towill Corp.

by

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16 August 1993

INTRODUCTION

The purpose of this report is to summarize the findings of a two day (3,6 August 1993) bird and mammal field survey of property along the proposed route of GTE Hawaiian Tel Fiber Optic Transmission Line, Keawaula to Mokuleia, Oahu (Fig. 1). Also included are references to pertinent literature as well as unpublished reports.

The objectives of the field survey were to:

1- Document what bird and mammal species occur on the property or may likely to be found there given the range of habitats available.

2- Provide some baseline data on the relative abundance of each species.

3- Determine whether or not unique or special habitat resources for native birds occurs in the project area.

GENERAL SITE DESCRIPTION

Figure One indicates the proposed route for the GTE transmission line. Portions of the path follow existing roads. Pasture lands, second growth forest and dry coastal weeds and brush covered habitat characterize this site. No habitat suitable for waterbirds occurs along the proposed alignment.

STUDY METHODS

Field observations were made with binoculars and by listening for vocalizations. Attention was also paid to the presence of tracks and scats as indicators of bird and mammal activity. The entire length of the proposed route was covered on foot and by truck where possible. Census stations were established along the alignment. At these stations all birds seen or heard over a span of eight minutes were tallied. Any unusual observations, such as uncommon species, made between the census stations were also noted.

Observations of feral mammals were limited to visual sightings and evidence in the form of scats, tracks and skeletal remains. No attempts were made to trap mammals in order to obtain data on their relative abundance and distribution.

Scientific names used herein follow those given in Hawaii's Birds (Hawaii Audubon Society 1989); Field guide to the birds of Hawaii and the Tropical Pacific (Pratt et al. 1987) and Mammal species of the World (Honacki et al. 1982).

RESULTS AND DISCUSSION

Resident Endemic (Native) Land Birds:

No endemic land birds were recorded on this survey. The Pueo

or Short-eared Owl (Asio flammeus) is listed by the State of Hawaii as endangered on the island of Oahu. Pueo forage over open country as well as forest. The native owl potentially could occur at this site. I have seen Pueo in similar habitat elsewhere on Oahu.

Resident (Native) Indigenous and Endemic Waterbirds:

No habitat suitable for waterbirds was noted on the survey. Waterbirds would not be expected to occur in areas directly effected by the proposed project.

Resident (Native) Indigenous Seabirds:

No seabirds were recorded on the survey. The White-tailed Tropicbird (Phaeton lepturus) forages at sea but nests and roosts in rocky cliffs. They are often seen in the back of ampitheater valleys where they soar on the updrafts. The steer cliff faces on both the Keawaula and Mokuleia ends of the proposed route would be a reasonable place to expect this species. Laysan Albatross (Dromedea immutabilis) are commonly seen soaring and on the ground at Kaena Point and Dillingham Airfield. From November to May albatross could be seen in this region of Oahu.

Migratory Indigenous Birds:

The only migratory shorebird recorded on the survey was the Pacific Golden Plover (Pluvialis fulva). This species is the most

common migrant in Hawaii. They arrive in early August from their arctic breeding grounds and remain in Hawaii until late April before migrating north (Johnson et al. 1981, 1989). The seven plover noted on this survey were birds that probably had just returned from the arctic. The birds had remnants of breeding plumage. Another migrant likely to occur in the open pasture lands along the proposed alignment is the Ruddy Turnstone (Arenaria interpres).

Exotic (Introduced) Birds:

A total of 12 species of exotic birds were found during the field survey. Table One shows the species recorded and their relative abundance. The most abundant species were Japanese White-eye (Zosterops japonicus) and Red-vented Bulbul (Pycnonotus cafer). Exotic species not recorded on the actual survey but which potentially could occur in the area given the location and type of habitas available include: Ring-necked Pheasant (Phasianus colchicus), Cattle Egret (Bubulcus ibis), Northern Mockingbird (Mimus polyglottus), Hwamei (Garrulax canorus), Japanese Bush-warbler (Cettia diphone), Eurasian Skylark (Alauda arvensis), Common Waxbill (Estrilda astrild) and Barn Owl (Tyto alba) (Pratt et al. 1987; Hawaii Audubon Society 1989; Bruner 1992).

Feral Mammals:

The only feral mammal observed during the survey was the Small

Indian Mongoose (Herpestes auropunctatus). Rats, mice and cats would also be expected in this area. Without a trapping program it is difficult to conclude much about the relative abundance of feral mammals at this site. It is likely, however, that their numbers are typical of what one would find elsewhere in similat habitat on Oahu.

Records of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) are sketchy but the species has been reported occasionally from Oahu (Tomich 1986; Kepler and Scott 1990). None were observed on this field survey. This bat is believed to roost solitarily and forages for insects at dusk over forest, agricultural lands, urban areas and bays. The likelyhood that bats occur regularly in the area of the proposed project is unknown.

CONCLUSIONS

A brief field survey can provide only a limited perspective of the wildlife present in any given area. Not all species will necessarily be observed and information on their use of the site must be sketched together from brief observations and the available literature. The number of species and the relative abundance of each species may vary throughout the year due to available resources and reproductive success. Species which are migratory will quite obviously be an important part of the ecological picture only at certain times during the year. Exotic species sometimes prosper for a time only to later

disappear or become a less significant part of the ecosystem (Williams 1987; Moulton et al. 1990). Thus only a long term studies can provide the insights necessary to acquire a complete understanding of the bird and mammal populations in a particular area. Despite these limitations the following conclusions related to bird and mammal activity on this property are provided below:

1- The present environment provides a limited range of habitats which are utilized by the typical array of exotic birds one would expect at this elevation and in this type of environment on Oahu. Some species were unaccounted for but this may have been due to the limited time frame of the survey and the fact that some species typically have localized populations that may or may not at present be found on this property. No unusual sightings of introduced birds were obtained on this survey.

2- The only migratory shorebird observed on the survey was the Pacific Golden Plover. Because of the timing of the survey only a few plover were seen. A little later in August/September many more plover would be expected in the patureland and other open habitats along the proposed route.

3- No waterbirds were found and none would likely be expected given the absence of suitable habitat withing the study area.

4- No seabirds were noted. The White-tailed Tropicbird and Laysan Albatross would be likely to occur in this area.

5- No endemic or endangered land birds were recorded on the survey. The only species that may forage at this site is the native owl, Pueo. This species is listed as endangered on the island of Oahu by the State of Hawaii.

6- The brief observations of this survey did not reveal any unusual mammal activity. No endangered species were recorded.

7- No particularly special or unusual wildlife habitats were found on this survey. The areas directly touched by the proposed transmission line route are generally disturbed and dominated by introduced vegetation. Native resident bird communities were not found along the proposed alignment.

TABLE 1

Introduced (exotic) birds recorded along the proposed route for the GTE Hawaiian Tel Fiber Optic Transmission Line, Keawaula to Mokuleia, Oahu.

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE*
Feral Chicken	Gallus gallus	R - 3
Erckel's Francolin	Francolinus erckelii	C - 8
Spoted Dove	Streptopelia chinensis	U - 2
Zebra Dove	Geopelia striata	C - 9
Common Myna	Acridotheres tristis	C - 8
White-rumped Shama	Copsychus malabaricus	R - 2
Northern Cardinal	Cardinalis cardinalis	C - 6
Red-crested Cardinal	Paroaria coronata	U - 4
Red-vented Bulbul	Pycnonotus cafer	A - 14
Japanese White-eye	Zosterops japonicus	A - 11
House Finch	Carpodacus mexicanus	C - 6
Nutmeg Mannikin	Lonchura punctulata	R - 29

* (see key to symbols on page 10)

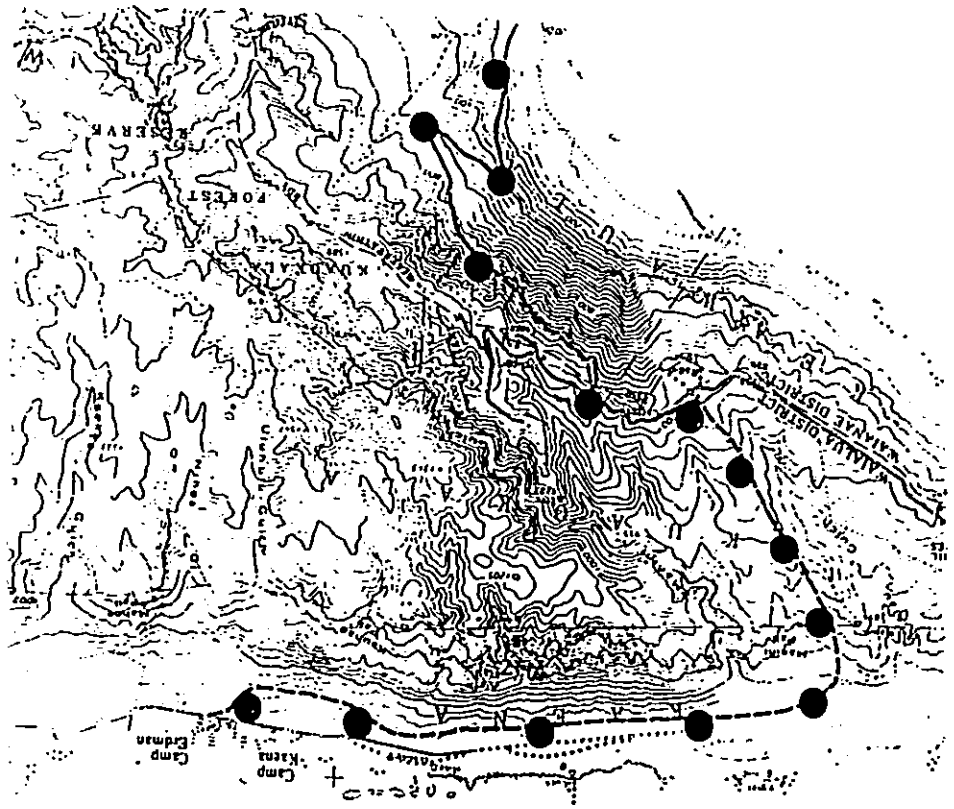

Fig. 1. Location of faunal survey with census stations shown as solid circles.

PROPOSED ROUTE

GTE Hawaiian Tel
Fiber Optic Transmission Line
Kcawaula to Mokuleia, Oahu

R.M. TOWILL CORPORATION

December 14, 1992

KEY TO TABLE 1

Relative abundance = average number of individuals recorded on eight minute census count in appropriate habitat.

A = abundant (average seen or heard greater than ten)

C = common (average seen or heard five to ten)

U = uncommon (average seen or heard less than five)

R = rare (recorded but not on eight minute counts. Total number for the survey is given)

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APPENDIX C:

ARCHAEOLOGICAL ASSESSMENT OF THE PROPOSED GTE FIBER OPTIC TRANSMISSION LINE ALIGNMENT AT KAENA AND KUAOKALA, WAIALUA DISTRICT, AND KEAWAULA, WAIANAE, OAHU, HAWAII

Archaeological Assessment of the Proposed GTE Fiber Optic Transmission Line Alignment at Ka'ena and Kuaokalā, Waialua District, and Keawa'ula, Wai'anae, O'ahu, Hawai'i

by

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Cultural Surveys Hawaii
October 1993

ABSTRACT

An archaeological assessment of a proposed Fiber Optic Cable route at Ka'ena Point involved field survey of the corridor and historic background research of the area. The route extends from Camp Erdman along the *mauka* side of the existing road towards Ka'ena Point and ascends the Pali between Manini Gulch and Alau Gulch where it runs to existing roads of the Ka'ena Point Satellite Tracking Station. Following the road alignment the route descends the slope on the Wai'anae side of Ka'ena Point to Farrington Highway. The proposed route follows an existing cable line along most the course except for the section near Farrington Highway where the existing route diverts from the road. An agricultural tram way built by C.D. Pringle in the 1920 for transporting pineapple to the O.R.& L. Railroad and resembling in all aspects an ancient Holua slide lies adjacent to the present cable route at Manini Pali and has already been impacted by bulldozing. The tramway and associated road are considered significant under Criterion A, B and C of the national Register. The new cable can fallow the old route adjacent to the structure if impact to this structure can be considered in the process. On the Wai'anae side there is a large structure considered a possible *heiau* (Site 23, the Keawa'ula Complex) which lies *makai* of the planned cable route. Cable laying along the road should not impact this structure but secondary erosional effects should be avoided. At the junction of the tracking station road and Farrington Highway is a cultural layer (the Keawa'ula Dune Site (Site 3802). Based on field inspection if the cable route stays on the *makai* side of the road the base of the vertical roadcut this site will not be impacted by cable trenching.

ACKNOWLEDGEMENTS

The fieldwork was conducted by the senior author and Mr. Mark Stride and Mr. Ted Novack of Cultural Surveys Hawaii. Mr. Douglas Borthwick conducted much of the background research and Mr. David Shideler compiled the material for this project. Ms. Colette Sakoda of R.M. Towill provided coordination and valuable information as did Mr. Chester Koga. Report production was provided by Dr. Vicki Creed of Windword Processing.

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I. INTRODUCTION

A. Project Area Description

This report involved archaeological reconnaissance survey of the Ka'ena Point Proposed GTE Fiber Optic Transmission Line Alignment at Ka'ena and Kuaokalā, Waialua District (Fig. 1-3).

The proposed fiber optic transmission line alignment follows an existing cable alignment that begins just south (*mauka*) of Camp Erdman in the *ahupua'a* of Ka'ena and extends west approximately 3.3 km. (2 miles), typically running approximately 30 m. (100') west (*mauka*) of the main road/jeep road. Just east of Alau Gulch, the alignment turns SSW ascending the steep slope of Manini Pali, traversing a steep man-made ramp-like structure up onto the Kuaokalā plateau. Upon achieving the plateau in the *'ili* (a subdivision within an *ahupua'a*) of Kuaokalā near the "Manini" triangulation point, the cable alignment turns SE for approximately 1.5 km (1 mile) following a relatively straight four-wheel drive (4-WD) road to a T intersection with the paved Ka'ena Point Satellite Tracking Station road. The alignment then follows the paved road to the east and then on down to the SSE to Farrington Highway entering the *ahupua'a* of Keawa'ula as it leaves the plateau and descends the steep cliff on the Wai'anae side. The elevation range for the project area is from approximately 6 m. to 380 m. back to 6 m. (20' to 1250' back down to 20' feet) A.M.S.L.

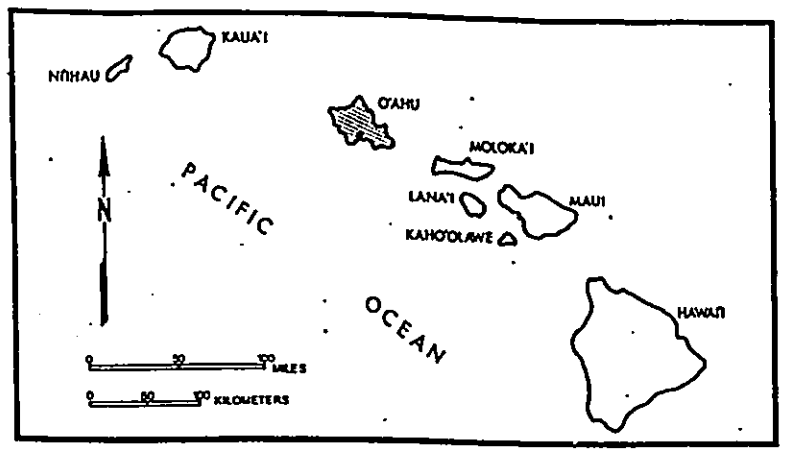

Fig. 1. State of Hawaii

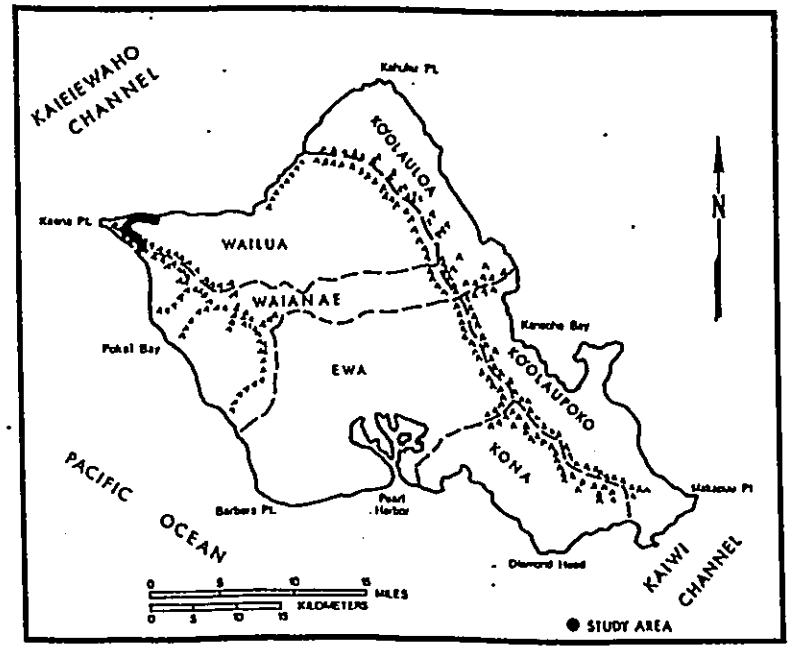

Fig. 2. General Location Map, O'ahu Island

Fig. 3 Kaena Quad USGS Topographical Map Showing Project Area

B. Scope of Work and Methods

The specific tasks of the agreed upon scope of work include:

1. Surface reconnaissance survey of the route. Judging by the map, the cable route follows existing roads from Farrington Highway to the Ka'ena Tracking Station and then follows a dirt road to the top of Manini Pali. After dropping down the pali it goes *mauka* of the beach road eastward to Camp Erdman. The route is far enough from the highway that a walking survey will be necessary. This area could have cultural layers and burials in sandy soils and some previous archaeology has been done here. The areas of concern will be documented and evaluated. No subsurface testing will be performed in this phase.
2. Historic Research will consist of a review of known sites in the area and previous archaeological work as well as historic maps and other relevant documents.
3. Preparation of a report on the findings of the fieldwork and Historic Research. The report will contain a) a map of the route showing sensitive areas; b) the explanation of the sensitive areas in terms of previous archaeology and historic research, and c) recommendations for additional work to mitigate impact of the cable installation on potential archaeological resources. If known or potential site areas are found along the route then an inventory survey level of effort would be recommended to comply with the requirements of the DLNR Historic Preservation Division.

III. NATURAL AND HISTORICAL SETTING

A. Natural Setting

The proposed transmission line alignment traverses several soil units as it runs west of Camp Erdman but these are typically stony to extremely stony clays, clay loams and silty clays of the Ka'ena-Waialua association. Ascending the rock outcrops of the Manini Pali the route traverses the Mahana Bad Land Complex and associated silty clay loam soils before descending through the rock land and stony steep land of the Wai'anae scarp. The route meets up with Farrington Highway in an area of Lualualei extremely stony clay (Foote *et al.* 1972). Rainfall is generally within the range of 52 cm. (20 in.) per year with the majority falling between October and April (Warwick et al., 1973). The current vegetation within the project area is dominated by koa haole (Leucaena glauca) and various exotic grasses, especially molasses grass. Other exotics include lantana (*L. camara*), Christmasberry (*Schinus terebinthifolius*), guava (*Psidium guajava*), ironwood (*Casuarina* sp.), and *lilikoi* (*Passiflora edulis*). Though the vegetation community predominantly consists of exotics, some native plants still exist (within the general vicinity of the project area). These include *a'ali'i* (*Dodonaea* sp.), *alahe'e* (*Canthium* sp.), *akia* (*Wikstroemia* sp.), *'ili-ahi* (sandalwood - *Santalum ellipticum*, *naio* (*Myoporum sandwicensis*), *nehe* (*Lipochaeta integrifolia*), *pa'u o Hi'iaka* (*Jacquemontia sandwicensis*), *pili* grass (*Heteropgon contortus*), *'ulei* (*Osteomeles anthyllydifolia*), *wiliwili* (*Erythrina sandwicensis*), and *aheahea* (*Chenopodium oahuense*) (pers. com. B. Silva 7/87).

B. Historic Setting and Land Use

1. Introduction

The traditional landholding pattern in ancient Hawai'i was based on a sectioning of the land along natural boundaries into ahupua'a. The ahupua'a was the basic unit of social, economic and political life in pre-contact Hawai'i.

> Ideally an ahupua'a land section stretched in a wedge from its apex at a mountain top to its base in the sea, thereby including within its boundaries all environments necessary for a self-sustaining community. Again ideally, the inhabitants of an ahupua'a were related by blood and through children, and could claim some degree of relationship to the chiefly family to whom the ahupua'a had originally been assigned (Barrere, 1970:3).

The proposed transmission line alignment traverses a large portion of the *ahupua'a* of Ka'ena "the heat or red hot" (Pukui et al., 1974:61), crosses the *'ili* of Kuaokala "Back of the Sun" (*ibid.*:119), which is part of the *ahupua'a* of Ka'ena and then enters Keawa'ula named "red harbor" in reference to the "numerous cuttlefish (*mūhe'e*) that color the water (*ibid.*:105).

2. Traditional Accounts

There are numerous accounts relating to Ka'ena Point, in general, and this suggests that it was of great importance during Hawaiian prehistory. Ka'ena Point is referred to as the place on O'ahu where souls departed from this earth, where the demi-god Maui tried to join the islands of O'ahu and Kaua'i and where he fished for and caught a giant red fish. It was also a place important in the myths of the goddess Pele.

Leina-a-Ka-'Uhane, the leaping place or ghost's leap, is where the souls of the dead would leave the earth for the spirit world.

> Among the old Hawaiians it was a belief that as soon as the soul left the body, it traveled west. 'Travels west' is a euphemistic term for 'dying' among many other peoples. Kaena Point is the western extremity of Oahu. As the newly released soul approached the point, it was met by the souls of ancestors or friends who had preceded it. They might send it back to the body if death were not real. On the other hand, if the disintegration were to be final, they conducted it to Leinaknuhane(sic), whence the soul would make its plunge into the sea on its way to eternity (*Honolulu Advertiser* Feb. 12, 1933; in Sterling and Summers 1978:94).

The actual location of this place was also described in the newspaper account.

> We stopped at a stratified and overhanging mass of granular limestone between the track and the sea, near No. 63 culvert as the railroad begins to straighten out after the bend (Waialua side of the point). It is known as 'White Rock' to the railroad men and campers, but the Hawaiians of early days knew it as Leinakauhane... 'The Souls Leap'. (*ibid.*)

Although a Bishop Museum Inventory of sites on Army bases in 1976/1977 described it as being destroyed (Rosendahl 1977:2-14), this site (State Site # 50-80-03-00186) is extant but is approximately 1.8 km (1.1 miles) west of the proposed transmission line alignment.

The legends of Maui relating to Ka'ena include the attempt to join the islands of Kaua'i and O'ahu and the catching of a giant *kumu (Parupeneus porphyreus)*.

> It was at Kaena Point that Maui attempted to unite Kauai and Oahu. According to some legends, after stationing himself on the western extremity of Oahu, ...from which the island of Kauai is clearly visible on a bright day, Maui cast his wonderful hook, Mana-ia-ka-lani, far out into the ocean that it might engage itself in the foundations of Kauai. When he felt that it had taken a good hold, he gave a might tug at the line. A huge boulder, the Pohaku o Kauai fell at his feet....
>
> Kaena Point is mentioned as an excellent fishing ground. At one time when Maui was fishing here he caught a huge red fish, which he dragged up the point, leaving a trail from Pohaku o Kauai to the heiau, which formerly could be followed. This fish, a kumu, he placed on Kuakala (sic) Heiau (Site 188) where the menehunes found it and cut it into small

> bits. Then, when the sea covered the land (Kaiakahinalii), the pieces of fish went back to the ocean. Since then the kumu are small. (From McAllister, in Sterling and Summers, 1978:93, 94).

The Pohaku o Kaua'i is also attributed to a great chief (or giant), Ha'upu, from Kaua'i who, thinking he was being attacked from O'ahu hurled the stone across the Kaieiewaho Channel where it landed at Ka'ena Point (Westervelt, W.D., in Sterling and Summers 1978:93-94 and Pukui et al. 1974:187). The giant *kumu* legend is also told in other ways, but a common factor in all is the dragging of the fish up to a *heiau* on a well-defined trail. McAllister clearly equates "Kuakalā *heiau*" with his site 188 which he calls "Mokaena Heiau." Hammatt and Borthwick (1987:16), who relocated the structure mapped and described by McAllister in 1933 (Mokaena Heiau, State Site #50-80-03-00188) concluded that this was not the site described elsewhere as Kuakalā *heiau*. The identification of the site of Kuakalā *heiau* is of particular archaeological interest as another reference to this (?) *heiau* states:

> There were sun-worshippers among the original arrivals in Hawaii, and there were two temples dedicated to the sun on Oahu...one at Kaneoloa (a part of the present Kapiolani Park), and one at Kuaokala, Waianae. These temples were not for the whole population, but for only a few who claimed it as a privilege, the rest acknowledging it as such (Nakuina, Emma Metcalf, in Sterling and Summers, 1978:98).

The Emerson map of Ka'ena Pali Lands, dated 1896 (R.M. 1784; Fig. 4), had penciled in, a reference to "Kuaokala Heiau," the location on the map was to the Ka'ena point side of Puu Pueo (NW of this project area), but a perusal of the filed notes associated with this map failed to turn up any more information. This map location indicates the existence of another *heiau* and that Kuaokala and Mokaena are two separate structures with Kuaokala not observed by McAllister in 1930. An 1880 traveler's account of an unnamed *heiau* is as follows:

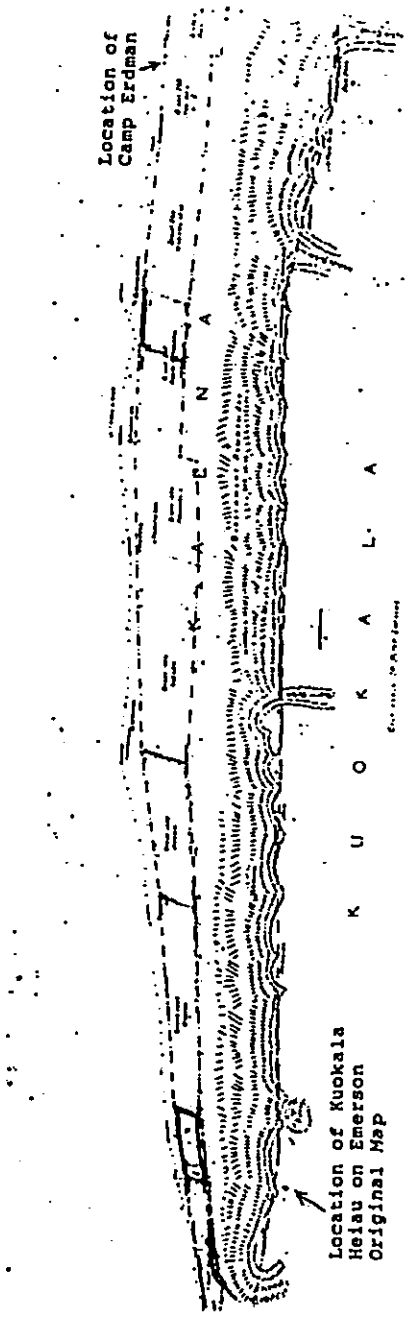

Fig. 4 Portion of Emerson 1896 map of Ka'ena Pali Lands (R.M. 1784)

> On the top of a hill near Kaena Point, there are the remains of an old *heiau*, or temple of the native gods. The place is almost perfect as far as the structure itself is concerned, although all its idols have long since disappeared. The temple is about forty feet long by about twenty feet wide. Its walls are of stone without any cement or mortar, and stands about eight feet high. The place will well repay to the tourist the toil of visiting it. Why this spot was chosen for its erection, it is not easy to divine. Possibly it was on account of the fact already mentioned, that from Kaena Point, when the air is clear enough, the outline of the distant Island of Kauai can be descried (Bowser, 1880:491).

This description as to location (the traveler was moving along the coast) and dimensions (8 foot high walls) clearly indicate that another *heiau* stood above the coast near Ka'ena Point and was a separate site from that described by McAllister in the 1930's as Mokaena. The eight foot high *heiau* near the point itself is probably Kuaokala Heiau. A later reference to this site is in the *Hawaiian Annual* of 1907 in which "Kuokala" (sic) is listed as in "Waianae, overlooking Ka'ena Point - Built by Kauaians on their settling Oahu. Now in Ruins; Class doubtful" (Thrum 1907:46). The site is listed again in 1938 and is said to be in ruins (*Hawaiian Annual*, 1938). Again, the most likely interpretation is that Mokaena and Kuaokala *heiau* are two separate structures and McAllister failed to observe the latter in his 1930's survey.

Mokaena Heiau is located approximately 500 m. west of the proposed optic transmission alignment. While it appears that Kuakalā *heiau* was a separate site, it was probably closer to Ka'ena point and thus does not lie near the proposed alignment.

The Pele myths incorporate Ka'ena Point as an important focus:

> Pele, the spirit of volcanoes, also figures in this region (Kaena) where she landed from Kauai, seeking a place to make a home for her lover Lohiau. With Pele was her youngest sister, Hiiaka, carried under Pele's arm in the form of an egg. The tiny creeper *pa'u-o-Hi'iaka* (*Jacquemontia sandwicensis*) "Hi'iaka's Girdle" is plentiful and after rains its delicate pale blue blossoms may be found intermingled with the golden

> ilima" (*Honolulu Advertiser* Feb. 12, 1933: In Sterling and Summers, 1978:96).

Mary Kawena Pukui relates another reason Pele was associated with Ka'ena Point:

> Ka Ena...red hot. Ka'ena was one of the relatives of Pele who came with her from *Kahiki* and decided to stay at this place. That is why she visited this area, to see her cousin (*ibid.*:93).

The importance of Ka'ena Point in prehistoric times probably was focused on the abundant marine resources, especially deep sea fishing. The Ka'ena Point lands, lacked abundant water, and thus were poor agricultural lands. Agricultural lands for the cultivation of sweet potato with limited taro cultivation are recorded on both the Mokuleia and Keawa'ula sides of Ka'ena Point.

> It was principally sweet potato land on the western flank of the Wai'anae range but there were about 20 taro *lo'i* with rock facings on the slopes below Uluhulu gulch. These were irrigated form a spring on a hill west of the gulch. This (Kaena) was probably the poorest *ahupua'a* in land resources on O'ahu, but its sea side faced out onto very rich deep-sea fishing grounds (Handy and Handy, 1972:467).

Though the land resources were poor, procurement of upland forest resources, such as medicinal plants and timber, probably occurred in the Kuaokala area during prehistoric times.

Another recurring theme in the traditional accounts is the association of Ka'ena Point with the Island of Kaua'i. The *heiau* (Kuaokala/Mokaena) was (were) said to be built by Kauaians; Maui attempted to unite Kaua'i and O'ahu from Ka'ena Point (Pohaku-o-Kauai); and Pele and Hi'iaka arrive from and return to Kaua'i from Ka'ena Point. This association is probably due to the fact that when weather conditions are right Kaua'i is visible from Ka'ena. Ka'ena Point also juts out in nearly a direct line towards Kaua'i and because of this it would be a natural navigational landmark. It would be useful in

channel crossings as well as deep sea fishing trips from both O'ahu and Kaua'i (weather conditions permitting, of course).

The Ka'ena Point area, including Kuaokala, was undoubtedly not heavily populated during prehistoric times, mainly because of a lack of fresh water supplies. Large permanent populations would have been restricted to Mokuleia and Mākua Valley where there was sufficient water for extensive taro cultivation. "It has been suggested that perhaps 100 people lived permanently at Keawa'ula during the prehistoric period" (Yent 1991:5). It seems likely that the permanent population at Ka'ena was even less. However, its importance is evidenced by a number of traditional accounts as well as being a prime marine resource (especially deep-sea resources) procurement area. This would have drawn people into semi-permanent or recurrent use fishing camps utilizing whatever resources of water and agriculture were available (as at Uluhulu Gulch).

C. Historic Period

The first people of Hawai'i to sight Cook's ships (Jan. 1778) were from Wai'anae and Waialua O'ahu (McGrath et al. 1973:17). However, the first European account of the Wai'anae District (including Ka'ena) comes from Capt. George Vancouver in March 1793;

> Westward of Opooroaa (Puuloa) was one barren rocky waste, nearly destitute of verdure, civilization or inhabitants, with little variation all the way to the west point (Kaena) of the Island (McAllister 1933:112).

Vancouver, who was interested in resupplying his ship(s) was obviously unimpressed with the resources, (i.e. fresh water and cultivated plants) available on the Leeward coast.

In the early 1800's Hawai'i became involved in the trading of sandalwood (*'ili-ahi (Santalum ellipticum)*; it was the first profitable export trade commodity. There were large stands of sandalwood on the slopes of the Wai'anae Mountains and by 1811 ships were anchoring off Wai'anae to trade directly with the local chiefs. From 1816 to 1818 the

sandalwood trading in the Wai'anae Range was directly controlled by Kamehameha I, but with the death of Kamehameha (1819) the local chiefs were once again in control. The demands on the people (*maka'āinana*) were so oppressive that they pulled up saplings to avoid having to harvest trees in the future (Kuykendall, 1938 and 1967). Though there is no direct reference to Kuaokala as a specific sandalwood harvesting area, it would undoubtedly be included in the general Wai'anae range deforestation. The 1800's were also a time of great decline in native population (especially in the rural areas). Epidemics, starting as early as 1804 and migration to the growing urban centers were the main causes. The missionary census of 1831-32, counted 2,640 individuals for the district of Waialua (49 in the *ahupua'a* of Ka'ena) and 2,415 in the 1835-36 census (Ka'ena not given separately). This represents a loss of 225 individuals in four years, nearly a 10% decline in population.

> "Many people have died in this archipelago in one year, and there are none to replace them; therefore the people of Hawaii are indeed diminishing.
>
> Clearly, the diminishing has taken place on Oahu, at Waialua, and Waianae and Ewa. It is same with our place, here on Kauai" (Translated by Frances Frazier. Unsigned, but probably written by William P. Alexander. [Ed.]: in Schmitt, 1973:25).

Population did not start to increase in the districts of Waialua and Wai'anae until sugar plantations initiated large scale importation of Asian laborers in the 1880's. One of the few early accounts of the Ka'ena Point area, which was of course something of a backwater, was by the missionary Levi Chamberlain who recorded the following account of Keawa'ula in 1826:

> About 12 o'clock we arrived at Keavaula, an indifferent village, but the place of a school, containing 24 scholars nearly all destitute of books and but five acquainted with the letters (Chamberlain, 1826:490).

In the mid-1800's, change in land tenure, the Great Mahele, took place in Hawai'i. the change was from Hawaiian use-rights to that of private ownership. Ka'ena, including Kuaokala, was granted to Victoria Kamamalu, granddaughter of Kamehameha I. She gave up the rights to the land, however, shortly after the original grant in 1848-49. These lands then became Crown Lands and by 1860 were converted to Government Lands. There were no grants of *kuleana* "lands awarded to native tenants," which for the most part were "taro lands and considered the more valuable lands in the Islands".(Kuykendall, 1938: in Chinen 1958:31). The lands of Keawa'ula were split in two with an award of 210 acres to La'amaikahiki (Mahele Award 14) (Indices 1929:56) with the other half of Keawa'ula declared "government lands." Two land commission awards (LCAs) were granted at Keawa'ula; LCA #5557 - a ten-acre parcel at a place called Kikiolo - was awarded to Kaio and LCA #5999 - a 19.0-acre parcel at Kopiliole was awarded to Lonoahilei. Their land commission applications are given below:

LCA No. 5557 Kaio Keawaula, Waianae, Oahu, January 15, 1848

To the Honorable Land Commissioners of the Hawaiian Islands, Greetings: I hereby state my claim for land and house. This land is at Keawaula and is a combined kula cultivated by us here at Keawaula. Our cultivated kula is bounded on the north by a Pali, on the east by Kahanaiki, on the south by the sea, on the west by Kaena. My house claim is bounded on the north by the house of Anahiwa, on the east by the house of Lumaawe, on the south by the sea, on the west by kula. The occupancy has been from the time of Kahahana by my people (Native Register p73 v5).

LCA No. 5999 Lonoahiilei Keawaula, Waianae, Oahu, January 14, 1848

To the Honorable Land Commissioners of the Hawaiian Islands, Greetings: I hereby state my claim for land and house. This land is at Keawaula and is a combined kula cultivated by us here at Keawaula. It is bounded on the north by a pali, on the east by Kahanaiki, on the south by the sea, on the west by the house of Lumaawe. My people lived here from the reign of Peleioholani and they are gone, and I remain until this time. I am, respectfully, your obedient servant LONOAHIILEI X (Native Register p204 v5).

These transactions suggest a general lack of interest (at this time) in this particular tract of land, probably because of its poor agricultural qualities.

In the latter half of the 19th century land grants were given to a number of individuals along the coastal portion of Ka'ena *Ahupua'a*. The proposed cable alignment may cross portions of Grant 232 Naaihelu - Lot 2, Grant 248 Opunui et al., Grant 247 Kahili & Nuuanu, Grant 1804 Kahunalii and Grant 1806 Kahuhu (See Fig. 4).

Traditional subsistence was disappearing with the new emphasis on a market economy and maximizing profits of the privately owned lands. Sugar plantations started up in Wai'anae and Makaha in the late 1870's and 1880's. In 1895, "Dillingham's Folly," the O'ahu Railway and Land Company reached Wai'anae and by 1898 extended around Ka'ena Point. Some of the railroad bed and associated infrastructure are still visible around Ka'ena Point but the railroad alignment was typically well seaward of the proposed optic transmission line alignment. Many Japanese worked on railroad construction around Ka'ena Point which is reflected in the popular name for Keawa'ula Bay of "Yokohama Bay." The rail line moved passengers and cattle and late in its career (mid 1940s) moved municipal refuse to a dump site at Keawa'ula. With railway service to Honolulu, sugar companies sprang up on O'ahu's north shore, including Waialua (ca. 1898).

However, within the project area, the main focus of the new commercialism was on ranching. The first lease of the newly created government lands of Kuaokala went to Peter Larken in 1868, but in 1873 the lease was taken over by Samuel Andrews who already leased Mākua-Kahanaiki-Keauwa'ula areas for cattle ranching. Samuel Andrews was the son of a missionary, but he took up life with a Hawaiian woman, Malaea Naiwi, in Mākua Valley in 1869. Andrews is said to have "identified himself with the native

Hawaiians" (McGrath et al. 1973:31). On the shoreline of Mākua he and his wife built a church and a school house that supported a small community. In the 1880's a Mrs. Kamealani got the government lease for "Kaena Palis" it is not known what she did with the land, but she gave up the lease within 10 years. A government map of 1889, delineating the boundaries of Kuaokala Forest Reserve, shows a small square indicating the house of S. Andrews, which was probably a temporary shelter during the ranching period.

In 1897 L.L. McCandless purchased Mākua Valley properties and leases from Andrews and requested the purchase of government lands at Ka'ena/Kuaokala. He was turned down and leased the land instead. By the early 1900's the McCandless ranching "Empire" included large tracts of land in Nanakuli, Lualualei, Wai'anae, Makaha, Keaau, Ohikilolo, Mākua, and Kuaokala. McCandless lost the least of Mākua-Kahanaiki-Keauwaula-Kuaokala (General Leases 1740 & 1741) to Frank Woods in 1925. Woods, a cattle rancher from Kohala, Hawai'i was to use the lands as "fattening lands" to "top-off" cattle before sending them to the slaughter house. Woods only kept the leases for some three years, at which time he turned them back over to McCandless. McCandless' "stock" (cattle, pigs, and goats) were said to have caused severe damage to the forest reserve(s) as fencing was inadequate (McGrath et al, 1973:31).

Yent (1991:6) has noted that "no ranching features have been inventoried at Ka'ena Point" and that "enclosures, corrals, and well sites are recorded at Keawa'ula but the ranchers lived at Kahanaiki or Mākua." It seems likely that most of the ranching infrastructure on the Wainlua side was similarly well back from the Point in an area of greater amenities. By the early 1920's, the Dillingham Ranch was based in Mokuleia.

One of the more interesting characters of the early 1900's was Robert L. Meyers, the "Hermit of Ka'ena Point." "He lived with his wife and son in a shack he built near a rock called Leine-a-kauhane (Soul's Leap) on the north side of the point" (McGrath et al., 1973:84). The hermit traded fish for water with the railroad men, as he was an expert fisherman. The hermit's life exemplifies some of the major characteristics associated with this area, the abundance of marine resources, but lack of fresh water, and the pursuit of individualism and independence.

Another individualist more important for the project area was the Honolulu real estate man and politician C.D. Pringle. Starting in 1921, Pringle began an enterprise to grow pineapple up on the Kuaokalā plateau in association with farmers of Japanese ancestry. A major problem they faced was how to get the pineapples down off the steep sided 800' high plateau. A War Department Corps of Engineers map dated 1922 (Fig. 5) shows no roads whatsoever back from the coast. "Pringle tried to construct a cable arrangement to lower pineapple he and other farmers grew on the high flatlands to Keaau for packing and rail shipment to Honolulu" (Whitten 1966:B-2). It is related that "Pringle abandoned the cable project and transported the pineapple by wagon down the Pringle Route to meet O'ahu Railway and Land Company trains on the north shore" (*ibid.*) The Pringle Route lies alongside the proposed optic transmission line alignment and is quite visible on the 1929 U.S.G.S. map (Fig. 6) as the only route onto the west portion of the Kuaokalā plateau. While it is not a certainty, it appears that the ramp-like feature, which the proposed optical cable line alignment crosses, is a remnant of Pringle's initial cable project slightly predating the adjacent switchbacks of the "Pringle Route" road on which wagons of pineapple were to have been hauled down to the adjacent railroad station.

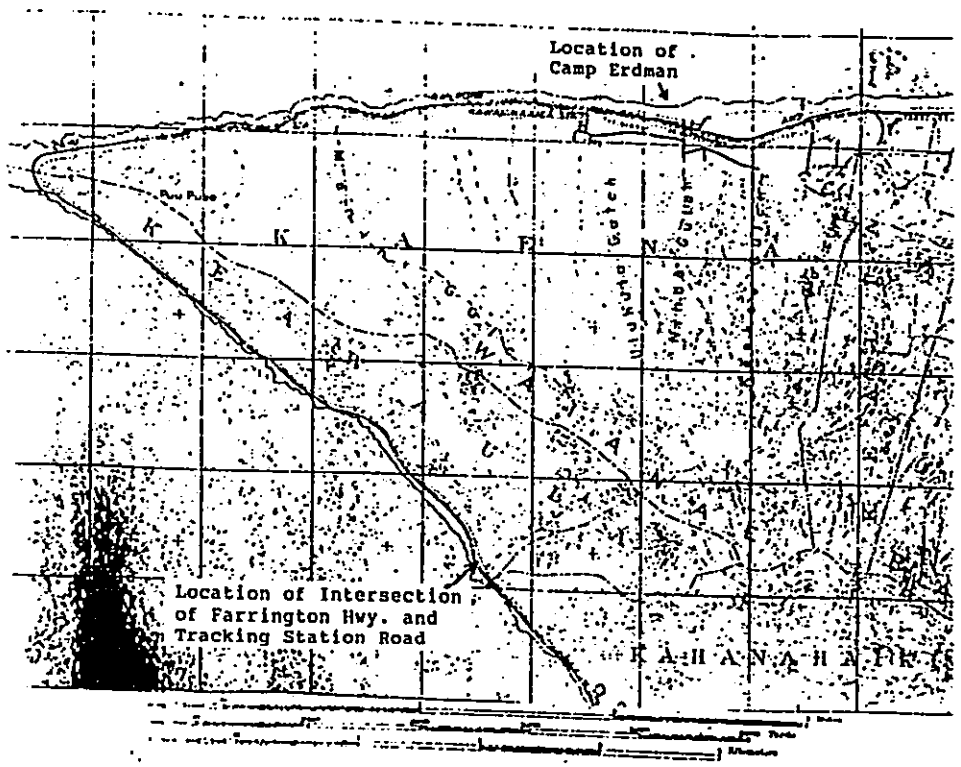

Fig. 5 War Department Corps of Engineers Ka'ena Point Map 1922, Showing General Absence of Inland Roads

Stokes (IN Sterling & Summers 1978:97) relates the following account as related from a Henry Aila to S. Ioane on a trip around Ka'ena Point in the early 1930s:

> ...Too soon we came to Alau, the gorge and slope where I had seen the supposed slide a few years ago. ... Maninihoio was the next gorge and slope to the east. Henry explained that the slide--for such it was in appearance--was built only about tens years ago or so previously by a group of pineapple people in order to get some tractors on to the plateau above. At the same time, they were building a zig-zag road up the face of the cliff. The local account is that the money was exhausted before the roads were completed and the leader died of a broken heart as well as purse.
>
> The side then is modern and so far as it goes would serve splendidly as a model of the stone-built slide such as was made on rocky lands. It was laid up with lava blocks to a width of 10 to 12 feet and like a railroad bed, but on a grade twice as steep as Wilhelmina Rise.

This account seems to be largely correct except that the slide was probably envisaged more for the purpose of lowering pineapples by cable than raising machinery and that the zig-zag road (the Pringle Route) was not built quite at the same time, but rather subsequently as a result of the failure of the cable and ramp solution. Whitten (1966:B-2) declares that Pringle "transported the pineapple by wagon down the Pringle Route to meet O'ahu Railway and Land company trains on the north shore" but notes that "the pineapple growing venture of Pringle and his neighbors also failed; records do not show what went wrong." It may well be that Henry Aila was correct in his conclusion that "money was exhausted before the roads were completed." The 1929 (See Fig. 6) and a 1943 map (Fig. 7) appear to show a small gap at 350' elevation between roads started from the plateau and up from the coast. The gap may never have been closed or perhaps was finished by the military during World War II. By the time of the 1954 U.S.G.S. map (Fig. 8), the Pringle Route was a distant memory and no longer even a topographic feature.

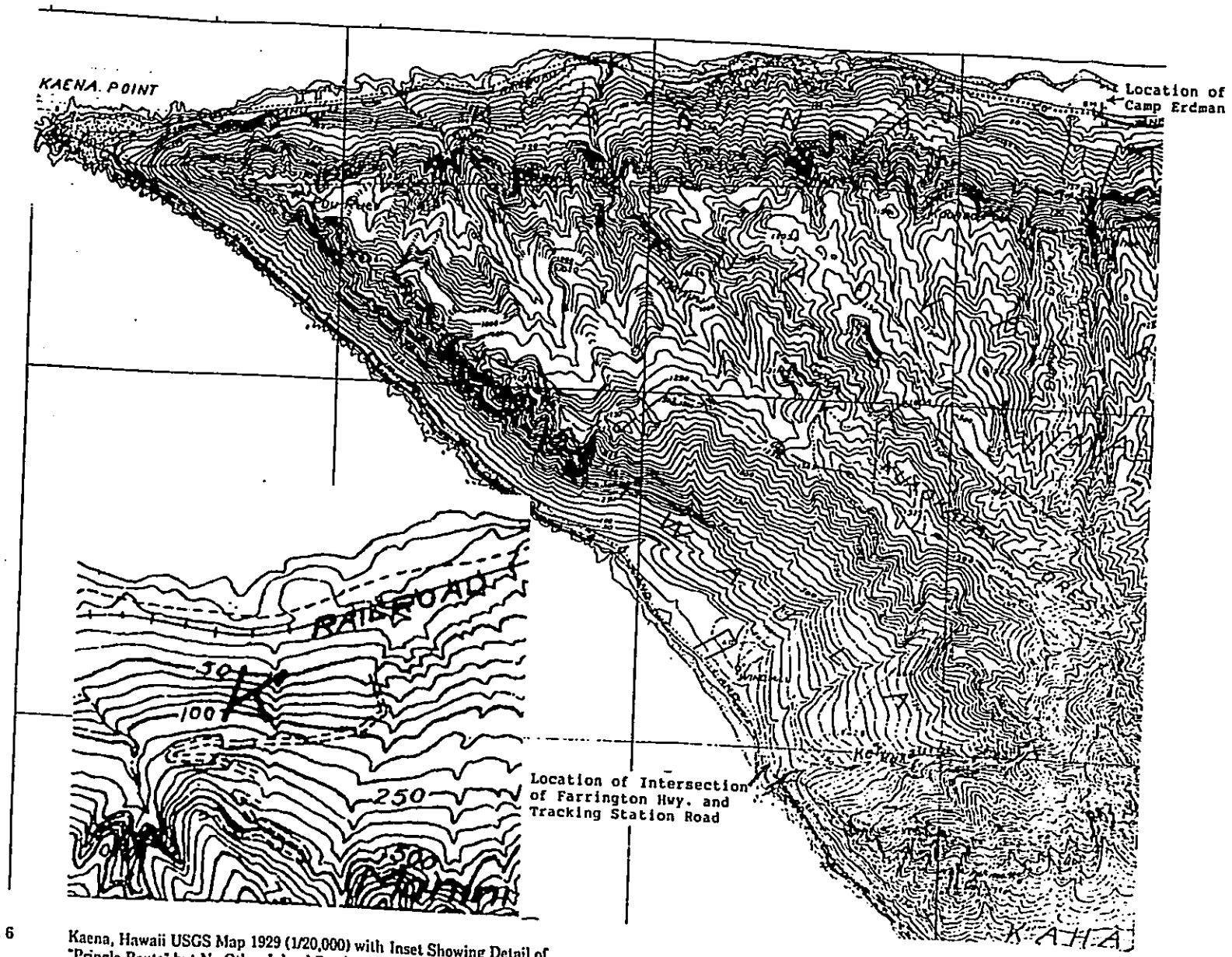

Fig. 6 Kaena, Hawaii USGS Map 1929 (1/20,000) with Inset Showing Detail of "Pringle Route" but No Other Inland Roads in the West Portion of the Kuaokala Plateau

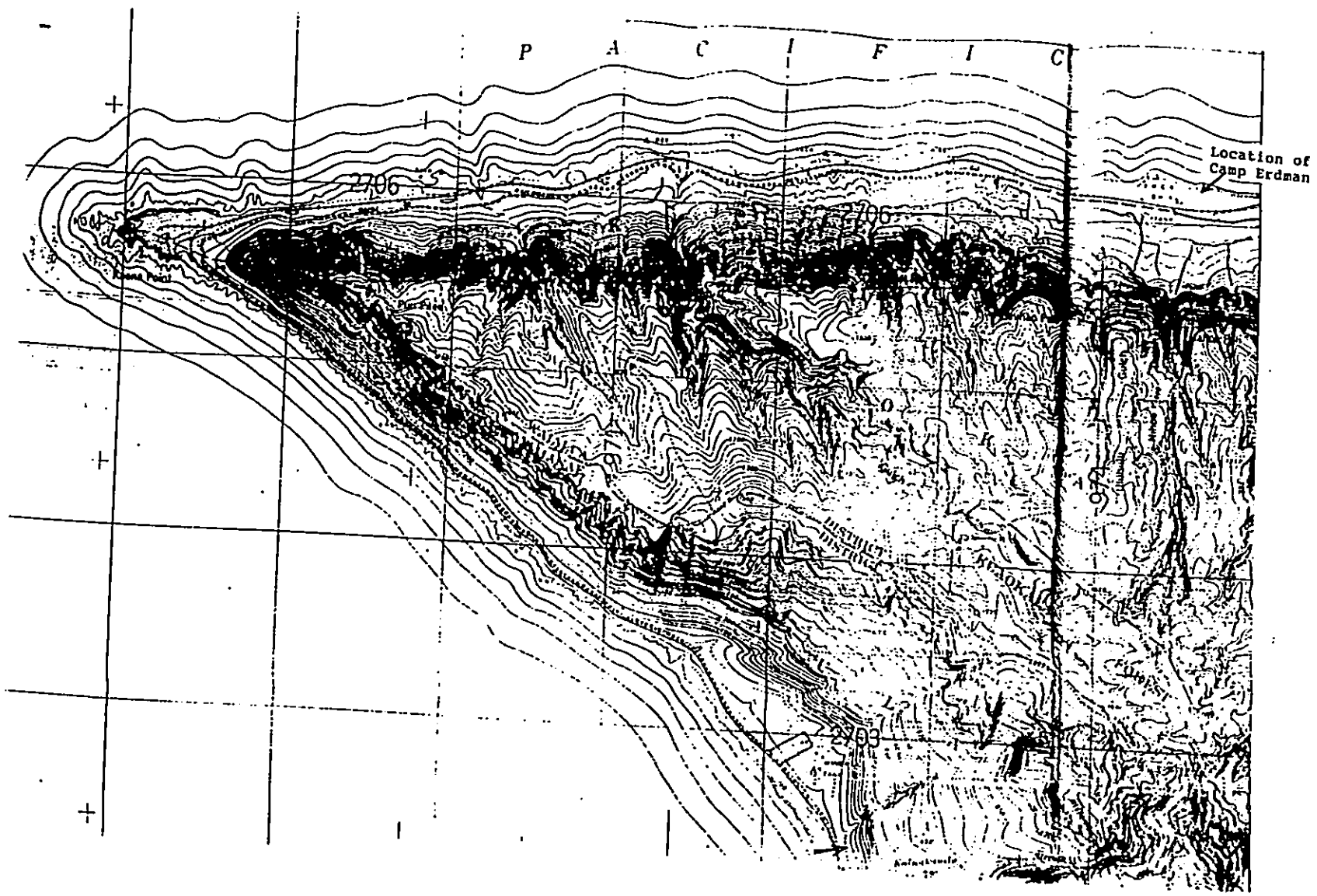

Fig. 7 Kaena Quad, USGS Hawaiian Territorial Survey Map 1943 (1/20,000) Showing Network of Roads on Kuaokala Plateau Meeting Up with Pringle Road"

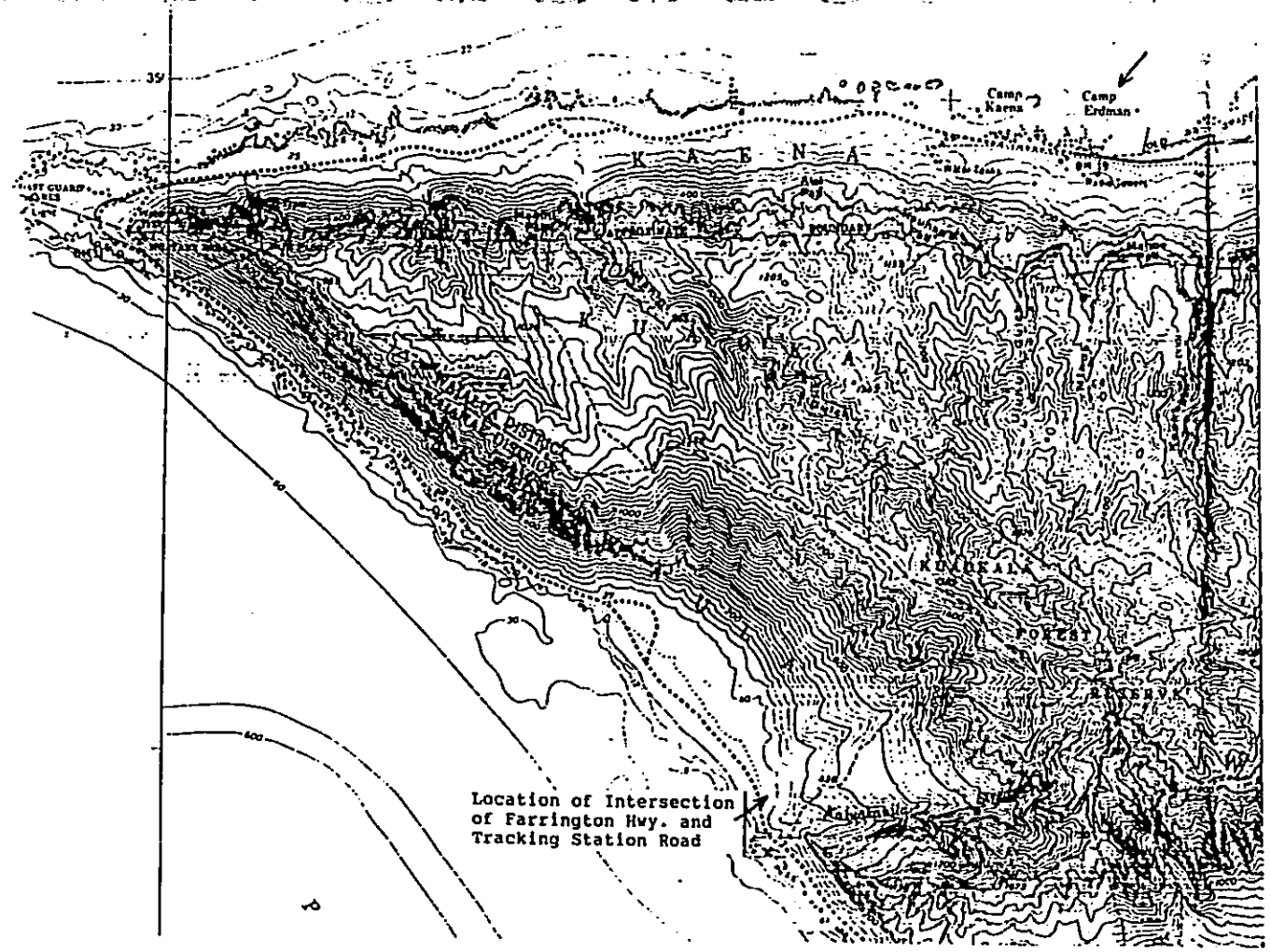

Fig. 8 Kaena Quad USGS Map 1954 (1/24,000), "Pringle Route" and Most of OR&L Railroad Bed Not Shown

The Ka'ena Point Military Reservation was created under Executive Order 4679 in July 1923. The installation was mapped for full-scale construction in 1946. The tracking station construction progressed through the 1950's when the Army built the station for the Air Force.

Ranching activity is still in evidence in the Kuaokala area though on a limited scale. The geodesic domes and satellite dishes of the Satellite Tracking Station are impressive features used by many deep sea fishermen as navigational landmarks.

IV. PREVIOUS ARCHAEOLOGICAL RESEARCH

A. Ka'ena

McAllister (1933:124-127) designated four sites in the *ahupua'a* of Ka'ena including Site # 186, a site complex in the immediately vicinity of the Point itself, Site # 187, the Alauiki fishing shrine, Site # 188 Mokaena *heiau* which lies in the *'ili* of Kuaokalā and will be addressed below and Site # 189 which includes Ulehulu *heiau* and the associated Hauone fishing shrine (*koa*). Sites 186 and 187 lie at a distance of more than 2 kms to the west of where the proposed alignment heads south. Site 189 lies on the east side of the mouth of Keekee Gulch approximately 900 m. SE of the beginning of the proposed optic transmission line at Camp Erdman. All of these McAllister sites along the north shore lie at quite a distance from the proposed transmission line alignment. It appears that the only archaeological research in the seaward portion of Ka'ena since 1933 involves work right at the point itself and the report of other isolated finds of human remains.

Research at the immediate Ka'ena Point area during the State-wide Inventory of Historic Places in 1970 identified a cultural deposit which was called "Ka'ena Fishing Camp" and designated State Site #50-80-03-1183 (Martin 1971). In 1988, this site number was used to designate the "Ka'ena Complex" (Bath 1988) which encompasses 5 sites in the Ka'ena Point vicinity and extends approximately 900 m. east of the Point (thus the designated Ka'ena Complex Site # 1183 does not come anywhere near the present project area). The Ka'ena Complex around the Ka'ena Point Lighthouse has been the focus of recent work (Yent 1991).

A number of isolated discoveries of human remains have been reported from the seaward margin of Ka'ena in recent years (Bath 1987, Smith 1989, 1990, Lee 1990, Kawachi 1991, Yent 1991). Typically, these burials are exposed in sand dune deposits

within 60 m. (200') of the coast. Of particular relevance to the present project is the identification of a human burial at Camp Harold Erdman (Smith 1989).

Archaeological sites which have not been recorded would include the agricultural features in Uluhulu Gulch and Kuakalā *heiau* previously discussed. Neither of these lies near the proposed transmission line alignment.

Historic developments near the present project area which are of archaeological note include the O.R.& L. railway infrastructure and the infrastructure associated with Pringle's 1920's pineapple enterprises. The O.R.& L. infrastructure would include the railway alignment and appurtenances (rails, bridges) and related developments including a plurality of houses around the two stations that the proposed transmission alignment passes near (Kawaiakaaiea Station and an unnamed station very close to where the alignment turns south; See Fig. 5). The Pringle infrastructure would include both the "Pringle Route" Road and the adjacent slide feature.

B. Kuaokalā

Previous archaeological research specific to the *ahupua'a* of Kuaokalā includes J.G. McAllister's O'ahu Island Survey in 1930, and attempts by E.P. Sterling, and E. Neller to relocate the one site (#188) described by McAllister. McAllister described Site 188 as Mokaena Heiau (McAllister 1933:127).

The only other report of archaeological sites within the *ahupua'a* of Kuaokalā is that of Hammatt and Borthwick (1987) conducted in advance of certain proposed projects at the Ka'ena Point Satellite Tracking Station. This study identified and described nine sites of which 3 were considered prehistoric (including the previously described but "lost" Mokaena *heiau*) in an area of 300-400 acres. The only site identified which lies in close

proximity to the proposed alignment is Site 3716, which lies about 20 m. SW of the 4-WD road. This low boulder platform was tested and interpreted as "historic and probably associated with ranching activities" (*ibid*:45). The Hammatt and Borthwick study shows that prehistoric Hawaiian sites do occur on these plateau lands but indicate that prehistoric sites are uncommon (perhaps one per 100 acres). This apparent paucity of prehistoric sites on the Kuaokalā plateau may be in part a reflection of the substantial bulldozing in the area associated with pineapple cultivation.

C. Keawa'ula

McAllister (1933:124) designated three sites at Keawa'ula including Site 183 - Puaakanoahoa fishing shrine (*koa*), Site 184 Poha natural sea cave and Site 1815 the Holua fishing shrine (*koa*) which he notes was "destroyed at the time the railroad was built (ca. 1898). A 1970 field check of the one man-made site (Site 183) McAllister documents as extant in 1933 suggested "that Site 183, the Puaakanoaha [sic] fishing shrine, had also been totally destroyed" (Estioko-Griffin and Lovelace 1980:31).

More recent archaeological research dealing with Keawa'ula include Boucher (1970), Bishop Museum (Rosendahl, 1977), Yent and Estioko-Griffin (1977, 1978), Estioko-Griffin and Lovelace (1980) and Yent (1991).

In 1970 Sylviane Boucher conducted a "surface survey of an approximately one mile long, 100 foot wide corridor of the proposed Ka'ena Point Road, Keawa'ula, Oahu" (Boucher, 1970:2). The survey located some 37 features including historic and probably pre-historic age structures as well as the possibility of subsurface remains.

The 1977 Bishop Museum report was an inventory of "all lands owned or controlled by the Army within the State of Hawaii" (Rosendahl, 1977:1-i). Relevant to this report is

the section on Ka'ena Point Military Reservation and Mākua Military Reservation. The Keawa'ula area of Mākua Military Reservation included previously recorded sites from McAllister (1933) and Boucher (1970) and two new sites, Kaluakauila complex and Keawa'ula cultural deposit. The Kaluakauila complex is described as a historic complex of stone walls and platforms. The Keawa'ula cultural deposit was described as a subsurface cultural deposit of probable prehistoric age.

Yent and Estioko-Griffin (1977, 1978), as "in house" archaeologists for the State Parks conducted a surface survey of the Ka'ena-Mākua State Park comfort station, the connecting water line, and the water tank. They located a number of new features as well as relocating sites from Boucher (1970) and Bishop Museum (1977).

The Hawaii State Park archaeologists also conducted test excavations at the Keawa'ula dune Site 50-80-03-2802 (Bishop Museum's Keawa'ula Cultural Deposit 50-Oa-C7-8). They reported "two major cultural deposits within the site," one of historic context the other prehistoric.

This site is of particular importance to the proposed alignment for it lies adjacent to (and probably under) the intersection of Farrington Highway (the Ka'ena Point Road) and the Ka'ena Point Tracking Station Road (Fig. 9).

Because of the results of test excavations at Site 50-80-03-2802 indicating intact cultural deposits, Hawaii State Parks' archaeologists undertook extensive excavation of this dune site (Estioko-Griffin and Lovelace, 1980). The excavations revealed "a range of activities which have occurred in this area over at least the last 300 years." These activities are grouped into four major phases, prehistoric, late prehistoric/proto-historic, historic, and modern. The prehistoric is characterized by "exploitation of coastal and marine resources." The late prehistoric/proto-historic utilization appears to be "a series of

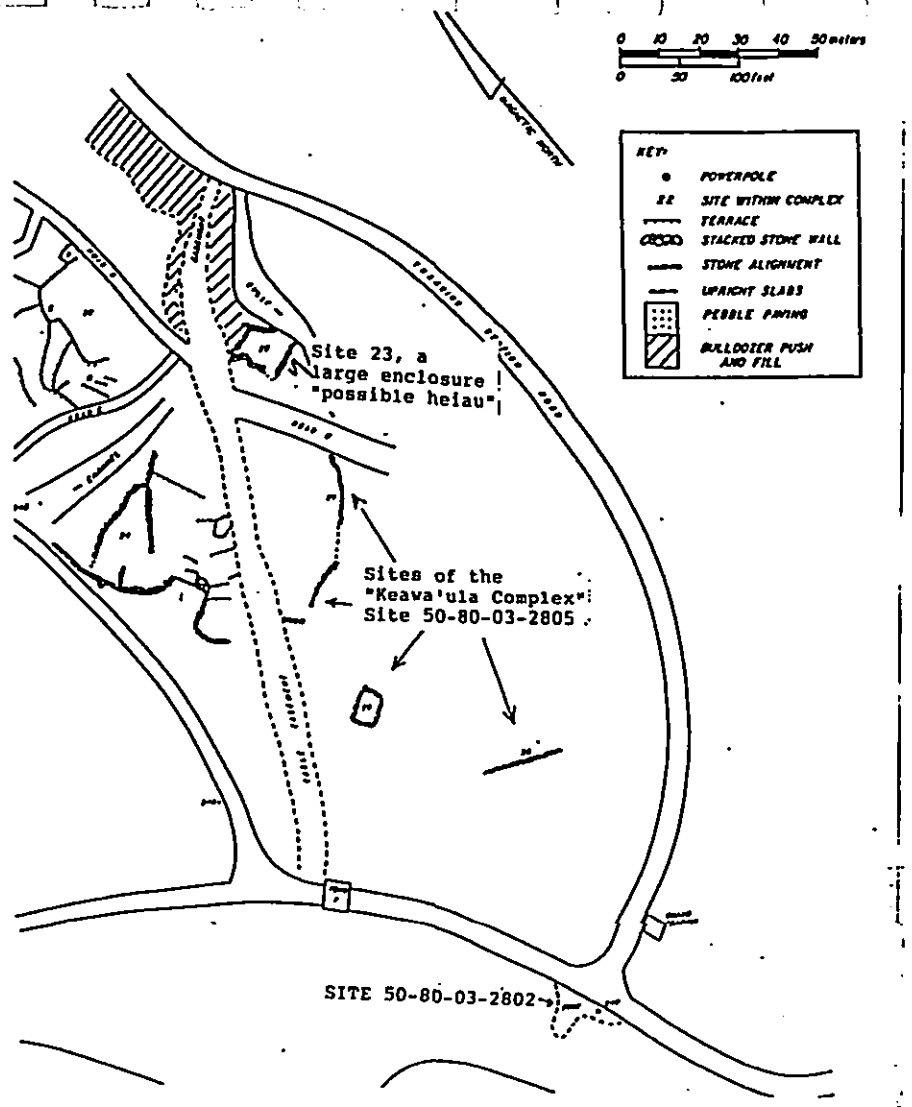

Fig. 9 Map Showing Location of Site 50-80-03-2802 Relative to Tracking Station Road and Southern Sites of the "Keawa'ula complex" (Site 50-80-03-2805) (Adapted from Yent 1991)

sporadic and temporary occupations." The historic period is evidenced by crushed coral fill which is probably related to the railroad construction, ca 1900. The modern period is characterized "by two garbage pits with various bottles (primarily beer bottles), glass jars and miscellaneous trash" (*ibid.*:156-161).

In 1990, a State Parks archaeological inventory survey (Yent 1991) focused on an area just north of Farrington Highway (the Ka'ena Point Road) and just west of the Satellite Tracking Station Road. A number of archaeological features were lumped into the "Keawa'ula Complex" (State Site 50-80-03-2805). Most of the sites identified are historic and associated with the railroad, ranching, and the historic use of the area as a dump. Only eight of the 37 sites identified in the Keawa'ula Complex are suggested to be prehistoric. One of particular note is Site 23, described as a possible *heiau* (*ibid.*:15) and lying about 33 m. (110') from the proposed optic cable alignment as it follows the tracking station road and is immediately adjacent to the present cable easement (See Fig. 9). Research relevant because of its geographic location in Wai'anae includes the Makaha Valley Project (Green 1980), cultural history research in Mākua Valley" (Kelly and Quintal, 1977), archaeological excavations at Waianae Army Recreation Center, Pokai Bay (Hammatt, et al., 1985), "archaeological survey of inland portions of Kea'au Valley (Kennedy, 1984), and sub-surface testing along Farrington Highway from Kea'au Beach Park to Mākua Military Reservation (Hammatt, et al., 1986). In general these studies show early and continuous use of shoreline areas for fishing camps with later development of intensive agriculture in the valley floodplains.

V. SURVEY RESULTS

The field survey was conducted by 3 people over a period of 2 days. The first day consisted of walking along the existing cable route from Camp Erdman to the top of Manini Pali and to the dirt road connecting to the Satellite Tracking Station. The bulk of this survey was done on foot except for portions of the cable route easily visible from the beach road, west of Camp Erdman. The second day involved coverage of the Wai'anae side from Farrington Highway to the uplands following existing roads. This was done by vehicle except for inspection of Sites 23 and 3802.

Camp Erdman to Manini Pali

The cable route begins at Camp Erdman and runs slightly *mauka* of the camp facility along the *mauka* side of the beach road. The route is marked every 500-1000 feet by vertical 4-5 foot high pipes and parallels the road 50-250' *mauka* of the shoulder. Virtually all of the route has been previously disturbed by grading for the present road and land clearing, probably going back to and before World War II. In some areas grading is visible to the toe of the slope 4-500 ft. *mauka* of the road (Figs. 10, 11). No archaeological sites were located near the route and sites have not been previously recorded here.

Manini Pali

West of Manini Gulch the cable route ascends the pali along a path clearly marked by previous bulldozing for cable laying (Fig. 12) The route then runs straight up a cleft in the cliff a few feet west of a constructed stone ramp (Fig. 13). This ramp is identified as

Fig. 10 Kaʻena Point Road Showing Cable Route *Mauka* of Road, View Towards Camp Erdman (east)

Fig. 11 Cable Route from Camp Erdman Towards Kaʻena Point, View West

Fig. 12 Bulldozed Cable Route Ascending Westward to Manini Puli

Fig. 13 Manini Puli Showing Cable Route Adjacent to Ramp, View Upslope to South

the 1920s structure built to transport pineapple from the plateau to the OR&L Railroad. This feature has been given State Site #50-80-03-4703.

Site 50-80-03-4703 Description

The ramp structure (Fig. 14-18) is most intact at its *mauka* end where it rests against a nearly vertical section of cliff. Along a 42 meter long intact upper section, the structure is 3.9 meters wide and has facing on the west and east sides averaging 2.5 meters high. The cable lies 1-2 meters to the west. Medium size, blocky boulders are stacked on either side to from neat facings. The east side parallels a drainage gully with sloping facing. The west side is nearly vertical. Although rocks were carefully selected thee is no pre-shaping of the rocks. The top surface of the ramp is core filled with small rocks and soil forming the main material. The ramp descends the slope on an angle off horizontal of 34 degrees or on a straight route oriented 5 degrees true. Bulldozing of the cable line has disturbed the next 21 meters of the length although 18 meters of the original facing is still visible on the east side.

The cable line crosses the ramp here and runs diagonally downslope to the east marked by a bulldozer path. Sections of the ramp are visible downslope 125 meters from the cable crossing to a jeep road that crosses the ramp and has breached it. Here the ramp is considerably lower and the visible facing in the *Koa haole* shows a height of 20-40 cm. with cobble and boulder paving in between the parallel facings. From the jeep trail the ramp extends downslope an additional 70 meters. The parallel facings are 4.4 meters apart with cobble and small boulder paving in between. The ramp alignment here is shown by vegetation marks visible from the upslope end of the structure. The ramp terminates at the junction of two gullies which appear to have been deepened considerably

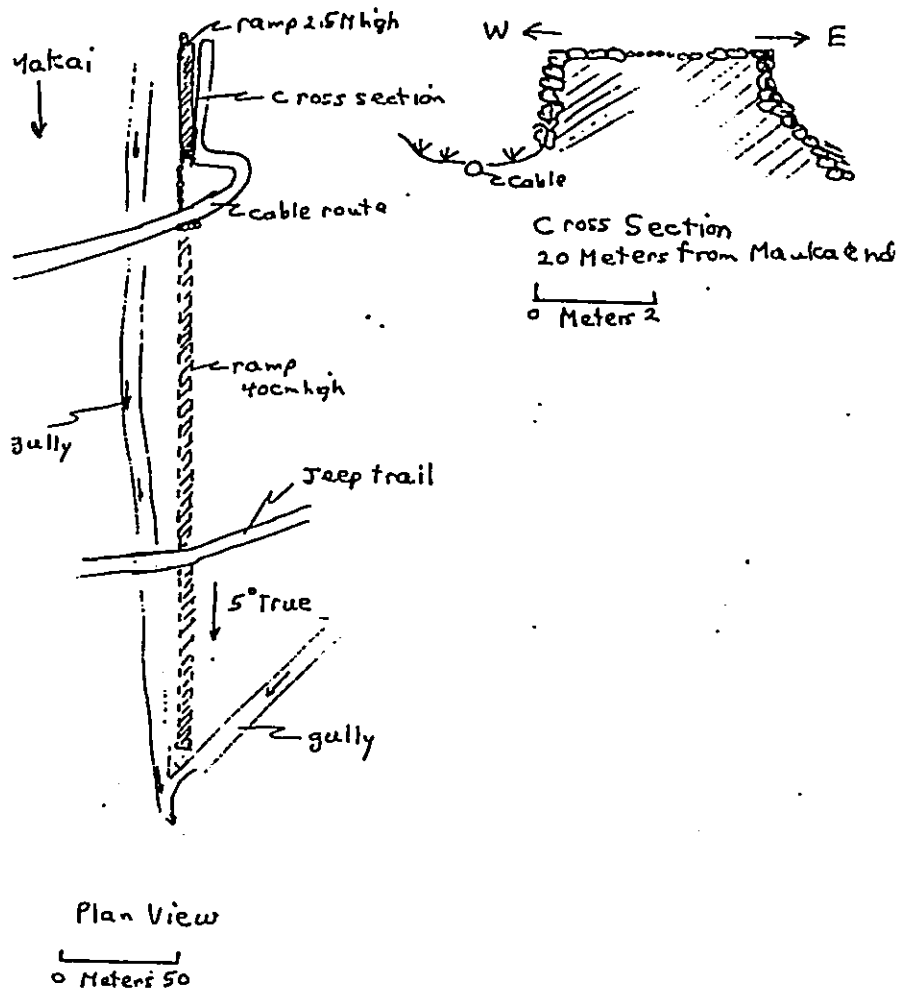

Fig. 14 Various Views of Site 50-80-03-4703 Ramp

Fig. 15 Site 50-80-03-4703 Ramp Showing Various Features, View Upslope Towards South

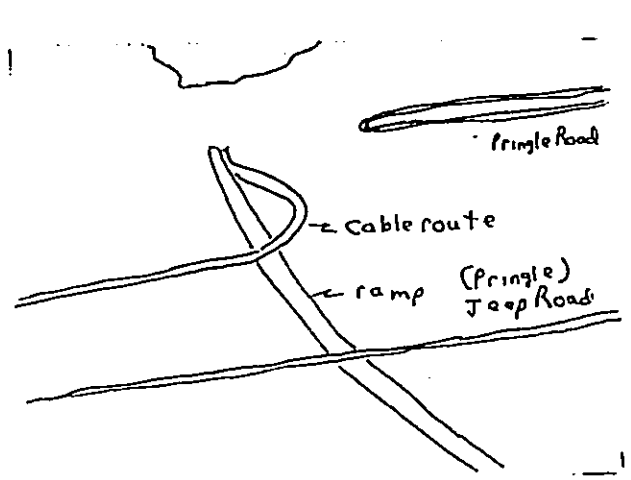

Fig. 16 Site 50-80-03-4703 Ramp Sketch from Fig. 15 Photo

Fig. 17 Site 50-80-03-4703 Ramp *Mauka* Section, View Upslope to South

Fig. 18 View of Site 50-80-03-4703 Looking Downslope to North

by erosion in the last few years. The total length of the slide is estimated to have been 270 meters long (885 feet) from top to bottom accounting for breached sections and is estimated to have covered an area of 1215 square meters before it was breached.

Age and Origin

This structure is assigned to the early 20th century on the basis of historic information on the pineapple industry presented elsewhere. However, there appears to be a striking, almost uncanny similarity in design layout and construction to ancient Hawaiian *hōlua* slides which the authors have observed, mostly on the Kona Coast of Hawaii Island (Keauhou and Keopuka, for example).

The steepness of the grade of the ramp (34° at the *mauka* end) precludes its use for a road and is entirely consistent with its use as a ramp. Clearly, vast expenditure of labor was required for its construction. Could not a simple cable or wooden structure descending the cliff to the railway have sufficed to achieve the purpose of transporting goods downslope? Although the 20th century origin of this structure is feasible, all questions concerning its function and age are not entirely resolved.

From Manini Pali to Farrington Highway

At the top of Manini Pali, the route leads across open pasture land to a dirt road (Figs. 19, 20) which connects directly to the paved road of the Satellite Tracking Station. No archaeological sites were observed along this route. The Hammatt and Borthwick (1987) study identified 2 sites in the area. One site (50-80-03-3716) is 20 meters southwest of the alignment.This is a historic ranching structure and will not be impacted by the cable route. The re-identified Mokaena Heiau is more than 450 meters to the

Fig. 19 Cable Route along Dirt Road on Kuaokalā Plateau, View South

Fig. 20 Cable Route on Kuaokalā Plateau with Marker Pipes, View Northwest

southwest of the cable route across Alau gulch. Descending the Tracking Station road to the Wai'anae Coast there are also no archaeological sites until near the coast.

Site 23, identified as a possible *heiau* (Yent 1991) lies 30 meters *makai* of the road route at about 100 feet elevation (See Fig. 9). No direct impact is anticipated if laying of the cable will not effect erosional patterns down the adjacent gully.

At the junction of the Tracking Station road and Farrington Highway lies Site 2802 a gray cultural layer in dune deposits (Griffin and Lovelace 1991). The intact cultural layer is still visible in the wave-cut bank on the *makai* side of the intersection. road construction and improvements, as well as older railroad construction have heavily impacted this site. On the *mauka* side the road bed and shoulder have been cut into the bedrock slope. This appears to preclude a possibility that the cultural layer extends *mauka* as far as the *mauka* road shoulder. For this reason impact to the layer by cable trenching would be unlikely.

VI. SUMMARY, SIGNIFICANCE AND RECOMMENDATIONS

Background research and a field reconnaissance of the proposed alignment for a GTE optical cable from the immediate vicinity of Camp Harold Erdman to the immediate vicinity of the intersection of Farrington Highway and the Ka'ena Point Satellite Tracking Station Road (following the alignment shown in Figure 3) has shown this alignment to be relatively free of adverse impact to archaeological resources, except for three areas of particular archaeological concern noted below:

1) After traversing approximately 3.3 km west of Camp Erdman, the alignment turns SSW ascending the Manini Pali just east of Alau Gulch (See Fig. 3). On this ascent, the proposed alignment impacts a steep 4-wheel drive road and an even steeper slide course just to the east (See Fig. 6). These visually impressive constructions are understood to be remnants of a wagon road and cable system developed by C.D. Pringle in the early 1920's to deliver pineapples grown on the Kuaokalā plateau to the O.R. & L. railroad for shipment. While these are 20th century constructions (state site number 50-80-03-4703, they may merit inclusion on the State Register of Historic Sites under Criterion A "site reflects major trends or events in the history of the state or nation."

- the pineapple boom of the 1920's, Criterion B "site is associated with the lives of persons significant in our past" - built by C.D. Pringle and Waka Dayasho, and Criterion C "site is an excellent example of a site type" - agricultural tramway. The presently installed cable line already impacts the Pringle site and it seems not unreasonable that the proposed GTE optical cable follow this alignment if the work is done by hand and an effort is made to retain both the structural integrity and aesthetic appearance of these features. An

alternative way of protecting the site would be on-site archaeological monitoring when heavy equipment is in the area of the slide to ensure that no further damage is done. We recommend that this matter be coordinated with the State Historic Preservation Division (contact Dr. Tom Dye) DLNR and cleared in writing in advance of installation.

2) Approximately 260 m before (upslope of where) the Ka'ena Point Tracking Station Road meets Farrington Highway, the tracking station road crosses the present cable easement and a small gully (See Fig. 9). About 30 m seaward of this is a large enclosure (which lies between the cable easement and the gully. This has been designated Site 23 of the Keawa'ula Complex and as a "possible *heiau*" (Yent 1991:15). Certain Wai'anae residents believe that it is a *heiau*. Martha Yent at the Division of State Parks (DLNR) has expressed her concern regarding the impact of erosion from gully wash and the adverse impact of previous construction activities upslope. Care should be taken to avoid even the appearance of adverse impact (direct or indirect) on this structure. Such efforts might involve incorporating concerned Wai'anae Coast individuals in the planning of the design of this brief stretch of transmission line alignment (this might be facilitated through Ms. Yent).

3) Where the Ka'ena Point Tracking Station Road joins Farrington Highway is a designated prehistoric cultural deposit, the "Keawa'ula Dune" Site 50-80-03-2802. Specifics of the proposed impact (depth and width of trench, mechanical trenching or not) should be discussed with State Historic Preservation Division (SHPD) DLNR personnel (contact Tom Dye) well in advance of installation to discuss concerns and possible mitigation. Possible

mitigation could potentially involve slight realignment to avoid the deposit, archaeological testing in advance of construction, archaeological monitoring during trenching of this brief section or burial of the transmission line above existing grade. Mitigation should be agreed upon in writing with SHPD well in advance of construction. Based on field examination of the present conditions, including the assumed location of the buried archaeological layer in relation to the proposed cable route, it appears that if the cable route stays on the *mauka* side of the road, just below the cut rock bank it will not impact the buried layer. Any activity under or on the *makai* side of the road would involve potential impact.

In summary, the proposed alignment is relatively free of archaeological constraints except for the three concerns summarized above. Agreement on mitigation of these concerns should be relatively easy if discussions with SHPD personnel are undertaken in advance. Any divergence from the proposed alignment, particularly on the lower Wai'anae slope may well involve other archaeological constraints. Our research indicates the chances of any trenching within the proposed alignment encountering human burials is quite low. As always, workers should be instructed that if any human remains are encountered, all work in that immediate area should be immediately stopped and the SHPD should be promptly notified.

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