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GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
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OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

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LAND MANAGEMENT
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WATER AND LAND DEVELOPMENT

FILE NO.: OA-2617
DOC. NO.: 2874

JUN 8 1993

MEMORANDUM

TO: Mr. Brian Choy, Director
Office of Environmental Quality Control

FROM: Keith W. Ahue, Chairperson *KA*
Department of Land and Natural Resources

SUBJECT: Negative Declaration for the Koolau-Kaneche 46 kV
Sub-Transmission Line Project

The Department of Land and Natural Resources has reviewed the comments received during the 30-day public comment period which began on March 8, 1993. The agency has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the OEQC BULLETIN as soon as possible.

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

Please contact Don Horiuchi at 587-0381, if there are any questions.

Enclosure

96

1993-06-23-0A-*FEA-Koolau-Kaneohe 46 KV*
Sub-Transmission Line Project

JUN 23 1993

FINAL ENVIRONMENTAL ASSESSMENT
FOR THE
KOOLAU-KANEOHE 46 kV
SUB-TRANSMISSION LINE PROJECT

Kaneohe, Oahu, Hawaii

May 1993

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Hawaiian Electric Company, Inc.
An **HEI** Company

**KOOLAU - KANEOHE 46 kV
SUB - TRANSMISSION LINE PROJECT
FINAL ENVIRONMENTAL ASSESSMENT**

Kaneohe, Oahu, Hawaii

May 1993

Prepared For:
Hawaiian Electric Company, Inc.
900 Richards Street
Honolulu, Hawaii 96813

Prepared By:
Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite #740
Honolulu, Hawaii 96814

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- Appendix D** **Archaeological Assessment for the Proposed 46 kV
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Prepared by Cultural Surveys Hawaii, September 24, 1992
- Appendix E** **Electric Field and Magnetic Flux Density Measurements
Report**
Prepared by MK Engineers, Inc., February 1992
- Appendix F** **State Public Utilities Commission Decision and Order
Number 11883**

**SECTION 1.0
SUMMARY**

Applicant:

Hawaiian Electric Company, Inc. (HECO) is the applicant for this project. Their principal place of business is located at 900 Richards Street, Honolulu, Hawaii 96813.

Approving Agency:

The State Department of Land and Natural Resources (DLNR) is the approving agency for Part 1 of the proposed project. The installation and construction of underground 46 kV cables from the Koolau Substation will be located within the Conservation District. In addition, Part 1 of the project includes the replacement of three existing poles (Poles 5X, 6X and 7X) located along Kamehameha Highway. Parts 2 through 5 of the project are located within the Urban District, and are subject to approval by the State Public Utilities Commission and State Department of Transportation.

Project Location:

The proposed Koolau-Kaneohe 46 kV Sub-Transmission Line project is located in Kaneohe on the island of Oahu. Improvements to existing sub-transmission lines will generally run along Kamehameha Highway and minor streets from HECO's Koolau Substation (located near the H-3 and Kamehameha Highway interchange) to the Puohala Substation (located near Castle High School).

Tax Map Keys:

The project will be located on portions of Tax Map Keys (TMK): 4-5-42; 4-5-54; 4-5-36; 4-5-38; 4-5-103; 4-5-43; 4-5-60; 4-5-61; and 4-5-34.

Project Description:

HECO is proposing to construct improvements to existing circuits situated between the Koolau and Puohala substations to create a new Koolau-Kaneohe 46 kV circuit to serve as a needed backup system. The proposed improvements involves the construction of 3-phase, 46 kV underground cables near both the Koolau and Puohala substations. In addition, improvements will also be made to existing 46 kV overhead conductors generally routed along Kamehameha Highway, Koa Kahiko Street, and from Namoku Street to the Puohala Substation.

Existing Land Uses:

The immediate area surrounding the project corridor has generally been greatly urbanized and consists of a mixture of various land uses. The alignment for most of the proposed improvements to existing electrical lines and poles predominantly follow public roadways through urban residential neighborhoods. In addition, a portion of the alignment lies within the Koolau Substation area, and another portion lies within the Puohala Substation adjacent to Castle High School.

Government Approvals/Permits

State Land Use District: According to the State of Hawaii Land Use Commission's Land Use District Boundaries Map, Part 1 of the project falls partly within the Conservation District. Therefore, a Conservation District Use Permit (Type B) from DLNR is required only for Part 1 of the entire Koolau-Kaneohe 46 kV Sub-Transmission Line Project. The remainder of the project is located in the Urban District.

County Zoning: According to the City and County of Honolulu, Department of Land Utilization's Zoning Map Number 22, various segments of the project alignment are routed through land uses currently zoned P-1, R-5, and R-7.5. The proposed project is a permitted use in areas zoned R-5 and R-7.5. Therefore, no zoning change by the County will be required for Parts 2 - 5 of the project. Part 1 of the project is located within the Conservation District zoned P-1 and thus regulated by the appropriate State agency which is DLNR.

**Development Plan
Public Facilities Map:** According to Attachment A, Criteria for DP Public Facilities Map (Rev. 9/85), of Department of General Planning Form 101, the Koolau-Kaneohe 46 kV Sub-Transmission Line Project is classified as a minor project which does not require a Development Plan Public Facilities Map Amendment.

Public Utilities
Commission:

Approval by the State Public Utilities Commission is required for the Koolau-Kaneohe 46 kV Sub-Transmission Line Project to expend funds in excess of \$500,000 and to construct a 46 kV overhead line through residential areas. A Public Utilities Commission public hearing was previously held on January 29, 1992 (Docket Number 7143) for the proposed project in accordance with Hawaii Revised Statutes, Chapter 269, Section 27.5. A Decision and Order dated September 28, 1992 was made approving the expenditure of funds and construction work for the entire project (Parts 1 through 5). A copy of this Decision and Order is included in Appendix F.

SECTION 2.0 BACKGROUND

2.1 INTRODUCTION

Hawaiian Electric Company, Inc. (HECO) is proposing to construct improvements to their existing electrical distribution system in Kaneohe. These improvements will consist of creating a new Koolau to Kaneohe 46 kilovolt (kV) sub-transmission line (circuit) from HECO's Koolau Substation to its Puohala Substation.

This new 46 kV circuit is needed to create an efficient backup system for the Koolau-Aikahi and Koolau-Laelae-Kahuku 46 kV circuits which would be overloaded in the event of a failure to other circuits or transformers. In addition, the expiration of existing easements for both the Koolau-Aikahi and Koolau-Laelae-Kahuku 46 kV circuits have resulted in the need for alternative connections to the Koolau Substation for this new circuit.

The proposed improvements consist of the installation and reconductoring of 3-phase, 46 kV, 800 amp, underground cables and overhead conductors from the Koolau Substation to the Puohala Substation. A section of this project (Part 1) will involve the construction of new 46 kV underground cables running from the Koolau Substation to an existing sub-transmission pole (Pole 7X) located on the H-3 Service Road (Service Road).

The installation of this underground cable will be located in the Conservation District and will run along the Service Road to the existing sub-transmission pole. As a result of this segment (Part 1) of the proposed project, a Conservation District Use Permit (Type B) from the State Department of Land and Natural Resources is required. In accordance with Chapter 343 of the Hawaii Revised Statutes (HRS) and Title 11, Chapter 200, of the State Department of Health's (DOH) Administrative Rules, an Environmental Assessment (EA) on the proposed project is required.

A Draft EA (dated December 1992) was previously prepared and published in the State Office of Environmental Quality Control's (OEQC) Bulletin on March 8, 1993. After the notice of the availability of the Draft EA appeared in the OEQC Bulletin, a 30-day comment period commenced. The comment period ended on April 7, 1993. The comments received during this comment period were considered and responded to in writing (refer to page 105 of this report). Consequently, this Final EA has been prepared pursuant to Chapter 343, HRS and Title 11, Chapter 200, of the State DOH's Administrative Rules, and is intended to fully comply with the requirements of such statutes and regulations.

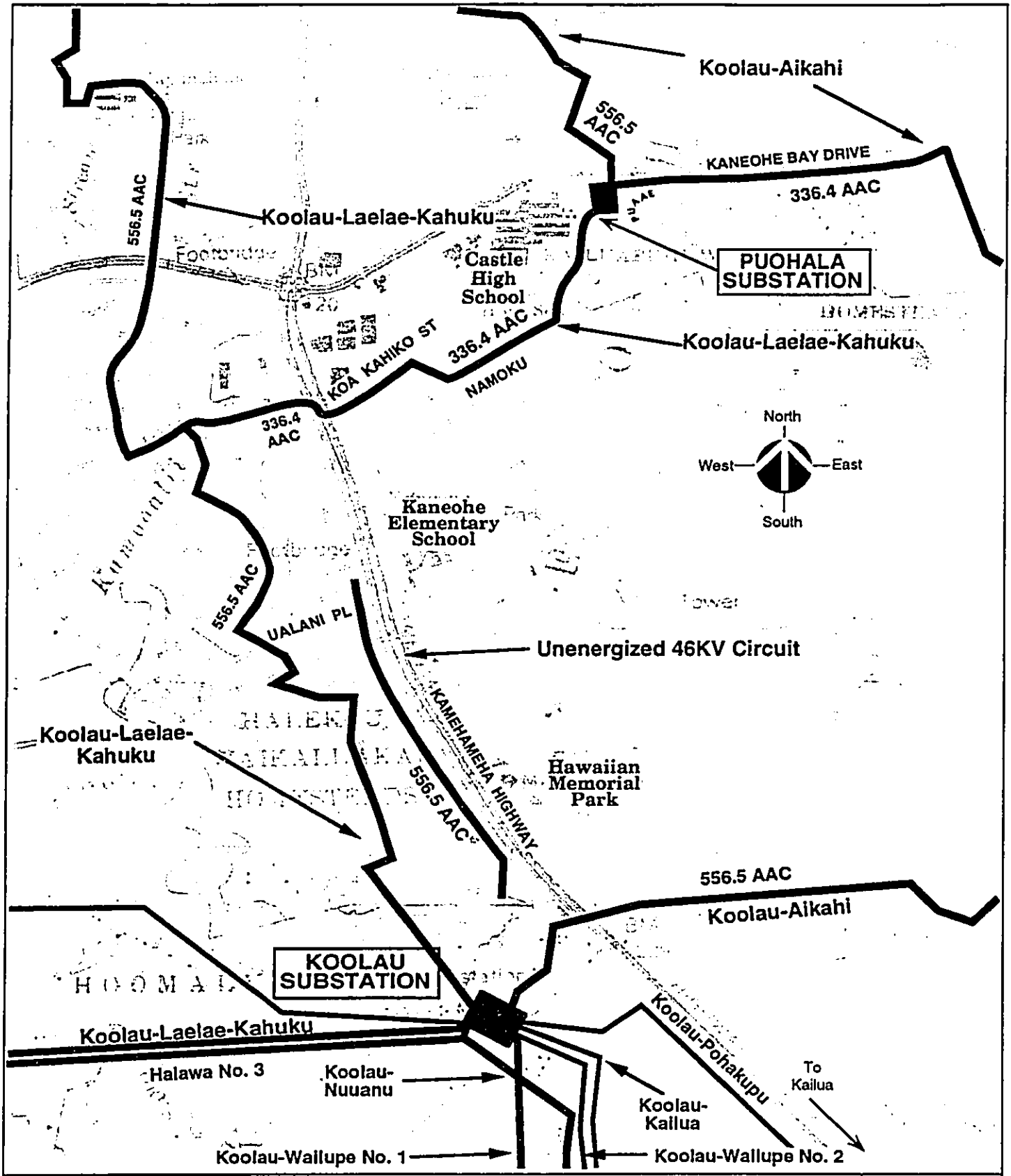
2.2 PRESENT ELECTRICAL DISTRIBUTION SYSTEM

The existing circuits connected between the Koolau and Puohala substations consist of a combination of 46 kV sub-transmission and 12 kV distribution lines generally routed along existing roadways such as Kamehameha Highway. Figure 2.2.1 shows the present 46 kV circuits connected to both the Koolau and Puohala substations.

2.2.1 Existing Substations

The Koolau Substation is located in Kaneohe near the new H-3 Freeway and Kamehameha Highway Interchange. This substation is generally bordered by Hoomaluhia Park to the East (mauka), Hawaiian Memorial Park to the West (makai) and the Pali Golf Course to the South. The Koolau Substation functions as an important link to HECO's electrical distribution system serving the Windward district. A number of 46 kV circuits connect to this substation from other areas of the island such as Kailua and East Honolulu.

The Puohala substation is located along Kaneohe Bay Drive adjacent to Castle High School. There are presently eight 46 kV circuits connected to this substation of which two are the Koolau-Laelae-Kahuku and Koolau-Aikahi circuits.



PACIFIC PLANNING
 ENGINEERING, INC.
 Source: Hawaiian Electric Company, Inc.

Existing 46KV Circuits

Figure 2.2.1

2.2.2 Existing 46 kV Circuits

An existing circuit of importance to this project is the Koolau-Aikahi 46 kV circuit which emanates from the Koolau Substation. As shown on Figure 2.2.1, the Koolau-Aikahi circuit consists of a 46 kV sub-transmission line with 556.5 KCMIL all aluminum conductors (AAC). This circuit is generally routed in the makai direction from the Koolau Substation towards the Kaneohe Marine Corps Air Station (KMCAS) along the recently constructed H-3 Freeway. A tap from this circuit (also named Koolau-Aikahi 46 kV Circuit) is then routed back feeding into the Puohala Substation. This tap consists of smaller 46 kV conductors (336.4 KCMIL AAC) which are routed along Kaneohe Bay Drive before connecting with the substation. From the Puohala Substation, this Koolau-Aikahi circuit then travels north through Puohala Village utilizing larger 46 kV conductors (556.5 KCMIL AAC).

The second circuit of importance to this project is the Koolau-Laelae-Kahuku 46 kV circuit which also emanates from the Koolau Substation. From this substation, it generally runs north mauka of Kamehameha Highway utilizing 556.5 KCMIL conductors. Before reaching Kaneohe Bay Drive, a tap off the Koolau-Laelae-Kahuku circuit consisting of smaller 46 kV conductors (336.4 KCMIL AAC) are routed along Koa Kahiko Street and Namoku Street to the Puohala Substation.

As shown in Figure 2.2.1, there is presently a 46 kV sub-transmission line with 556.5 KCMIL AAC conductors routed along the mauka side of Kamehameha Highway. This 46 kV sub-transmission line is not connected with any substation and subsequently is not energized or "live." This line is presently situated on about 18 existing wooden poles which also have energized 12 kV distribution and secondary lines. This unenergized section of 46 kV line is planned to be utilized as part of the proposed project.

SECTION 3.0
PROJECT NEED AND OBJECTIVES

3.1 NEED FOR PROJECT

Improvements to the present 46 kV sub-transmission lines from the Koolau Substation to the Puohala Substation are needed to install a new Koolau-Kaneohe 46 kV circuit between these substations by April 1994. The purpose of this new circuit is to provide an efficient backup system for the Koolau-Aikahi and Koolau-Laelae-Kahuku 46 kV circuits which would be overloaded in the event of a failure to other circuits or transformers. In addition, the expiration of existing easements for the Koolau-Aikahi and Koolau-Laelae-Kahuku 46 kV circuits have resulted in the need to find alternative connections to the Koolau Substation for this new 46 kV circuit.

3.1.1 Efficient Backup System

A System Planning analysis conducted for the Koolau area by HECO was completed last year (April 1991).¹ This analysis consisted of predicted peak loads expressed in kilovolt-ampere (kVA) for various transformers and circuits for the years 1990 to 1999. Based upon this analysis, the Koolau-Aikahi 46 kV circuit was projected to become overloaded by 7.1 percent in 1991 if the Koolau-Laelae-Kahuku 46 kV circuit or the Koolau #2 80 megavolt-ampere (MVA) transformer failed. The analysis also showed that the Koolau #3 80 MVA transformer would be overloaded by 10.5 percent in 1991 if the Koolau #1 80 MVA transformer failed. Further, by the year 1999, the projected overload to the Koolau-Aikahi 46 kV circuit and Koolau #3 80 MVA transformer are expected to increase to 18.7 percent and 20 percent, respectively.

¹ Exhibit II, Docket Number 7143, Application and Certificate of Service, Before the Public Utilities Commission of the State of Hawaii.

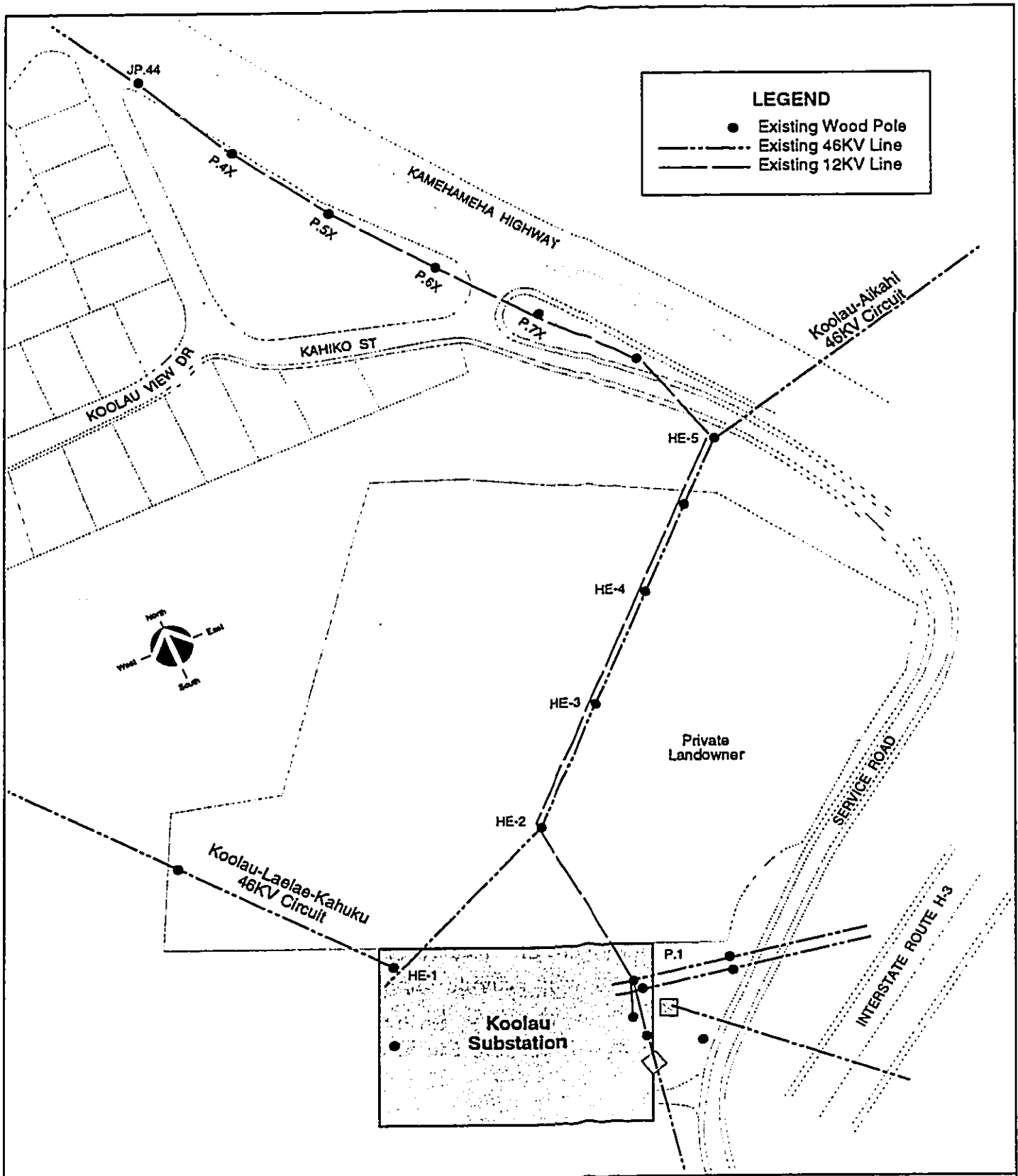
Consequently, a new 46 kV circuit is needed immediately to serve as an effective backup system in the event one of these transformers or circuits fail. Therefore, improvements to existing 46 kV and 12 kV circuits located between the Koolau and Puohala substations are needed to create this backup circuit.

3.1.2 Expiration of Existing Easements

As shown on Figure 3.1.1, the Koolau-Aikahi and Koolau-Laelae-Kahuku circuits emanating from the Koolau Substation are presently routed through property owned by a private landowner (TMK 4-5-42:8 and 10). However, the existing easements for these circuits have recently expired and are being extended on a month-to-month basis pending relocation of the circuits' lines and poles. The landowner will not renegotiate perpetual easements for these or any new lines across this property adjacent to the Koolau Substation and has expressed intentions to terminate these easements in preparation for a planned development.

To route the new Koolau-Kaneohe 46 kV circuit out of the Koolau Substation using existing circuits, HECO would need to double circuit this new 46 kV circuit with either the Koolau-Aikahi or Koolau-Laelae-Kahuku 46 kV circuit. However, an alternative route is needed due to the landowner's intention to terminate the easements for these circuits. Otherwise, a condemnation process would need to be conducted to retain and utilize the existing easements. HECO has estimated that a costly and lengthy process would be required to obtain the Court Order of Possession which will delay the service date for the new 46 kV circuit.

In addition, the installation of underground cables from the Koolau Substation associated with this proposed project may serve as an alternative for HECO's future relocation plans for the Koolau-Aikahi and Koolau-Laelae-Kahuku circuits. At the time HECO receives a formal termination notice of these easements by the private landowner, planning and design work will commence for the relocation of these 46 kV circuits.



PACIFIC PLANNING
 ENGINEERING, INC.
 Source: Hawaiian Electric Company, Inc.

Existing Circuits to Koolau Substation

Figure 3.1.1

The use of an existing easement for the new 46 kV circuit would also result in both the primary and backup lines being located on a single pole. This is not a preferred alternative because: 1) for safety reasons, both the primary and backup circuits may need to be taken out of service when performing maintenance or repair work on the pole, and 2) an incident affecting the pole could cause a fault to both the primary and backup circuits. Therefore, HECO is proposing to complete the connection of this new Koolau-Kaneohe 46 kV circuit with the Koolau Substation by routing the line underground along the Service Road from the substation to Pole 7X located along Kamehameha Highway.

3.2 OBJECTIVES OF PROJECT

To meet the need for a backup system to the Koolau-Aikahi and Koolau-Laelae-Kahuku 46 kV circuits in the event of a failure to other circuits or transformers, HECO is proposing to install the new Kaneohe-Koolau 46 kV circuit. This project will relieve the present and future loads on existing 46 kV circuits and provide an effective and reliable backup system.

HECO is proposing to construct underground 46 kV cables along the Service Road from the substation to Pole 7X. This underground route will result in the following advantages compared to utilizing existing easements:

1. An earlier service date because of the costly and lengthy process to obtain possession of the land under the existing easement.
2. Overhead crossings at the Koolau Substation will be minimized.
3. System reliability will be increased compared to having both primary and backup circuits located on one pole.
4. Underground work will provide capabilities to accommodate the future relocation of the two 46 kV lines utilizing temporary easements (Koolau-Aikahi and the Koolau-Laelae-Kahuku).

SECTION 4.0 PROPOSED PROJECT

4.1 PROJECT LOCATION

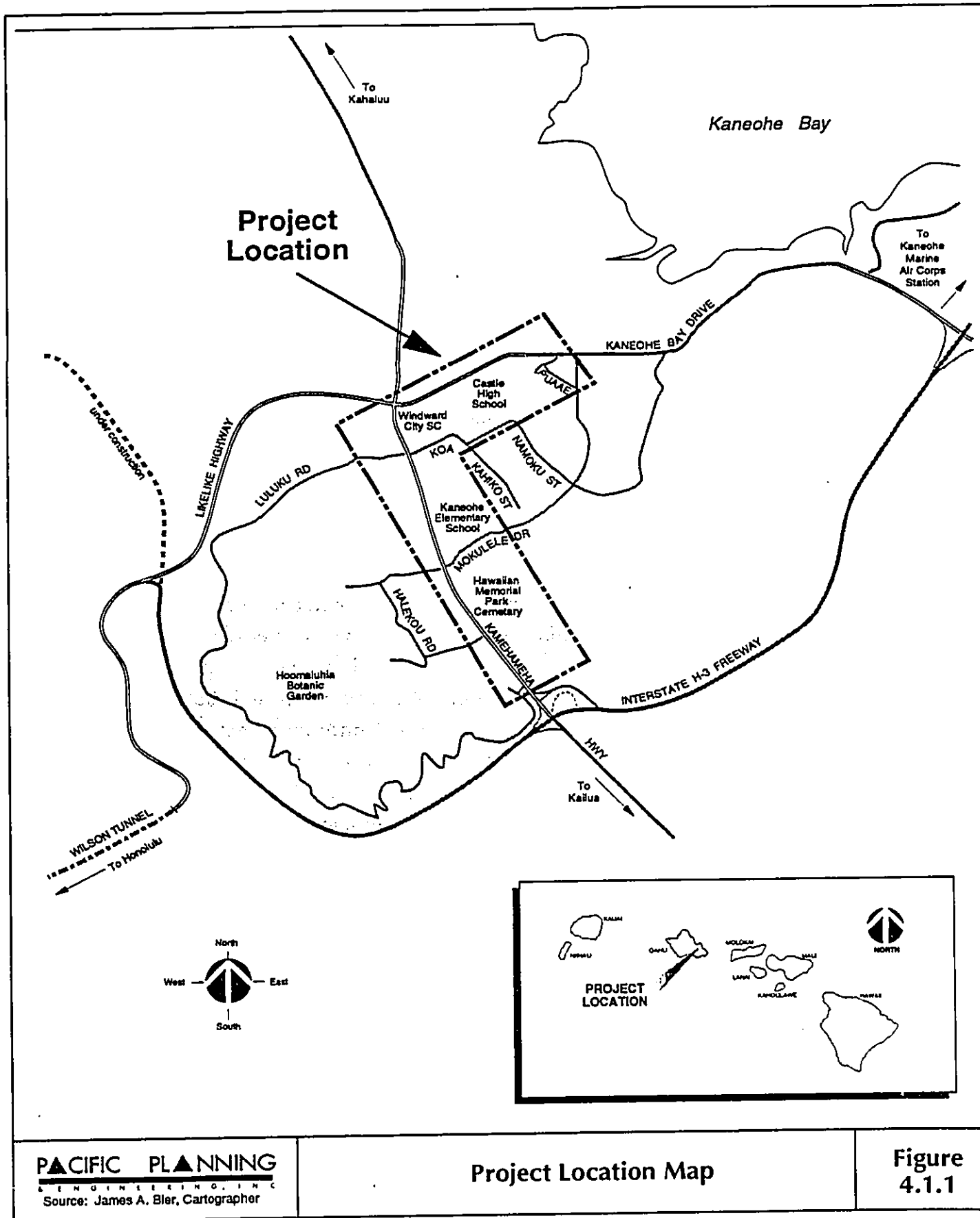
The project is located on the northeastern end of the island of Oahu in the town of Kaneohe which makes up a portion of the Koolaupoko District (Windward District). Figure 4.1.1 shows the general location of the project in Kaneohe along with the major roadways in the area.

The proposed improvements will generally follow existing roadways in the area which are located on portions of TMK: 4-5-42; 4-5-54; 4-5-36; 4-5-38; 4-5-103; 4-5-43; 4-5-60; 4-5-61; and 4-5-34.

4.2 PROJECT DESCRIPTION

HECO is proposing to construct improvements to existing circuits situated between the Koolau and Puohala substations to create a new Koolau-Kaneohe 46 kV circuit to serve as a needed backup system. Figure 4.2.1 schematically shows the overall improvements proposed between the Koolau and Puohala substations. The proposed improvements necessary to create the new Koolau-Kaneohe 46 kV circuit involves the construction of 3-phase, 46 kV underground cables near both the Koolau and Puohala substations. In addition, improvements will also consist of the construction of 3-phase, 46 kV overhead conductors along Kamehameha Highway, Koa Kahiko Street, and from Namoku Street to the Puohala Substation located along Kaneohe Bay Drive.

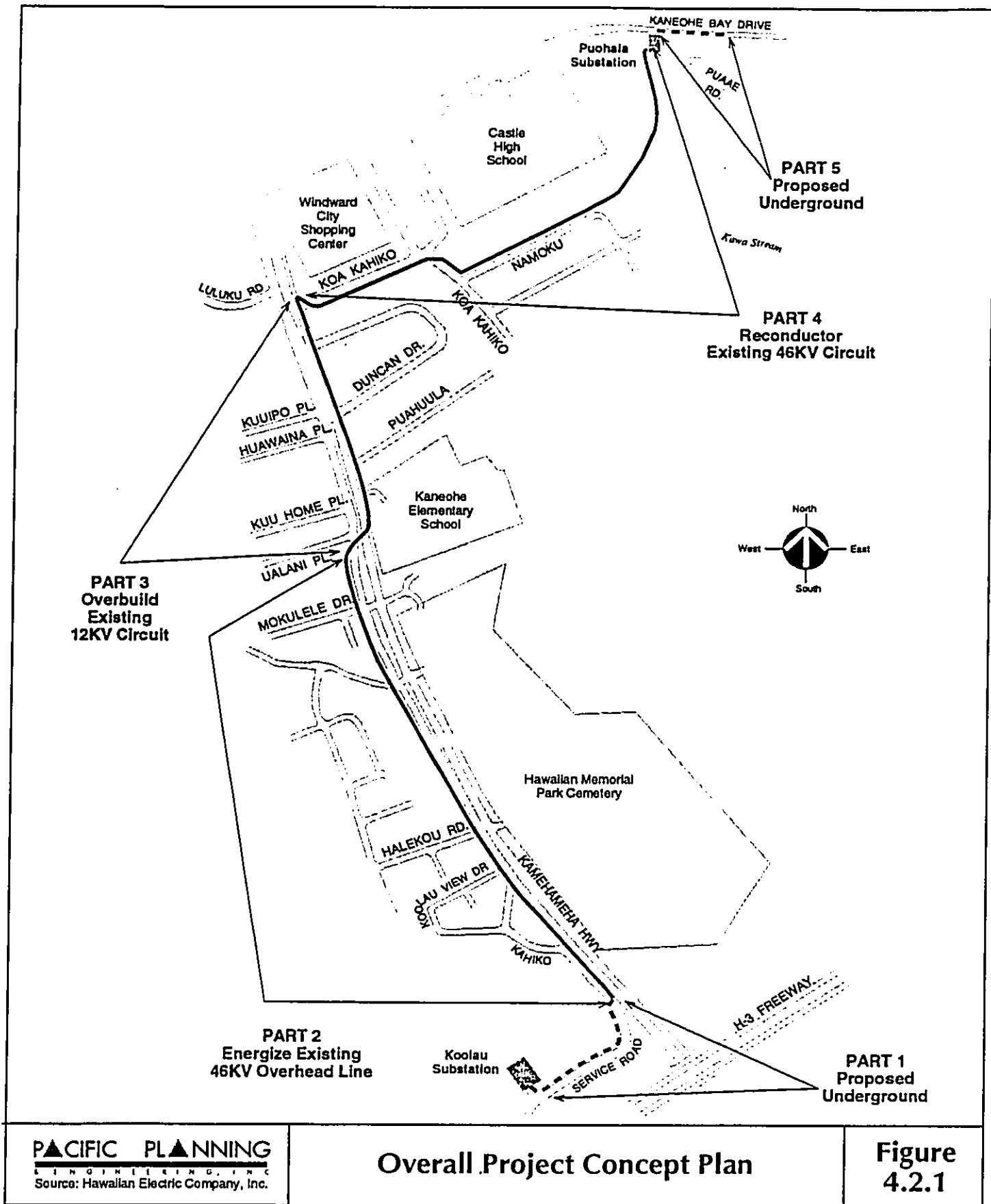
This project is divided into five parts which are further described in greater detail. Preliminary approval for the entire project (Parts 1 through 5) from the State Department of Transportation (DOT), Highways Division, has been given to HECO which is shown in a letter dated August 20, 1992 (included in Appendix A). HECO has also obtained approval from the State Public Utilities Commission (PUC) for the entire project (Appendix F).



PACIFIC PLANNING
 ENGINEERING, INC.
 Source: James A. Bler, Cartographer

Project Location Map

Figure 4.1.1



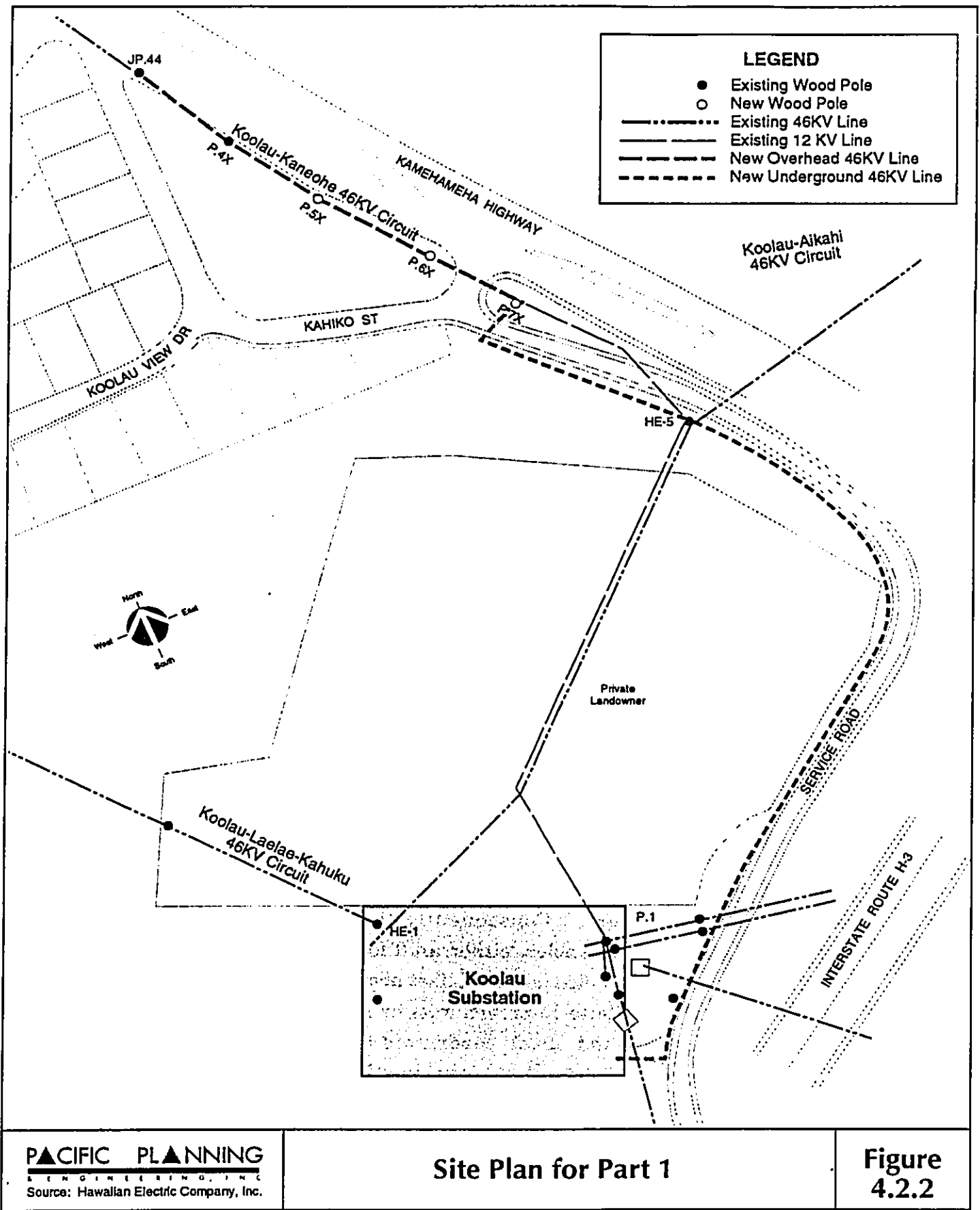
4.2.1 Part 1 - Underground Cables From Koolau Substation

This section of the project requires the construction and installation of 46 kV underground cables from the Koolau Substation and the replacement of three existing poles with taller poles capable of supporting 46 kV overhead conductors.

As graphically shown on Figure 4.2.2, this underground cable will generally follow the Service Road from the substation within DOT's right-of-way before rising up to connect with Pole 7X. Approximately 2,200 feet of twelve 5-inch ducts, four 8 x 16 foot manholes, and 2,200 feet of 3 single conductor, 46 kV, 1500 KCMIL aluminum polyethylene insulated jacket (PEIJ) underground cables will be installed.

Three existing wooden poles numbered 5X, 6X, and 7X (Figure 4.2.2) will also be replaced with new taller wooden poles capable of supporting 46 kV overhead conductors. The existing poles are presently about 55 feet tall and are only equipped for 12 kV overhead conductors. Consequently, new taller poles which are about 65 feet tall and equipped for supporting both 46 kV and 12 kV conductors need to be installed. The new underground 46 kV cable will thus rise up to connect with the 46 kV overhead conductors (556.5 KCMIL AAC) installed on the new Pole 7X. New 46 kV conductors will then be routed overhead from Pole 7X to Poles 5X and 6X.

The installation of underground cables and connection with Pole 7X conducted for this part of the project will be located in the Conservation District based upon the State Land Use Commission's District Map O-12. Consequently, a Conservation District Use Permit (Type B) from the State Department of Land and Natural Resources (DLNR) will be required for only this portion of the project (Part 1).



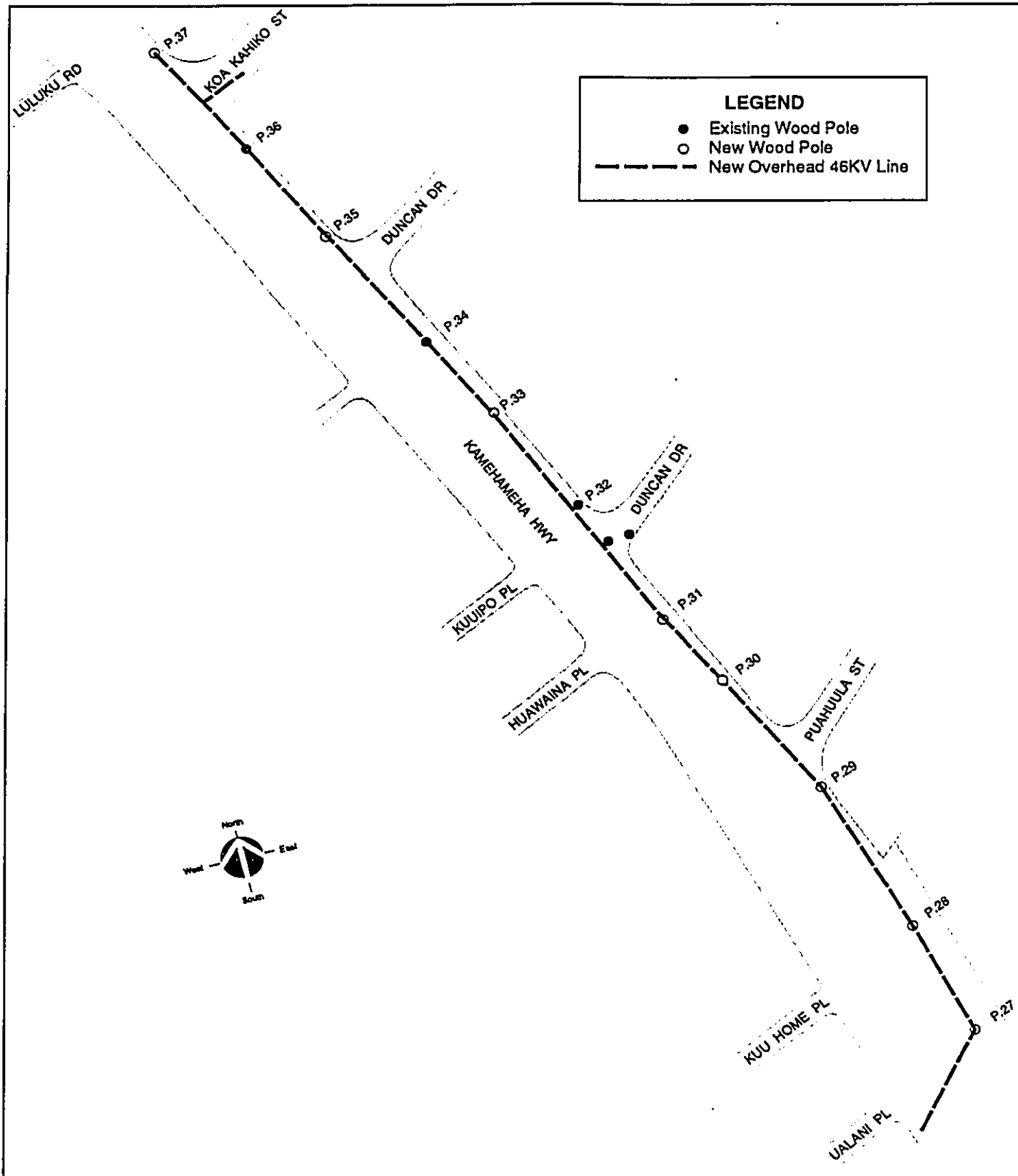
4.2.2 Part 2 - Energize Existing 46 kV Circuit

This section of the project consists of energizing existing 46 kV overhead conductors located along Kamehameha Highway. There are about 18 poles 65 feet tall (about 58 feet above ground) located along the mauka side of the highway between Ualani Place and Kahiko Street (from Pole 5X). These poles are presently equipped with both 46 kV (556.5 KCMIL AAC) and 12 kV overhead conductors. However, the 46 kV conductors are currently not energized because they are not connected to any substations or other energized 46 kV conductors. Therefore, as part of this project, the existing 46 kV conductors from Pole 5X near Kahiko Street to Pole 28 (shown previously on Figure 4.2.1) will be connected to the new Koolau-Kaneohe 46 kV circuit and energized.

4.2.3 Part 3 - Overbuild Existing 12 kV Circuit

This section of the project requires the *overbuild* of existing 12 kV conductors located along Kamehameha Highway from Ualani Place to Koa Kahiko Street. Figure 4.2.3 shows the alignment and poles included in this section. This overbuild consists of the construction and installation of approximately 2,700 feet of 46 kV (556.5 KCMIL AAC) overhead conductors from Pole 28 (near Ualani Place) across Kamehameha Highway to Pole 27, and finally along the makai side of the highway to Pole 1 located on Koa Kahiko Street.

The existing wooden poles located in this section presently range in height from 45 and 60 feet, and are only equipped to accommodate the existing 12 kV overhead conductors. Consequently, depending upon the present condition of these wooden poles, either an 8 foot extension will be added or new 65-foot tall wooden poles (about 58 feet above ground) will be installed to replace these poles. These improvements or replacement of existing poles will allow both 46 kV and 12 kV conductors to be supported by them. As shown on Figure 4.2.3, a total of eight existing poles will either have an extension added or be replaced.



PACIFIC PLANNING
 ENGINEERING, INC.
 Source: Hawaiian Electric Company, Inc.

Site Plan for Part 3

Figure 4.2.3

4.2.4 Part 4 - Reconduct Existing 46 kV Circuit

This section of the project requires the *reconductoring* of the existing Koolau-Laelae-Kahuku 46 kV circuit routed along Koa Kahiko Street and Namoku Street before connecting to HECO's Puohala Substation. This reconductoring consists of replacing the present 46 kV conductors (336.4 KCMIL AAC) with new higher-capacity 556.5 KCMIL AAC conductors from Pole 1 on Koa Kahiko Street to the Puohala Substation. Approximately 4,000 linear feet of conductors are expected to be used.

4.2.5 Part 5 - Underground Cables From Puohala Substation

This section of the project requires the construction and installation of 46 kV underground cables from the Puohala Substation to a pole located on Kaneohe Bay Drive makai of Castle High School and the substation. This underground segment will provide an additional connection from the substation to the Koolau-Aikahi 46 kV circuit which then travels north to Aikahi.

This segment requires the installation of approximately 570 linear feet of four 5" ducts, two 6 x 11 foot manholes, and 570 circuit feet of 3 single conductor 750 KCMIL aluminum PEIJ 46 kV cables. The underground cables will run from the Puohala Substation onto the middle of Kaneohe Bay Drive. It will then run in an eastward direction under this road before connecting to Pole 22 located along Kaneohe Bay Drive. From this pole, the cables will rise up and connect with the existing overhead 46 kV conductors on Pole 22 associated with the Koolau-Aikahi 46 kV circuit.

4.3 CONSTRUCTION METHODOLOGY

4.3.1 Construction Methodology

Construction work will be divided into three phases. Phase I will include the installation and construction of underground cables from the Puohala Substation (Part 5) first and then the reconductoring of existing 46 kV sub-transmission lines associated with the Koolau-Laelae-Kahuku circuit (Part 4). Phase II will include the the overbuilding of existing 12 kV lines along Kamehameha Highway (Part 3) and the energizing of existing 46 kV sub-transmission lines along the highway (Part 2). The last phase (Phase III) will consist of installing the underground cables to the Koolau Substation and replacement of three poles to complete the Koolau-Kaneohe 46 kV circuit (Part 1).

Construction of the underground segments of the project will consist of removing an 18 to 24-inch wide strip of pavement followed by the excavation of a 3-foot trench. Concrete encased PVC conduits will be placed in the trench, appropriate backfill material will be installed over the conduits and pavement will be restored to its original condition. The cables will then be pulled into the conduits, spliced and terminated. Manholes will be installed to due to limits in allowable tension when pulling cable. The construction of underground cables at the Puohala Substation will require shutting down one lane of Kaneohe Bay Drive from 9:00 am to 3:00 pm each weekday.

Construction work replacing existing wooden poles will first involve digging a hole next to the existing pole to be replaced. The new pole will then be installed in the hole and guy wires added to help support the horizontal load on the pole. This pole will then be "framed" by adding appropriate transformers and insulators. Existing or new conductors will then be relocated or added to the new pole as necessary and the old pole will be removed.

Construction work will require the use of pickup trucks, pavement-cutting machinery, line trucks, a backhoe, a cable truck, and approximately six workers per day. HECO will supply all materials for the construction of the underground segments and the work will be performed by independent contractors. Materials and vehicles used for construction activities are planned to be stored on a project staging area at a location that will be designated by the hired contractor.

4.4.2 Construction Schedule

A Conservation District Use Permit (Type B) from DLNR is required only for Part 1 of this proposed project and is expected to take up to six months to process. Approval for the entire project from the State PUC was granted on September 28, 1992.

Due to the six month processing time for Part 1 of the project, HECO plans to start construction for Phases I and II (Parts 2 through 5) of the project first. As a result, construction work for Parts 4 and 5 are expected to begin in September 1993. Construction work for the final phase of the project (Part 1) will commence after receiving approval from DLNR.

Construction work for the entire project (Parts 1 to 5) is expected to take approximately eight months to complete resulting in a project completion date of April 1994.

4.4.3 Construction Costs

The funding for the project was requested from the PUC in an Application dated October 31, 1991 and approved in a Decision and Order dated September 28, 1992. The total costs to construct the Koolau-Kaneohe 46 kV Circuit is \$1,741,700.

SECTION 5.0 EXISTING CONDITIONS

5.1 SETTING

Oahu is the third largest island in the State of Hawaii with a total land area encompassing approximately 608 square miles. The island of Oahu serves as the center of government and industry in the State, and is the home for about 80 percent of the State's population. The town of Kaneohe makes up a portion of the Koolaupoko District which is located on the northeastern (Windward) side of Oahu. Kaneohe is primarily made up of various residential communities, recreational centers, commercial centers and military facilities.

The Kaneohe area lies on a coastal flat derived from alluvial and colluvial fans, terraces and uplands. This region is bounded to the west by the Koolau Mountain range and to the east by Kaneohe Bay. The topography is flat to gently sloping near the shoreline, and moderately sloping further inland. The area of Kaneohe in the vicinity of the project corridor ranges from 90 feet to 240 feet above sea level.

5.2. EXISTING AND SURROUNDING LAND USES

5.2.1 Existing Land Uses

The immediate area surrounding the project corridor has generally been greatly urbanized and primarily consists of residential developments. The alignment for most of the proposed improvements to existing electrical lines and poles will predominantly follow public roadways through these residential neighborhoods. Consequently, the existing land uses located along the project corridor generally consists of paved roadways and sidewalks.

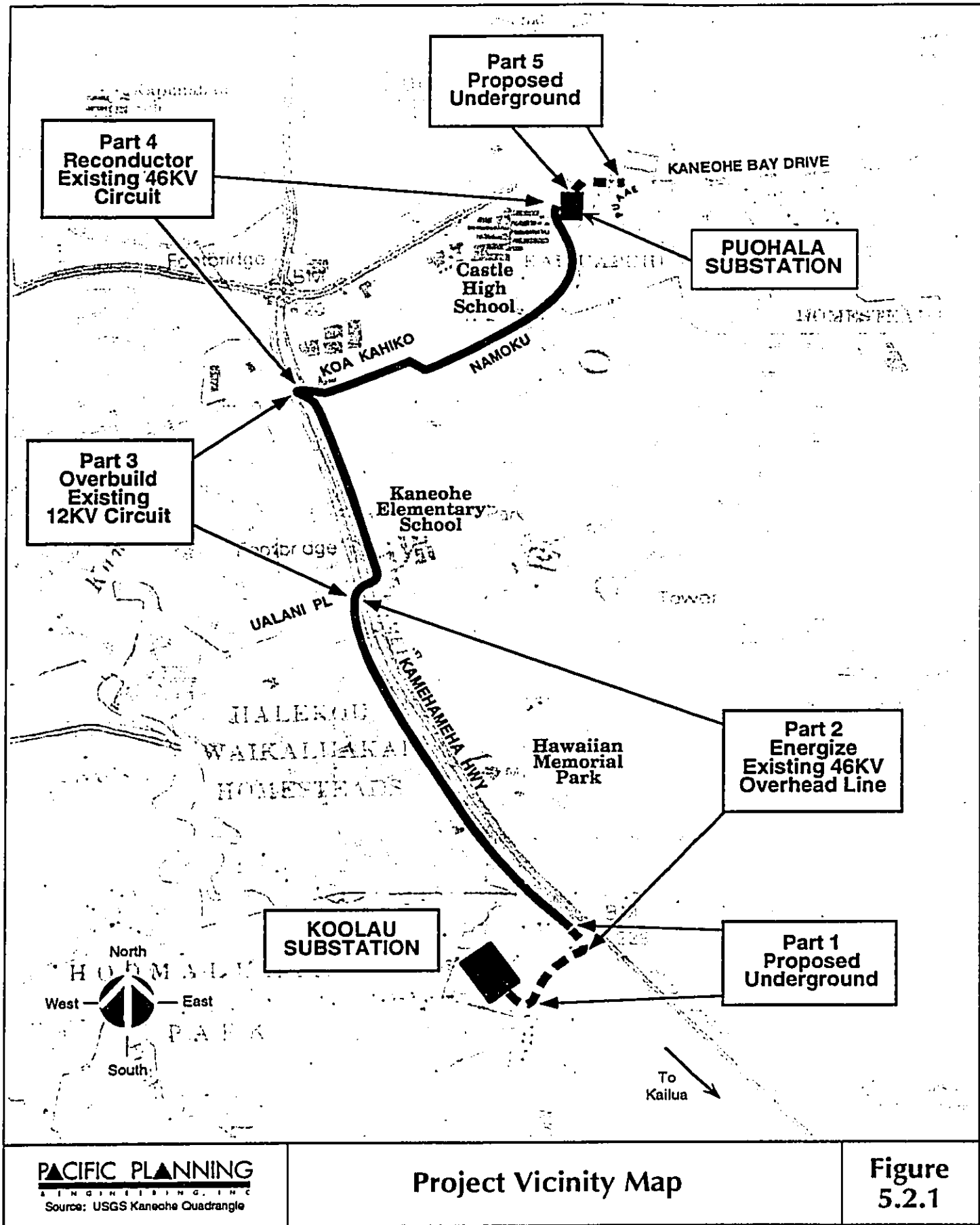
Near the Koolau Substation, the proposed underground cable (Part 1) will run within the State's right-of-way along the Service Road. The existing land use nearest to the substation within this right-of-way consists primarily of undeveloped land composed of road fill material from the construction of the recently completed H-3 Freeway and interchange. Along this roadway is a strip of land presently covered with infrequently maintained vegetation commonly used for landscaping along with several weedy grasses and herbs. Near Kamehameha Highway, this underground cable will be continue to be located under the paved Service Road.

Near the Puohala Substation, the existing land use where the underground cable will be routed (Part 5) consists of modern road fill layers associated with the construction of Kaneohe Bay Drive. The area behind (south) this substation, where Part 4 of the project will be conducted, consists of undeveloped land landscaped with various weeds and brush. This area has been modified due to the construction of the roadway and channelized Kawa Stream.

5.2.2 Surrounding Land Uses

Figure 5.2.1 shows the major land uses located in the immediate vicinity of the project and surrounding area. Due to the urbanization of this area, most of the residential and commercial developments are located near Kamehameha Highway. Residential subdivisions consisting mainly of single-family residences largely surround the project corridor.

At the southern end of the project, the Koolau Substation borders on one end of Hoomaluhia Park. Castle High School and the Windward City Shopping Center are located at the northern most section of the project. Kaneohe Elementary School and the Hawaiian Memorial Park Cemetery are located along the makai end of Kamehameha Highway.



5.3 LAND USE DESIGNATIONS

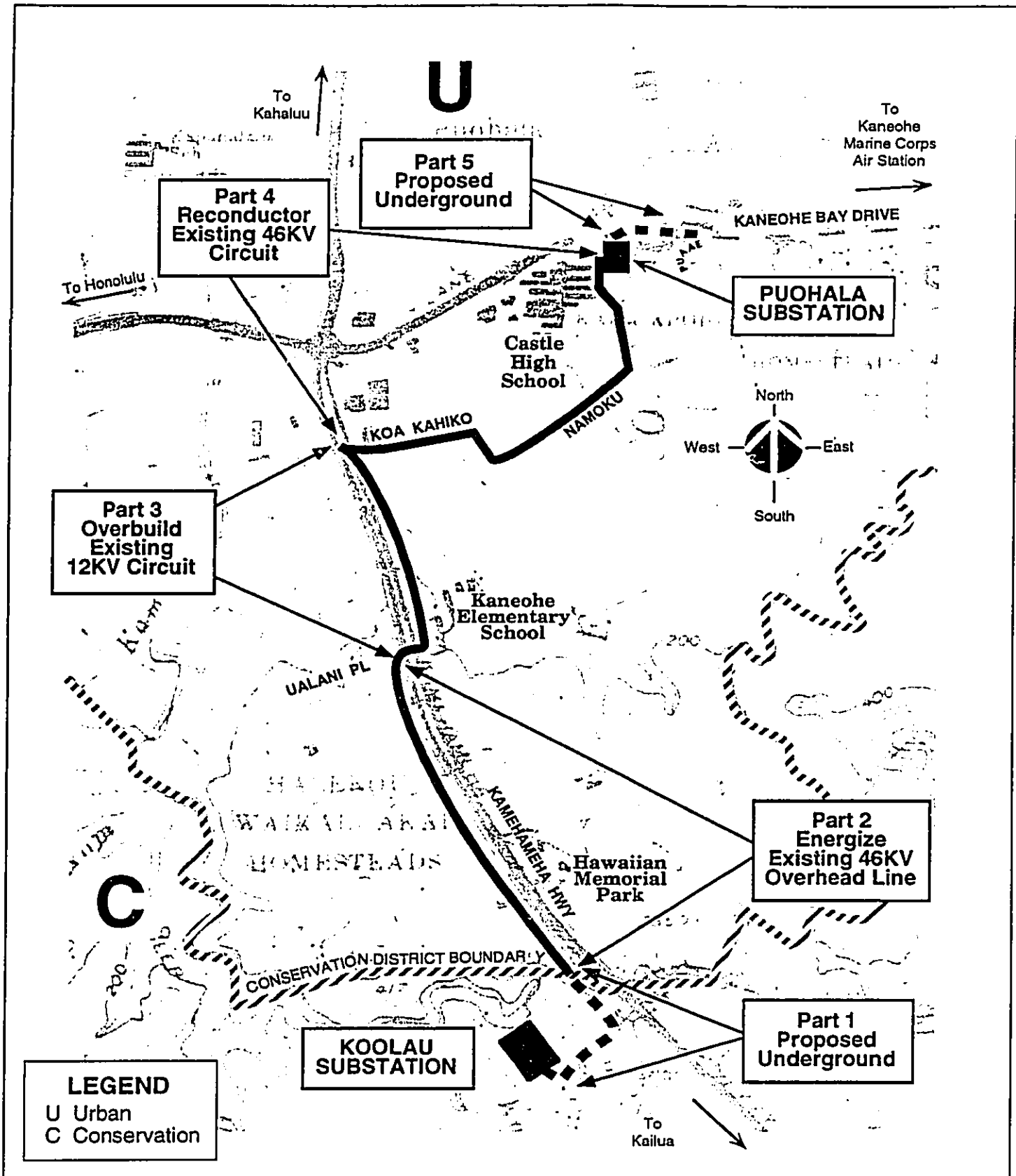
5.3.1 State Land Use District

The State Land Use Commission (LUC) classifies all lands in the State of Hawaii into the following four land use districts: Urban, Rural, Agricultural and Conservation. A review of the LUC's District Map (O-12) for the project area shows that the proposed underground cable from the Koolau Substation routed along the Service Road (Part 1 of the project) will be located within the State's Conservation District. This assessment was verified by a comment letter received from the LUC (Appendix A) indicating that a portion of the proposed project will be located within the Conservation District.

Land uses within the Conservation District are regulated by DLNR. As a result, a Conservation District Use Permit (Type B) is required from DLNR for only Part 1 of this project. The remainder of the project is located within the Urban District. Figure 5.3.1 shows the State Land Use boundaries for the project area.

5.3.2 County Zoning

According to the City and County of Honolulu, Department of Land Utilization's Zoning Map Number 22, various segments of the project will be located in areas zoned P-1, R-5 and R-7.5. Proposed improvements occurring in areas zoned R-5 and R-7.5 are permitted uses, therefore, no zoning change by the County will be required for Parts 2 - 5 of the project. Since Part 1 of the project is located within the State's Conservation District, which is zoned P-1 by the County, this portion of the project is regulated by the appropriate State agency which is DLNR.



PACIFIC PLANNING
 ENGINEERING, INC.
 Source: State Land Use Commission
 District Map O-12

State Land Use Designations

Figure 5.3.1

SECTION 6.0
RELATIONSHIP OF PROPOSED PROJECT
TO STATE AND COUNTY PLANS

The relationship between the proposed project and the goals, objectives and policies expressed in the Hawaii State Plan, State Functional Plans, the State Environmental Policy, and City and County of Honolulu General Plan were assessed and are discussed below.

The proposed project is generally compatible with the objectives and policies of both State and County land use plans as well as with the goals and guidelines of the State Environmental Policy. Sections from various land use plans determined to be relevant to the proposed project are discussed below.

6.1 HAWAII STATE PLAN

The Hawaii State Plan consists of a series of broad goals, objectives, and policies which serve as guidelines for the future growth and development of the State of Hawaii. The section of the State Plan that directly relates to the proposed project is Section 226-18 of the Hawaii Revised Statutes (HRS).

SEC. 226-18 Objectives and policies for facility systems - energy/telecommunications.

- Objectives:
- (a) Planning for the State's facility systems with regard to energy/telecommunication shall be directed towards achievement of the following objectives:
 - (1) Dependable, efficient, and economical statewide energy and telecommunication systems capable of supporting the needs of the people.

- (b) To achieve the energy/telecommunications objectives, it shall be the policy of this State to ensure the provision of adequate, reasonably priced, and dependable power and telecommunication services to accommodate demand.

- Policies:
- (2) Ensure a sufficient supply of energy to enable power systems to support the demands of growth.
 - (4) Ensure that the development or expansion of power systems and sources adequately consider environmental public health and safety concerns, and resource limitations.

Comments: As discussed in Section 3.0, this project is needed to create a reliable backup system for other 46 kV circuits due to projected overloads occurring in the event of failures to other lines or transformers. Consequently, the purpose of the proposed project is designed to ensure dependable and efficient electrical service to residents in the Windward area. This project will assist in accommodating the expected load growth on the Windward side of Oahu, and are also designed to meet these objectives using cost efficient methods.

6.2 STATE FUNCTIONAL PLANS

The State Functional Plans are intended to provide more detail to the Hawaii State Plan by focusing on twelve specific areas of concern such as agriculture, conservation lands, energy, and housing. A functional plan sets forth the policies, programs and projects designed to implement the objectives of a specific field of activity or program.

A review of the State Functional Plans determined that the proposed project does not conflict with the objectives and policies described in the various functional plans.

6.3 STATE ENVIRONMENTAL POLICY

The State Environmental Policy (Chapter 344 of the HRS) establishes a policy which will "encourage productive and enjoyable harmony between man and his environment, promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man, and enrich the understanding of the ecological systems and natural resources important to the people of Hawaii."

This Environmental Policy generally states that the State, through its programs, authorities, and resources, shall conserve the natural resources and enhance the quality of life. In pursuing this policy, ten guidelines covering areas such as population, transportation, and economic development are provided for all agencies to consider.

Comments: A review of these policy statements and applicable guidelines have determined that the proposed project will not conflict with the State's Environmental Policy. The purpose of this project to create an effective and reliable backup system will assist in achieving the guideline encouraging the efficient use of energy resources. The project will not create an increase in population or economic development in the are conflicting with the population and economic development guidelines. Studies and assessments conducted in this EA indicate the project will not affect endangered flora and fauna or conflict with guidelines associated with parks and open space. Furthermore, the project will not conflict with guidelines for land, water and other natural resources, transportation, community life and housing, and others specified in the regulations.

6.4 GENERAL PLAN FOR CITY & COUNTY OF HONOLULU

The General Plan for the City and County of Honolulu is a written commitment by the City and County government to a future for the island of Oahu which it considers desirable and attainable. The General Plan is also a requirement of the City Charter.

The General Plan (1988) is a two-fold document which first has statements of long-range social, economic, environmental and design objectives with an approximate 20-year time horizon. Secondly, it is a statement of broad policies to facilitate the attainment of objectives stated on the Plan. Objectives and policies relevant to the proposed project are discussed below.

Natural Environment

Objective: (B) To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

Policies: (2) Protect Oahu's scenic views, especially those seen from highly developed and heavily travelled areas.

(3) Locate roads, highways, and other public facilities and utilities areas where they will least obstruct important views of the mountains and the sea.

Comments: The proposed project will activate idle overhead lines as well as replace some wooden utility poles with slightly taller ones. As discussed in the Visual Assessment conducted in this EA, there will be relatively minimal change to the overall views located in the area where these taller poles will be installed. Consequently, there will be minimal visual impacts resulting from the installation of these slightly taller poles.

Transportation and Utilities

Objective: (C) To maintain a high level of services for all utilities.

Policies: (1) Maintain existing utility systems in order to avoid major breakdowns.

(3) Plan for the timely and orderly expansion of utility systems.

Comments: The project is needed to accommodate the existing and future projected electrical loads and increase the reliability of electrical service provided to residents in the Windward area. Consequently, the project will create a new 46 kV circuit to serve as an efficient backup system ensuring adequate electric power to residents in the event of a failure to other transformers or circuits. Modifications or the replacement of existing poles will help to improve and maintain this utility system thereby minimizing the chances and potential effects of failures to existing circuits.

Objective: (D) To maintain transportation and utility systems which will help Oahu continue to be a desirable place to live and visit.

Policies: (5) Require the installation of underground utility lines whenever feasible.

Comments: The segment of the proposed project near HECO's existing Koolau substation will include the installation of underground utility lines, thereby enabling an unobstructed view of the Koolau Mountain. Another segment of the proposed project, specifically the section by the Puohala Substation will also install underground lines. Existing overhead lines located in other segments of the proposed project will remain above ground because it is not cost effective or warranted to install them underground.

Energy

Objective: (A) To maintain an adequate, dependable, and economical supply of energy for Oahu residents.

Comments: The sub-transmission line project will help maintain an adequate and dependable supply of energy for residents in the vicinity as well as for residents on the Windward side of Oahu.

SECTION 7.0 PHYSICAL AND NATURAL ENVIRONMENT

This section provides a description of the physical and natural environments that may be impacted by the proposed project. A description of existing environmental conditions is presented with an assessment of probable impacts resulting from the proposed project, and potential mitigation measures if necessary.

7.1 PHYSICAL ENVIRONMENT

7.1.1 Existing Conditions

Climate

The climate in the vicinity of Kaneohe is generally typical of Oahu's climate for the windward area, with mild and steady temperatures throughout the year, moderate humidity, and relatively constant northeasterly tradewinds. The average temperature has historically been about 75 degrees Fahrenheit, with maximum temperatures in the high 80's and minimum temperatures in the low 60's. Prevailing tradewinds blow steadily from the northeast with greater persistence during the summer months than during the winter. Kaneohe has historically received an average annual rainfall of 70 to 90 inches which is fairly evenly distributed throughout the year.

Geology and Topography

The island of Oahu is volcanic in origin, and consists of the Waianae Range in the west and the Koolau Range on the east connected by the Schofield Plateau. These mountain ranges are the remnants of the heavily eroded Waianae and Koolau shield volcanoes. The Koolau Range west of Kaneohe was formed during the Tertiary Period by pahoehoe and aa basalt volcanic lava flows. Later, deep valleys were eroded by water, leaving ridges and depositing materials in the coastal areas.

Kaneohe lies on a coastal flat derived from alluvial and colluvial fans, terraces and uplands on the windward side of Oahu. The resulting topography is flat to gently sloping near the shoreline (3 to 8 percent slope), and moderately sloping further inland (5 to 15 percent slope). The elevation of the project site ranges from 90 feet above sea level near Castle High School to 240 feet above sea level at the Koolau Substation, approximately 1.7 miles away.

Soils

Soils along the project corridor are predominantly of the Kaneohe and Lolekaa Series. These series are derived from terraces, fans, and volcanic ash and cinders. In the areas of the project corridor which lie south of Namoku Street and its vicinity, the soils are predominantly Kaneohe silty clay loam (KHMC). The Kaneohe Series soils are underlain by large amounts of volcanic ash and cinders. Areas of the project corridor adjacent to and north of Namoku street in the Castle High School area predominantly feature Lolekaa silty clay soil (LoB). The Lolekaa Series soils are formed on fans and terraces of alluvium and colluvium.

Both the KHMC and LoB soils are acid, well drained and low in fertility. They are used for pastures, homesites, orchards and truck crops. Permeability is moderately rapid, and runoff is slow to medium. Erosion hazard is slight for the Lolekaa silty clay soils and moderate to severe for the Kaneohe silty clay loam soils.

7.1.2 Probable Impacts

The proposed project is expected to have no impact to the existing physiography of the area in the immediate vicinity of the project. Since most of the area surrounding the project has long been urbanized by both residential, commercial, and roadway infrastructure development, the project will not impact or alter the present topography, soils, or geology.

The excavation work to be conducted near the Koolau Substation (Part 1) is expected to be confined to a narrow strip along the Service Road which primarily consists of road fill material. When completed, there should be minimal if any changes to the physiography of this site resulting in no impact.

Two underground stream crossings at Kawa and the unnamed tributary are not expected to be effected with significant erosion. Erosion is unlikely to occur because excavation will be confined to a narrow strip under the existing paved roads, and because substantial stream channelization occurs at the project site. All subterranean excavation will be in existing roadbeds, which consist of road fill material.

Overhead reconductoring in the Puohala Substation is unlikely to cause erosion along Kawa stream due to stream channelization and the presence of a paved vehicle access road alongside the stream at the Substation.

7.2 SURFACE WATER AND DRAINAGE

7.2.1 Existing Conditions

There are two streams which presently run near the Koolau and Puohala substations. Existing 46 kV sub-transmission lines associated with this project are also routed over these streams to connect to the substations. As a result, portions of the proposed improvements will involve activities crossing these streams.

Kawa Stream flows beside the Puohala Substation before meandering approximately 0.75 miles to its mouth at Kaneohe Bay. A smaller, unnamed stream flows near the Koolau Substation. This unnamed stream is a tributary of the Kamooalii Stream which in turn is a tributary of Kaneohe Stream. For purposes of impact assessment, the unnamed tributary and Kamooalii Stream are considered by the U.S. Geological Service as part of the Kaneohe Stream network. However, instead of emptying directly into Kamooalii Stream, the unnamed tributary flows first to the Hoomaluhia Reservoir where its waters are effectively dammed for most of the year.

Both Kawa and Kaneohe streams have continuous flows to the sea year-round and are listed as perennial streams by the 1990 Hawaii Stream Assessment (HSA) prepared for the Commission on Water Resource Management.

Kamooalii Stream Tributary

An unnamed tributary to Kamooalii Stream currently runs between the Koolau Substation and Kamehameha Highway, and under the existing Service Road. As a result, the existing Koolau-Aikahi 46 kV overhead circuit presently runs from the substation across this tributary. The HSA addresses Kaneohe Stream and its tributaries as a single management unit, and classifies Kaneohe Stream (#3-2-10) as a medium sized stream (between 10 and 15 cubic feet per second average flows).

Portions of Kaneohe and Kamooalii Streams are lined, and the large Hoomaluhia dam is located at the upper reaches of Kamooalii Stream. Kaneohe Stream was not identified as estuarine or an embayment by CZMP/NOAAQ or John Ford/USFWS studies. The State Department of Health's (DOH) water quality classification for this stream is class AA which recommends that it should remain in their natural state with minimum of pollution or alteration of water quality.

The unnamed tributary to Kamooalii Stream intersecting the project at the Service Road has been extensively channelized in this area due to the construction of the H-3 Freeway and local flood control initiatives. This tributary presently flows through a concrete-lined channel and is diverted into a concrete culvert beneath the road. Field observations of this area have shown that this lined channel is extensively overgrown and filled with various weeds and brush.

Kawa Stream (3-2-11)

Kawa stream is unclassified by size and no water quality data exist for Kawa Stream, although the DOH has assigned it a water quality rating of AA similar to Kaneohe Stream.

Kawa Stream flows next to the Puohala Substation and under Kamehameha Highway before reaching Kaneohe Bay. The portion of this stream that flows past the Puohala Substation is an elevated, concrete lined drainageway which is fenced off to the public. Presently, the Koolau-Laelae-Kahuku 46 kV circuit crosses this stream at two locations before connecting to the substation. The Koolau-Aikahi 46 kV overhead circuit running along Kamehameha Highway also crosses this stream. Based on field observations of stream flows and existing streambed vegetation, Kawa Stream was determined not to be a marine or estuarine environment.

7.2.2 Probable Impacts

Proposed improvements to existing sub-transmission lines associated with this project will involve crossing both Kawa Stream and the unnamed tributary. The construction of underground cables along the Service Road from the Koolau Substation (Part 1) will cross the unnamed tributary. The overbuild of the existing Koolau-Laelae-Kahuku 46 kV circuit (Part 4) will also involve work crossing Kawa Stream at two locations. The construction of underground cables along Kaneohe Bay Drive from the Puohala Substation (Part 5) will also cross Kawa Stream.

These portions of the project are not expected to affect the physical design and water quality of Kawa Stream and the unnamed tributary because construction activities will not result in the filling or alteration of the existing concrete-lined stream beds or banks. All subterranean excavation for the underground cables (Parts 1 and 5) will occur within existing roadways which consist of road fill material. Erosion and stream sedimentation are unlikely to occur because excavation will be confined to a narrow strip under the existing paved roads, and because of substantial stream channelization at these locations.

The overhead reconductoring of the existing Koolau-Laelae-Kahuku circuit near the Puohala Substation will not involve any excavation or other activities which may contribute to the sedimentation or filling of Kawa Stream. As a result, this segment of the project (Part 4) is not expected to affect Kawa Stream. There is also a paved vehicle access road located alongside the stream near this substation providing convenient access to poles further minimizing impacts to Kawa Stream.

7.3 AIR RESOURCES

7.3.1 Existing Conditions

The prevailing wind throughout the year on Oahu is the northeasterly trade wind. In general, these trade winds are more persistent during summer than in the winter with frequencies averaging 90 and 50 percent, respectively, and are generally stronger during the afternoon than at night. The mean trade wind flow averages between 24 and 27 miles per hour (mph).

Ambient concentrations of air pollution are regulated by both national and state ambient air quality standards (AAQS). National AAQS are specified in Section 40, Part 50 of the Code of Federal Regulations while the State of Hawaii AAQS are defined in Chapter 11-59 of the Hawaii Administrative Rules. Air sampling data of regulated pollutants are periodically taken from various monitoring sites on Oahu, and are listed in the State Department of Health's (DOH) Hawaii Air Quality Data report (January 1988 to December 1990). Of the pollutants monitored in the report, Carbon Monoxide, Particulate Matter, and PM-10 (Particulate Matter 10 microns or less in diameter) were determined to be pollutants most relevant to the proposed project.

The Waimanalo monitoring station, located at the Waimanalo Wastewater Reclamation Facility, is the closest station to the project area and takes samples of Particulate Matter. Based upon data from 1988 to 1990, Federal and State AAQS were not exceeded based upon a total of 60 samples taken from the monitoring station. Of the 113 samplings of PM-10 taken at this same monitoring station, Federal AAQS were not exceeded (the State has not set a standard for PM-10). Carbon Monoxide samplings (1,025 samplings) taken from the closest monitoring station to the project site is located in Waikiki. The data showed that Federal AAQS were not exceeded, although State AAQS was exceeded once (which occurred in 1990) primarily due to the high traffic volumes associated with Waikiki and the surrounding area.

7.3.2 Probable Impacts

Probable impacts to air quality from the proposed project will primarily be associated with short-term construction activities. As a result, minimal impacts to the existing air quality in the project area is expected to occur due to short-term construction activities. Short-term impacts to air quality from construction activities should result in minor amounts of air pollution emissions associated with fugitive dust from vehicle movement, construction equipment, and minor soil excavation for poles. However, State and National AAQS for Carbon Monoxide, Particulate Matter and PM-10 are not expected to be exceeded because of the short-term nature and minimal construction activity required.

Emissions of fugitive dust from construction activities are difficult to accurately estimate because it varies greatly depending upon the type of soil, amount of dirt-disturbing activity occurring, moisture content of exposed soil in work areas, and wind speed. However, small amounts of fugitive dust are expected to be emitted during construction activities primarily associated with the installation of underground conductors near the Koolau and Puohala substations (Parts 1 and 5).

Some vehicle emissions, primarily consisting of nitrogen oxide and carbon monoxide, will also be emitted during construction activities. The standard for nitrogen dioxide is set on an annual basis, and is not likely to be exceeded by short-term construction activities. Carbon monoxide emissions from equipment and trucks utilized in the project construction should be low and relatively insignificant compared to vehicular emissions from nearby roadways and Kamehameha Highway.

7.4 NOISE ENVIRONMENT

The noise descriptor currently used by federal agencies to assess environmental noise is the Day-Night Average Sound Level (Ldn) which is a 24-hour average of instantaneous A-Weighted Sound Levels. An exterior noise level of 65 Ldn or lower is considered an acceptable standard nationally for federal agencies in determining noise acceptability for funding assistance.

7.4.1 Existing Conditions

As a general rule, urbanized areas that are shielded from high traffic volume streets are usually exposed to Ldn levels generally ranging from 55 to 65 Ldn. These noise levels are usually controlled by vehicular traffic noise. Residences which front major roadways are generally exposed to levels of 65 Ldn which can increase to levels as high as 75 Ldn when located next to a high speed freeway. Table 7.4.1 shows current federal noise standards and acceptability criteria for residential land uses.

Based upon field observations of land uses surrounding the project corridor, it was determined that existing residences and businesses located along Kamehameha Highway are probably exposed to noise levels of 65 Ldn or higher due to the relatively high volumes of traffic occurring along the highway. Noise measurements taken along Kaneohe Bay Drive 50 feet from the roadway centerline for the Bay View Golf Course Expansion Draft EIS recorded levels near 70 Ldn during the afternoon peak hour of traffic. Noise levels along Koa Kahiko Street, Namoku Street, and the Service Road are probably exposed to noise levels of 60 Ldn or less due to the relatively light traffic occurring on these roads.

**Table 7.4.1 Exterior Noise Exposure Classification
(Residential Land Use)**

<u>Noise Exposure Class</u>	<u>Day-Night Sound Level</u>	<u>Equivalent Sound Level</u>	<u>Federal Standard¹</u>
Minimal	≤ 55 Ldn	≤ 55 Leq	Unconditionally Acceptable
Moderate	> 55 and ≤ 65 Ldn	> 55 and ≤ 65 Leq	Acceptable ²
Significant	> 65 and ≤ 75 Ldn	>65 and ≤ 75 Leq	Normally Unacceptable
Severe	> 75 Ldn	> 75 Leq	Unacceptable

Notes: 1. Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.

2. FHWA uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: a) heavy trucks don't exceed 10% of total traffic flow in vehicles per 24 hrs, and b) traffic between 10:00 pm and 7:00 am does not exceed 15% of average daily traffic flow in vehicles per 24 hrs. The noise mitigation threshold used by FHWA for residences is 67 Leq.

Source: Guidelines for Considering Noise in Land Use Planning and Control, Federal Interagency Committee on Urban Noise, June 1980.

As a result, residences presently located along Kamehameha Highway and Kaneohe Bay Drive are probably classified as having significant noise exposure depending upon their distance away from these roadways. However, due to the noise shielding effects from intervening structures, interior house lots are usually exposed to three to ten Ldn lower noise levels than house lots adjacent to roadways. Residences presently located on the less used roads, such as Nanoku Street, are probably classified as having moderate noise exposure.

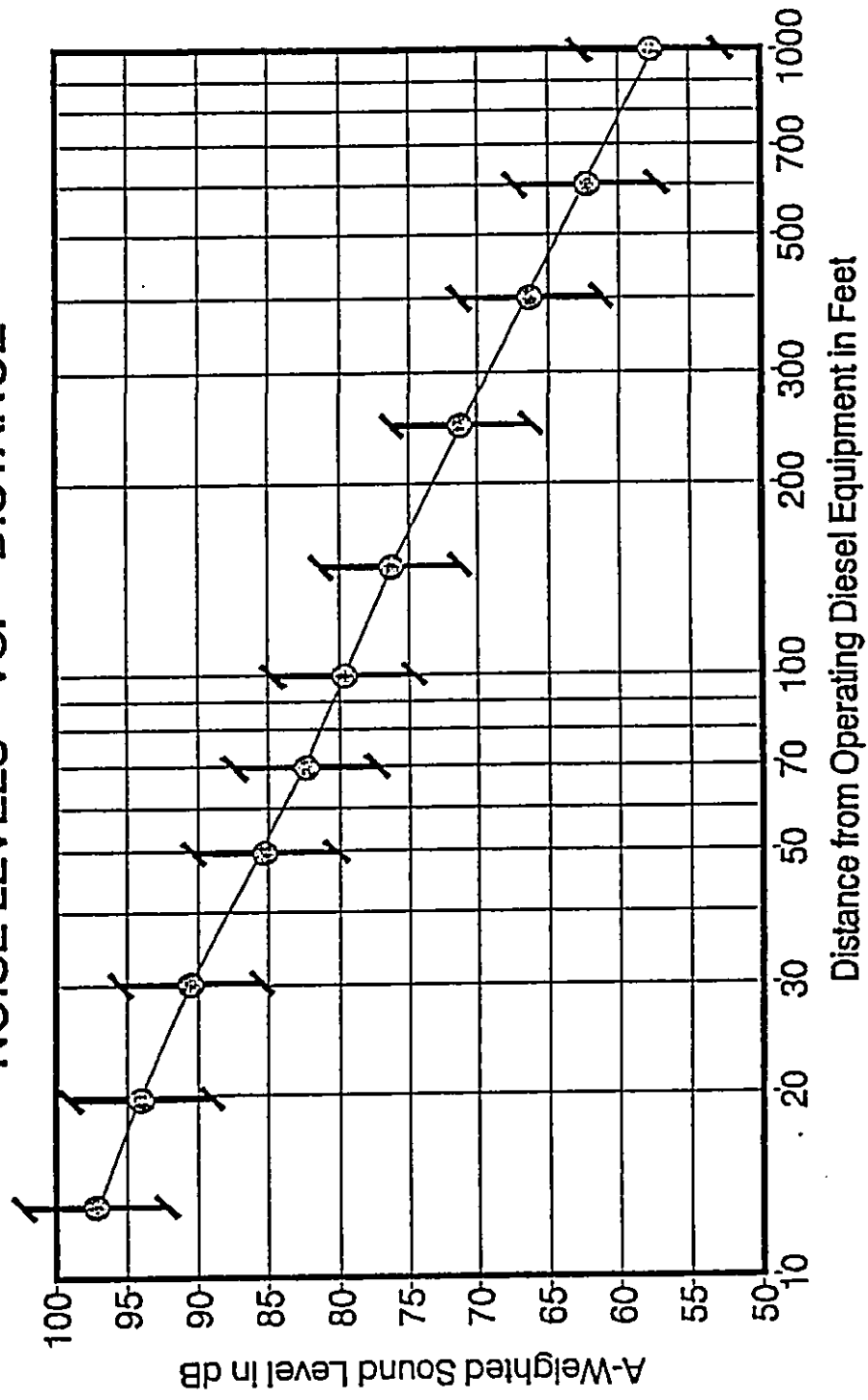
7.4.2 Probable Impacts

The probable noise impacts resulting from the project will primarily be associated only with construction activities. Temporary audible construction noise will probably be unavoidable during construction activities for the project. Audible construction noise are expected to be primarily associated with Parts 1, 3, and 5 of the project due to the installation of new poles and excavation work required for the underground cables. The energizing and reconductoring of existing 46 kV lines (Parts 2 and 4) are expected to create minimal audible construction noise.

The increased noise levels from construction activities are not expected to be significant due to the limited excavation area required and temporary nature of the work. Further, administrative controls regulating construction activities are described in the DOH's Administrative Rules (Chapter 43, Community Noise Control for Oahu) to minimize disturbances.

Consequently, these minor impacts are expected to be limited to a temporary degradation in the quality of the acoustic environment in the immediate vicinity of the project. In addition, construction activities are expected to occur during normal work hours when most residents are not home. Figure 7.4.1 shows typical levels of noise from construction activity. To minimize disturbances, residents located adjacent to sub-transmission lines and poles to be worked on may be notified prior to planned construction activities.

ANTICIPATED RANGE OF CONSTRUCTION NOISE LEVELS VS. DISTANCE



PACIFIC PLANNING
ENGINEERING
Source: Y. Ebsu and Associates

Typical Construction Activity Noise Levels

Figure
7.4.1

7.5 ELECTRIC AND MAGNETIC FIELDS

7.5.1 Introduction

During the 1960's and 1970's, public concern over extra high voltage transmission lines (example 500 kV) generally focused on aesthetic impacts from large towers, and nuisance effects such as audible noise and TV/radio interference. In recent years, there has been increasing public interest in the potential health effects associated with high and low frequency electrical and magnetic fields (EMF). People at home are frequently exposed to EMF from common appliances such as electric stoves, refrigerators, televisions, computers, and electric blankets. Consequently, research on potential health risks associated with EMF has been conducted by various organizations, such as the Electric Power Research Institute (EPRI), and literature reviewed by several authors and advisory panels, but the results thus far are very complex and are inconclusive.²

Power sub-transmission in Hawaii is 60 Hertz frequency. "Frequency" refers to the number of waves passing a given point in a given time. The official unit of frequency is the Hertz (Hz), which is the number of waves or "cycles" per second. There are two kinds of fields associated with 60 Hz power that are caused by electric charges: 1) electric fields which result from the strength of the charge, and 2) magnetic fields which result from the motion of the charge. The strengths of both electrical and magnetic fields diminish with increased distance from the electrical source.

² Nair, I., Morgan, G., Florig, K., Department of Engineering and Public Policy, Carnegie Mellon University, Biological Effects of Power Frequency Electric and Magnetic Fields - Background Paper, prepared for Congress of the United States Office of Technology Assessment, May 1989.

7.5.2 Existing Conditions

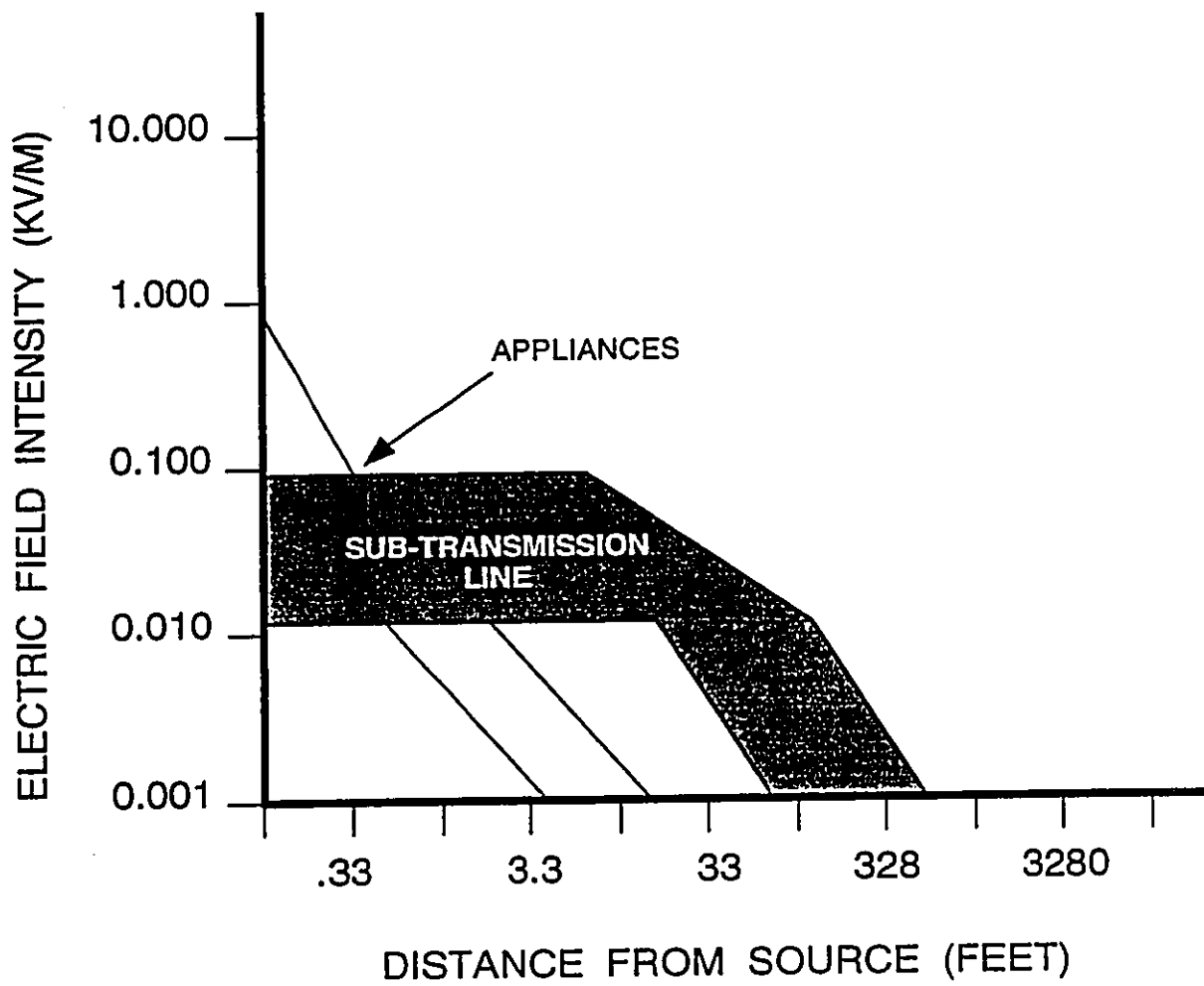
Electric Fields

Electric fields are very common phenomena since most household appliances which operate on electricity create electric fields. These appliances do not need to be in operation to create electric fields, but must be connected to an electrical outlet. The strength of the electric field depends upon the voltage of the appliance or object and diminishes significantly with distance.³ Electrical fields that result from "point source" items such as household appliances generally decrease more rapidly with distance than from line sources such as sub-transmission lines. Figure 7.5.1 shows how the strength of electric fields changes with distance for general appliances and sub-transmission lines.

Multiple sources located near one another, such as two sub-transmission lines, can also add to or subtract electric field amplitudes from each other depending upon the source's frequency and strength. For example, two sources with electric fields of 0.10 kV per meter (kV/m) each may result in a total electric field level between 0.00 and 0.20 kV/m. Electrical fields from sub-transmission lines are also affected by objects such as trees or houses which can partially block or shield out electric fields. The amount of electric fields shielded by homes varies with the type of construction material used, but a typical house can shield about 90 percent of the electric field from the outside.⁴ In addition, when conductors are placed underground, the characteristics of the electrical fields change. Because the conductors are situated closer together underground, the fields tend to cancel one another causing lower levels of field strengths.

³ "Electric and Magnetic Fields from 60 Hertz Electric Power: What Do We Know About Possible Health Risks?" by Department of Engineering and Public Policy, Carnegie Mellon University, 1989, pp. 4-7.

⁴ Ibid., pg. 8.



Electric field levels in the work environment generally ranges from 0.001 to 0.100 kV/m in offices.⁵ Table 7.5.1 shows typical electric field levels for common household appliances.

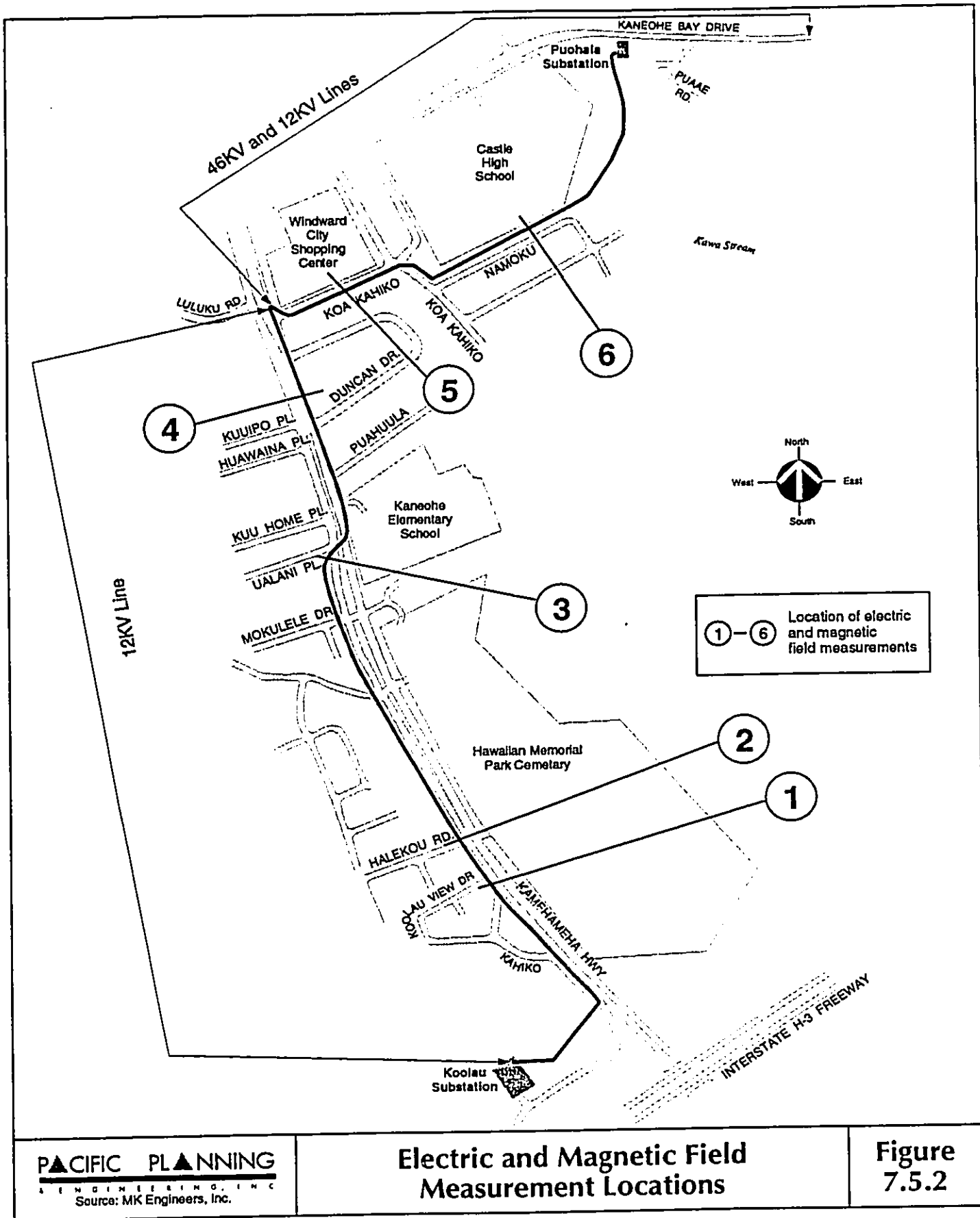
Table 7.5.1 Typical Electric Field Levels
(In Kilovolts / Meter)

<u>Appliance Description</u>	<u>Electric Field Levels</u> <u>30 Centimeters (11.81 in.) Away</u>
Broiler	0.130
Coffee Pot	0.030
Color Television	0.030
Electric Blanket	0.250
Electric Iron	0.060
Hair Dryer	0.040
Hand Mixer	0.050
Refrigerator	0.060
Stereo	0.090
Toaster	0.040
Vacuum Cleaner	0.016

Source: Electric and Magnetic Field Fundamentals, An EMF Health Effects Resource Paper, by Electric Power Research Institute

Measurements of electric field levels for existing lines associated with the proposed Koolau-Kaneohe 46 kV circuit were taken by MK Engineers, Inc. from various locations and distances from the lines. A letter report prepared by MK Engineers, Inc. summarizing the measurement results are included in Appendix E. The locations where these measurements were taken are shown on Figure 7.5.2.

⁵ "Electric and Magnetic Field Fundamentals, An EMF Health Effects Resource Paper," by Electric Power Research Institute.



Measurements were taken at six locations within the project corridor at distances varying between five and 24 feet from the center line of the existing sub-transmission lines. Measurements taken at locations 5 and 6 include both 46 kV and 12 kV sub-transmission lines while the other locations have only 12 kV lines. Table 7.5.2 shows the electric field levels measured at the six locations. The measurement results show that the present electric field levels along these existing sub-transmission lines range from a low of .0023 kV/m to a high of .0518 kV/m. In comparison with common household items shown on Table 7.5.1, the electric field levels associated with the lines are comparable to electric field levels from a refrigerator (.060) or electric iron (.060) about one foot away.

**Table 7.5.2 Existing Electric Field Levels
(In Kilovolts / Meter)**

<u>Location Description</u>	<u>Distance (ft.)</u>	<u>Measured Electric Field Levels</u>
Location 1		
street side	15.0	.0074
center line		.0075
house side	10.0	.0137
Location 2		
street side	10.0	.0067
center line		.0050
house side	5.0	.0052
Location 3		
street side	17.0	.0200
center line		.0050
house side	11.0	.0023
Location 4		
street side	11.0	.0133
center line		.0030
house side	10.0	.0085
Location 5		
street side	5.0	.0060
center line		.0108
house side	7.0	.0188
Location 6		
street side	6.5	.0265
center line		.0383
house side	5.0	.0518

Source: MK Engineers, Inc.

Magnetic Fields

Magnetic fields are a product of an electrical current and are not present unless current is flowing due to the operation of an appliance or device. The stronger the current is (ex. hair dryer operating on high heat versus low heat) the greater the magnetic field level. Magnetic fields are commonly measured in units called Gauss which is a unit of magnetic flux density (intensity of magnetic field attraction per unit area). One milligauss (mG) is equal to one-thousandth of a Gauss.

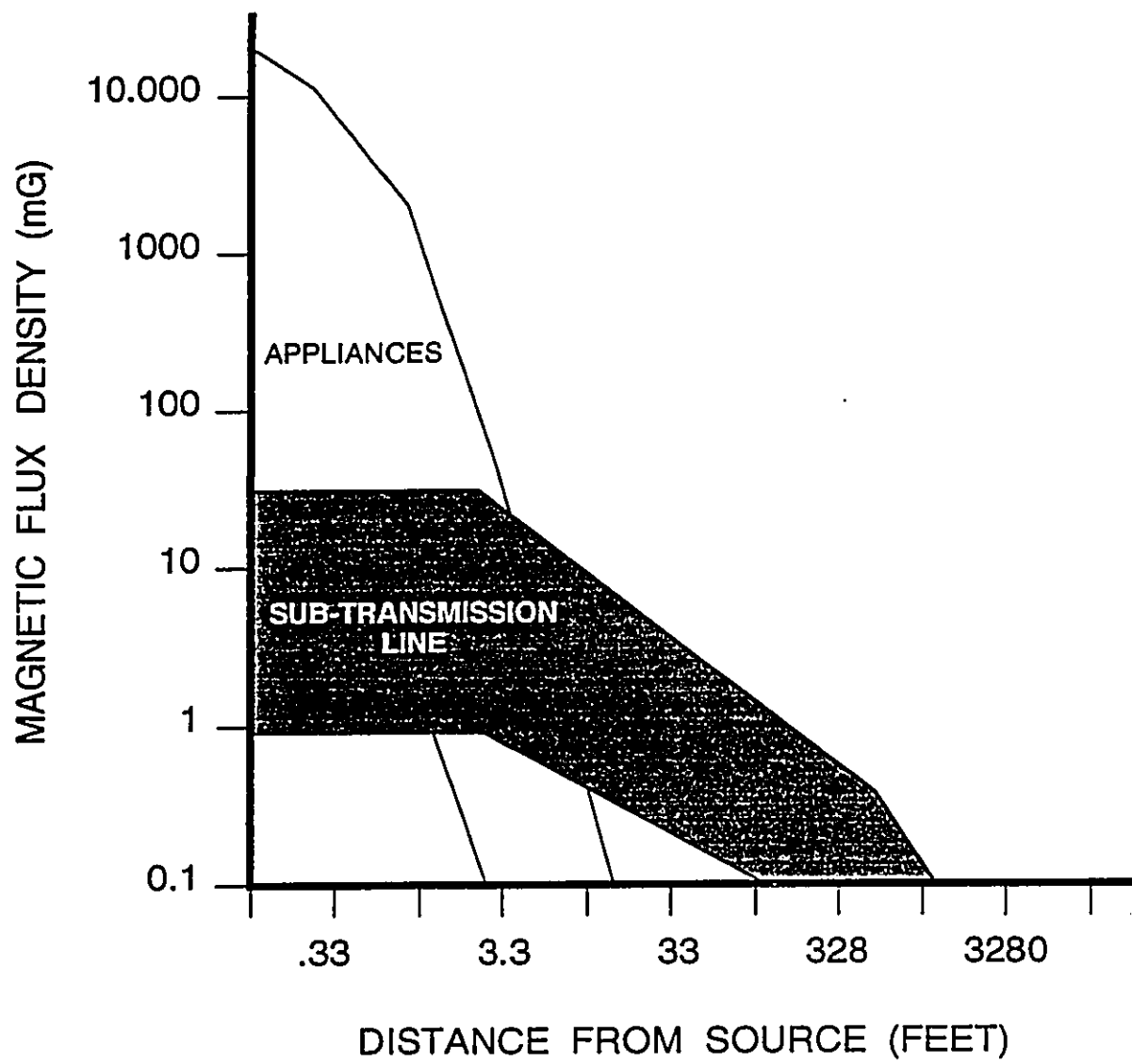
As with electric fields, the strength of magnetic fields diminishes significantly with distance, and fields surrounding point source items (ex. appliances) generally decrease more rapidly with distance than from line sources.⁶ Figure 7.5.3 shows how the strength of magnetic fields changes with distance for general appliances and sub-transmission lines.

Multiple magnetic field sources located near one another can also add to or subtract from the strength of the magnetic field depending upon the source's frequency and strength. Unlike electric fields, magnetic fields are not significantly shielded passing through most common objects.

Typical magnetic field levels in the work environment generally range from 1 to 100 mG in offices.⁷ Table 7.5.3 shows typical magnetic fields in proximity to common household appliances.

⁶ Department of Engineering and Public Policy, Carnegie Mellon University, pp. 4-7.

⁷ Electric Power Research Institute.



**Table 7.5.3 Typical Magnetic Field Measurements
In Milligauss (mG)**

<u>APPLIANCE</u>	<u>Magnetic Field (mG)</u>	
	<u>12 in. Away</u>	<u>Maximum</u>
Can Opener	35-250	10,000-20,000
Circular saw	10-250	2,000-10,000
Clothes Dryer	1-3	3-80
Clothes Washer	2-30	10-400
Coffee Maker	0.8-1	15-250
Color Television	9-20	150-500
Hair Dryer	1-70	60-20,000
Iron	1-3	90-300
Electric Drill	25-35	4,000-8,000
Electric Oven	2-5	10-50
Electric Range	3-30	100-1,200
Electric Shaver	1-100	150-15,000
Refrigerator	0.3-3	4-15
Vacuum Cleaner	20-200	2,000-8,000
Toaster	0.6-8	70-150

Source: Effects of Electric and Magnetic Fields, Technical Report for
Waiiau-Makalapa No. 2 138 kV Transmission Line Project, by Eneritech
Consultants, November 1989

Measurements of magnetic field levels for existing lines associated with the project were also taken by MK Engineers, Inc., from the same locations (Figure 7.5.2) and distances taken for the electric field levels. These measurement results are shown below on Table 7.5.4 and are included in Appendix E.

The measurement results show that present magnetic field levels along existing lines associated with this project range from a low of 1.0 mG to a high of 13.3 mG. In comparison with common household items shown on Table 7.5.3, the magnetic field levels are comparable to levels near a color television or clothes washer located one foot away.

Table 7.5.4 Existing Magnetic Field Levels (mG)

<u>Location Description</u>	<u>Distance (ft.)</u>	<u>Measured Magnetic Field Levels</u>
Location 1		1.1
street side	15.0	1.0
center line		1.3
house side	10.0	
Location 2		2.0
street side	10.0	2.1
center line		2.2
house side	5.0	
Location 3		1.2
street side	17.0	1.7
center line		1.7
house side	11.0	
Location 4		1.5
street side	11.0	1.9
center line		1.7
house side	10.0	
Location 5		3.9
street side	5.0	4.2
center line		8.0
house side	7.0	
Location 6		1.4
street side	6.5	1.3
center line		1.4
house side	5.0	

Source: MK Engineers, Inc.

7.5.3 Probable Impacts

Electric and Magnetic Field Standards

The National Electrical Safety Code (NESC) and State PUC's General Order Number 6 (Rules for Overhead Electric Line Construction) provide standards for the construction of overhead lines which are followed by HECO. However, these documents do not address concerns associated with the potential health effects related to electric and magnetic fields.

There are no national standards in the United States for electric or magnetic field exposure. The State DOH issued a policy last year relating to EMF from electric power lines which states:

A prudent approach is needed at this time to regulate electric and magnetic fields around low-frequency electric power facilities, including high-voltage transmission lines. The existing research data are inconclusive and not sufficient enough for adequate, accurate risk assessment. However, the data suggest that a "prudent avoidance" approach to siting new facilities is appropriate. Where technically feasible and practical, public exposures should be minimized. Too little is presently known to be able to determine where or what rules would provide useful public-health protection.

Implementing actions:

- (a) All newly-installed power lines should be constructed with engineering controls to reduce exposure (for example, the "delta" configuration).*
- (b) The Department of Health will continue to collect and evaluate research data on electromagnetic fields in order to be aware of significant finding with public-health implications.*

The International Nonionizing Radiation Committee of the International Radiation Protection Association published "Interim Guidelines on Limits of Exposure to 50/60-Hz Electric and Magnetic Fields" in the January 1990 issue of Health Physics. Those guidelines relating to the general public are shown below:

<u>General Public Exposure Characteristics</u>	<u>Electric Field Strength (kV/m)</u>	<u>Magnetic Flux Density (mG)</u>
Up to 24 hours/day	5	1,000
Few hours/day	10	10,000

Projected Electric and Magnetic Field Levels

To assess the probable impacts resulting from EMF levels associated with the project, computer modeled projections of electric and magnetic field levels were conducted by HECO. These projections were made for six locations corresponding to the measurement locations and distances from the sub-transmission lines previously taken by MK Engineers, Inc. (Figure 7.5.2). These projections were conducted using HECO's standard framing design along with normal sub-transmission line amperage. In addition, projections were also made using an alternative framing design (low reactance phasing) which generally reduces the level of electric and magnetic fields. The resulting projections are shown in Table 7.5.5.

Based upon the projected levels, existing electric and magnetic fields along the project's corridor are expected to increase due to the new Koolau-Kaneohe 46 kV circuit. Electric field levels are projected to range from approximately 0.020 kV/m to 0.090 kV/m based upon HECO's standard framing design. Magnetic field levels are projected to range from approximately 8.80 mG to 11.75 mG.

Table 7.5.5 Projected Electric and Magnetic Field Levels

Electric Fields (kV/m)			
<u>Location Description</u>	<u>Existing Measurement Level</u>	<u>Projected Level (Standard Framing)</u>	<u>Projected Level (Low Reactance Framing)</u>
Location 1 (1) Property Line	0.014	0.040	0.021
Location 2 (1) Property Line	0.005	0.037	0.023
Location 3 (1) Property Line	0.002	0.022	0.022
Location 4 (1) Property Line	0.008	0.027	0.028
Location 5 (1) Property Line	0.019	0.051	0.034
Location 6 (2) Property Line	0.052	0.089	0.076

Magnetic Fields (mG)			
<u>Location Description</u>	<u>Existing Measurement Level</u>	<u>Projected Level (Standard Framing)</u>	<u>Projected Level (Low Reactance Framing)</u>
Location 1 (1) Property Line	1.3	11.33	4.71
Location 2 (1) Property Line	2.2	11.09	4.79
Location 3 (1) Property Line	1.7	9.00	7.82
Location 4 (1) Property Line	1.7	8.79	8.07
Location 5 (1) Property Line	8.0	11.73	9.09
Location 6 (2) Property Line	1.4	8.85	7.68

Note: (1) Calculations based on normal line amperes (A) of:
445 A (46 kV line) and 131 A (12 kV line)
(2) Calculations based on normal line amperes of:
445 A (46 kV line) and 25 A (12 kV line)

Source: Hawaiian Electric Company, Inc.

By incorporating low reactance framing into the design of the project, electric and magnetic field levels along the project corridor are expected to be slightly lower than that projected using the standard framing design. Electric field levels are projected to range from approximately 0.020 kV/m to 0.075 kV/m, and magnetic field levels are projected to range from approximately 4.70 mG to 9.10 mG. As shown on Table 7.5.5, the low reactance framing resulted in certain locations having moderately lower EMF levels while other locations had minimal changes.

Resulting Probable Impacts

Proposed improvements to existing sub-transmission lines and poles to create the new Koolau-Kaneohe 46 kV circuit is expected to increase the present levels of electric and magnetic fields along the project corridor. Based upon the general public guidelines previously mentioned and projected EMF levels, the project is not expected to have a significant impact on surrounding properties or pose a significant health hazard to nearby residents. Although research to date has not demonstrated conclusive evidence that there are no health hazards associated with power lines, the projected electric and magnetic field levels are not at levels which should cause concern.

As shown on Table 7.5.5, the projected electric and magnetic field levels will be considerably below the general public guidelines. These projected levels will also be similar to or lower than EMF levels associated with common household appliances previously shown on Tables 7.5.1 and 7.5.3. Furthermore, residents and the general public are regularly exposed to various levels of EMF in the home, at work, or during other activities. Table 7.5.6 provides a summary of everyday magnetic field levels presently experienced by the public at various locations in Waipahu.

Table 7.5.6 Summary of Everyday Magnetic Field Levels

<u>Location in Waipahu Area</u>	<u>Magnetic Field (mG)</u>
Gem's Department Store	0.2 - 2.5
Gem's Jewelry	10.0 - 300.0
Waipahu Times Supermarket	0.5 - 14.0
"Skill Crane" Game	12.0 - 50.0
Tokyo Deli	0.5 - 8.0
Driving on Farrington Highway	0.5 - 10.0
McDonald's Restaurant	0.5 - 15.0
Waipahu Sporting Goods	1.0 - 5.0
Arakawa's Department Store	0.5 - 5.0

Source: Final Environmental Impact Statement, Waiau-Campbell Industrial Park
138 kV Transmission Line, Part 2-Ewa Nui Substation to Waiau Power Plant

A concern with EMF levels near Kaneohe Elementary School was expressed by the State Department of Education due to the location of Part 3 of the proposed Koolau-Kaneohe 46 kV circuit. Based upon the projected EMF levels near the school shown on Table 7.5.5 (Figure 7.5.2, Location 3), the project is not expected to pose a significant health hazard to students and school faculty. The location of school facilities are also situated away from and below (over 15 feet) the highway grade due to the existing topography of the area. Consequently, electric and magnetic field exposure levels are expected to be even lower.

7.5.4 Potential Mitigation Measures

Based upon discussions between HECO and the State Department of Education staff, HECO plans to incorporate design changes into Parts 2 and 3 of the project to minimize EMF exposure levels at Kaneohe Elementary School. HECO plans to extend the Koolau-Kaneohe 46 kV circuit routed along the mauka (west) side of Kamehameha Highway (shown as Part 2 of Figure 4.2.1) further north before crossing the highway. The circuit would be extended north to an existing pole located near Kuu Home Place before crossing the highway to connect with the overbuild of existing 12 kV circuits associated with Part 3 of the project. This change in the design of the project would result in the Koolau-Kaneohe 46 kV circuit being located further away (north) from Kaneohe Elementary School, thereby reducing exposure to EMF levels.

Although the proposed project is not expected to pose a significant health hazard to nearby residents, HECO plans to adopt strategies consistent with the State DOH's policy of a "prudent avoidance" approach. Wherever practical, HECO will utilize a low reactance phasing design to minimize EMF levels.

7.6 NATURAL HAZARDS

The proposed project will not contribute to any impacts related to natural hazards. However, natural hazards which may potentially cause damages to the project are volcanic eruptions, earthquakes, tsunamis/flooding, and hurricanes.

7.6.1 Volcanic Eruptions

Since 1790, there have been 12 reported volcanic eruptions in the State of Hawaii with 11 of them occurring on the island of Hawaii and one at Haleakala on Maui. According to a newspaper article recently published, there have been about 40 volcanic eruptions on Oahu occurring within the past 500,000 years indicating an average of 1 every 10,000 years.⁸ The most recent eruptions occurring on Oahu were estimated to have been approximately 60,000 years ago and formed such features as Rabbit Island, Koko Head, and Hanauma Bay.

Potential impacts to the project resulting from volcanic eruptions cannot be accurately determined or predicted with any degree of certainty. However, George P. Walker, Professor of Volcanology at the Department of Geology and Geophysics, University of Hawaii, stated in the article noted above that an eruption occurring every 10,000 or 20,000 years is quite rare. Consequently, it can reasonably be determined that the probability of damages occurring to the project resulting from volcanic eruptions is very low.

⁸ "Isles' older volcanoes may wake," The Honolulu Advertiser, Tuesday, June 11, 1991, Section A-1, 4.

7.6.2 Earthquake Hazards

Earthquakes in the Hawaiian Islands are primarily associated with volcanic eruptions resulting from the inflation or shrinkage of magma reservoirs beneath which shift segments of the volcano. Tectonic plate movement causes most earthquakes on continental regions, and is nearly absent in Hawaii. However, the Molokai Fracture Zone, which is a large system of sea-floor faults extending from the East Pacific Rise in the Gulf of California, intersects the Hawaiian Islands in the area between Molokai and Lanai.

Oahu is periodically subject to episodes of seismic activity of varying intensity. The Lanai Earthquake of February 1871 is considered to be the most significant recorded earthquake having higher recorded intensities on Oahu than any other historic earthquake. According to a study by Doak C. Cox, this earthquake had a Richter scale magnitude of approximately 7.0 causing damage to buildings, furniture, as well as landslips, slumps and rockfalls.⁹ The Oahu Earthquake of June 1948 is considered to be the second greatest earthquake recorded.

Available historical data indicates that the number of major earthquakes occurring on Oahu have generally been less and of lower magnitude compared with other islands such as Hawaii. However, earthquakes cannot be predicted with any degree of certainty or avoided, and a earthquake of sufficient magnitude (greater than 5 on the Richter Scale) may cause damage to the proposed project and surrounding structures. Although the possibility of earthquakes on Oahu have been lower than other islands, potential damages to sub-transmission lines resulting from earthquakes can be minimized by following appropriate design and construction standards set by the State Public Utilities Commission. Further, the project is intended to create a needed backup system in the event other lines or transformers are damaged from an earthquake, and would help minimize power outages from occurring in the Kaneohe region.

⁹ Doak C. Cox, Earthquakes Felt on Oahu, Hawaii and Their Intensities, Environmental Center, University of Hawaii, 1986.

7.6.3 Tsunami and Flood Hazards

According to the Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM), Panel 150001-0090-C, dated September 28, 1990, the project corridor is for the most part located in areas Zone D and Zone X. Zone D indicates areas in which flood hazards are undetermined while Zone X are areas determined to be outside the 500-year flood plain. Consequently, there is an extremely low potential for flood-related damages occurring in areas designed Zone X. The project is also located outside of the tsunami inundation zones which are designated as Zones V and VE on the FIRM.

As shown on Figure 7.6.1, the only portions of the project located within areas not designated Zones D or X are Parts 4 and 5. The reconductoring of the existing 46 kV circuit (Part 4) crosses Kawa Stream at two points which are designated Zone AE (Special Flood Hazard Areas Inundated by 100-Year Flood). A segment of the underground cables from the Puohala Substation to be situated under Kaneohe Bay Drive (Part 5) will also be located over the culvert for Kawa Stream which is designated Zone AE.

These portions of the project located within Zone AE are not expected to be significantly damaged from flooding. The reducted 46 kV circuit will be located above ground on existing poles located sufficient distances away from the concrete channelized stream. As a result, potential flooding of this stream should cause minimal damages to these pole and reducted lines. The 46 kV cables installed under Kaneohe Bay Drive is also expected to have minimal or no damages resulting from the flooding of the stream.

7.6.4 Hurricane Hazards

Hurricanes which pose a threat to the Hawaiian Islands in the Central Pacific are classified as critical hurricanes. A Hurricane Vulnerability Study for Honolulu, Hawaii, and Vicinity completed in 1985 by the U.S. Army Corps of Engineers studied all recorded hurricanes between 1950 and 1983. Of the recorded hurricanes during the 34 year study period, a list of 20 critical hurricanes were developed of which a total of seven either struck or came close to the State, or posed an extreme threat to the State. In 1959 Hurricane Dot passed over Kauai and in 1982 Hurricane Iwa passed within 30 miles of the island. This year, Hurricane Iniki passed over the island of Kauai causing island-wide destruction with wind gusts up to 165 mph. On Oahu, high surf powered by wind and tide caused damage to the Leeward Coast and parts of Waikiki.¹⁰

The three major elements of a hurricane which make it hazardous are: 1) winds, 2) waves and storm surge, and 3) heavy rainfall. Of the 3 elements, high wind speeds have the greatest potential to impact sub-transmission lines. With the body of water nearest the project being a sheltered bay (Kaneohe Bay), wave and storm surge induced by a hurricane is generally low. The Hurricane Vulnerability study indicates that the potential for heavy rainfall resulting from hurricanes is no greater than that resulting from extreme Kona storms. Maximum wind speeds near the center (eye) of a hurricane may exceed 100 mph while decreasing further away.

As a result, proposed improvements to HECO's existing lines may be damaged from high wind speeds from a hurricane especially if it passes directly over or near Oahu. However, Parts 1 and 5 of the project will help minimize potential damages to poles and lines because the lines will be installed underground. Further, the project is intended to create a needed backup system in the event other lines are damaged, and would help minimize power outages from effecting the Kaneohe region.

¹⁰ "It Broke My Heart," The Sunday Honolulu Star Bulletin & Advertiser, September 12, 1992, Section A-1.

7.7 VISUAL IMPACTS

Field studies were conducted to determine probable visual impacts associated with the sub-transmission line project. The Coastal View Study (CVS), prepared for the City and County of Honolulu's Department of Land Utilization, identified significant visual resources and the resulting "viewsheds" created by these resources. Consequently, these visual viewsheds along with concepts developed in this study were incorporated into the visual assessment.

The concepts of visual Vividness, Intactness, and Unity derived in the CVS were used to describe the existing character or "visual quality" of a resource. Changes to the visual quality of a viewshed in terms of these concepts were then used to determine the probable visual impacts resulting from the proposed project. These concepts of vividness, intactness, and unity are further described in terms of low, moderate, and high visual qualities.

The Vividness of a landscape is derived from contrasting landscape components as they combine to create distinctive visual patterns, taking into account form, line, texture and color. Visual Intactness refers both to the integrity of visual patterns and the extent to which the landscape is free from visually encroaching features. In suburban and urban environments, visual intactness can be measured by assessing the consistency and order of the visual pattern. Visual Unity is the degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. The key criterion here is the composition and balance between man-made and natural pattern elements.

7.7.1 Existing Viewsheds

Coastal View Study Viewsheds

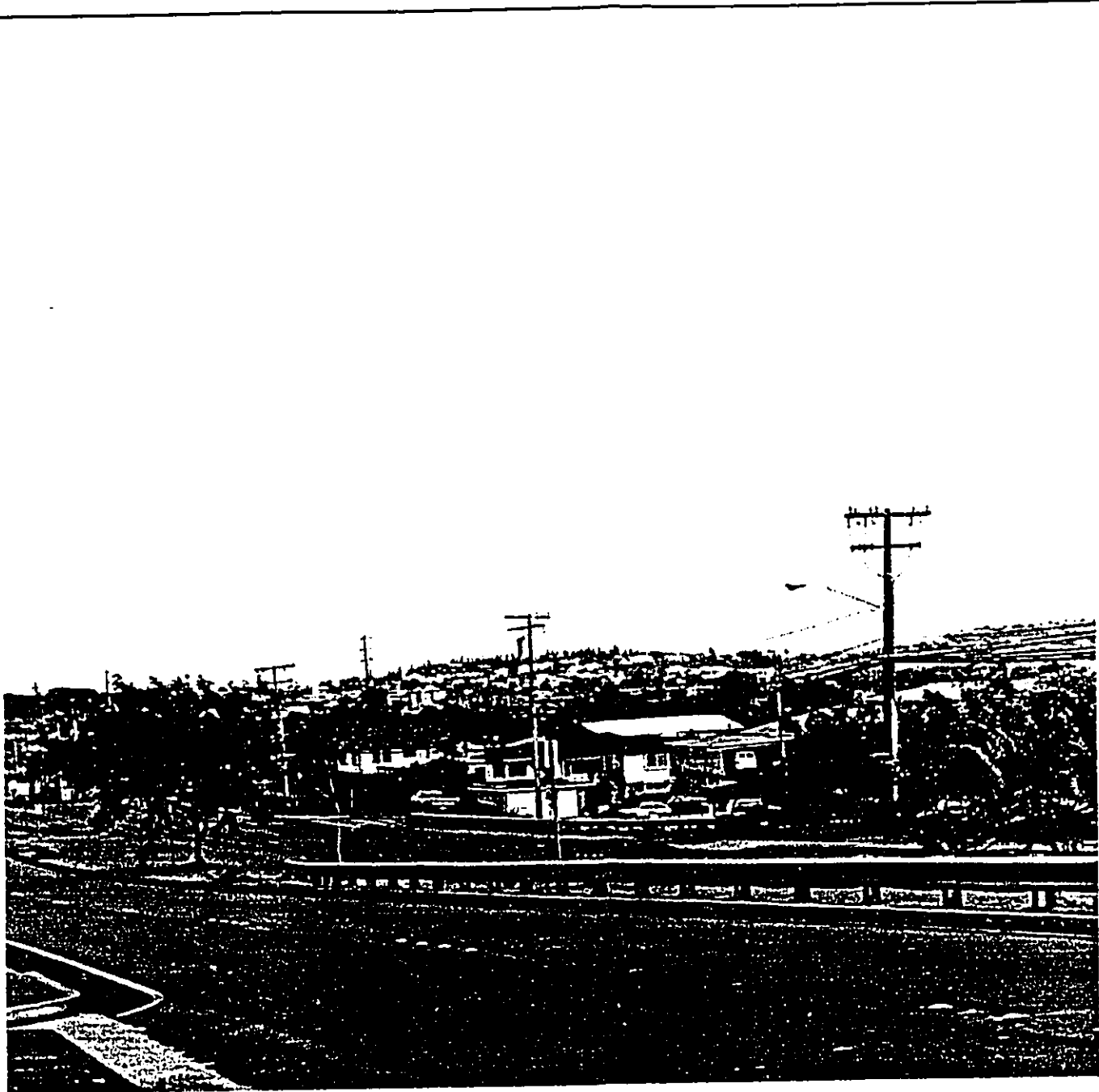
The CVS identified three viewsheds located within the Koolaupoko District. Of these three, the Kaneohe Bay Viewshed was the only viewshed located within the vicinity of the project. The Heeia section of this viewshed, which is located within the vicinity of the project, covers the area from Heeia to the entry of the Kaneohe Marine Corps Air Station (KMCAS).

Two significant roadway views were identified within this Heeia section, however, these views are not located within the project corridor. The first roadway view is located along Kamehameha Highway near the Heeia Boat Harbor while the second view occurs from the portion of the H-3 Freeway leading into the KMCAS. The only significant stationary views (pedestrian) are from Heeia State Park and the H-3 scenic lookout both of which are located outside of the project vicinity.

Project Specific Views

Since there were no viewsheds identified in the CVS which may be affected by the project, a field survey was conducted to identify and evaluate existing views associated with the project. Based upon the proposed project, only the overbuild of existing 12 kV circuits along Kamehameha Highway (Part 3) may affect existing views in these areas. As a result, the existing view associated with this part of the project was identified and evaluated to provide baseline conditions from which impacts may be assessed.

For Part 3 of this project, the present view of the surrounding land uses along Kamehameha Highway in relation to the existing lines were evaluated. As shown on Figure 7.7.1, these views were determined to presently have low to moderate visual qualities for suburban environments.



View of Kamehameha Highway facing north.

PACIFIC PLANNING
& ENGINEERING, INC.
Source: Pacific Planning & Engineering, Inc.

Existing View
Associated with Part 3 of Project

Figure
7.7.1

7.7.2 Probable Impacts

The existing views associated with Part 3 of the project were evaluated using the criteria described in the CVS. Using this same criteria, the probable impacts were evaluated based upon the expected changes to these views resulting from the project. A visual simulation, shown on Figure 7.7.2, was conducted to provide a general indication of the nature of changes to these views resulting from the overbuild of existing lines and poles. Table 7.7.1 shows the evaluation results using the CVS criteria for both existing and with project conditions.

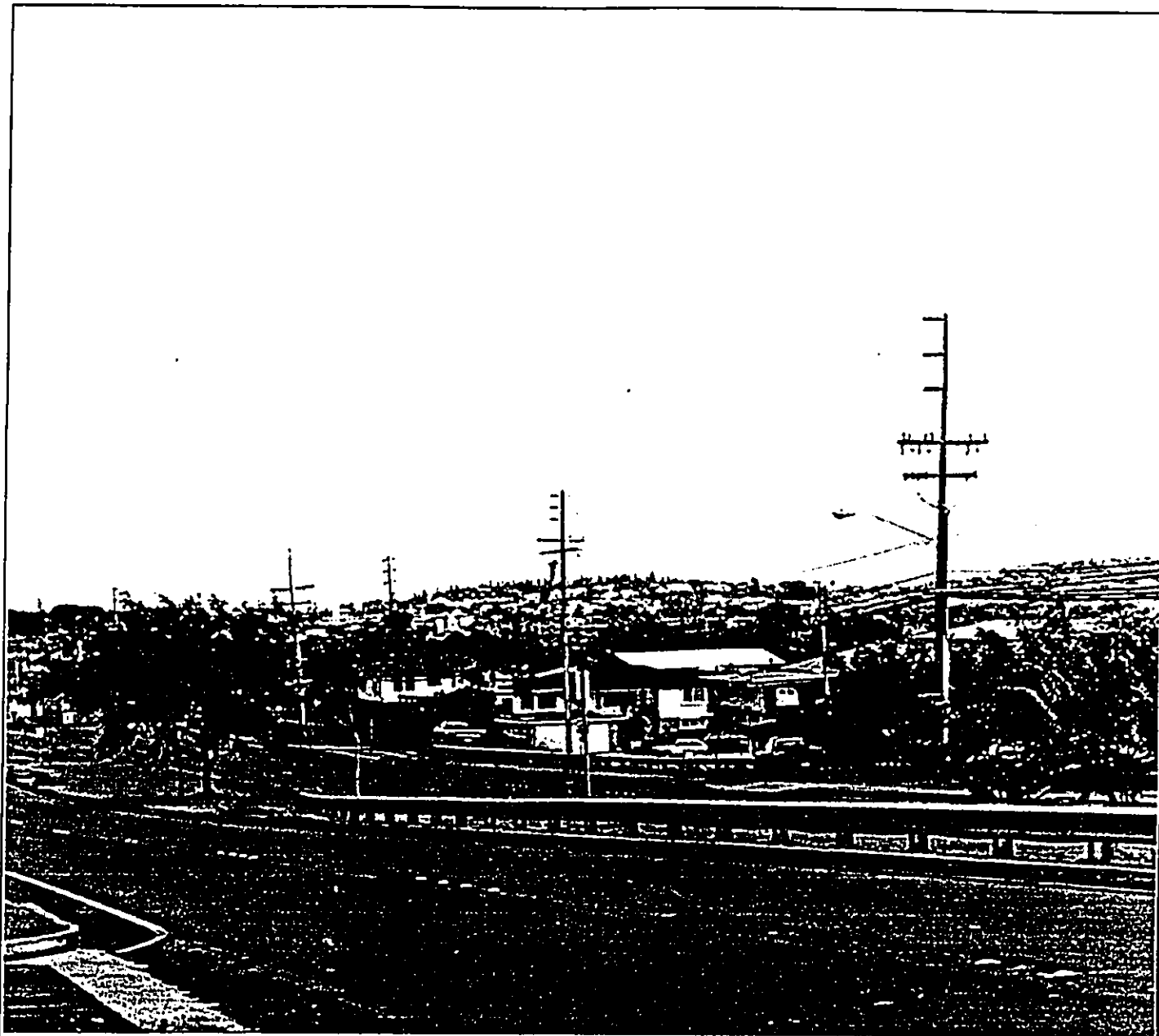
Table 7.7.1 Evaluation of Project Specific Views

<u>Views Associated with Part 3</u>	<u>Existing Conditions</u>	<u>With Project</u>
Visual Vividness	Low to Moderate	Low to Moderate
Visual Unity	Moderate	Moderate
Visual Intactness	Moderate	Moderate

Source: Pacific Planning and Engineering, Inc.

The overbuild of existing 12 kV lines along Kamehameha Highway (Part 3) may result in the replacement of existing poles having heights ranging between 45 to 60 feet with new 65 foot poles (58 feet above ground) capable of supporting both 46 kV and 12 kV conductors. The moderate increase in pole height is not expected to change the overall visual characteristics associated with this view along the highway, and should generally retain the present low to moderate visual quality.

Although taller poles will be used to replace existing ones, minimal changes to the overall visual characteristics of this suburban environment should result. Additional conductors for the 46 kV circuit should also result in minimal changes to the overall view. The visual unity should generally remain the same because the composition of the view will still reflect a pattern dominated by man-made features such as the highway and residences. The landscape will continue to have encroaching features associated with the poles and lines resulting in minimal changes to the visual intactness, and the visual vividness should remain low to moderate.



Simulated view of Kamehameha Highway facing north.

PACIFIC PLANNING
ENGINEERING, INC.
Source: Pacific Planning & Engineering, Inc.

**Simulated View Associated
with Part 3 of Project**

**Figure
7.7.2**

7.8 FLORA AND FAUNA

7.8.1 Flora

A botanical study was conducted to assess probable impacts to botanical resources found near the proposed improvements occurring in the immediate vicinity of the Koolau and Puohala substations (Parts 1 and 5 respectively). A survey for Parts 2 through 4 of the project was not conducted because the area has already been extensively urbanized. The primary objectives of the botanical survey were to: 1) provide a description of existing vegetation, 2) search for threatened and endangered plant species protected by Federal and State laws, and 3) identify areas of potential environmental problems or concerns, and propose possible mitigation measures. The botanical study was conducted by Char and Associates and is included in its entirety as Appendix C.

Existing Conditions

Near the Koolau Substation, the narrow band of vegetation along the edge of the Service Road is infrequently maintained. This vegetation consists of low mats of wedelia (Wedelia trilobata) which is a ground cover species commonly used in landscaping along with several weedy grasses and herbs. These include California grass (Brachiaria mutica), pualele (Emilia fosbergii), Spanish clover (Desmodium incanum), and Hilo grass (Paspalum conjugatum). Seedlings of Java plum (Syzygium cumini) and guava (Psidium guajava) are also found here.

The scrub vegetation by this substation consists of clumps of koa-haole (Leucaena leucocephala), Christmas berry (Schinus terebinthifolius), and guava shrubs in a dense mat of California grass. Further down the Service Road, trees of Java plum and hau (Hibiscus tiliaceus), as well as the shrubs mentioned above, form somewhat dense stands. Also found in the scrub vegetation bordering the road is elephant grass or Napier grass (Pennisetum purpureum). This robust grass forms large clumps, from six to 14 feet tall, and has narrow, spikelike, soft-bristly, yellow flowering heads which are eight to ten inches long.

The area between the Puohala Substation and Kaneohe Bay Drive is landscaped with low mats of wedelia. Scattered through the wedelia are small patches of weedy species such as swordfern (Nephrolepis multiflora), partridge pea (Chamaecrista nictitans), fimbriate paspalum (Paspalum frimbriatum), ricegrass (Paspalum scrobiculatum), sensitive plant or puahilahila (Mimosa pudica), and Florida beggarweed (Desmodium tortuosum).

Along the north side of Kaneohe Bay Drive, where the underground sub-transmission line is proposed, the vegetation adjacent to the road consists of a maintained grassy strip. Next to the narrow, grassy strip is a chainlink fence and dense Guinea grass (Panicum maximum), from five to seven feet tall. Behind the fence is a line of Java plum trees, 25 to 30 feet tall, a large mango (Mangifera indica), and smaller shrubs of koa-haole, 12 to 15 feet tall. Maile pilau (Paederia scandens), a twining vine with foul-smelling leaves and purple and white flowers, is common, growing up the Java plum, koa-haole, and the fence.

Probable Impacts

The vegetation located at the two areas surveyed is dominated by introduced or alien species. Two native plants which occur on or border the areas surveyed are hau (Hibiscus tiliaceus) and ricegrass (Paspalum scrobiculatum). These plants are found throughout the islands in similar habitats.

None of the plants found during the survey are officially listed threatened and endangered species (U.S. Fish and Wildlife Service 1989) or a candidate for such status (U.S. Fish and Wildlife Service 1990). A botanical survey conducted for the nearby Koolau golf course (Char 1986) recorded similar findings. This results of this botanical survey concur with a letter received from the U.S. Department of the Interior, Fish and Wildlife Service regarding the proposed project (Appendix A).

Given the findings above, and limited nature of the project, the impacts upon the existing botanical resources are not expected to be significant. There are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed project.

7.8.2 Fauna

Given the existing level of urbanization located along Kamehameha Highway and near the Puohala Substation, the only area having the potential to impact avifauna or feral mammals is near the Koolau Substation. Consequently, the proposed underground 46 kV cable running from the Koolau Substation to Pole 7X (Part 1 of the project) was used as the primary basis for determining the probable impacts to avifauna and feral mammals.

Existing Conditions

A field survey was conducted of the area located along the Service Road where the proposed underground 46 kV circuit will run from the Koolau Substation. Based upon this survey, the existing environment along the Service Road and in the immediate vicinity is absent of significant features that may be well-suited for bird habitats such as wetlands. Neither Kamooalii stream nor its tributaries have been ranked for habitat quality or water quality. Further, since the construction of the Hoomaluhia Dam, the upper tributaries of Kamooalii Stream have been cut off, effectively prohibiting migrations of fish from Kaneohe Bay and Kaneohe Stream into these tributaries. A botanical survey conducted verified that the existing vegetation near the Koolau Substation consists of a narrow band of vegetation commonly used in landscaping which is infrequently maintained.

Probable Impacts

The construction and installation of a 46 kV underground cable from the Koolau Substation is not expected to change the physiography of the area, and will not impact the existing flora according to the results of the botanical study (Appendix C). As a result, potential resident endemic and indigenous birds along with migratory birds which may be inhabiting the Koolau Mountain area are not expected to be impacted by the project. Similarly, potential feral mammals which may be found in the area such as wild cats, rats or mongoose are also not expected to be impacted. A letter received from the U.S. Department of the Interior, Fish and Wildlife Service (Appendix A) also confirms this assessment by stating "... To the best of our knowledge, there are no listed or proposed endangered or threatened species of animals or plants that would be expected to found in the vicinity of, or be affected by, the proposal. Similarly, there are no especially significant habitats or other resources of our concern that would be adversely affected by the project."

7.9 HISTORIC AND ARCHAEOLOGICAL RESOURCES

An archaeological study was conducted to assess probable impacts to historic and archaeological resources associated with the proposed project. Fieldwork conducted in the study consisted of an archaeological reconnaissance of the transmission line corridor to locate, map, and describe archaeological sites. The archaeological study was conducted by Cultural Surveys Hawaii and is included in its entirety as Appendix D.

7.9.1 Archaeological and Historical Background

The project area lies within the large *ahupua'a* (traditional land division) of Kaneohe which is one of the 11 *ahupua'a* within the Koolaupoko District. In the early accounts of Kamehameha I's land allocations of Oahu, the land divisions of Kaneohe and Kailua were not mentioned. Thus, it has been assumed that Kamehameha I retained these lands for himself and his lineage. During the Kuleana Act of 1850, no lands were claimed in the immediate vicinity of the project area. Although many lots were not claimed for a variety of reasons, studies in Koolaupoko indicate that the vast majority of claimed lots were located along main streams and lowlands where crops could be easily irrigated. The present project area lies on an embankment above Kawa Stream and would not have been ideal for cultivation.

Much of land owned by Queen Kalama in the Kaneohe area was utilized by the Kaneohe Sugar Plantation between 1865 and 1885 for ranching operations which became a major enterprise during this time period. By the mid 1860s, cattle operations grew substantially and herds were so large causing environmental degradation in the area. As a result, much of the land modification in the Kaneohe area may be from activities associated with Kaneohe Ranch.

The greatest disruption to the land may have been from pineapple cultivation which flourished from 1910 to 1925. Pineapple cultivation is credited with having displaced a number of archaeological sites in the area. With the collapse of commercial pineapple cultivation on the windward side, most of the pineapple fields became pasture or scrub forest. Cattle were probably pastured in the project area throughout much of the Twentieth Century.

7.9.2 Previous Archaeological Research

The earliest systematic archaeological coverage of upland areas of Kaneohe was by J.G. McAllister (1933) who recorded a number of *heiaus* and other sites in the Kaneohe area. Of the sites recorded, there were only four located in the vicinity of the project area which are graphically shown on Figure 7.9.1 and described below:

1. Site 354, Kawaewae Heiau (State Site #80-10-354) - Located on the Kaneohe side of the ridge dividing Kaneohe and Kailua, this heiau was said to be one of five heiau built by Olopana and dates to the beginning of the 12th Century. The heiau structure, described as a large rectangular enclosure measuring 120 by 253 feet, survived the activities associated with pineapple cultivation and is presently on the State and National Register and under the care of the Queen Emma Hawaiian Civic Club.
2. Site 355 - This site was an ancient *holua* slide which was eliminated during historic pineapple cultivation.
3. Site 356, Pu'u Makani Heiau - No trace of this heiau is present due to the area being heavily modified and graded over the years. However, a Hammatt and Shideler 1989 survey conducted for the then proposed Hawaii State Veterans Cemetery relocated a probable place for this site which is shown on Figure 7.8.1.
4. Site 357, House Site of Pakuanui - This site is located makai of Kamehameha Highway outside of the project area, and it is not known if this site still exists.

The relative lack of human enterprise in the area along with the land alterations resulting from ranching activities, pineapple cultivation, the U.S. Army and golf course development, probably have eliminated much of what little archaeology might have existed in the vicinity of the project. This probably accounts for the lack of archaeological sites in the area around the proposed transmission line project corridor.

7.9.3 Survey Results

Evidence from historical sources and from neighboring archaeological reports suggest that there was probably little traditional Hawaiian utilization of this immediate area. Background research also shows that the area in the vicinity of the project was greatly altered by previous ranching activities and pineapple cultivation. An archaeological reconnaissance further revealed no prehistoric sites, cultural layers, and significant historic sites located within the project area. As a result, the proposed project is not expected to have an archaeological impact.

Based upon the archaeological reconnaissance of the area near the Koolau Substation, it is clear that there has been extensive modification to the land surface resulting from roadway construction. From this substation, the land has been cut away in the form of a road cut, exposing lateritic soils (decomposing basaltic lava flows from the Koolau Mountain Range) for approximately 500 linear feet. The remainder of the distance (1,700 linear feet) is composed of fill layers that have been created during road construction. Consequently, the road bed in which the 46 kV underground cable will be buried lies two to three meters above the surrounding topography which is composed of road fill material.

Proposed improvements from the Puohala Substation (Part 5) along Kaneohe Bay Drive for 600 linear feet runs through an area that has been extensively modified by road construction. The first 300 feet of the corridor runs through a road cut composed of exposed lateritic soils. The remaining 300 feet runs across a bridge spanning Kawa Stream and also along an area that is composed of modern road fill layers.

Proposed improvements described in Parts 2, 3, and 4 of the project are above ground and utilize existing poles or replacement poles that will be placed in or near existing poles, thus creating no archaeological impact.

No further archaeological investigation or monitoring within the project area was recommended by Cultural Surveys Hawaii. However, in the unlikely event that cultural remains of any kind are encountered during construction, an archaeologist and the State Historic Preservation Division will be contacted immediately before construction activities in the vicinity are resumed.

SECTION 8.0
SOCIAL - ECONOMIC FACTORS

8.1 SOCIAL FACTORS

Potential social impacts which may occur as a result of the proposed sub-transmission line construction are expected to be primarily associated with construction activities, and with increased electrical system reliability under certain emergency conditions. Construction activity may cause minor inconveniences associated with noise, traffic, and air quality to nearby facilities such as Castle High School and Kaneohe Elementary School. However, any negative impacts occurring will be temporary. Social benefit should occur in the form of increased safety and system reliability afforded by the proposed circuit which would minimize disruptions and inconveniences to daily activities in the event of a failure to one of HECO's circuits or transformers. These potential impacts are discussed in the appropriate sections of this EA.

8.2 ECONOMIC FACTORS

Potential economic impacts to consumers and to HECO would occur if the Koolau-Kaneohe 46 kV circuit is not completed. As previously discussed in Section 3, HECO's existing line easements near the Koolau Substation are expected to be terminated by the landowner. Any resulting loss of system capacity due to decreased reliability would impact HECO financially. More importantly, the decrease in system capacity would also contribute to economic impacts to residents and businesses who are dependent upon a reliable power source to maintain their daily operations.

SECTION 9.0
INFRASTRUCTURE AND PUBLIC FACILITIES

9.1 GROUND TRANSPORTATION

9.1.1 Existing Conditions

The major roadways located in the immediate vicinity of the project corridor are the H-3 Freeway, Kamehameha Highway, and Kaneohe Bay Drive (see Figure 5.2.1).

H-3 is presently a State maintained four-laned divided freeway generally running in the mauka to makai direction, however, it is presently only open to vehicles travelling from Likelike Highway (after the Wilson Tunnel) toward the KMCAS area. Kamehameha Highway is a State maintained four-laned divided highway generally running in a north to south direction. Within the project corridor, this highway provides vehicular access between the towns of Kailua and Kaneohe. Kaneohe Bay Drive is also a State maintained two-laned roadway generally running in a mauka to makai direction near the Puohala Substation. Within the project corridor, Kamehameha Highway and Kaneohe Bay Drive both have posted speed limits of 35 miles per hour (mph) while H-3 has a posted speed limit of 55 mph.

Vehicular access to the Koolau Substation is from the two-laned H-3 Service Road which forms an unsignalized T-intersection with Kamehameha Highway near Kahiko Street. From this intersection, the Service Road travels along Kamehameha Highway before turning mauka (west) to the substation. This road then crosses over the H-3 Freeway to provide vehicular access to the Koolau Golf Course (Minami Group) and a few residences located in the area.

Other minor roads situated within the project alignment are Koa Kahiko and Namoku Street which are both located near Castle High School. Both streets are two-laned roadways with posted speed limits of 25 mph. These streets are primarily utilized to provide vehicular access to the residential homes located in the area.

A major intersection located near the project corridor (corner of Windward City Shopping Center) is the signalized intersection of Kamehameha Highway with Kaneohe Bay Drive. Other minor intersections include the signalized intersections of Kamehameha Highway with Koa Kahiko Street and with Halekou Road. The signalized intersection with Koa Kahiko Street is limited to allowing vehicles to make right-turns entering onto Kamehameha Highway.

9.1.2 Probable Impacts

The proposed project (Parts 1 to 5) is not expected to create long-term impacts to the previously described roadway facilities and intersections because it is a utility project thereby not generating additional permanent traffic. Consequently, the only probable impacts to roadway facilities will be associated with short-term construction activities.

The level of disruptions caused by this construction work are expected to vary from minimal to minor for different portions of the project, and should be further minimized by police officers assigned for traffic control at the various sites. In addition, construction activities will be conducted during non-peak commuter periods (9:00 am to 3:00 pm) to further alleviate traffic congestion on the roadways.

Construction activities for Part 1 of the project should result in minimal disruptions to traffic flow in the area because the majority of work will be confined near the Koolau Substation and along the Service Road. Only the replacement of poles 5X and 6X will be located along Kamehameha Highway. As a result, traffic along Kamehameha Highway should experience only minor disruptions. Vehicular traffic on the Service Road is minimal because it is primarily used for individuals travelling to or from the Koolau Golf Course. Therefore, the majority of work for this portion of the project should create minimal disruptions to traffic flow on this Service Road.

The installation of underground cables from the Puohala Substation (Part 5) should cause minor disruptions to traffic flow on Kaneohe Bay Drive due to the excavation work required on the road. The overbuild of existing 12 kV circuits along Kamehameha Highway (Part 3) is also expected to cause minor disruptions to traffic flow on the highway due to the replacement of existing poles.

Energizing the existing 46 kV overhead line along Kamehameha Highway (Part 2) will not involve any construction work and thus no disruptions to traffic flow on the highway. Reconductoring the existing Koolau-Laelae-Kahuku 46 kV circuit along Koa Kahiko and Namoku Street (Part 4) should create minimal disruptions to traffic flow on these streets due to the relatively low volumes of traffic occurring during the timeframe work will be conducted. Consequently, police officers are not expected to be needed to monitor traffic for this portion of the project.

9.2 WATER AND SEWAGE SYSTEM

9.2.1 Existing Conditions

The City and County of Honolulu, Board of Water Supply (BWS) operates and maintains water lines in the area to provide water service to existing residents, businesses, and facilities. The City and County of Honolulu, Department of Public Works operates and maintains sewer lines in the area to provide wastewater service to existing residents and businesses. Both water and sewer lines are generally routed underground along existing roadway facilities. As a result, water and sewer lines of varying sizes are located within various portions of the project corridor.

9.2.2 Probable Impact

Of the proposed project, only construction activities associated with the installation of underground cables (Parts 1 and 5) have the potential to impact existing water and sewer lines. Construction activities associated with other segments of the project will generally occur above the ground thereby not impacting existing water and sewer lines located in the area. New poles needing to be installed will be located next to existing poles to be replaced, and thus should not impact existing lines.

The excavation and construction work needed to install the underground cables are not expected to impact existing water and sewer lines located in the area. Construction plans for this project will be coordinated with both the BWS and Department of Public Works to ensure that the underground cables will not conflict with any existing water or sewer lines routed in the area.

9.3 EDUCATIONAL FACILITIES

9.3.1 Existing Conditions

Kaneohe Elementary School and Castle High School are both State operated public schools located within the immediate vicinity of the project corridor. As previously shown on Figure 5.2.1, Kaneohe Elementary School is located makai of Kamehameha Highway across of Ualani Place. This elementary school is situated below-grade of the highway, and has vehicular entrances from both the highway and a minor street makai of the school.

This elementary school is part of the Windward District school system and serves students in Kindergarten through 6th grade including Special Education. In 1991, the school had a total enrollment of 483 students making it the 11th largest elementary school in the district out of 23 (the highest was Mokapu Elementary School with 934 students).¹¹

Castle High School is situated along Kaneohe Bay Drive near the Puohala Substation. This school is one of four high schools in the Windward District school system, and serves students in 9th through 12th grade including Special Education. This high school had the second highest student enrollment in the district in 1991 with 1,700 students.

9.3.2 Probable Impacts

Of the proposed project, only the overbuild of the existing 12 kV circuit (Part 3) may effect Kaneohe Elementary School. This portion of the project will not effect the projected student enrollments or staffing requirements for the school. A concern with EMF levels expressed by the Department of Education was previously discussed in Section 7.5 which determined that the projected EMF levels should be low in comparison to daily household items. Further, HECO is considering adding another pole along the mauka side of Kamehameha Highway to allow the new Koolau-Kaneohe 46 kV circuit to cross the highway further north and away from the school.

¹¹ Public and Private School Enrollment, September 11, 1991, Office of Business Services, Department of Education, State of Hawaii, January 1992.

Consequently, the only portion of this project which may impact Kaneohe Elementary School is associated with construction activities. This work should result in only short-term disruptions having a minimal impact to the elementary school's activities. As previously discussed in Section 7.4, increased noise generated by the installation of poles should be minimal because of the buildings' concrete structure serving as a noise buffer, and the distance and elevation away from the sidewalk (construction area). Construction work will also be conducted during non-peak commuter hours (9:00 am to 3:00 pm) resulting in no impact to the school's morning traffic. Some construction work would be occurring when school finishes in the early afternoon resulting in increased traffic congestion. However, vehicular access to the school from the highway will remain open and police officers would be assigned to direct traffic at the site to minimize traffic disruptions.

As with Kaneohe Elementary School, only construction activities associated with the reconductoring of the existing Koolau-Laelae-Kahuku 46 kV circuit (Part 4) and the installation of underground cables from the Puohala Substation (Part 5) may impact Castle High School. This construction work is expected to have minimal impacts to the daily activities conducted at this high school.

Increased noise generated by the installation of underground cables along Kaneohe Bay Drive should be minimal because of the buildings' structure serving as a noise buffer, and the school's distance away from the construction area. The reconductoring of the existing 46 kV lines should generate minimal noise increases since no excavation activities will be conducted. Construction work conducted during non-peak commuter traffic hours should not impact the high school's early morning traffic. Construction work occurring when school finishes in the early afternoon may result in increased traffic congestion. However, vehicular access to the school will remain open and police officers would be assigned to direct traffic at the site further minimizing traffic disruptions.

9.4 RECREATIONAL FACILITIES

9.4.1 Existing Conditions

The major recreational facilities located in the immediate vicinity of the project corridor include Hoomaluhia Botanical Garden, Bay View Golf Course, and playgrounds associated with Kaneohe Elementary School and Castle High School.

Hoomaluhia Botanical Garden is a City and County of Honolulu park located mauka of the Koolau Substation and Kamehameha Highway (Figure 5.2.1). Hoomaluhia Botanical Garden generally serves as a passive recreational park for both residents and tourists, and is open during normal daylight hours. Included on the grounds are a visitor center, equestrian area, restroom and picnic facilities, and paved trails for hiking or nature walks.

Kaneohe Elementary School and Castle High School both have athletic fields which are regularly used by students as well as organized youth sports leagues. Soccer, baseball and football games are commonly held at these facilities on weekends and used for practicing during the the late afternoons on weekdays.

Bay View Golf Course is located along Kaneohe Bay Drive by Puaae Road. This golf course is an 18-hole, par 3 golf course with a driving range that is open to the public. The golf course is open during normal daylight hours while the driving range is open during the day and at night.

9.4.2 PROBABLE IMPACTS

The completed project should not have any long-term impacts on the various activities conducted at these recreational facilities. Construction activities associated with the project should also have minimal or no impact to these facilities.

The only portion of the project located near Hoomaluhia Botanical Garden is Part 1. This segment of the project will not impact the use or access to this park because construction activities will be located outside the park and the only available access is from Luluku Road which is located in the residential area below Likelike Highway (see Figure 4.1.1).

The use and access to the field at Kaneohe Elementary School should not be disrupted by construction activities associated with Parts 3 or 4 of the project because the field is located on the makai (east) end of the school, and access is from a minor street off of Koa Kahiko Street. Construction activities associated with Parts 4 and 5 of the project should not disrupt access to Castle High School's field because work will be conducted during normal weekday work hours. Most games associated with youth activities occur on weekends, and practice is usually held during late afternoons on weekdays.

Construction activities associated with Part 5 of the project should result in increased traffic congestion along Kaneohe Bay Drive, however, vehicle disruptions accessing Bay View Golf Course should be minimal. Construction activities will take place approximately 800 feet away from the golf course entrance, and activities conducted at the course during this construction time period (9:00 am to 3:00 pm) is lower than weekends or evenings. Further, police officers will be assigned to the site to monitor traffic flow.

9.5 COMMUNITY FACILITIES

9.5.1 Existing Conditions

Hawaiian Memorial Park Cemetery, Aloha Health Care Center and Windward City Shopping Center are the major community facilities located along the proposed project corridor. Hawaiian Memorial Park Cemetery is located along a stretch of Kamehameha Highway opposite of Kahiko Street and Mokulele Drive. The main entrance to this cemetery is from the highway across of Halekou Road.

Windward City Shopping Center encompasses the entire block located at the corner of Kamehameha Highway with Kaneohe Bay Drive. This shopping center is comprised of a variety of commercial businesses, retail stores, a supermarket, and various restaurants. Vehicular access to this shopping center is primarily from Kaneohe Bay Drive and Kamehameha Highway, but other accesses are available from minor streets such as Koa Kahiko Street.

The Aloha Health Care Center is a privately-owned care home for the elderly and handicapped. This center is located makai of Kamehameha Highway at its intersection with Duncan Drive. With a staff of 160 employees, it has provided comprehensive 24-hour care to its 130 residents for the past four years. There are two entranceways to this facility, one entrance is from Kamehameha Highway and the other is from Duncan Drive.

9.5.2 Probable Impacts

The completed project should not have any long-term impacts to these community facilities or activities conducted at them. Construction activities associated with the project may result in minor disturbances to the shopping center and health center. However, these disturbances are expected to result in only minimal short-term impacts.

The overbuild of existing circuits located along Kamehameha Highway (Part 3) may result in increased noise levels due to construction activities. However, as discussed in Section 7.4, the anticipated increase in noise levels should not adversely disrupt activities conducted at the health center. Vehicular access to this center should not be affected by construction activities since the center has two entrances into the site of which one is from Duncan Drive which should not be affected by construction activities.

The overbuild of existing circuits along Kamehameha Highway (Part 3) and the reconductoring of the Koolau-Laelae-Kahuku circuit (Part 4) are expected to result in minimal disturbances to existing activities occurring at the Windward City Shopping Center. The entrance to this shopping center from Koa Kahiko Street is generally used less and should not be affected by construction activities.

Access to Hawaiian Memorial Park Cemetery is located makai (east) of Kamehameha Highway and therefore will not be impacted by Part 2 of the project which involves energizing the existing 46 kV line located mauka of the highway.

9.6 POLICE AND FIRE PROTECTION SERVICES

9.6.1 Police Protection Services

Existing Conditions

Police protection services for Windward Oahu are provided by the Kaneohe Police Station located at the intersection of Kamehameha Highway and Waikalua Road. Based upon discussion with staff at this station, there are presently 15 plain clothes police officers that comprise a Crime Reduction Unit and approximately 172 uniformed police officers that service the community by patrol cars. At any given time, there are approximately 50 uniformed police officers patrolling the Windward District.

Probable Impacts

The proposed project is expected to have minimal or no impact on the present level and delivery of police protection services. Disruptions to traffic flow are expected to be minimal and construction activities will be scheduled during non-peak traffic hours. If some lanes are closed during construction, alternate routes for all streets (except Kamehameha Highway) could be used by police officers in response situations.

There would be no loss of manpower at the Kaneohe Police Station in terms of officers being assigned to direct traffic flow during project construction. Officers assigned to direct traffic are not necessarily taken from the nearest police station. If officers are needed from the Kaneohe station to direct traffic at the project sites, they will probably be off-duty and compensated by HECO.

9.6.2 FIRE PROTECTION SERVICES

Existing Conditions

Fire protection services for Windward Oahu are provided by the Kaneohe Fire Station located at the intersection of Kamehameha Highway and Paleka Road. Based upon discussion with staff from this station, there are presently 12 fire fighters and one captain stationed here.

The Kaneohe Fire Station is equipped with two fire trucks and a medical emergency unit. If further assistance is needed, the Aikahi Fire Station located near the Kaneohe Marine Corps Air Base can respond with two additional fire trucks.

Probable Impacts

The proposed project is expected to have minimal or no impact on the present level and delivery of fire protection services. During construction activities, traffic congestion may increase slightly thereby hindering the fire fighters' access to the emergency site. However, police officers assigned to direct and monitor the movement of traffic at the construction sites should assist the efficient movement of fire trucks thereby minimizing impacts.

SECTION 10.0
ALTERNATIVES CONSIDERED

HECO considered three alternatives to the proposed project to meet their needs for a backup system in the event of a failure to other circuits or transformers. Two alternatives specifically apply to Part 1 of the project because of the expiration of the existing Koolau-Aikahi easement, and the easement owner's desire not to renegotiate perpetual easements due to preparation for a planned development. The alternatives considered are discussed below.

10.1 ALTERNATIVE A - NO-ACTION

The No-Action Alternative involved HECO not constructing the Koolau-Kaneohe 46 kV circuit to serve as a backup system. However, this is not a feasible alternative because projections made by HECO indicated the Koolau-Aikahi and Koolau-Laelae-Kahuku-Kahuku 46 kV circuits would be overloaded in the event of a failure to other circuits or transformers. Consequently, these two circuits would also fail resulting in potential failures to circuits serving other areas of the island. The loss of electrical power would cause disruptions and inconveniences to existing activities conducted in the affected areas along with economic impacts to businesses.

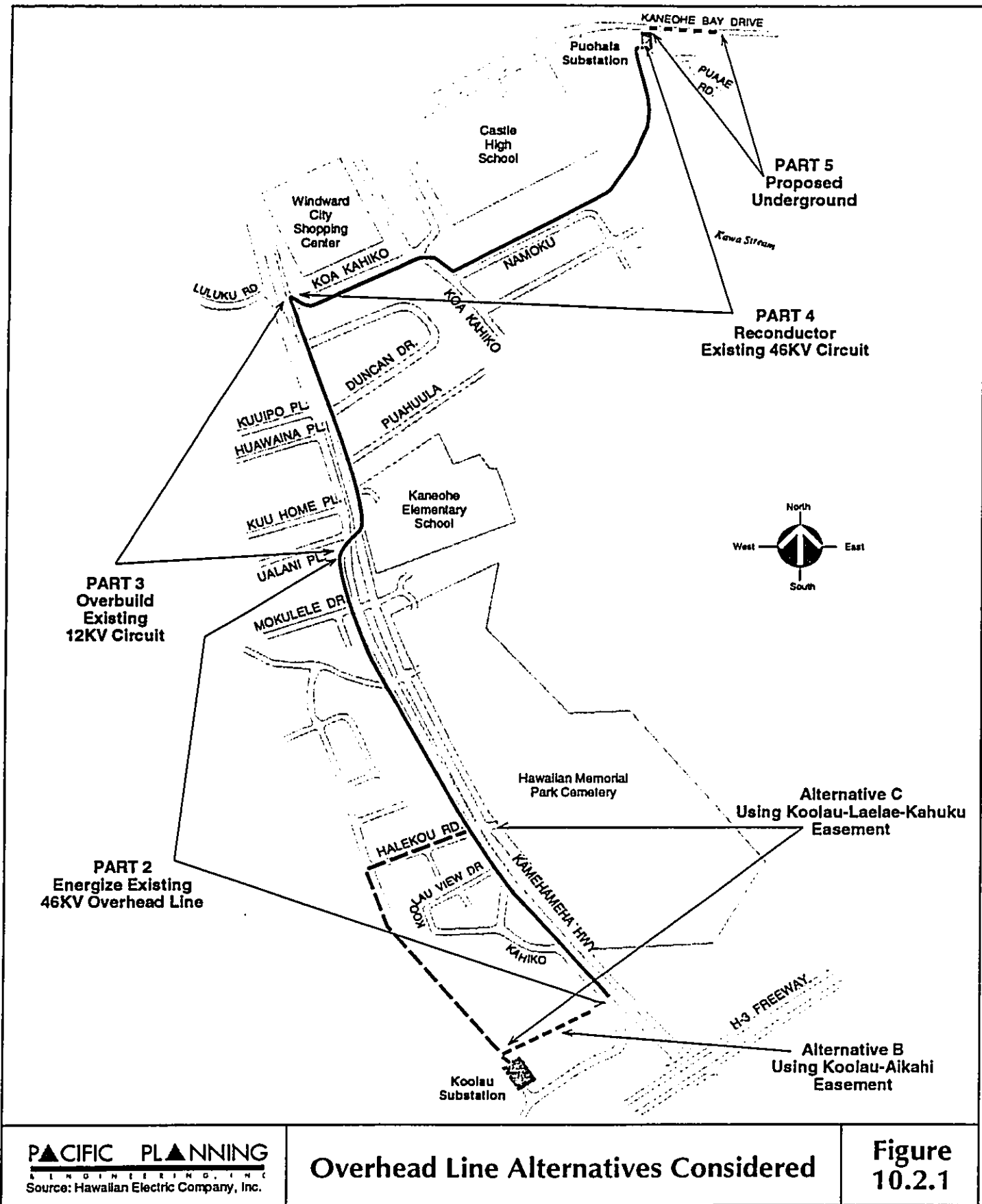
10.2 ALTERNATIVE B - USING KOOLAU-AIKAHI EASEMENT

Alternative B would involve the construction and installation of Parts 2 through 5 of the proposed project. However, the circuit would be connected to the Koolau Substation through the existing Koolau-Aikahi 46 kV circuit easement across privately-owned land. Figure 10.2.1 shows the alignment associated with this alternative.

This overhead line alternative would consist of double circuiting these existing lines (putting both 46 kV circuits on the same poles) to connect with the substation. Steel towers would need to be constructed to replace the existing wooden poles along this easement because the existing poles do not have enough room to add the new 46 kV conductors associated with the Koolau-Kaneohe circuit. Furthermore, the towers are needed to increase system reliability by providing additional strength to prevent the lines from falling. Consequently, these towers would require larger easements than present through the privately-owned land.

As a result, condemnation processes need to be initiated to obtain and retain the easement which would conflict with the land owner's future development plans. As discussed in Section 3.1, this condemnation process would also effectively delay the actual service date of the backup system.

Double circuiting these lines will reduce the reliability of the system because both the primary (Koolau-Aikahi) and backup (Koolau-Kaneohe) circuits will be located on single towers. If one tower goes down, both primary and backup circuits will fail which negates HECO's project objective of creating the backup circuit. Therefore, the proposed project was determined by HECO to be a more feasible and reliable alternative to meet their need for a backup system than Alternative B.



PACIFIC PLANNING
 ENGINEERING, INC.
 Source: Hawaiian Electric Company, Inc.

Overhead Line Alternatives Considered

Figure 10.2.1

**10.3 ALTERNATIVE C - USING KOOLAU-LAELAE-KAHUKU
EASEMENT**

Alternative C would involve the construction and installation of Parts 2 through 5 of the proposed project. However, the circuit would be connected to the Koolau Substation through the existing Koolau-Laelae-Kahuku 46 kV circuit easement across County-owned land (Hoomaluhia Park) and a portion of the privately-owned land.

As shown on Figure 10.2.1, this overhead line alternative would consist of routing the Koolau-Kaneohe 46 kV circuit along Halekou Road and then parallel to Kamehameha Highway before connecting with the substation. The existing Koolau-Laelae-Kahuku circuit would also need to be double circuited with the new backup circuit which will reduce the reliability of the system as discussed under Alternative B. Therefore, the proposed project was determined by HECO to be a more feasible and reliable alternative to meet their need for a backup system than Alternative C.

**SECTION 11.0
DETERMINATION AND FINDINGS**

11.1 DETERMINATION

The environmental assessment conducted assessed whether the probable impacts resulting from the proposed project may be significant in accordance with the significance criteria listed in Section 11-200-12 of the State Department of Health's EIS Rules.

Based upon the analysis results and assessment findings, the proposed project is not expected to have a significant impact to the existing environment as specified under the significance criteria. As a result, it was determined that a Negative Declaration is warranted for this proposed project.

11.2 FINDINGS AND REASONS SUPPORTING DETERMINATION

The findings and reasons which support the Negative Declaration determination for the proposed project are discussed below in terms of the 11 significance criteria from the EIS Rules.

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

The project will not involve an irrevocable commitment to loss or destruction of any natural or cultural resources located in the immediate vicinity of the project corridor. Part 1 of the project will involve the installation of 46 kV underground cables along the existing Service Road, and Part 5 will consist of constructing underground cables under Kaneohe Bay Drive. Thus, this work will not result in the loss or destruction of any natural or cultural resource. The remaining portions of the project will involve work on existing urbanized land areas primarily along roadways.

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

The proposed project will not curtail any existing or future beneficial uses of the environment located within the project corridor. The project will primarily consist of work limited to areas along existing roadways which are already committed to existing land uses, and thus will not curtail the range of beneficial uses of the environment.

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

As discussed in Section 6.3, the proposed project will not conflict with the State's long-term environmental policies or goals as expressed in Chapter 344 of the Hawaii Revised Statutes.

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

The proposed project consists of improvements to existing public utilities (electrical lines) intended to minimize the potential economic loss or social disruptions caused by power failures by creating an efficient and reliable backup system. As a result, the project will not substantially affect the economic or social welfare of the surrounding community or State.

5. Substantially affects public health.

The project will not substantially affect public health based upon the analysis and assessments conducted in this EA. The primary impacts associated with this project are related to construction activities which should cause only short-term minor disruptions to existing activities in the surrounding area. Furthermore, the State Department of Health did not have any concerns associated with the project based upon their response letter stating they had "no comment" on the project (see Appendix B).

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

The proposed project will only involve improvements to existing sub-transmission lines. As a result, the project will not create substantial secondary impacts resulting in changes to existing public facilities or population.

7. Involves a substantial degradation of environmental quality.

Based upon the field studies and assessments conducted in this EA, the proposed project will not involve a substantial degradation of environmental quality. Impacts associated with this project will be limited to short-term minor impacts such as increased noise levels at certain sites, and disruptions to traffic flow from construction activities.

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

The proposed project will not involve a commitment for larger actions, and will not have a cumulatively considerable impact to the existing environment.

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

The field surveys undertaken in this EA, and comments received from the U.S. Department of the Interior, Fish and Wildlife Service, have determined that rare, threatened or endangered species are not located within the project area. Consequently, the proposed project will not substantially affect these species or their habitat.

10. Detrimentially affects air or water quality, or ambient noise levels.

The only impacts to air or water quality, or ambient noise levels, associated with project are related to construction activities. However, these impacts are expected to be minimal and short-term. Air quality in the surrounding environment should not exceed National and State AAQS, and increased noise levels will only be temporary and are controlled by applicable regulations. Construction work will also not effect the existing water quality of streams.

11. Affects an environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

Only Parts 4 and 5 of the proposed project will be located in flood hazard areas inundated by 100-year flood associated with Kawa Stream. However, based upon field surveys observations, this area was not determined to be an estuarine environment. Construction work for Part 4 of the project will be located above ground resulting in minimal disruptions to the existing environment. Part 5 will involve construction and excavation work limited to specific areas within the existing roadway resulting in minimal erosion. Consequently, these portions of the project will result in minimal disturbances to this area.

SECTION 12.0
CONSULTED PARTIES AND THOSE WHO PARTICIPATED
IN THE PREPARATION OF THE REPORT

12.1 CONSULTED PARTIES IN THE DRAFT ENVIRONMENTAL ASSESSMENT

To seek comprehensive input on the project, the following organizations, government agencies, and citizens were consulted during the preparation of the Draft Environmental Assessment (Draft EA). The following agencies were sent a project summary describing the proposed sub-transmission line project. All issues and concerns raised in the various response letters received have been considered and assessed in the Draft EA. Those organizations, agencies, and citizens who have provided comments associated with the project are indicated with a "•." Correspondence letters with these organizations, agencies, and citizens are presented in Appendix A.

Federal Agencies

- Department of the Army, U.S. Army Engineer District
U. S. Department of Agriculture - Soil Conservation Service
- U. S. Department of the Interior - Fish and Wildlife Service
- U. S. Department of the Interior - Geological Survey, Water Resources Division

State and City Representatives

Honorable John Henry Felix
Honorable Marshall Ige
Honorable Stanley Koki
Honorable Terrance Tom
Honorable Michael McCartney

State Agencies

- Department of Business, Economic Development, and Tourism
- Department of Land and Natural Resources
- Office of Environmental Quality Control
- Office of State Planning
- Public Utilities Commission
- State Department of Education
- State Department of Health
- State Department of Transportation
- State Land Use Commission
- University of Hawaii Environmental Center

City and County of Honolulu Agencies

- Department of General Planning
- Department of Land Utilization
- Department of Parks and Recreation
- Department of Public Works
- Department of Transportation Services
- Honolulu Fire Department
- Honolulu Police Department

Neighborhood Boards

Kaneohe Neighborhood Board #30

Public Utilities

- Board of Water Supply
- GTE Hawaiian Tel

12.2 CONSULTED PARTIES IN THE FINAL ENVIRONMENTAL ASSESSMENT

The Draft EA was filed with the Office of Environmental Quality Control (OEQC) in March 1993 and published in the March 8, 1993 OEQC Bulletin. A 30-day comment period ensued and a total of two agencies submitted letters. One letter stated that there was no objection to the proposed action, while the other letter stated that there was "no comment." The two agencies whom have provided comments associated with the project are indicated with a "•." The two letters of correspondence with these agencies are presented in Appendix B.

Federal Agencies

Department of the Army, U.S. Army Engineer District
U. S. Department of Agriculture - Soil Conservation Service
U. S. Department of the Interior - Fish and Wildlife Service
U. S. Department of the Interior - Geological Survey, Water Resources Division

State and City Representatives

Honorable John Henry Felix
Honorable Marshall Ige
Honorable Stanley Koki
Honorable Terrance Tom
Honorable Michael McCartney

State Agencies

- Department of Business, Economic Development, and Tourism
- Department of Land and Natural Resources
- Office of Environmental Quality Control
- Office of State Planning
- Public Utilities Commission
- State Department of Education
- State Department of Health
- State Department of Transportation
- State Land Use Commission
- University of Hawaii Environmental Center

City and County of Honolulu Agencies

- Department of Land Utilization
- Department of Parks and Recreation
- Department of Public Works
- Department of Transportation Services
- Honolulu Fire Department
- Honolulu Police Department
- Planning Department

Neighborhood Boards

Kaneohe Neighborhood Board #30

Public Utilities

Board of Water Supply
GTE Hawaiian Tel

**12.3 ORGANIZATIONS AND INDIVIDUALS WHO ASSISTED IN
THE PREPARATION OF THIS EA REPORT**

Pacific Planning & Engineering, Inc.

Alvin K. U. Chong	Project Manager
Ronald A. Sato	Senior Planner
Alyssa Miller	Planner
Gwen Zakahi	Planner

Subconsultants and Organizations

Historic / Archaeology	Cultural Surveys Hawaii
Flora	Char & Associates
Electrical	Hawaiian Electric Company, Inc.
EMF Readings	M. K. Engineers, Inc.

SECTION 13.0
REFERENCES

CH2M Hill. Final Environmental Assessment and Routing Report, Waiiau-Makalapa No. 2 138 kV Transmission Line Project, prepared for Hawaiian Electric Company, Inc. May 1990.

Chu, Michael S. and Jones, Robert B. Coastal View Study, prepared for City and County of Honolulu, Department of Land Utilization. 1987.

Cox, Doak C. Earthquakes Felt on Oahu, Hawaii and Their Intensities. Environmental Center, University of Hawaii. 1986.

Department of Engineering and Public Policy, Carnegie Mellon University. Electric and Magnetic Fields from 60 Hertz Electric Power: What Do We Know About Possible Health Risks? 1989.

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

Electric Power Research Institute. Electric and Magnetic Field Fundamentals. An EMF Health Effects Resource Paper. n.d.

Environmental Protection & Health Services Division, State Department of Health. Hawaii Air Quality Data For Period of January 1988 - December 1990. 1992

"Isles' older volcanoes may wake." The Honolulu Advertiser, Tuesday, June 11, 1991, Section A-1, 4.

"It Broke My Heart." The Sunday Honolulu Star Bulletin and Advertiser, September 13, 1992, Section A-1, 1.

Murabayashi, Edwin T. and Iwao Kuwahara. Oahu Lands Classified by Physical Qualities For Urban Usage. Land Study Bureau, University of Hawaii. June 1969.

Nair, I., Morgan, G., and Florig, K., Department of Engineering and Public Policy, Carnegie Mellon University. Biological Effects of Power Frequency Electric and Magnetic Fields - Background Paper, prepared for Congress of the United States Office of Technology Assessment. May 1989.

Office of Business Services, Department of Education. Public and Private School Enrollment, September 11, 1991. May 1991

Sahara, Tamotsu, Edwin T. Murabayashi, Arthur Y. Ching, Gary D DeVight, Faith N. Fujimura, Eunice L. Awai, Lois S. Nishimoto, Harold L. Baker. Detailed Land Classification - Island of Oahu. Land Study Bureau, University of Hawaii. December 1972.

United States Army Corps of Engineers, Pacific Ocean Division. Hurricane Vulnerability Study For Honolulu, Hawaii and Vicinity. Volumes 1 and 3. Prepared for State of Hawaii Department of Defense. 1985.

United States Department of Agriculture Soil Conservation Service. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. August 1972.

APPENDICES

APPENDIX A

**Comments Received From Organizations and Agencies During
the Preparation of the Draft Environmental Assessment**



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT SHAFTER, HAWAII 96814

September 21, 1992

REPLY TO
ATTENTION OF:

Planning Division

Mr. Alvin K. U. Chong
Project Manager
Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

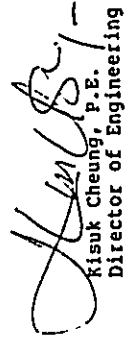
Dear Mr. Chong:

Thank you for the opportunity to review and comment on the environmental assessment preparation for the proposed Sub-Transmission Line Project in Kaneohe, Oahu. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act, the Rivers and Harbors Act of 1899, and the Marine Protection, Research and Sanctuaries Act.

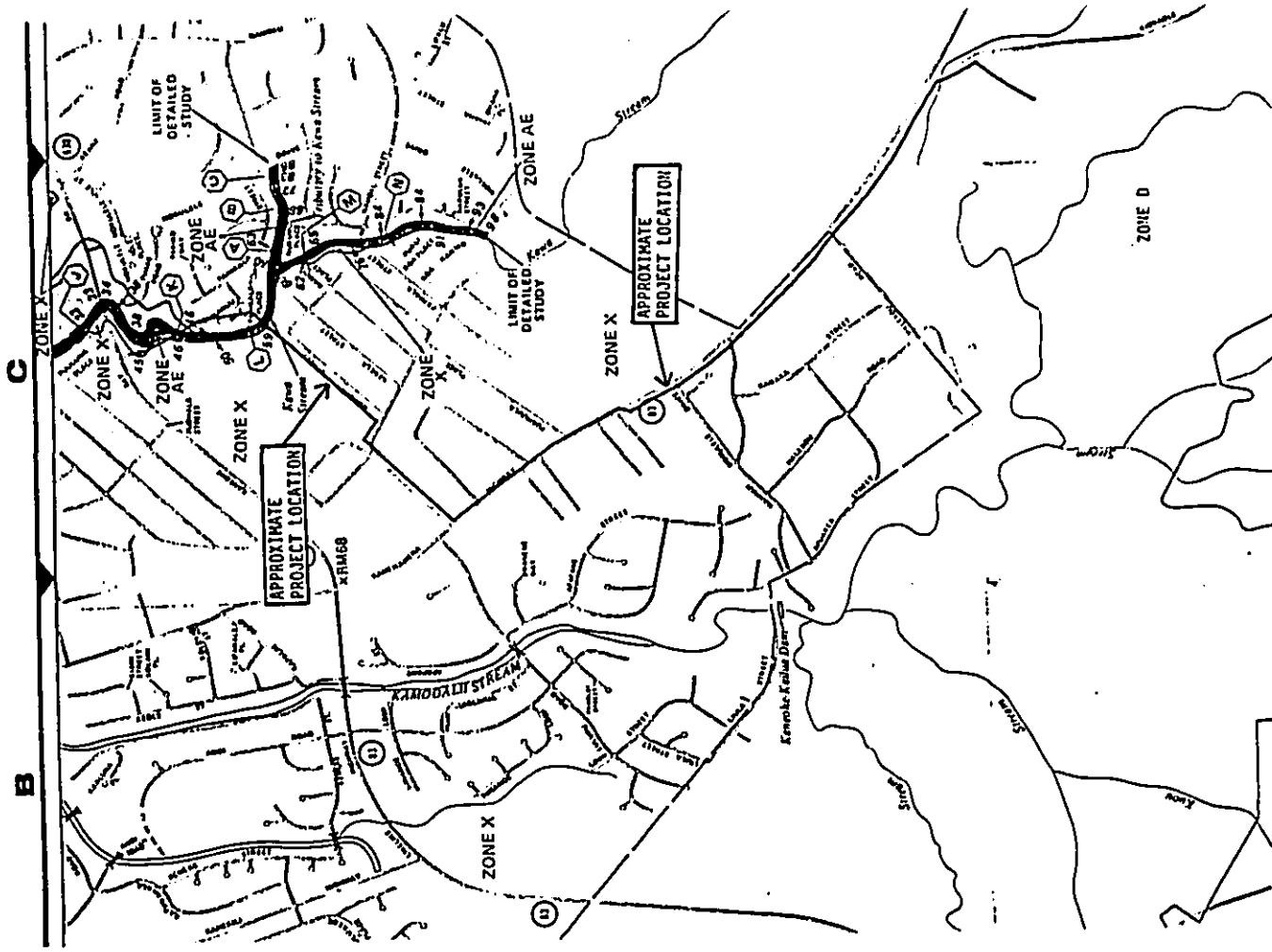
a. Replacement of transmission lines over Kawa Stream may require a Department of the Army Permit. HECO should consult with Operations Division as detailed plans are developed.

b. According to the enclosed Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM), Panel 150001-0090-C, dated September 28, 1990, the project area is located in the floodway area designated as Zone AE (areas inundated by the 100-year flood) with a base flood elevation of 46 and 59 feet; in Zone X-shaded (areas inundated by the 500-year flood); Zone X-unshaded (areas determined to be outside the 500-year flood plain); and Zone D (areas in which flood hazards are undetermined).

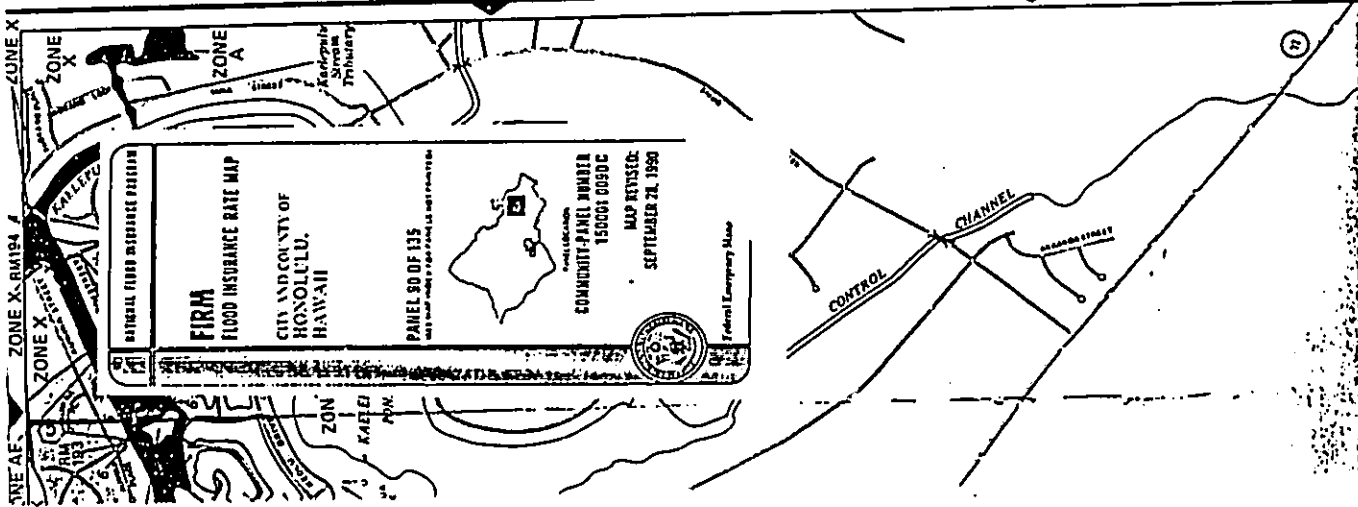
Sincerely,


Kinuk Cheung, P. E.
Director of Engineering

Enclosure



RECEIVED
SEP 23 1992



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
See Base Flood Elevation Determination.

ZONE A
Base Flood Elevation Determination.

ZONE AH
Flood depths of 1 to 3 feet (depths of 4 to 6 feet are shown in Zone AE); base flood elevations determined.

ZONE AG
Flood depths of 1 to 3 feet (depths of 4 to 6 feet are shown in Zone AE); average depths determined; for areas of 100-year flood, velocities also determined.

ZONE AB
To be protected from 100-year flood by levees or other flood protection systems under Federal or State jurisdiction.

ZONE V
Coastal flood with velocity hazard from storm surge; see base flood elevation determination.

ZONE VE
Coastal flood with velocity hazard (from storm surge); see base flood elevation determination.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X
Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X
Areas determined to be outside 500-year flood plain.

ZONE D
Areas in which flood hazards are undetermined.

Flood Boundary
Floodway Boundary
Zone D Boundary
Boundary Dividing Special Flood Hazard Zones, and Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
Base Flood Elevation Line; Elevation in Feet
Cross Section Line
Base Flood Elevation in Feet Where Uniform Within Zone
Elevation Reference Mark
Elevations to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding. Liability from local drainage sources of small size, or all planning features outside Special Flood Hazard Areas.

Areas of special flood hazard (100-year flood) include Zones A, AH, AG, AB, V, VE, and VE.

Levee areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodway were computed at cross sections and perpendicular between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shore line.

Elevation reference marks are described in the Flood Insurance Study Report.

For additional information, see separately printed Map Book 150001.

PACIFIC PLANNING
ENGINEERING INC.

October 29, 1992

Mr. Kisuk Cheung, Director of Engineering
Department of The Army
United States Army Engineer District
Fort Shafter, Building 250
Fort Shafter, Hawaii, 96858-5440

Dear Mr. Cheung:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 21, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Based upon field surveys and assessments conducted, the portion of Kawa Stream located mauka (south) of the Puohala Substation consists of a concrete lined drainageway which is not subject to tidal influence. The reconductoring of existing 46 kV lines (Part 4 of the project) over Kawa Stream will not result in the discharge of dredged or fill material into this drainageway requiring a Department of the Army Permit. However, Hawaiian Electric Company, Inc. will consult with your Operations Division staff as detailed construction plans are prepared.

Your flood hazard information discussed in your letter is appreciated and was addressed in the Environmental Assessment. Based upon this assessment, existing lines and proposed improvements are not expected to be significantly effected by flooding.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Office
P.O. Box 50167
Honolulu, Hawaii 96850



September 3, 1992

Mr. Alvin K. U. Chong
Pacific Planning Engineering, Inc.
1221 Kapiolani Boulevard
Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

This responds to your September 1, 1992 request for information on species and habitats of U.S. Fish and Wildlife concern that may be found in the vicinity of, or may be affected by, the proposed Sub-Transmission Line Project, Kaneohe, Hawaii.

We have reviewed the information provided with your request and pertinent information in our files. To the best of our knowledge, there are no listed or proposed endangered or threatened species of animals or plants that would be expected to be found in the vicinity of, or would be affected by, the proposal. Similarly, there are no especially significant habitats or other resources of our concern that would be adversely affected by the project.

Thank you for the opportunity to comment.

Sincerely yours,

Brooks Harper

Brooks Harper
Deputy Field Supervisor
Pacific Islands Office

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SEP 05 1992

PACIFIC PLANNING
ENGINEERING INC.

October 29, 1992

Mr. Brooks Harper, Deputy Field Supervisor
Fish and Wildlife Service
United States Department of the Interior
300 Ala Moana Boulevard
Honolulu, Hawaii, 96850

Dear Mr. Harper:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 3, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Your comments indicating there are no threatened habitats and endangered or threatened species of animals or plants in the project vicinity were supported by the botanical study and field work conducted for this Environmental Assessment.

Sincerely,

Alvin K. U. Chong

Alvin K. U. Chong
Project Manager



United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813



RECEIVED
SEP 16 1992

September 14, 1992

Mr. Alvin K. U. Chong
Project Manager
Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Subject: Environmental Assessment for a proposed Sub-Transmission Line project in Kaneohe, Oahu

The staff of the U.S. Geological Survey, Water Resources Division, Honolulu District, has reviewed the subject environmental assessment and we have no comments.

Thank you for allowing us to review this report.

Sincerely,

William Meyer
William Meyer
District Chief

October 29, 1992

PACIFIC PLANNING
ENGINEERING

Mr. William Meyer, District Chief
United States Department of the Interior
Geological Survey
Water Resources Division
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii, 96813

Dear Mr. Meyer:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 14, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project. Your comments will be included in the Environmental Assessment.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

PACIFIC PLANNING
ENGINEERING INC.

October 29, 1992

Mr. William W. Paty, Director
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Subject: Environmental Assessments for Koolau-Kaneohe 46 kV Sub-
Transmission Line Project

Thank you for your letter of October 16, 1992 regarding the Koolau-Kaneohe 46 kV Sub-Transmission Line Project. The comment provided by your Historic Preservation Division indicating that the project will have no effect on historic sites was verified in a archaeological study conducted for this Environmental Assessment.

According to the Commission on Water Resource Management staff, a stream channel alteration permit will not be required because construction activities will not result in the alteration of existing concrete-lined stream beds or banks.

The underground 46 kV cable to be installed from the Koolau Substation will be located within the State Department of Transportation's existing right-of-way for the H-3 Service Road. Adequate duct space will be provided in these cables for the potential future relocation of existing 46 kV lines by HECO.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE: 808-534-4188

September 9, 1992

Mr. Alvin Chong
Pacific Planning and Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Subject: Proposed Koolau-Kaneohe 46 kV Sub-Transmission Line,
Kaneohe, Oahu

Thank you for the opportunity to review the project summary for the
subject sub-transmission line. We have no comments to offer at
this time.

Sincerely,

Brian J. Choy

Brian J. J. Choy
Director

BRIAN J. CHOY
Director

RECEIVED
SEP 11 1992

PACIFIC PLANNING
ENGINEERING INC.

October 29, 1992

Mr. Brian J. J. Choy, Director
Office of Environmental Quality Control
State of Hawaii
220 South King Street, Fourth floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-
Transmission Line Project.

Thank you for your letter of September 9, 1992 regarding the proposed
Koolau-Kaneohe 46 kV Sub-Transmission Line Project. Your comments will
be included in the Environmental Assessment.

Sincerely,

Alvin K. U. Chong

Alvin K. U. Chong
Project Manager

PACIFIC PLANNING
ENGINEERING, INC.

October 29, 1992

Mr. Harold S. Masumoto, Director
Office of State Planning
Office of the Governor
250 South Hotel Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Masumoto:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-
Transmission Line Project.

Thank you for your letter of September 14, 1992 regarding the proposed
Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

We appreciate your clarification of the location for the Windward City
Shopping Center and comment on map clarification. A description of
existing land uses and probable impacts resulting from the proposed project
will be addressed in the Environmental Assessment.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

RECEIVED
SEP 27 1992



THOM BLAKE
Contractor

STATE OF HAWAII
PUBLIC UTILITIES COMMISSION
DEPARTMENT OF BUDGET AND FINANCE
465 S KING STREET
ELEAHOA BUILDING, FIRST FLOOR
HONOLULU, HAWAII 96813

PAUL A. YOUNG
Commissioner

September 21, 1992

Alvin K. U. Chong
Project Manager
Pacific Planning Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

We are responding to your letter of September 1, 1992. Hawaiian Electric Company, Inc. (HECO) is seeking the Public Utilities Commission's approval to commit \$1,606,600 to install the Koolau-Kaneohe 46 kilovolt (kv) circuit (the project). The project involves the installation and reconductoring of underground cables and overhead conductors from the Koolau substation, along Kamehameha Highway, Koa Kahiko Street, and Namoku Street to the Puohala substation. The proposed project appears to be the same project that is the subject of HECO's conservation district use application.

The Public Utilities Commission has not completed its deliberations with respect to HECO's request. Accordingly, the Commission refrains from commenting on HECO's request before the Department of Land and Natural Resources.

Very truly yours,

Henry Tsuyemura
Henry Tsuyemura
Administrative Director

HT:CG:ac

PACIFIC PLANNING
ENGINEERING INC.

October 29, 1992

Mr. Henry Tsuyemura, Administrative Director
Public Utilities Commission
Department of Budget and Finance
State of Hawaii
Kekuanaoa Building, First floor
465 South King Street
Honolulu, Hawaii 96813

Dear Mr. Tsuyemura:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kv Sub-Transmission Line Project.

Thank you for your letter of September 21, 1992 regarding the proposed Koolau-Kaneohe 46 kv Sub-Transmission Line Project. Your comments will be included in the Environmental Assessment.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

1221 KAPLOANI BOULEVARD SUITE 740 HONOLULU HAWAII 96813 TEL: (808) 521-6163 FAX: (808) 521-6748

JOHN BURNS
GOVERNOR

CHARLES TOGUCHI
SUPERINTENDENT



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 740
HONOLULU, HAWAII 96814

OFFICE OF THE SUPERINTENDENT

September 15, 1992

Mr. Alvin K. U. Chong
Project Manager
Pacific Planning
1221 Kapiolani Blvd. Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

SUBJECT: Environmental Assessment
Sub-Transmission Line Project; Hawaiian Electric
Kaneohe, Oahu

We have reviewed the subject project summary and have the following concerns regarding the 46KV sub-transmission line next to Kaneohe Elementary School. Part 3 of the project requires the addition of 46KV conductors to an existing 12KV line along Kamehameha Highway and fronting part of the Kaneohe Elementary School campus.

The Department of Education is concerned that such high voltage transmission lines pose a health and safety risk to the students and staff at Kaneohe Elementary School. Until research studies can show that such high voltage transmission lines pose no safety and health risk to students and staff, we strongly recommend that the lines be located away from the school campus.

Should there be any questions, please call the Facilities Branch at 737-4743.

Sincerely,

Charles T. Toguchi
Superintendent

CTT:hy

cc: A. Suga
J. Sosa

PACIFIC PLANNING
ENGINEERING, INC.

December 17, 1992

Mr. Charles T. Toguchi, Superintendent
Department of Education
State of Hawaii
P.O. Box 2360
Honolulu, Hawaii 96804

Dear Superintendent Toguchi:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 15, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Based upon projected EMF levels, the project is not expected to pose a significant health hazard to Kaneohe Elementary School. The projected EMF levels should be similar to or lower than levels associated with household appliances and electrical equipment used in classrooms.

In response to your concerns, HECO plans to incorporate design changes into the project to minimize EMF exposure levels at Kaneohe Elementary School. For example, HECO plans to extend the Koolau-Kaneohe 46 KV circuit routed along the mauka (west) side of Kamehameha Highway further north before crossing the highway. This change would result in the circuit being located further away (north) from Kaneohe Elementary School, thereby further reducing the already low exposure to EMF.

PACIFIC PLANNING
ENGINEERING, INC.

-2-

HECO plans to utilize a low reactance phasing design wherever practical to minimize EMF levels. Those measures are consistent with your department's policy adopted in April 1991 recommending a prudence avoidance approach in the siting of new electric facilities.

December 17, 1992

Dr. John C. Lewin, Director
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

Dear Dr. Lewin:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 10, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Based upon projected EMF levels, the project is not expected to pose a significant health hazard to Kaneohe Elementary School. The projected EMF levels should be similar to or lower than levels associated with household appliances and electrical equipment used in classrooms.

In response to your concerns, HECO plans to incorporate design changes into the project to minimize EMF exposure levels at Kaneohe Elementary School. For example, HECO plans to extend the Koolau-Kaneohe 46 kV circuit routed along the mauka (west) side of Kamehameha Highway further north before crossing the highway. This change would result in the circuit being located further away (north) from Kaneohe Elementary School, thereby further reducing the already low exposure to EMF.

PACIFIC PLANNING
ENGINEERING & PLANNING

December 18, 1992

Mr. T. Harano, Chief
Highways Division
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Harano:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-
Transmission Line Project.

Thank you for your letter of December 11, 1992 regarding the proposed
Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Your comments regarding the visual impacts and health effects associated
with magnetic fields from the overhead lines will be addressed in the
Environmental Assessment.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

JOHN W. HARRIS
DIRECTOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
145 FERNBUSH AVENUE
HONOLULU, HAWAII 96813

RE: D. JOHNSON
DIRECTOR
DEPARTMENT OF
TRANSPORTATION
JOHN W. HARRIS
DIRECTOR
CALIFORNIA HIGHWAY
PACIFIC

HRY-CH 2.3427
ID No. O-91-57

August 20, 1992

Mr. William F. Muench
Distribution Engineering Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Attention: Mr. Ryan Tani

Dear Mr. Muench:

Subject: Koolau-Kaneohe 46KV Underground Duct Lines Service
Road At E-3 Halakou Interchange
Your Letter of April 15, 1992

We approve the plans, subject to the following conditions:

1. Manholes should be located in shoulder areas;
2. Traffic control plans and notes should be provided;
3. Details and notes not applicable to project should be deleted; and
4. See other comments notated on the plans.

Please address each of the comments and submit three sets of the revised plans, including the checklist, for our review.

After you have satisfactorily addressed the above comments to the permits engineer, you may submit your tracing for my signature. Upon obtaining the required signatures, please submit three copies of the approved plans for our files.

The contractor may then apply for the Permit from our Oahu district engineer at 727 Kakaui Street (Telephone No. 831-6712).

Very truly yours,

John T. Harano
JOHN T. HARANO
Chief
Highways Division

Enclosure

JOHN BAUER
CONSULTING



STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
Room 114, Old Federal Building
Honolulu, Hawaii 96813
Telephone: 587-3422

ESTHER UEDA
EXECUTIVE OFFICER

RECEIVED
SEP 15 1992

September 11, 1992

Mr. ALVIN K. U. CHONG
Project Manager
Pacific Planning &
Engineering, Inc.
1221 Kapiolani Blvd., Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Subject: Project Summary for Hawaiian Electric Company, Inc.
Sub-Transmission Line Project in Kaneohe, Oahu

We have reviewed the subject project summary transmitted by your letter dated September 1, 1992 and confirm that a portion of the project is within the State Land Use Conservation District and the remaining portion is within the State Land Use Urban District.

Specifically, Part 1 of the project appears to be within the Conservation District. A portion of Part 2 of the project appears to be within the Conservation District, with the remaining portion within the Urban District. Parts 3 through 5 of the project are within the Urban District.

In regards to Part 2 of the project, the current boundary between the Conservation and Urban Districts is the property line between TRK: 4-5-42 and TRK: 4-5-54 south of Koolau View Drive.

We suggest that the project be depicted on a reproduction of State Land Use District Boundary Map, O-12 Kaneohe, and included in the environmental assessment.

We have no further comments to offer at this time.

Thank you for the opportunity to provide comments on this matter. If you should have any questions, please feel free to contact me or Leo Kusunok of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

ELJ:th

PACIFIC PLANNING
ENGINEERING

October 29, 1992

Ms. Esther Ueda, Executive Officer
Land Use Commission
Department of Business, Economic Development & Tourism
State of Hawaii
335 Merchant Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Ueda:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 11, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

We appreciate your comments identifying portions of the project located in either the Urban or Conservation Districts. According to the State Land Use District Boundary Map O-12 Kaneohe, the current Conservation line is the property line dividing Tax Map Keys 4-5-42 and 4-5-54. Consequently, only Part 1 of the proposed project is located within the Conservation District. A boundary interpretation has been obtained from your agency as part of the Conservation District Use Application for the project.

The proposed project will be depicted on a reproduction of the State Land Use Boundary Map O-12, and included in the Environmental Assessment.

Sincerely,

ALVIN K. U. CHONG
Project Manager

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU SEP 17 1992
950 SOUTH KING STREET
HONOLULU HAWAII 96813

RECEIVED



BENJAMIN B. LEE
CHIEF PLANNING OFFICER
EDWARD LIBERT JR.
DEPUTY CHIEF PLANNING OFFICER

ET 05/92-1928

September 16, 1992

Mr. Alvin K. U. Chong, Project Manager
Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Project Summary for
Hawaiian Electric Company (HECO) Proposed
Koolau-Kaneohe 46KV Subtransmission Line

In response to your letter of September 14, 1992, we have reviewed the subject project summary and have the following comments to offer:

1. The City's policy is that all high voltage transmission lines passing through urban or scenic coastal areas should be installed underground.
2. The Environmental Assessment should assess visual impacts of the proposed 46KV subtransmission line. Photo overlays or illustrations showing possible view impacts should be presented.

Thank you for the opportunity to comment. Should you have any questions, please contact Eugene Takahashi of our staff at 527-6022.

Sincerely,

Benjamin B. Lee
BENJAMIN B. LEE
Chief Planning Officer

BBL:ft

PACIFIC PLANNING
ENGINEERING, INC.

October 29, 1992

Mr. Benjamin B. Lee, Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Lee:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 16, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Regarding the City's policy of installing high voltage transmission lines underground, HECO is a regulated utility and is required to provide reliable electric service at a reasonable cost to its customers. In general, HECO's tariff as authorized by the Public Utilities Commission (PUC) is based on an overhead electric system. If a private developer requests underground facilities and is willing to pay for the additional cost, then HECO will place the lines underground. In certain specific locations where lines are required to be underground, such as in the Hawaii Capitol Special District, HECO will install lines underground which would be paid for by all customers subject to PUC approval.

The Environmental Assessment will assess visual impacts of the proposed project and include visual illustrations showing expected changes to existing views.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
150 SOUTH KING STREET
HONOLULU, HAWAII 96813 • PHONE 533-4423

RECEIVED
SEP 15 1992



FRANK FASH
MAILER

DONALD A. CLEGG
DIRECTOR
LORETTA C. CHONG
DEPUTY DIRECTOR
92-03000 (AC)

September 14, 1992

Mr. Alvin K. U. Chong
Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Environmental Assessment for a Proposed
Koolau-Kaneohe 46kV Sub-Transmission Line
Kaneohe, Oahu

Thank you for providing the Department of Land Utilization the opportunity to review the above referenced project summary as part of the environmental assessment process.

Figure 1, project site plan, incorrectly depicts the location of the Windward City Shopping Center. The correct location of the shopping center should be shown on the right side of Kamehameha Highway at the intersection of Kamehameha Highway and Kaneohe Bay Drive.

Should you have any questions, please contact Art Challacombe of our staff at 523-4107.

Very truly yours,

Donald A. Clegg
DONALD A. CLEGG
Director of Land Utilization

DAC:ct
81-0011001.AC

PACIFIC PLANNING
ENGINEERING INC.

October 29, 1992

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

Dear Mr. Clegg:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 14, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

We appreciate your clarification of the location for the Windward City Shopping Center. The correction will be made in the Environmental Assessment.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
1325 KALANIKULANI DRIVE
HONOLULU, HAWAII 96813

RECEIVED
SEP 18 1992



WALTER OZAWA
DIRECTOR
ALVIN K. U. CHONG
DEPUTY DIRECTOR

September 16, 1992

Mr. Alvin K. U. Chong
Project Manager
Pacific Planning
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Subject: Proposed HECO Subtransmission Line in Kaneohe
Tax Map Key 4-5-62, 54, et al

We have reviewed the proposed project to construct a new
46 KV subtransmission line in Kaneohe and make the following
comments and recommendation.

We have determined that the alignment of the project will
impact street trees along the City roadways. We recommend
that you contact Jason Yuen of our Advance Planning Branch at
527-6315 to discuss street trees concerns relative to the
project.

Construction plans for the project will be required to be
submitted for our review and approval.

Sincerely,

For WALTER M. OZAWA, Director

WMO:ei

cc: Hawaiian Electric Company, Inc.

PACIFIC PLANNING

AN ENVIRONMENTAL CONSULTING FIRM

October 29, 1992

Mr. Walter M. Ozawa, Director
Department of Parks and Recreation
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Ozawa:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-
Transmission Line Project

Thank you for your letter dated September 16, 1992 regarding the proposed
Koolau-Kaneohe 46 kV Sub-Transmission Line Project. Your concern with
potential impacts to street trees along City roadways was discussed with your
Department's staff, and were assessed in the Environmental Assessment.

Only Parts 4 and 5 of the project may affect street trees along City roadways.
Based upon the assessment, there should be minimal impacts to existing
street trees since no existing trees along City roadways will be replaced by the
project. The only effects to trees may be the trimming of some overgrown
branches to avoid the sub-transmission lines. HECO presently has a
maintenance crew assigned to make sure tree branches avoid existing lines in
order to prevent potential power failures.

Construction plans for the project will be submitted for your review and
approval.

Sincerely,

Alvin K. U. Chong
Project Manager

RECEIVED
SEP 23 1992

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
840 SOUTH KING STREET
HONOLULU, HAWAII 96813



C. MICHAEL STREET
DIRECTOR AND CHIEF ENGINEER
FELIX B. LIMTICO
DEPUTY DIRECTOR

ENV 92-229

September 17, 1992

Mr. Alvin K. U. Chong
Project Manager
Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Subject: Preliminary Environmental Assessment (PEA)
Koolau-Kaneohe 46 kV Sub-Transmission Line
TKK:Various

We have reviewed the subject PEA and have the following comments:

1. All improvements within the City's right-of-way should be done in accordance with City standards.
2. There may be conflicts between the proposed alignment of the subject 46 kV sub-transmission line and the City's existing sewers in the area. Therefore, construction plans for the subject project should be submitted to our Division of Wastewater Management for review and approval.

Very truly yours,

MICHAEL STREET
Director and Chief Engineer

PACIFIC PLANNING
ENGINEERING

October 29, 1992

Mr. C. Michael Street, Director
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Street:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 17, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

All improvements within the City's right-of-way will be constructed in accordance with City standards. The construction of the project is not expected to conflict with any existing City sewer lines in the area and construction plans will be submitted to your Division of Wastewater Management for review and approval.

Sincerely,

Alvin K. U. Chong
Project Manager

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

GENERAL ENGINEERING
1221 KAPOLANI BOULEVARD
HONOLULU, HAWAII 96814

RECEIVED
SEP 20 1992



JOSEPH M. MAGALDI, JR.
DIRECTOR
GENERAL ENGINEERING
1221 KAPOLANI BOULEVARD
HONOLULU, HAWAII 96814

TE-3837
PL92.1.327

September 17, 1992

Mr. Alvin K. U. Chong, Project Manager
Pacific Planning and Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Subject: Koolau-Kaneohe 46KV Sub-Transmission Line
Draft Environmental Assessment
THK: 4-5-34, 36, 38, 42, 43, 54, 60, 61, and 103

This is in response to your letter of September 1, 1992 requesting our comments on the subject environmental assessment. Based on our review, we have no objections to the proposed transmission line project at this time. However, construction plans should be submitted to our department for review. A traffic control plan showing temporary detours for pedestrians and vehicles should be included in these plans.

Should you have any questions, please contact Lance Watanabe of my staff at 523-4199.

Sincerely,

Joseph M. Magaldi, Jr.
JOSEPH M. MAGALDI, JR.
Director

PACIFIC PLANNING
ENGINEERING

October 29, 1992

Mr. Joseph M. Magaldi, Jr., Director
Department of Transportation Services
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Magaldi:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 17, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Construction plans which will include a traffic control plan will be submitted to your department for review.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

RECEIVED
SEP 17 1992

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
1433 SOUTH SEVENTH STREET, ROOM 305
HONOLULU, HAWAII 96814



FRANK F. KAM
MAYOR

LIONEL E. CAMARA
FIRE CHIEF
DONALD S. M. CHANG
DEPUTY FIRE CHIEF

September 15, 1992

Mr. Alvin K. U. Chong, Project Manager
Pacific Planning & Engineering, Inc.
1221 Kapiolani Blvd., Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Environmental Assessment
Proposed 46kV Sub-Transmission Line Project
Kaneohe, Oahu

We have reviewed the application for the above subject request and have no objections to the proposal.

Should you have any questions, please contact Assistant Chief Attilio Leonardi of our Administrative Services Bureau at 943-3838.

Sincerely,

Donald S. M. Chang
DONALD S. M. CHANG
Acting Fire Chief

AKL:ny

PACIFIC PLANNING
ENGINEERING INC.

October 29, 1992

Mr. Lionel E. Camara, Fire Chief
Fire Department
City and County of Honolulu
1455 South Beretania Street, Room 305
Honolulu, Hawaii 96814

Dear Chief Camara:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 15, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Your comments will be included in the Environmental Assessment prepared for the Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
821 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 531-3111

RECEIVED
SEP 18 1992



FRANK E. JASI
WAGON

MICHAEL S. NAKAMURA
CHIEF
HAROLD M. JAWALEKI
DEPUTY CHIEF

OUR REFERENCE MS-LX

September 15, 1992

Mr. Alvin K. U. Chong
Project Manager
Pacific Planning & Engineering, Inc.
1221 Keoluani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Subject: Environmental Assessment Preparation for
Koolau-Kaneohe 46KV Sub-Transmission Line

We have reviewed the information and map provided regarding the above project. Our primary concerns are the minimizing of hazards and traffic disruptions during the construction phases of the project.

Thank you for the opportunity to comment.

Sincerely,

MICHAEL S. NAKAMURA
Chief of Police

BY *Chester E. Hughes*
CHESTER E. HUGHES
Assistant Chief of Police
Support Services Bureau

PACIFIC PLANNING
ENGINEERING INC.

October 29, 1992

Mr. Michael S. Nakamura, Chief of Police
Police Department
City and County of Honolulu
1455 South Beretania Street
Honolulu, Hawaii 96814

Dear Chief Nakamura:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of September 15, 1992 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Your concerns with minimizing hazards and traffic disruptions raised in your letter will be addressed in the Environmental Assessment.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU HAWAII 96813



September 28, 1992

THANK YOU FOR
KAZU HAYASHIDA, JR. CHONG
MICHAEL STREIBER, CHIEF ENGINEER
SHERYL DALLMAN-CHONG, OSE
JIMMY ANDERSON, JR.
RELO JOHNSON
WELSA TILUM
KAZU HAYASHIDA, JR.
CHIEF ENGINEER

Mr. Alvin K. U. Chong,
Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 740
Honolulu, Hawaii 96814

Dear Mr. Chong:

Subject: Your Letter of September 1, 1992 Regarding the Environmental Assessment
for the Proposed HECO Koolau-Kaneohe 46 kV Sub-Transmission Line,
TMK: 4-5

RECEIVED
OCT 1 1992

Thank you for the opportunity to review and comment on the proposed transmission
line project. We have no objections to the proposed project. The construction drawings
should be submitted for our review and approval.

If you have any questions, please contact Bert Kuiuoka at 527-5235.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

PACIFIC PLANNING

ENGINEERING

October 29, 1992

Mr. Kazu Hayashida, Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-
Transmission Line Project.

Thank you for your letter of September 28, 1992 regarding the proposed
Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Construction plans for the project will be submitted to the Board of Water
Supply for your review and approval.

Sincerely,

Alvin K. U. Chong
Project Manager

HTC Hawaiian Tel

Beyond the call

Site address: Telephone Company Building
P.O. Box 2302, Honolulu, HI 96811 (808) 531-4511

September 16, 1992

RECEIVED
SEP 18 1992

Pacific Planning & Engineering Inc.
1221 Kapiolani Blvd., Suite 740
Honolulu, HI 96814

Attention: Alvin Chong

Subject: Koolau - Kaneohe 46 KV Line

WE ARE SENDING THE FOLLOWING: ATTACHED

PRELIM. DRAWINGS FINAL DRAWINGS
 STANDARD DRAWINGS SPECIFICATIONS

COPIES	NO.	DESCRIPTION
1	1	Figure 1

THESE ARE TRANSMITTED AS CHECKED BELOW:

FOR APPROVAL APPROVED AS SUBMITTED
 FOR YOUR USE APPROVED AS NOTED
 AS REQUESTED RETURNED FOR CORRECTIONS
 FOR REVIEW AND COMMENT

REMARKS: HTCo has a direct buried military cable along Namoku and Koa
Kahiko Streets, as shown on Figure 1.

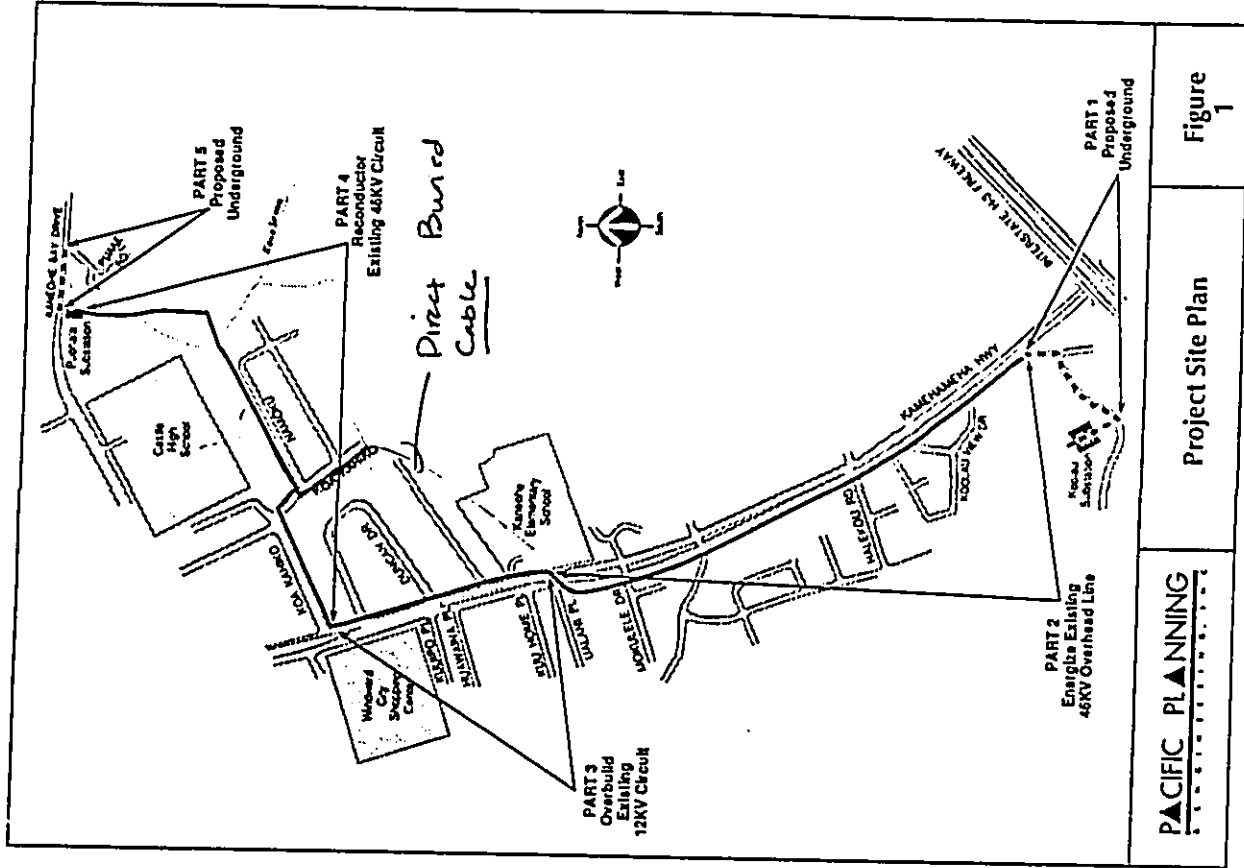
If there are questions, please call Lynette Yoshida at 834-6290.

Sincerely,

Daniel J. Hayashi
Garret T. Hayashi
Operations Supervisor

Attachments

c: L. Yoshida
File



PACIFIC PLANNING

Project Site Plan

Figure 1

PACIFIC PLANNING
ENGINEERING, INC.

October 29, 1992

Mr. Garret T. Hayashi, Operations Supervisor
GTE Hawaiian Telephone Company, Inc.
P.O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Hayashi:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-
Transmission Line Project.

Thank you for your letter of September 16, 1992 regarding the proposed
Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

We appreciate your prompt reply informing us that GTE Hawaiian
Telephone Company, Inc. has a direct buried military cable along Namoku
and Koa Kahiko Streets. The proposed project is not expected to affect this
cable since work conducted in this area will be situated above ground.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

APPENDIX B

**Comments Received on the Draft Environmental Assessment
From Organizations and Agencies**



53 MAR 2 1993
 DEPARTMENT OF HEALTH
 DIVISION OF ENVIRONMENTAL HEALTH SERVICES
 STATE OF HAWAII
 P. O. BOX 3378
 HONOLULU, HAWAII 96801
 February 25, 1993

JOHN C. LEWIN, M.D.
 DIRECTOR OF HEALTH

In reply, please refer to:

93-043/epo

To: The Honorable John P. Keppeler, II, Acting Chairperson
 Department of Land & Natural Resources

From: John C. Lewin, M.D. *John C. Lewin*
 Director of Health

Subject: Request for Comments
 Conservation District Use Application
 Applicant: Hawaiian Electric Company

File No.: OA - 2617
 Request: Underground Transmission Line
 Location: Koolau - Kaneohe, Oahu
 THK: 4-5-54: 72 & 78
 4-5-42: 2, 7-9, 11

Thank you for allowing us to review and comment on the subject request. We do not have any comments at this time.

33 00 10 55
 0000
 0000
 0000

PACIFIC PLANNING
 ENGINEERING, INC.

May 10, 1993

Dr. John C. Lewin, Director of Health
 Department of Health
 State of Hawaii
 P.O. Box 3378
 Honolulu, Hawaii 96801

Dear Dr. Lewin:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of February 25, 1993 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Your letter will be included in the Final Environmental Assessment for the subject project.

Sincerely,

Alvin K. U. Chong
 Alvin K. U. Chong
 Project Manager

PLANNING DEPARTMENT
CITY AND COUNTY OF HONOLULU
450 SOUTH KING STREET
HONOLULU, HAWAII 96813



30 MAR 8 4 37 J
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
PLANNING DIVISION

ROBIN FOSTER
CHIEF PLANNING OFFICER
ROLAND B. LIBBY, JR.
SECRETARY PLANNING OFFICER
ET 2/93-337

March 3, 1993

Honorable John P. Keppeler II, Acting Director
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Keppeler:

Conservation District Use Application
for 46 Kilovolt, Koolau-Kaneohe Transmission Line,
Tax Map Key: 4-5-54; portions of 72 & 78, and
4-5-42; portions of 2, 7, 8, 9 & 11--No. OA-1/12/93-2617

In response to your letter of February 10, 1993, we have reviewed the subject Conservation District Use Application and have no objections to the proposal.

Thank you for the opportunity to comment. Should you have any questions, please contact Eugene Takahashi of our staff at 527-6022.

Sincerely,

Robin Foster
ROBIN FOSTER
Chief Planning Officer

RF:js

PACIFIC PLANNING
ENGINEERING & ARCHITECTURE

May 10, 1993

Mr. Robin Foster, Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Foster:

Subject: Environmental Assessment for Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Thank you for your letter of March 3, 1993 regarding the proposed Koolau-Kaneohe 46 kV Sub-Transmission Line Project.

Your letter will be included in the Final Environmental Assessment for the subject project.

Sincerely,

Alvin K. U. Chong
Alvin K. U. Chong
Project Manager

APPENDIX C

**Botanical Assessment Report, Ko'olau-Kane'ohe
46 KV Sub-Transmission Line**

BOTANICAL ASSESSMENT REPORT
KO'OLAU-KANE'OHE 46 KV SUB-TRANSMISSION LINE
KANE'OHE, ISLAND OF O'AHU

by

Winona P. Char
CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: PACIFIC PLANNING & ENGINEERING, INC.
September 1992

BOTANICAL ASSESSMENT REPORT
KO'OLAU-KANE'OHE 46 KV SUB-TRANSMISSION LINE
KANE'OHE, ISLAND OF O'AHU

INTRODUCTION

The proposed project involves improvements to existing 12 kV and 46 kV lines located in Kane'ohe and will generally follow existing sub-transmission lines along public roadways. The proposed sub-transmission line improvements will extend from Kane'ohe Bay Drive near the Hawaiian Electric Company, Inc. (HECO), Pu'ohala Substation, along Namoku and Koa Kahiko Streets to Kamehameha Highway. The alignment would then follow along Kamehameha Highway to HECO's Ko'olau Substation, next to Ho'omaluhia Park and near the recently constructed segment of H-3 Freeway. A portion of the project near the Ko'olau Substation is located within the State Conservation District.

Field studies to assess the botanical resources found on the Ko'olau Substation and Pu'ohala Substation segments were conducted on 05 September 1992. The Ko'olau Substation segment will involve approximately 2,200 ft. of 46 kV underground cables, from the substation to a pole located on the Service Road adjacent to Kamehameha Highway. The shorter Pu'ohala Substation underground segment, about 600 ft. long, will extend from the substation to a pole located along Kane'ohe Bay Drive. The primary objectives of the botanical survey were to: 1) provide a general description of the vegetation along these two segments, 2) search for threatened and endangered plant species protected by Federal and State laws, and 3) identify areas of potential environmental problems or concerns and propose possible mitigation measures. The botanical assessment report will be incorporated into a document for a Conservation District Use Permit (Type B) from the State Department of Land and Natural Resources.

DESCRIPTION OF THE VEGETATION

The scientific names used in the following discussion follow Lamoureux (1984) for the ferns and Wagner et al. (1990) for the flowering plants.

Ko'olau Substation Segment

The narrow band of vegetation along the edge of the road, that is, the area between the pavement and where the scrub vegetation begins, is infrequently maintained. It consists of low mats of wedelia (Wedelia trilobata), a yellow-flowered ground cover species commonly used in landscaping, and several weedy grasses and herbs. These include California grass (Brachiaria mutica), pualele (Emilia fosbergii), Spanish clover (Desmodium incanum), and Hilo grass (Paspalum conjugatum); seedlings of Java plum (Syzygium cumini) and guava (Psidium guajava) are also found here.

The scrub vegetation by the substation consists of clumps of koa-haole (Leucaena leucocephala), Christmas berry (Schinus terebinthifolius), and guava shrubs in a dense mat of California grass. Further down the road, trees of Java plum and hau (Hibiscus tiliaceus), as well as the shrubs mentioned above, form somewhat dense stands. Also found in the scrub vegetation bordering the road is elephant grass or Napier grass (Pennisetum purpureum). This robust grass forms large clumps, from 6 to 14 ft. tall, and has narrow, spikelike, soft-bristly, yellow flowering heads which are 8 to 10 inches long.

Pu'ohala Substation Segment

The area between the substation and Kaneohe Bay Drive is landscaped with low mats of wedelia. Scattered through the wedelia are small patches of weedy species such as swordfern (Nephrolepis

multiflora), partridge pea (Chamaecrista nictitans), fimbriate paspalum (Paspalum frimbriatum), ricegrass (Paspalum scrobiculatum), sensitive plant or puahilahila (Mimosa pudica), and Florida beggarweed (Desmodium tortuosum).

Along the north side of Kaneohe Bay Drive, where the subtransmission line is proposed, the vegetation adjacent to the road consists of a maintained grassy strip. Next to the narrow, grassy strip is a chainlink fence and dense Guinea grass (Panicum maximum), from 5 to 7 ft. tall. Behind the fence is a line of Java plum trees, 25 to 30 ft. tall, a large mango (Mangifera indica), and smaller shrubs of koa-haole, 12 to 15 ft. tall. Maile pilau (Paederia scandens), a twining vine with foul-smelling leaves and purple and white flowers, is common, growing up the Java plum, koa-haole, and the fence.

DISCUSSION AND RECOMMENDATIONS

The vegetation on the two areas surveyed is dominated by introduced or alien species. Two native plants which occur on or border the areas surveyed are hau (Hibiscus tiliaceus) and ricegrass (Paspalum scrobiculatum). They are found throughout the islands in similar habitats. None of the plants found during the survey are officially listed threatened and endangered species (U.S. Fish and Wildlife Service 1989); nor are any proposed or candidate for such status (U.S. Fish and Wildlife Service 1990). A botanical survey of the nearby Minami golf course (Char 1986) recorded similar findings.

After reviewing the information on the proposed sub-transmission line project, the U.S. Fish and Wildlife Service (letter from B. Harper, 03 September 1992) responded that "... To the best of our knowledge, there are no listed or proposed endangered or threatened species of animals or plants that would be expected to

found in the vicinity of, or be affected by, the proposal. Similarly, there are no especially significant habitats or other resources of our concern that would be adversely affected by the project."

Given the findings above, and the limited nature of the project, the impacts upon the existing botanical resources are not expected to be significant. There are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed sub-transmission line project.

LITERATURE CITED

- Char, W.P. 1986. Botanical survey, 'Iolani School lands proposed for golf course development, Kane'ohe-Kailua, Island of O'ahu. Prepared for DHM, Inc., Honolulu. October 1986.
- Lamoureux, C.H. 1984. Checklist of the Hawaiian pteridophytes. Manuscript, University of Hawai'i, Manoa.
- U.S. Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants. 50 CFR 17.11 & 17.12.
- _____. 1990. Endangered and threatened wildlife and plants; Review of plant taxa for listing as Endangered and Threatened Species; Notice of review. Federal Register 55(35): 6184-6229.
- Wagner, W.L., D.H. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. 2 vols. University of Hawai'i Press and Bishop Museum Press, Honolulu. Bishop Museum Special Publication 83.

APPENDIX D

**Archaeological Assessment for the Proposed 46 kV
Sub-Transmission Line for Koolau-Kane'ohe**

**Archaeological Assessment for the Proposed 46kV Sub-
Transmission Line for Koolau-Kane'ohē, Kane'ohē O'ahu**

by
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and
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for

Pacific Planning and Engineering

Cultural Surveys Hawaii
September 24, 1992

Abstract

Cultural Surveys Hawaii was contacted by Pacific Planning and Engineering to perform an archaeological assessment for the proposed improvements to existing subtransmission lines between the Koolau Substation to Puohala substation to create a new Koolau-Kane'ohē 46kV circuit. Only two sections, a 2,200 linear foot section near the Koolau Substation and a 600 linear foot section near the Puohala Substation run underground while the rest of the corridor utilizes existing poles and conductors along Kamehameha Highway and several side streets. No prehistoric or historic sites or cultural layers were encountered within the proposed corridor. Construction of the transmission line corridor will have no adverse impacts on known cultural resources and no further archaeological work is recommended. Archaeological monitoring of construction excavations for the underground cable sections is not justified because of heavy previous disturbance (cutting and filling) of the areas by highway and Freeway construction.

Acknowledgements

Fieldwork was conducted by the authors. We would like to thank Alyssa Miller and Al Chong of Pacific Planning and Engineering and Lisa Ikeda of Hawaiian Electric for supplying maps and for facilitating our research.

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I. Introduction

A. Project Overview and Description

Cultural Surveys Hawaii was requested by Pacific Planning and Engineering to perform an archaeological survey and background literature survey in association with the proposed Koolau-Kane'ohe 46kV Sub-transmission Line project. The survey area (Figs. 1-4) consists of approximately 12,000 linear feet of transmission line corridor utilizing existing poles for most of the distance and underground cabling for 2,200 linear feet on the Koolau substation end and 600 linear feet on the Puohala substation end of the corridor route. From the Koolau substation the route extends underground along the side of the H-3 service road to Kamehameha Highway where it is then routed to existing surface poles to the north along the side of the highway until it reaches Koa Kahiko Street. It then runs along surface poles to Namoku Street and then along surface poles to Puohala substation. The route then comes out of Puohala substation and runs underground along Kane'ohe Bay Drive to the east for 600 linear feet before connecting with surface poles along Kane'ohe Bay Drive.

The project area was surveyed in pedestrian sweeps by two archaeologists in September of 1992. No prehistoric or historic features were encountered. The area has been heavily impacted by modern urbanization and road construction and any archaeological features that may have existed in the area have been completely destroyed during road construction. The two underground segments of the transmission line corridor are in areas that have been cut and filled to point where virtually none of the original land surface remains.

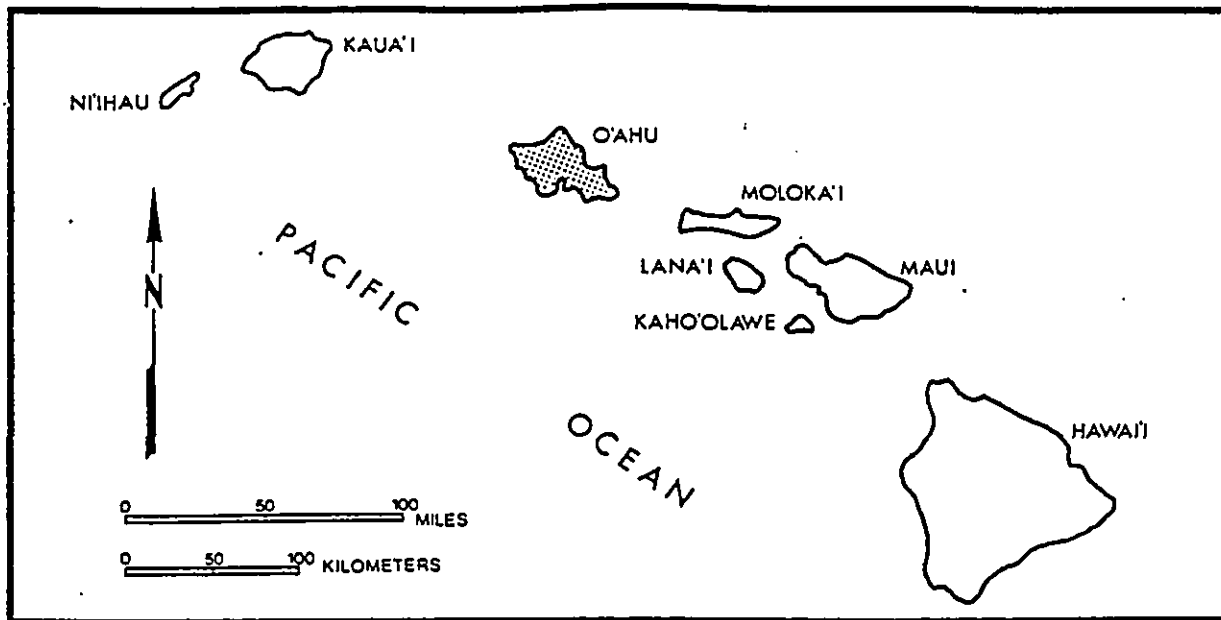


Fig. 1 State of Hawaii

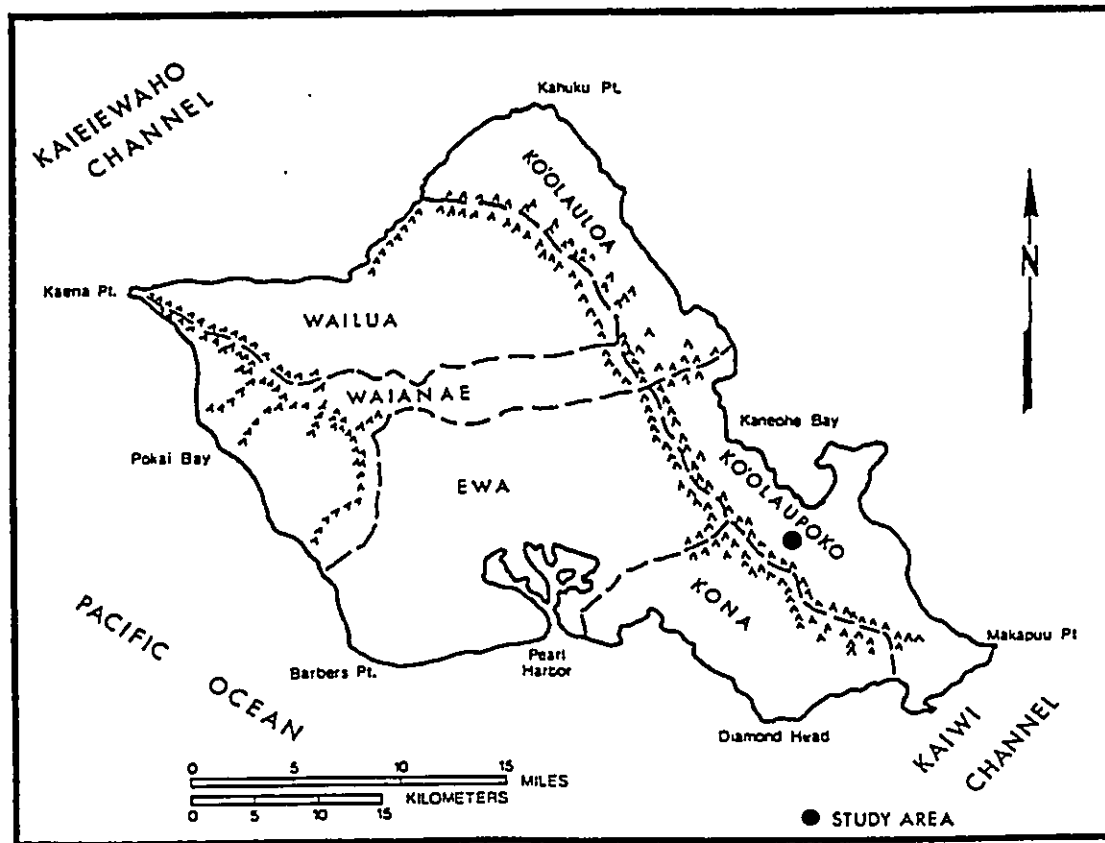


Fig. 2 O'ahu Island Location Map

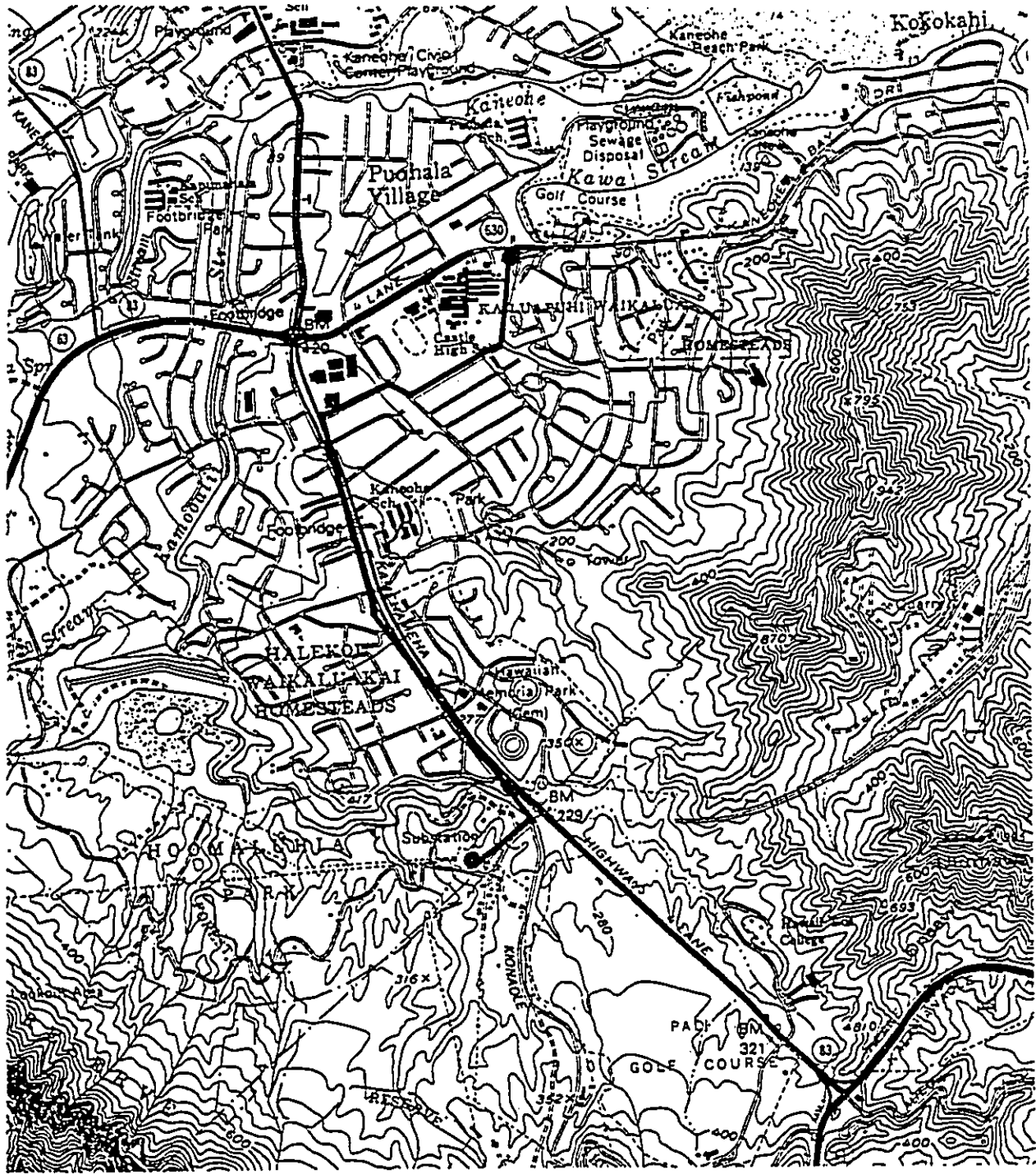


Fig. 3

U.S.G.S. Topographical Map 7.5 Minute Series of Kane'ohe Quad Showing Project Location

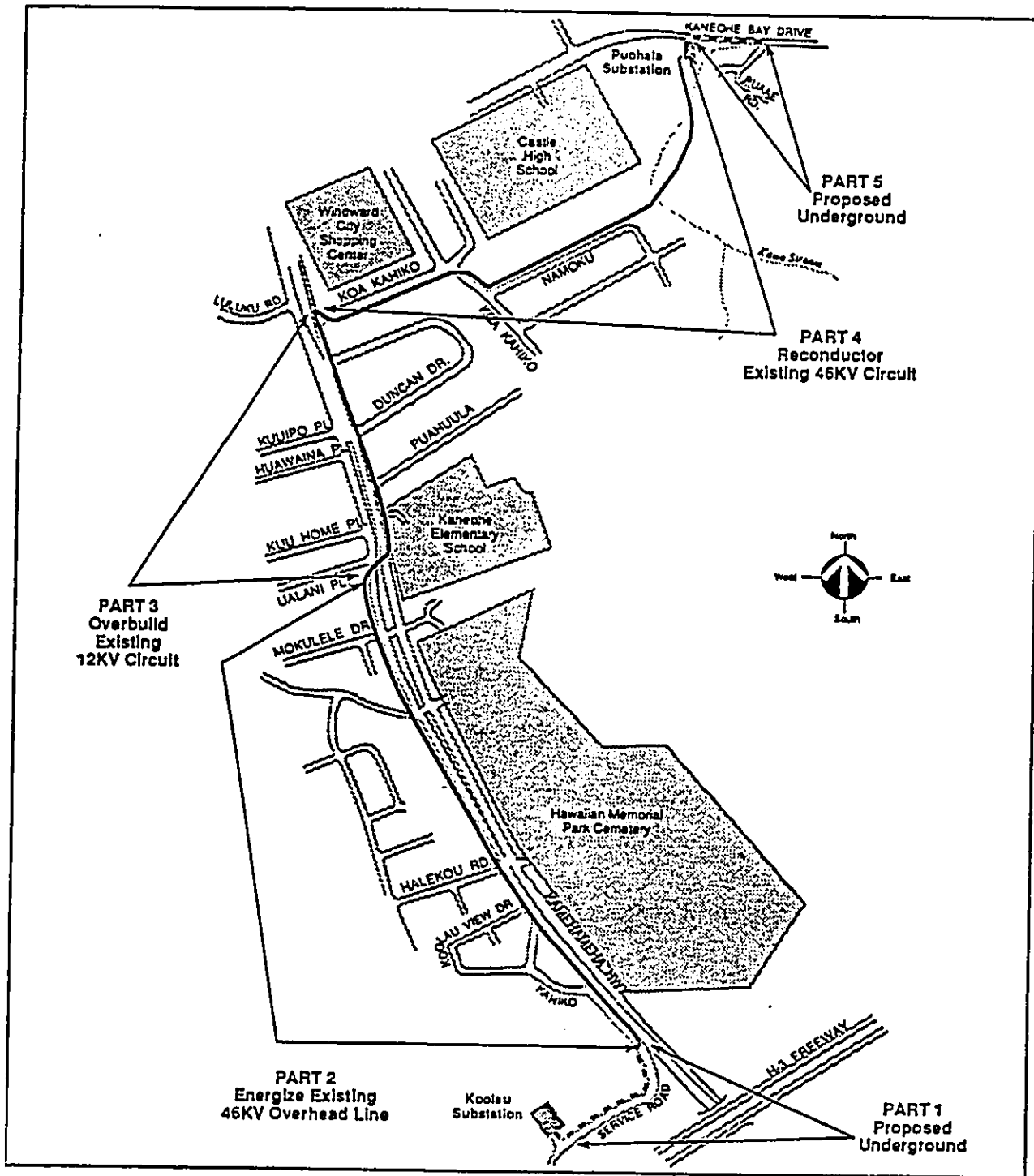


Fig. 4

46kV Transmission Line Corridor for Koolau-Kane'ohe Substation Showing Project Area

B. Scope of Work and Methods

The scope of work agreed upon between Cultural Surveys Hawaii and Pacific Planning and Engineering included the following.

1. Fieldwork consisting of an archaeological reconnaissance of proposed transmission line corridor to locate, map, and describe archaeological sites.
2. Preparation of a report containing the following:
 - a. A summary of historical sources and previous archaeological work;
 - b. Description of all archaeological sites found supplemented with maps and photos and with evaluations and significance assessments;
 - c. A summary and recommendations for further actions.

Background research was conducted primarily at Hamilton Library, University of Hawaii at Mānoa, the Historic Sites Section DLNR, and the State Survey Office.

No archaeological subsurface testing for the two segments of the powerline route proposed underground route was conducted because massive cutting and filling for highway construction was clearly indicated by surface survey observations including our conceptual reconstruction of the pre-highway topography as well as direct observation of exposed soil cuts.

II. Archaeological and Historical Background

A. History and Land Use

1. Traditional Land Use

The project area lies within the large *ahupua'a* (traditional land division) of Kāne'ohe; one of the eleven *ahupua'a* within the district of Ko'olaupoko, Island of O'ahu. Little is known of traditional land tenure. O'ahu was conquered by the Maui Chief Kahekili in 1783 and again by Kamehameha I in 1795 and it was the custom of ruling chiefs to disregard the land allocations of their defeated rivals. "Kamehameha I retained Kāne'ohe as his own personal property when he apportioned the conquered O'ahu lands in 1795 to his warrior chiefs and counsellors" (Devaney et al., 1982:222). In an early account of Kamehameha I's land allocations on O'ahu (Ti, 1959:69-70), the land divisions of Kāne'ohe and Kailua are not mentioned and thus it has been assumed (e.g. Shun et al., 1987:12) that Kamehameha I retained these lands for himself and his lineage. This seems quite likely, for during the great division (Mahele) of lands between the King and high chiefs in 1848, the *ahupua'a* of Kailua and Kane'ohe (Land Court Award 4452) were claimed by Queen Hazaleleponi Kalama Kapakuhaili, wife of Kamehameha III. In the Kuleana Act of 1850 commoners were allowed to receive awards for house lots and for land that they were cultivating at the time, but none were claimed in the immediate vicinity of the project area. Many *kuleana* were not claimed for a variety of reasons and thus it is not necessarily the case that there were no houselots or cultivated lands in the immediate area.

However, studies in Ko'olaupoko (Chun, 1954; Miyagi, 1963; Kelly and Clark, 1980; and Allen, 1987) indicate that the vast majority of *kuleana* were located along main streams and lowlands where crops could be easily irrigated with 'auwai (irrigation canals). The present project area lies on an embankment above Kawa Stream and would not have been ideal for cultivation. In the following account of the general vicinity in the mid 1840s the lack of occupation in the area is noted,

...(From the foot of the *Pali*). Thence the road passed through a dense coppice of Pandanus trees laden with large fruits and beautiful male flowers in long sheaths. From this coppice we came out into the open fields, which bore only slight traces of habitation and human industry...Along the entire remainder of the road, I suppose a stretch of about 3/4 mile, I discerned only a single hut and a few holes made in the ground for taro... [Billie MS In Sterling and Summers, 1978:205].

2. History of Sugar Planting and Cattle Ranching

Upon the death of Alexander Liholiho, Kamehameha III, most of his properties went to his widow, Queen Kalama. Much of Queen Kalama's land was utilized by the Kāne'ohe Sugar Plantation between 1865 and 1885. The Kāne'ohe Plantation started with 200 acres in 1865 and had 500 acres under cultivation in 1880 (Devaney et al., 1982:45).

It was in this same time frame that ranching became a major enterprise. Cattle and sheep had been left on O'ahu by Vancouver in 1793 and the former had multiplied into a large herd by the 1840s (Devaney, 1982:70). By the mid 1860s the cattle were so numerous as to cause environmental degradation. Kāne'ohe Ranch was formed in 1876, on lands originally belonging to Queen Kalama and at its peak

included 12,000 acres and 2,000 head of cattle. Much of the land modification in the Kane'ohe area may be from activities of Kāne'ohe Ranch.

3. History of Pineapple Cultivation

The greatest impact to the land may well have been from pineapple cultivation which flourished from 1910-1925. In 1912 the Kāne'ohe Ranch and Heeia Agriculture Co. agreed to lease 1,000 acres to Libby, McNeill, and Libby in He'eia, Kāne'ohe, and Kailua. A considerable amount of land was subleased to growers through 1920. About 1920 Mr. Herman Russell operated a small cannery in competition with the large Libby cannery at He'eia and the resulting competition for pineapples encouraged production. A 1924 photo (Fig.5) shows much of Kāne'ohe in pineapple cultivation. The rapid change in land use is also documented in the following cyclist's account of 1914:

from the foot of the Pali .. [we] looked out over the surrounding hills, but looked in vain for the great areas of guava through which but a few months ago we had fought and As far as the eye could reach pineapple plantations had taken the place of the forest of wild guavas (H.F. Alexander, Mid Pacific Magazine, Oct. 1914, 317-324).

Pineapple cultivation is credited with having wiped out a number of major sites in the area including a *holua* slide near Kawaewae Heiau.

With the collapse of commercial pineapple cultivation on the windward side most of the pineland became pasture or scrub forest. Cattle were probably pastured in the project area throughout much of the Twentieth Century.



Fig. 5

Panorama of Southern Kāne'ohe Bay Region at Height of
Pineapple Cultivation (Paradise of the Pacific, Jan 1924)

B. Previous Archaeological Research

The earliest systematic archaeological coverage of upland areas of Kāneʻohe was by J.G. McAllister (1933) who recorded major sites throughout Oʻahu in the early 1930s. McAllister recorded a number of *heiau* and other sites in the Kāneʻohe area. Of the sites that he recorded the only sites near the project area are site 354, Kawaewae *Heiau*, site 355, an ancient *holua* slide destroyed when pineapples were planted in the area, site 356, Puʻu Makani *Heiau*, and site 357, the house site of Pakuanui (fig. 6).

In Hammatt and Shideler's 1989 survey for the then proposed Hawaii State Veterans Cemetery relocated a probable place for site 356, Puʻu Makani *Heiau* (matching McAllister's description). The area was heavily modified and graded in recent times and no trace of the *heiau* is present.

Site 357, the house site of Pakuanui is located just *makai* of Kamehameha Highway and is outside the project area. Pakuanui was a notorious Hawaiian who is said to have preyed upon and robbed weary travellers coming down the Pali Trail. It is not known if the site is still in existence.

Kawaewae *Heiau* (BPBM Site # 50-Oa-G5-19 and State Site # 80-10-354) was located by McAllister on the Kāneʻohe side of the ridge which divides Kāneʻohe and Kailua. He provided a map of the structure (McAllister 1933:180) and describes it as a large rectangular enclosure measuring 120 x 253 feet. This *heiau* was said to be one of five *heiau* built by Olopana and dates to the beginning of the 12th Century.

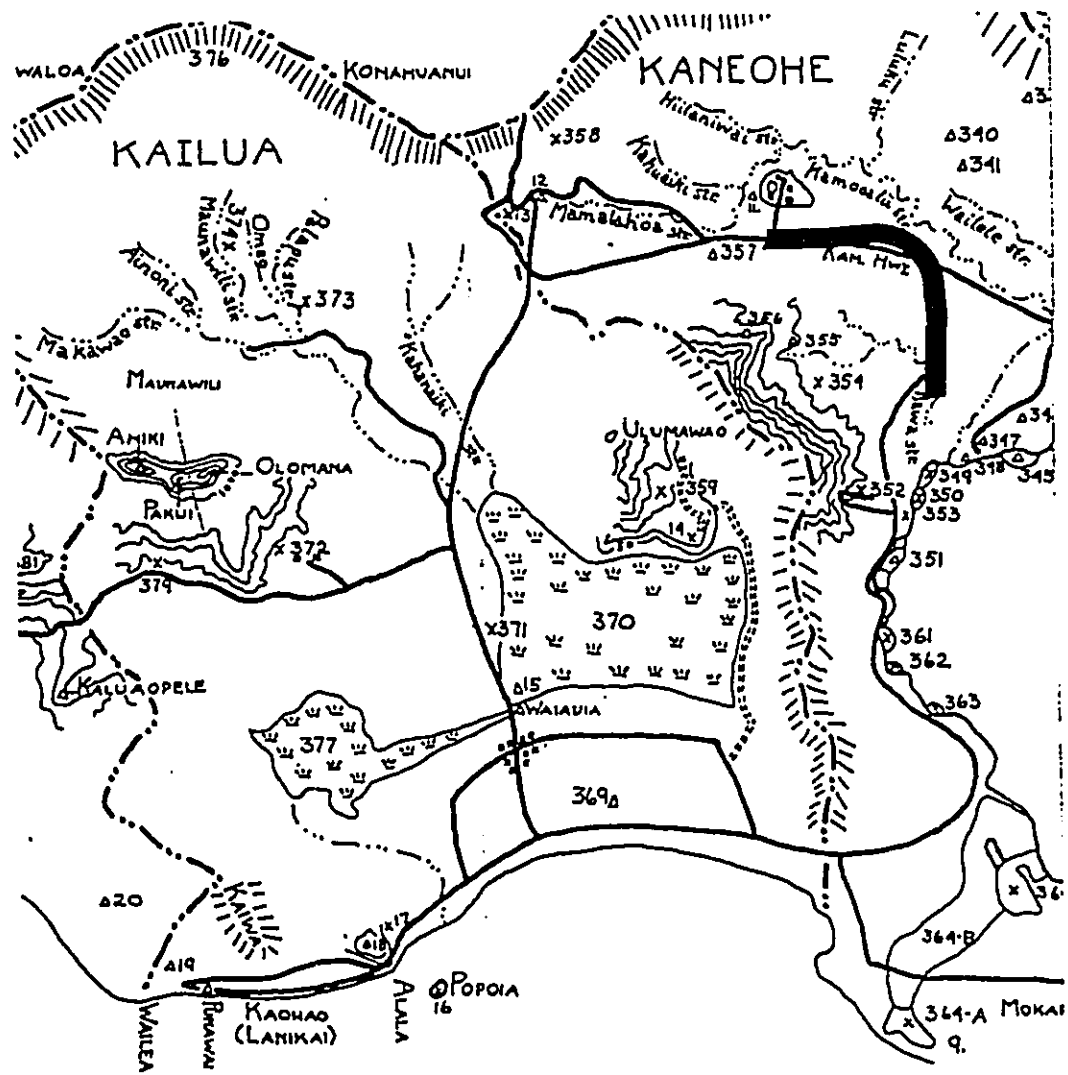


Fig. 6

Portion of McAllister Map Showing Sites Near Project Area

The *heiau* structure survived the activities of pineapple cultivation in the early part of the 20th Century and is presently on the State and National Register (Site number 80-10-354). The site is now under the care of the Queen Emma Hawaiian Civic Club.

The Upland portions of the *ahupua'a*(s) of Kailua and Kane'ohe have received a good deal of archaeological attention in the last fifteen years. Archaeological research has been associated with the Kane'ohe-Kailua Flood Control project (Rosendahl Ed., 1976), with the development of the H-3 Highway (Cleghorn and Rogers-Jourdane, 1976; Dye, 1977; Streck, 1982; Allen-Wheeler, 1984, 1985; Neller, 1985; and Wheeler, 1987), with proposed developments in Kawainui Marsh (Cordy, 1977; Ewart and Tuggle, 1977; Kelly and Clark, 1980; Kraft, 1980a, b; Kelly and Nakamura, 1981; Allen-Wheeler, 1981; Athens, 1983; Morganstein, n.d.), with the golf course development (Shun et al., 1987), with the development of two cemeteries (Szabian and Landrum, 1989; Hammatt and Shideler, 1989a) and with the development of a reservoir at Luluku (Hammatt and Shideler, 1989b). As Shun et al., (1987:7) point out "All of these investigations...amount to almost continuous systematic archaeological coverage for the upper portion of Kane'ohe *ahupua'a*." Probably the best attempt to date to synthesize data on the Ko'olaupoko district is in Wheeler's Five Upland 'Ili (1987:252 ff). She concludes that her work at Site G5-85 documents intensive use of an inland area in a core valley of Kane'ohe by A.D. 1400, a period posited for the development of a formative state system. However, her project area lies well outside of the proposed transmission line corridor and therefore

her conclusions are not indicative of the proposed transmission line corridor land.

The relative lack of human enterprise in the area which Billie Steen noted in the mid-1840s and the massive impact of ranching, pineapple cultivation, the U.S. Army and golf course development, which would have destroyed much of what little archaeology might have existed in the vicinity probably accounts for the lack of archaeological sites in the area around the proposed transmission line corridor.

III. Survey Results

No prehistoric or historic sites or cultural layers were encountered. Our specific observations are detailed below.

Beginning at the Koolau substation the corridor runs underground for 2,200 linear feet along an access road. Based upon archaeological reconnaissance it is clear that there has been extensive modification to the land surface due to road construction.

From the Koolau substation the land has been cut away in the form of a road cut, exposing lateritic soils (decomposing basaltic lava flows from the Koolau Mountain Range) for approximately 500 linear feet (Figs. 7-8). The remainder of the distance (1,700 linear feet) is composed of fill layers that have been created during road construction (Figs. 9-10). The road bed in which the cable will be buried lies two to three meters above the surrounding topography and is all road fill material. The middle 3 phases of the corridor are above ground and utilize existing poles or replacement poles that will be placed in or near existing poles, thus creating no archaeological impact. The last phase of the corridor, running from Puohala substation along Kane'ohē Bay Drive for 600 linear feet runs through an area that has been extensively modified by road construction. The corridor runs across Kane'ohē Bay Drive to the *makai* side and then east along the road until it reaches an existing pole. The first 300 feet of the corridor runs through a road cut composed of exposed lateritic soils (Figs 11-12). The remaining 300 feet run across a bridge spanning Kawa Stream and along an area that is composed of modern road fill layers (figs. 13-14).

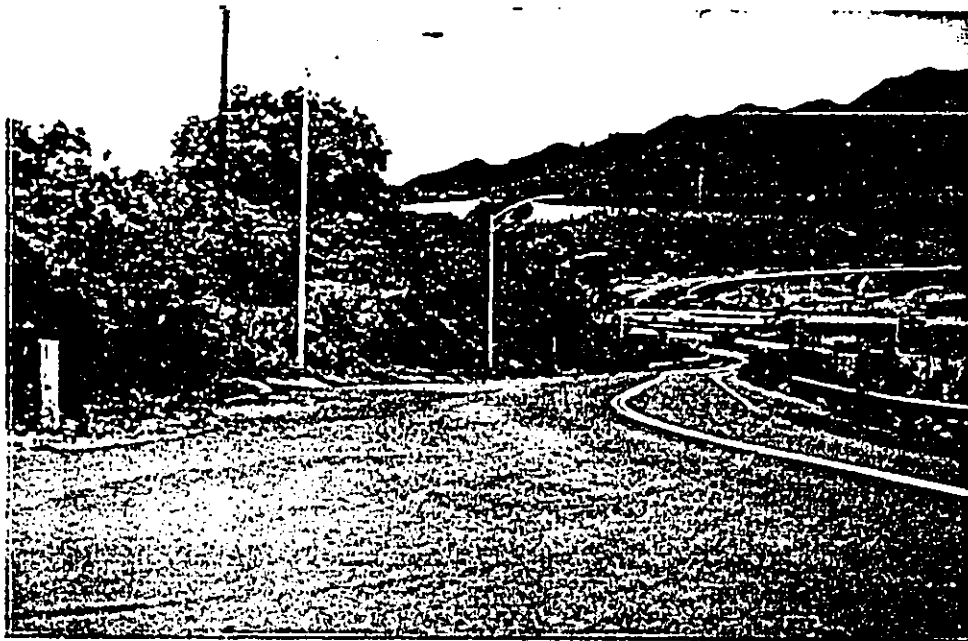


Fig. 7

View of Lateritic Soils Exposed in Road Cut at Koolau Substation

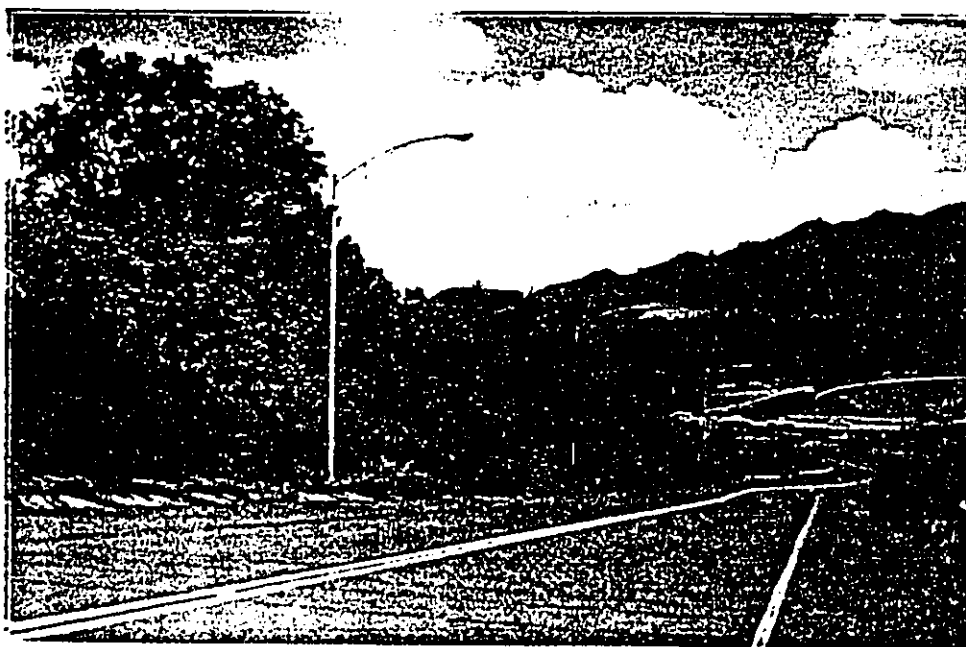


Fig. 8

View Showing Lateritic Soils in Road Cut at Koolau Substation



Fig. 9

View of Road Fill Along Road at Koolau Substation

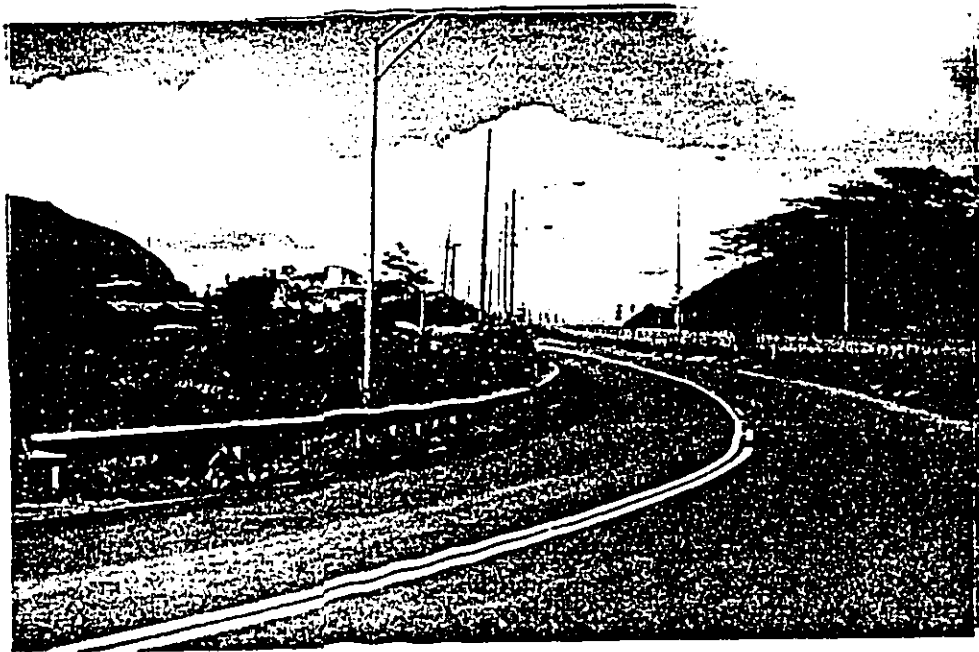


Fig. 10

View Showing Road Fill Along Road at Koolau Substation



Fig. 11 View of Lateritic Soils Exposed in Road Cut at Puohala Substation

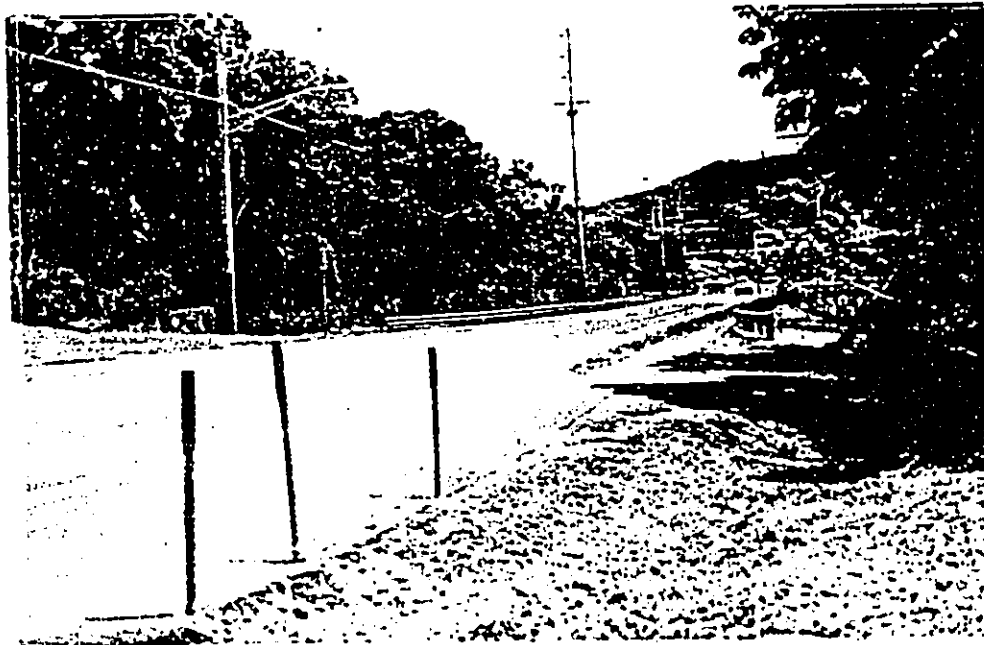


Fig. 12 View Showing Lateritic Soils in Road Cut at Puohala Substation



Fig. 13 View of Road Fill Along Road at Puohala Substation

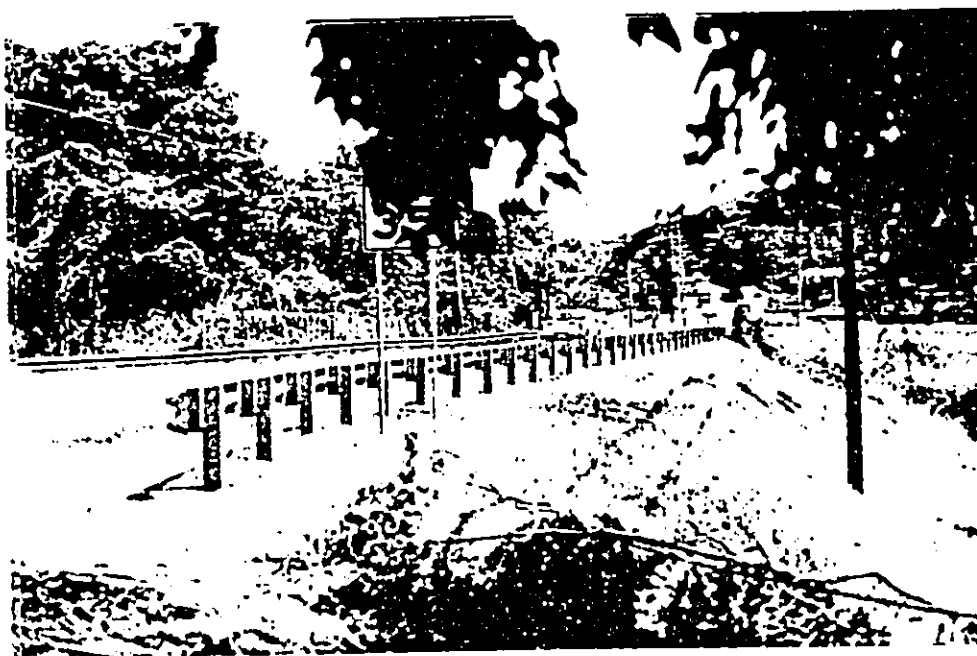


Fig. 14 View Showing Road Fill Along Road at Puohala Substation

IV. Summary and Recommendations

An archaeological reconnaissance of the project area revealed no prehistoric sites or cultural layers and no significant historic sites.

Background research shows that the area was massively impacted by ranching, pineapple cultivation.

The greatest impact to the project area has been associated with road construction. The construction of Kamehameha Highway, the H-3 Freeway ramp, and Kane'ohu Bay Drive was the cause of the massive earth moving within the project area.

Evidence from historical sources, particularly the account of Steen Billie circa 1845, and from neighboring archaeological, suggest that there was probably little traditional Hawaiian utilization of this immediate area.

No further archaeological investigation or monitoring within the project area is recommended. In the unlikely event that cultural remains of any kind especially human burials, are encountered during construction an archaeologist and the State Historic Preservation Division should be immediately contacted before earth moving in the vicinity is resumed.

V. References

- Alexander, H.F.
1914 "Cycling Around O'ahu, Mid Pacific Magazine, Oct. 1914, 317-325.
- Allen-Wheeler Jane
1984 Luluku: An Upland Agricultural System in Kāne'ohe, Ko'olaupoko District O'ahu. MS 123184, Dept. of Anthropology, Bishop Museum, Honolulu.
- Allen-Wheeler Jane
1985 Luluku: An Upland Agricultural System in Kāne'ohe, Ko'olaupoko District O'ahu. MS 060685, Dept. of Anthropology, Bishop Museum, Honolulu.
- Allen-Wheeler Jane, ed.
1987 "Five Upland 'Ili: Archaeological Investigations in the Kaneohe Interchange, Interstate Highway H-3, island of O'ahu." Departmental report series 87-1, Bishop Museum Press, Honolulu.
- Athens S.
1987 "Archaeological Excavations on the Pohakupu-Kukunono Slope, Kawainui Marsh O'ahu." MS 033183, Department of Anthropology, Bishop Museum, Honolulu.
- Billie, Steen
1851 "Report on the Voyage of the Danish Corvette "Galathea," Round the World, in the Years 1845, 1846, 1847. Translated by Hedemann in 1931.
- Borthwick, Douglas F.
1989 "Interim Report on Historical Background and Assessment of Fishponds for the Proposed Expansion of Bay View Golf Course," Cultural Surveys Hawaii.
- Chun, Paul
1954 Sequential Occupancy in Waihee Valley, O'ahu. M.A. thesis, University of Hawaii at Mānoa, Honolulu.
- Cleghorn, Paul L., and Elaine Rogers-Jourdane
1976 "Archaeological Reconnaissance Survey of the Windward Portion of Route H-3, District of Ko'olaupoko, O'ahu Island." MS in Dept. Anthropology, Bishop Museum, Honolulu.

- Cordy, Ross
1977 "A Cultural Resources Study for the City and County of Honolulu's Permit Request: Kawainui Marsh Sewerline (O'ahu). Archaeological Reconnaissance and Pre-1850 Literature Search." MS for the U.S. Army Engineer Division, Honolulu.
- Devaney, Dennis M., Marion Kelly, Polly Jae Lee, and Lee S. Motteler
1982 Kāne'ōhe - A History of Change. Bess Press, Honolulu.
- Dye, Thomas S.
1977 "Archaeological Phase I Survey of the Windward Portion of Proposed Interstate H-3: Halekou Interchange to Windward Portal of Koolau Tunnel, O'ahu." MS. 091277 in Dept. Anthropology, Bishop Museum, Honolulu.
- Ewart Ned D. and Myra Tuggle
1977 "Archaeological Investigation Kawainui Swamp Ko'olaupoko, Kailua, O'ahu Island," Archaeological Research Center of Hawaii.
- Hammatt H.H. and D.W. Shideler
1989 "Archaeological Survey of a 90-acre Parcel for Proposed Hawai'i State Veterans Cemetery Kāne'ōhe, O'ahu," Cultural Surveys Hawaii.
- Hammatt, H.H. and D.W. Shideler
1989 "Final Report on Archaeological Monitoring of Luluku Electric Line, Luluku Reservoir, and Luluku Water Line Trenching at Luluku, Kāne'ōhe, Ko'olaupoko, O'ahu" Cultural Surveys Hawaii.
- Ii, John Papa
1959 Fragments of Hawaiian History (Pukui translation), Bishop Museum Press, Honolulu.
- Kelly, Marion and Jeffery Clark
1980 Kawainui Marsh, O'ahu. Bishop Museum Departmental Report Series 80-3, Honolulu.
- Kelly, Marion and Barry Nakamura
1981 "Historical Study of Kawainui Marsh Area, Island of O'ahu," B.P. Bishop Museum, Honolulu.
- Kraft, John C.
1980 "Letter Report to Susumo Ono re: Corings in Kawainui Marsh, July 15, 1980."

- Kraft, John D.
1980 "Letter Report to Ed Mareus re: Corings in Kawainui Marsh, Dec. 18, 1980.
- Miyagi, M.
1968 "Land Use in Waiahole Valley, O'ahu," Masters Thesis, University of Hawaii at Mānoa, Honolulu.
- Morgenstein, Harry
n.d. "Geoarchaeological Analysis of Field Remnants, Kawainui Marsh, Kailua, Hawaii," U.S. Army Corps of Engineers Honolulu.
- Neller Earl
1985 "The Luluku Settlement: Site 50-Oa-2914: An Archaeological Reconnaissance of a Hawaiian Agricultural Settlement in Kāne'ōhe, O'ahu, TMK:4-5-41:1,4." MS on file State of Hawaii Historic Preservation Office, Honolulu.
- Rosendahl, Paul H. (ed.)
n.d. Archaeological Investigations in Upland Kāne'ōhe: Survey and Salvage Excavations in the Upper Kamo'ali'i Stream Drainage Area Kāne'ōhe Ko'olaupoko, O'ahu, Hawai'i. Departmental Report, Series 76-1, Bishop Museum, Honolulu.
- Shun, Kanalei et al.
1987 "Archaeological Inventory Survey of an Inland Parcel, Kāne'ōhe-Kailua, O'ahu Hawai'i, International Archaeological Research Institute, Honolulu.
- Sterling, Elspith P. and C. C. Summers
1978 Sites of O'ahu. Dept. of Anthropology, B.P. Bishop Museum, Honolulu.
- Streck, Charles
1982 "Archaeological Reconnaissance Survey for Route H-3" (Alternative A), Kāne'ōhe, O'ahu, Hawai'i." MS. in Dept. Anthropology, Bishop Museum, Honolulu.
- Szabian, John and J. Landrum
1989 A Reconnaissance Survey of the Proposed Pikoiloa Cemetery, Kāne'ōhe, O'ahu Island, TMK 4-5-33:1-2.

APPENDIX E

Electric Field and Magnetic Flux Density Measurements Report



Prepared by MK ENGINEERS, LTD.

Electric Field and Magnetic Flux Density measurements Report for Koolau-Kaneohe 46 KV Circuit.

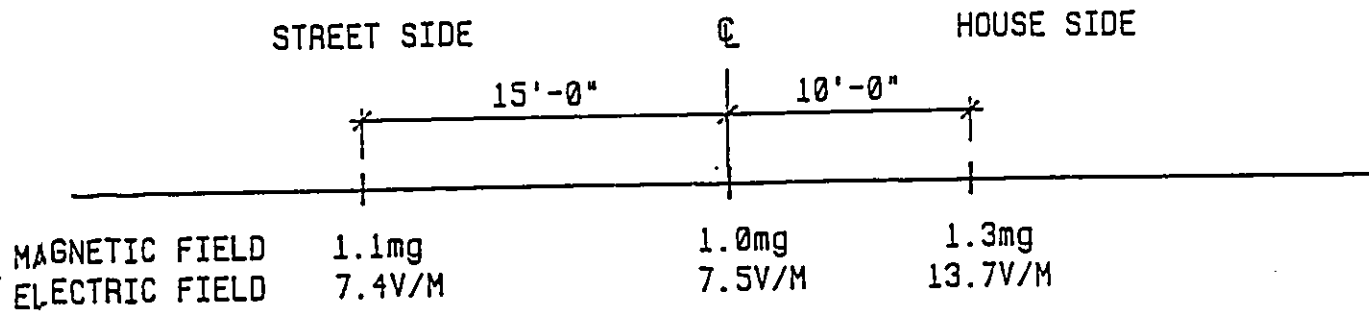
Objective: MK Engineers, Ltd. was tasked by Hawaiian Electric Company, Inc. to measure the electric field intensity and magnetic flux density along a 46 KV pole line between Koolau and Puhala Substations in Kaneohe.

Instrumentation: Electric Field Measurements Model 116PLUS-2-60, 60 Hz electric and magnetic field sensor system was utilized. A copy of the descriptive data and operating instructions are enclosed.

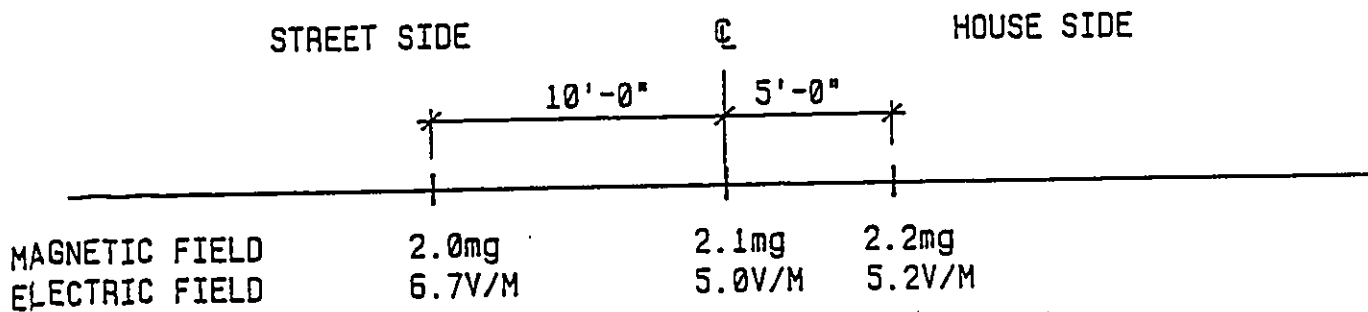
Method: Measurements were taken at selective locations along the existing electrical lines. Measurements were taken at seven locations. The locations of each point at which measurements were taken are indicated on the drawing included with this report. The magnetic flux density measurements taken at each point were maximum instantaneous readings. The axis of the magnetic sensor was rotated horizontally and vertically until a maximum reading was obtained.

Results: The magnitudes of the electric field and magnetic flux density at each point are shown on the data sheets. Values are indicated in milli-gaus (mg) and in volts per meter (V/M).

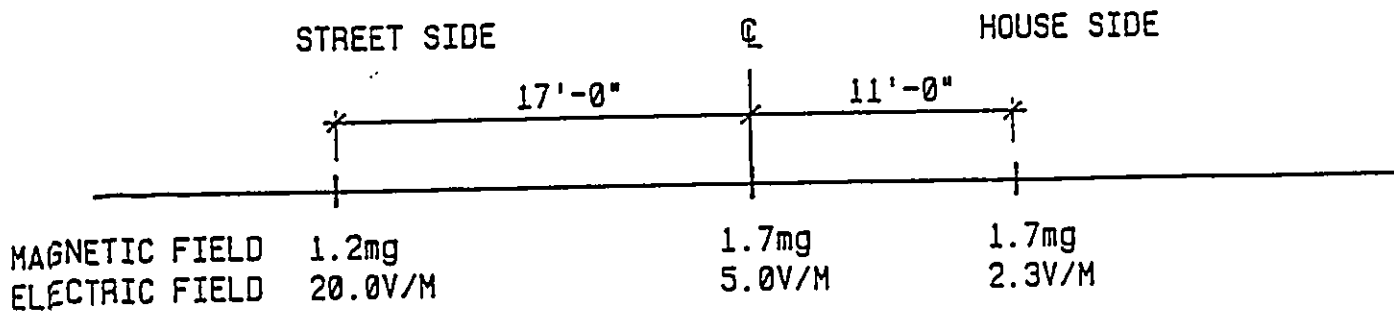
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FAX (808) 536-2661



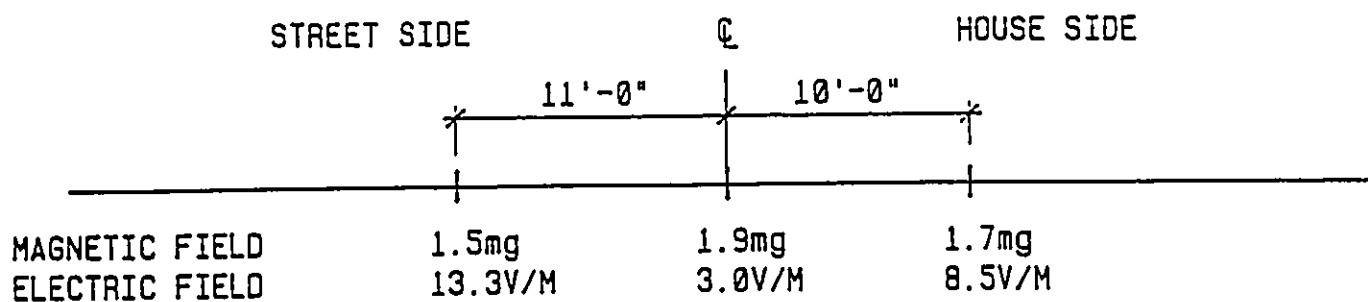
Location No. 1: KAMEHAMEHA HIGHWAY 50' SOUTH OF POLE 44
 Date of Measurement: 1/25/92
 Time of Measurement: 10:15



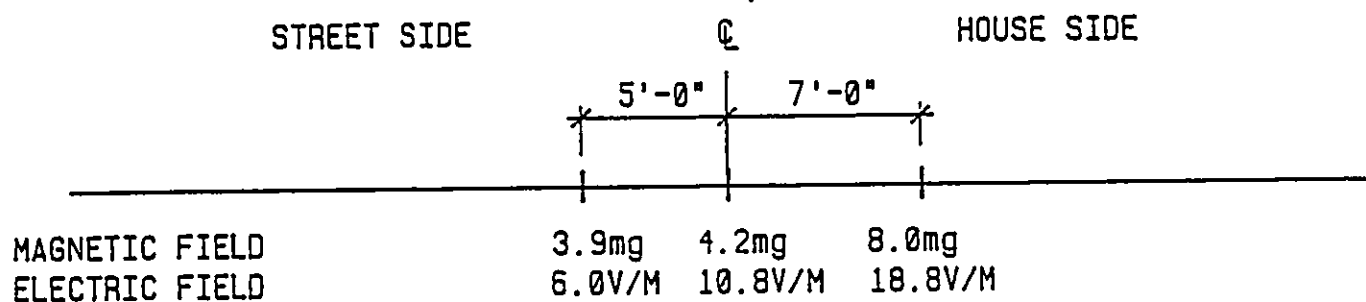
Location No. 2: KAMEHAMEHA HIGHWAY 42' SOUTH OF POLE 41
 Date of Measurement: 1/25/92
 Time of Measurement: 10:00



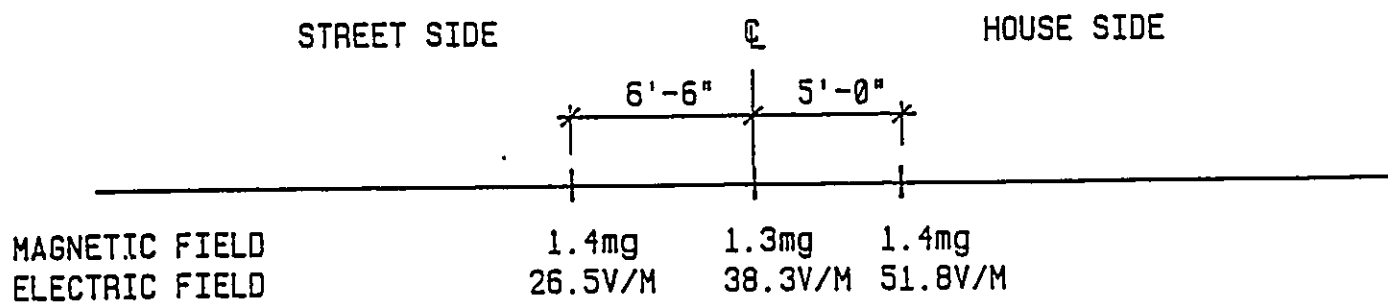
Location No. 3: KAMEHAMEHA HIGHWAY 30' SOUTH OF POLE 28
 Date of Measurement: 1/25/92
 Time of Measurement: 9:45



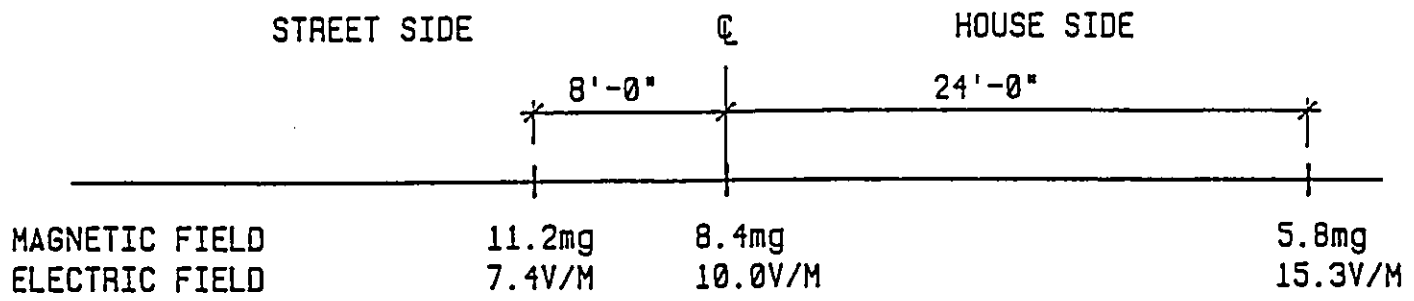
Location No. 4: KAMEHAMEHA HIGHWAY 27' NORTH OF POLE 32
 Date of Measurement: 1/25/92
 Time of Measurement: 10:30



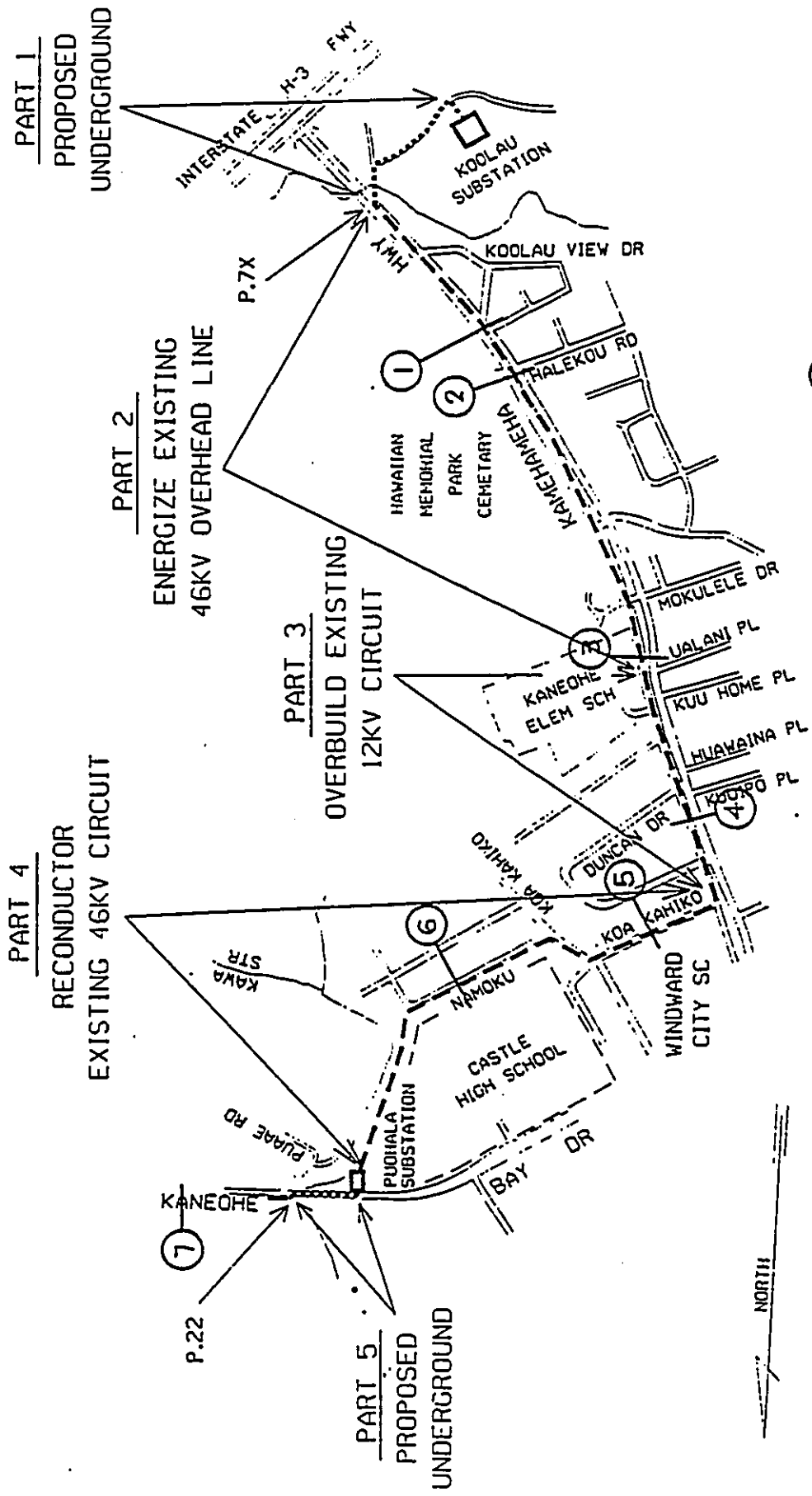
Location No. 5: KOA KAHIKO ST. 30' EAST OF POLE 3
 Date of Measurement: 1/25/92
 Time of Measurement: 10:30



Location No. 6: NAMOKU ST. 25' EAST OF POLE 4
 Date of Measurement: 1/25/92
 Time of Measurement: 10:55



Location No. 7: KANEOHE BAY DRIVE 22' EAST OF POLE 26
 Date of Measurement: 1/25/92
 Time of Measurement: 11:05



① CIRCLED NUMBERS INDICATE LOCATION OF ELECTRIC MAGNETIC FIELD MEASUREMENTS.

EXHIBIT B
DOCKET NO. 7143
KOOLAU-KANEOHE 46KV CIRCUIT
LOCATION PLAN

RECEIVED

MAY 14 1990

MK ENGINEERS, LTD.

OPERATING INSTRUCTIONS
MODEL 116 PLUS

The Model 116 Plus consists of a Model 116 Magnetic Field Sensor, a Digital Voltmeter, and an electric field sensor (which holds the meter). The magnetic field sensor has been calibrated so that a magnetic field with a magnitude of 1 milligauss will produce an output voltage of 1 millivolt (ac). The active axis of the magnetic sensor is oriented along its longest side. In the electric field sensor, the active axis is also along its longest side. This sensor is designed so that an electric field with a magnitude of 1 Volt/meter will produce an output voltage of 1 millivolt (ac). Use the following steps when operating the 116 Plus:

Magnetic Field Measurements

- 1) Set meter to 200m (200 millivolts) position for ACV.
- 2) Insert the sensor into the COM and V/OHM terminals, insuring that the sensor terminal marked G goes into the COM terminal of the meter.
- 3) Turn on meter.
- 4) Orient active axis of sensor parallel to the direction that you wish to make your measurement.
- 5) Read the field magnitude (in millivolts) off the meter, remembering that the reading in millivolts corresponds directly to the field value in milligauss.

Electric Field Measurements

- 1) Set meter to 200m (millivolts) position for ACV.
- 2) Insure that meter is securely attached to metal enclosure with the rubber bands.
- 3) Insert plug (from enclosure) into terminals on meter marked COM and V/OHM, insuring that the plug jack connected to the white wire goes into the COM terminal of the meter.
- 4) Assemble the pole (which is used as a handle) by connecting the pieces.
- 5) Push the end of the pole into the receptacle at the top of the enclosure. (Enclosure will "hang" from pole.)
- 6) Turn on meter.

- 7) Using the full length of the pole, hold the meter/enclosure away from your body (which acts as a ground) and at least one meter above the earth. Orient unit so that it is roughly parallel to the body (or perpendicular to the earth).
- 8) Read the field magnitude (in millivolts) off the meter, remembering that the reading in millivolts corresponds directly to the field value in Volts/meter.
- 9) In some cases, it may be necessary to use a less sensitive scale of the meter. The same conversion (.1 millivolt = 1 Volt/meter) should be used, though accuracy may be somewhat smaller.

Note: Since the Model 116 magnetic sensor is sensitive on a single axis only, users may wish to rotate the device in all directions to find the maximum field at a particular location. Another method which may be used is to take three perpendicular measurements and compute the maximum value as the square root of the sum of each value squared.

APPENDIX F

**State Public Utilities Commission
Decision and Order Number 11883**

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

In the Matter of the Application of)

HAWAIIAN ELECTRIC COMPANY, INC.)

DOCKET NO. 7143

For Approval to Commit Funds in
Excess of \$500,000 for Item
OM-775, Installation of
Koolau-Kaneohe 46 KV Circuit.

DECISION AND ORDER NO. 11883

bcc: J. Elliot (DK)
S. Elliot/R. Tani (WE)
F. Hiramami/L. Ikeda (YT)
W. Ichimura (DJ)
R. Wong/L. Jang-Che (XD)
PMF-775
RSY

Filed September 28, 1992
At 3:00 o'clock P.M.

Bertha F. Kurosawa
Chief Clerk of the Commission

bcc: E. Hirata
B. Utsumi
a. Yamamoto
G. Hirose
~~S. Tamao~~
NP File

ATTEST: A True Copy
BERTHA F. KUROSAWA
Chief Clerk, Public Utilities
Commission, State of Hawaii.

Bertha F. Kurosawa

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

In the Matter of the Application of)	
HAWAIIAN ELECTRIC COMPANY, INC.)	Docket No. 7143
For Approval to Commit Funds in)	Decision and Order No. 11883
Excess of \$500,000 for Item)	
OM-775, Installation of)	
Koolau-Kaneohe 46 KV Circuit.)	

DECISION AND ORDER

I.

By an application filed on October 31, 1991, HAWAIIAN ELECTRIC COMPANY, INC. (HECO) requests approval to commit \$1,606,600 for item OM-775, the installation of a Koolau-Kaneohe 46 kilovolt (KV) circuit (the project), and to conduct a public hearing as required by Hawaii Revised Statutes (HRS) § 269-27.5, for the overhead construction of a new transmission line, 46 KV or greater, through a residential area.

HECO served copies of the application upon the Division of Consumer Advocacy, Department of Commerce and Consumer Affairs (Consumer Advocate). In a letter dated December 11, 1991, the Consumer Advocate requested information from HECO. The utility responded to this request on January 29, 1992. The Consumer Advocate did not file a statement of position.

On May 1, 1992, the commission issued a request for information to which HECO responded on June 2, 1992. HECO also

responded earlier, on April 7, 1992, to the commission's informal request for information.

A public hearing was held on January 29, 1992, at 7:00 p.m., at the Kaneohe Elementary School cafeteria.

II.

The project involves the installation and reconductoring of underground cables and overhead conductors from the Koolau substation, along Kamehameha Highway, Koa Kahiko Street, and Namoku Street, to the Puohala substation. HECO's application describes the project in greater detail.

HECO completed a system planning analysis of the Koolau area in April 1991. The analysis shows overload of the Koolau-Aikahi 46 KV circuit by 7.1 per cent in 1991 upon failure of the Koolau-Laelae-Kahuku 46 KV circuit or the Koolau number 2 80 megavoltampere (MVA) transformer. The analysis also shows overload of the Koolau number 3 80 MVA transformer by 10.5 per cent in 1991 upon the failure of the Koolau number 1 80 MVA transformer. HECO determined that this emergency overload condition would be averted by transferring loads from the Koolau-Aikahi circuit to the proposed Koolau-Kaneohe circuit.

HECO evaluated three alternatives in routing the line from the Koolau substation to pole P.7X on Kamehameha Highway. These alternatives include two overhead routes and one underground route. HECO determined that the underground route was more desirable for the following reasons:

1. Overhead alternatives are generally less costly than underground routing. In this instance, however, the owner of property over which a portion of the line will

run will not grant new perpetual easements across the property. The current easements are subject to a month-to-month lease, and the landowner has indicated he intends to terminate the leases in preparation for a planned development. Thus, HECO would need to utilize the condemnation process to retain the existing easement. Such a process would be costly and would delay the actual service date.

2. The proposed Koolau-Kaneohe 46 KV line is intended to provide backup for the Koolau-Aikahi and the Koolau-Laelae-Kahuku lines, both of which run over the existing easement. The overhead alternative for the project would also traverse the existing easement and, as a result, both primary and backup lines would be located along a single pole line. In the event of an incident affecting the pole line, or when maintenance or repair work is required, both the primary and backup lines would be out of service at the same time.

3. The underground alternative can be placed into service earlier than the overhead alternatives.

4. Overhead crossings at the Koolau substation would be minimized in the underground alternative.

5. System reliability would be increased using the underground alternative.

6. The underground work can accommodate future relocation of the two 46 KV lines currently using the temporary easements, should the landowner decide to terminate the leases.

III.

Upon review of HECO's application, its responses to the requests for information from the Consumer Advocate and the commission, and the testimony given at the public hearing, we conclude that the request to commit \$1,606,600 for item OM-775, the installation of the Koolau-Kaneohe 46 KV circuit, appears reasonable and in the public interest. Accordingly, we determine that the request should be granted.

IV.

THE COMMISSION ORDERS:

1. HECO's application for approval to commit \$1,606,600 for item OM-775, the installation of the Koolau-Kaneohe 46 KV circuit, is granted.

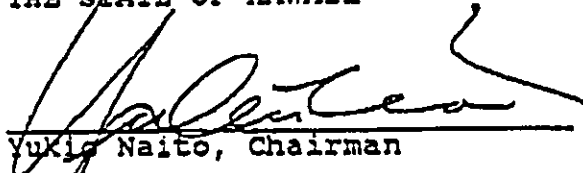
2. HECO shall submit an accounting report, with explanations as to any amount that deviates from the estimated cost of the project by 10 per cent. HECO shall submit the report within 60 days of commercial operation of the project. HECO shall promptly notify the commission of reportable cost deviations.

3. Failure to submit the report as required by this decision and order shall be cause to limit the total project cost to the original estimate, as submitted in this application for future ratemaking purposes.

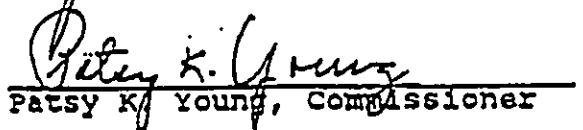
DONE at Honolulu, Hawaii this 28th day of September, 1992.

PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII


By


Yukio Naito, Chairman

By


Patsy K. Young, Commissioner

APPROVED AS TO FORM:


Colette H. Gomoto
Commission Counsel
7/43.H

CERTIFICATE OF SERVICE

I hereby certify that I have this date served a copy of the foregoing Decision and Order No. 11883 upon the following parties, by causing a copy hereof to be mailed, postage prepaid, and properly addressed to each such party.

DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS
DIVISION OF CONSUMER ADVOCACY
P. O. Box 541
Honolulu, HI 96809

BARRY M. UTSUMI
MANAGER, RATE & REGULATORY AFFAIRS DEPT.
HAWAIIAN ELECTRIC COMPANY, INC.
P. O. Box 2750
Honolulu, HI 96840-0001

Bertha F. Kurosawa

Bertha F. Kurosawa
Chief Clerk

DATED: September 28, 1992