



Ms. Genevieve Salmonson  
Page 2  
April 25, 2001

We have enclosed a completed OEQC Environmental Notice Publication Form and four copies of the final EA. Please contact Mr. Glenn Ahuna of our Engineering Division at 961-8070, if you have any questions.

Sincerely,



Milton D. Pavao, P.E.  
Manager

GGA:dms

Enc.

copy - R. M. Towill Corporation

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*Final Environmental Assessment*

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DEPARTMENT OF WATER SUPPLY (DWS)

**ALII HIGHWAY:**

**16-inch Water Transmission Main**

**KAILUA TO KEAHOHU, HAWAII, HAWAII**

April 2001

PREPARED FOR:

Department of Water Supply  
County of Hawaii  
25 Aupuni Street  
Hilo, Hawaii 96720

**RMTc**

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FINAL  
ENVIRONMENTAL ASSESSMENT

Department of Water Supply (DWS)

**Alii Highway:  
16-inch Water Transmission Main**

Kailua to Keauhou  
Hawaii, Hawaii

April 2001

PREPARED FOR:  
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420 Waiakamilo Road, Suite 411  
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## PROJECT SUMMARY

**Project:** Alii Highway: 16-inch Water Transmission Main

**Applicant:** County of Hawaii  
Department of Water Supply (DWS)

**Accepting Authorities:** County of Hawaii  
Department of Water Supply (DWS)

**TMKs:** 7-5-19,20 (por);  
7-6-13, 14, 15, 16, 17, 18, 19, and 25 (por);  
7-7-4, 08 (por);  
7-8-10 (por)

**Location:** Alii Drive, Kailua-Kona to Keauhou, Hawaii, Hawaii

**Project Area:** 24,100 lineal ft.

**Owners:** Dillingham Investment & Dillingham Partners,  
Kamehameha Investment Corporation, Kamani Tree,  
Alii Kai Subdivision, Kahakai Associates, Carl & Tina  
Rodi Family Trust, American Lutheran Church,  
Forest W. Brehm and others.

**Agent:** R.M. Towill Corporation  
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**Existing Land Uses:** Flood Plain, Resort, Medium/Low Density, Urban  
Alternative Urban Expansion and Orchard Area

**State Land Use District:** Urban and Agricultural

**County of Hawaii Zoning Designation:** RM-2\*, RM-3.5\*, RM-4\*, RM-7\*, RS-7.5, RS-15,  
CV-10 and Unplanned

SECTION 1  
INTRODUCTION

1.1 BACKGROUND

The Department of Water Supply (DWS), County of Hawaii, proposes to install a 16-inch waterline within the proposed Ali'i Highway right-of-way from Queen Kaahumanu Highway (also known as the Hawaii Belt Road) to Ali'i Drive at Keauhou in the South Kona District. The waterline will be installed in conjunction with Ali'i Highway construction connecting Kailua-Kona to Keauhou. The DWS is preparing an environmental assessment (EA) to address plans and implementation, as well as potential environmental impacts and mitigation measures of the proposed action. This Draft Environmental Assessment (EA) is prepared in accordance with Chapter 343, Hawaii Revised Statutes (HRS), Act 241, Session Laws of Hawaii (SLH) 1992, and Chapter 200 of Title 11, Department of Health (DOH) Administrative Rules.

The proposing agency is the DWS, County of Hawaii. The approving agency is the DWS, County of Hawaii.

1.2 PURPOSE AND NEED

The proposed 16-inch water transmission line is to be located within the proposed Ali'i Highway alignment and is scheduled for construction simultaneously with the highway project. An environmental impact statement (EIS) for the proposed Ali'i Highway project was prepared by the Hawaii County Department of Public Works (DPW) and approved by U.S. Department of Transportation (DOT) - Federal Highway Administration (FHWA) and State DOT - Highway Divisions in 1988. Since the approved EIS did not include information on the 16-inch water transmission line, this environmental assessment (EA) is being prepared to describe specific project details and impacts of the proposed waterline.

SECTION 2  
PROPOSED ACTION

2.1 OVERVIEW

The purpose of the proposed 16-inch waterline is to relieve the demand on the existing water main at Royal Poinciana Drive and to provide the infrastructure necessary to meet future water demand based on expected private and public sector development in the area served by the new highway. Installation of the waterline helps support the long range development strategy for the area, as expressed in the Hawaii County General Plan and the Kona Regional Plan.

The proposed 16-inch waterline will be connected to existing waterlines within Queen Kaahumanu Highway and Ali'i Drive that are presently being served from existing sources at the Kahaluu Shaft and/or the Kahaluu Well.

2.2 PROJECT LOCATION AND DESCRIPTION

The project is located between Kailua-Kona and Keauhou in the North Kona district on the Island of Hawaii (Exhibit 2-1 and Exhibit 2-2). The proposed 16-inch diameter transmission main will extend 24,100 lineal feet (4.6 miles) within the Right-of-Way of Ali'i Highway (Exhibit 2-3). Ali'i Highway is under the jurisdiction of the County of Hawaii, Department of Public Works.

Kailua-Kona, at the northern end and the Keauhou Resort at the southern end of Ali'i Highway are two anchor points of the Kailua-Keauhou resort area. According to the Hawaii County Planning Department, the North Kona district includes approximately 21.5% of the land designated as "Urban" by the State Land Use Commission. Considerable growth has already occurred within the region which comprises U.S. Census Tracts 213 through 216. Between 1970 and 1990 the growth rate for this area has more than tripled, and most of the land which remains undeveloped has already been designated for urbanization by the State Land Use Commission, the Hawaii County General Plan, and the Kona Regional Development Plan.

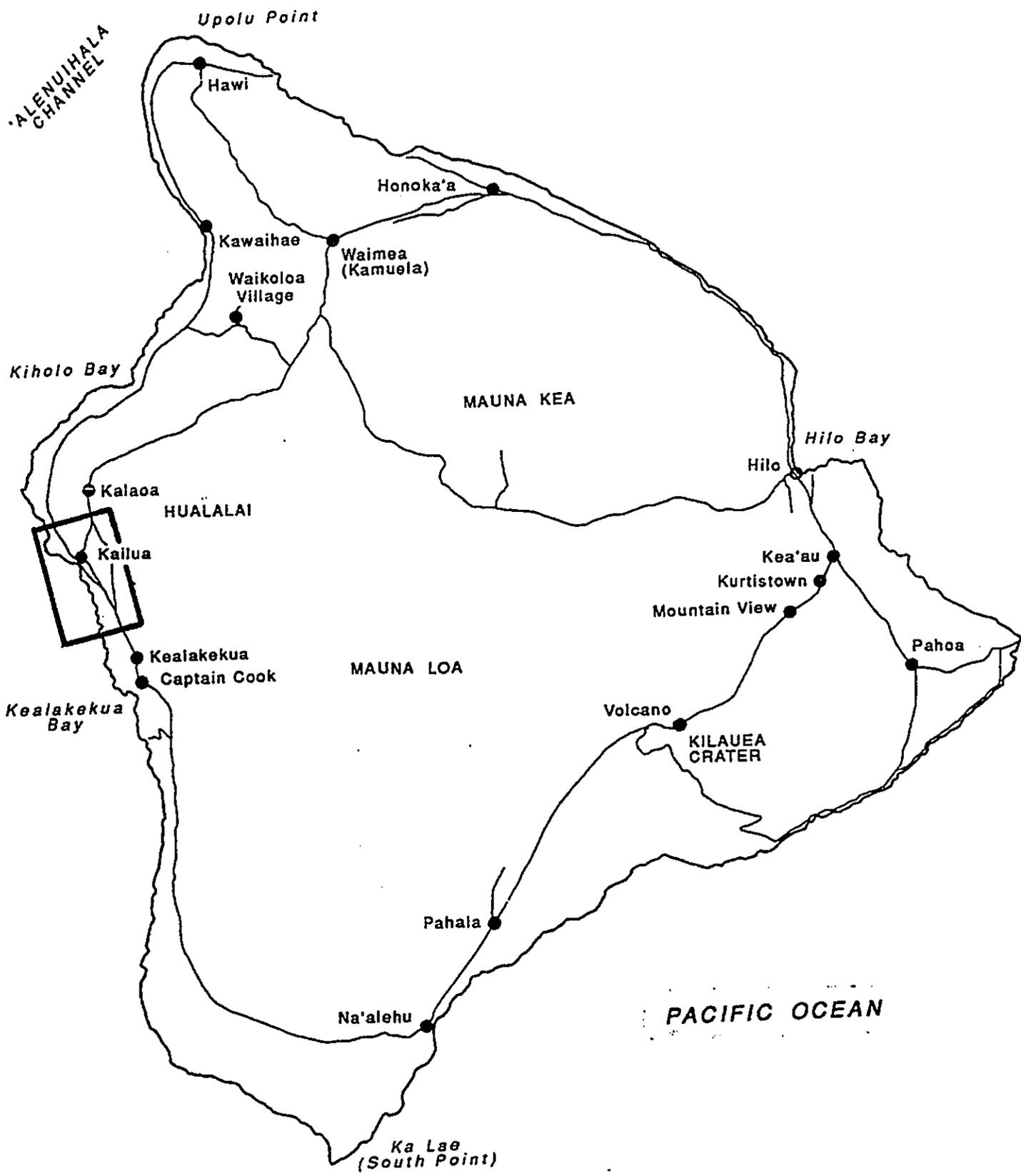


EXHIBIT 2-1  
 PROJECT LOCATION MAP  
 Alii Highway, North Kona, Hawaii



R. M. TOWILL CORPORATION  
 April 2001

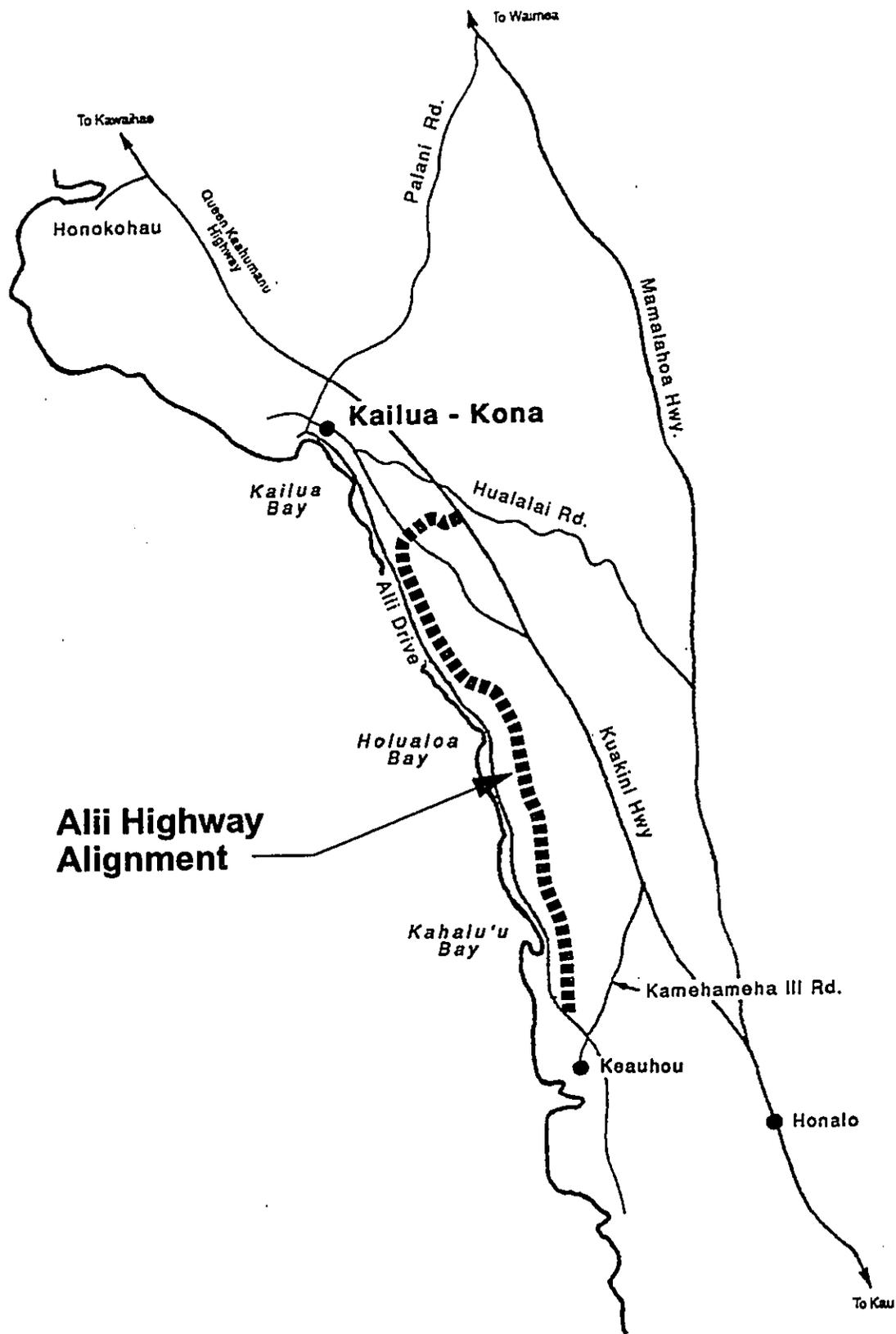
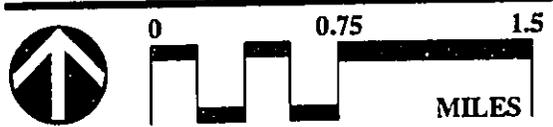


EXHIBIT 2-2  
 ALII HIGHWAY CORRIDOR  
 Alii Highway, North Kona, Hawaii



R. M. TOWILL CORPORATION  
 April 2001

ALII HIGHWAY  
SOUTH BOUND  
(MAKAI) LANE

SCALE: 1" = 10'

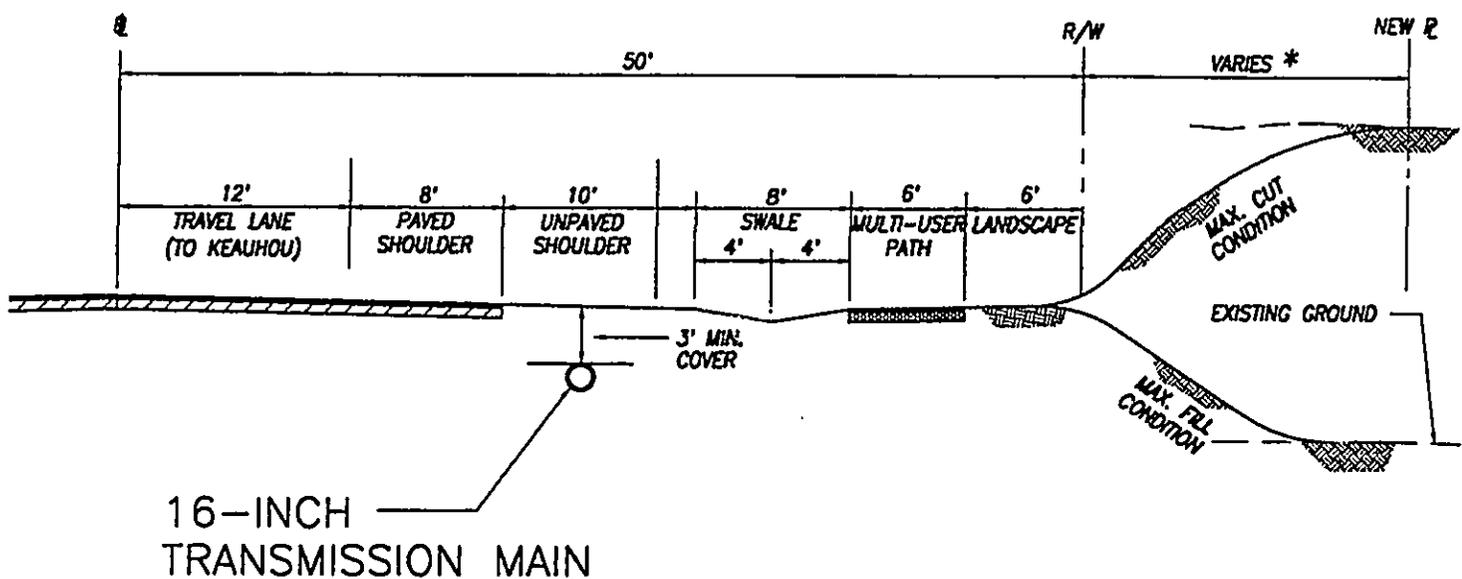


EXHIBIT 2-3  
TYPICAL WATER MAIN LOCATION  
Alii Highway, North Kona, Hawaii



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April 2001

Kailua-Kona is a significant urban center in the North Kona and South Kohala region. It is expected to accommodate most of the new commercial, industrial, and residential uses needed to support resort developments along the Kona coast. Conservative estimates of resort existing and planned or proposed by private developers in the North Kona and South Kona region include over 25,000 hotel rooms and condominium units.

State and County approvals have already been granted for extensive urban development within the area served by the new highway. The development will take place on a piecemeal basis by individual landowners as market conditions warrant. The project is intended to provide the basic infrastructure necessary to support the approved future developments along the new highway.

The water main will be buried in the 8-foot wide paved shoulder of the Ali'i Highway, and have a minimum cover of three feet. To avoid impacts to Ohia Cave, an important cultural and archaeological site, the water main will be hung on a structural span designed to carry the roadway for a distance of approximately 100 feet over the cave site. The water main is planned to be installed in sections (lengths to be determined by the construction contractor). All connections to existing water lines shall be done by the Department of Water Supply (DWS). The contractor will perform all excavation, backfill, road repair, and traffic control. Minimum horizontal clearance between waterlines and other utility systems shall be at least 8 feet unless specified in the construction documents. Minimum vertical clearance between the waterline and other utilities shall be 18 inches, provided other utilities are concrete jacketed. Generally, the waterline shall be at a grade higher than other utilities.

Construction of the project will be accomplished in 2 phases: the first phase involves installation of 11,600± linear feet of water main from Queen Kaahumanu Highway to the Lako Street intersection with Ali'i Drive; and the second phase includes installing 12,500± linear feet of water main from Lako Street to Ali'i Drive at Keauhou (Exhibit 2-4). Water main connections will occur at Queen Kaahumanu Highway (20-inch), Kuakini Highway (20-inch), and Ali'i Drive (12-inch).

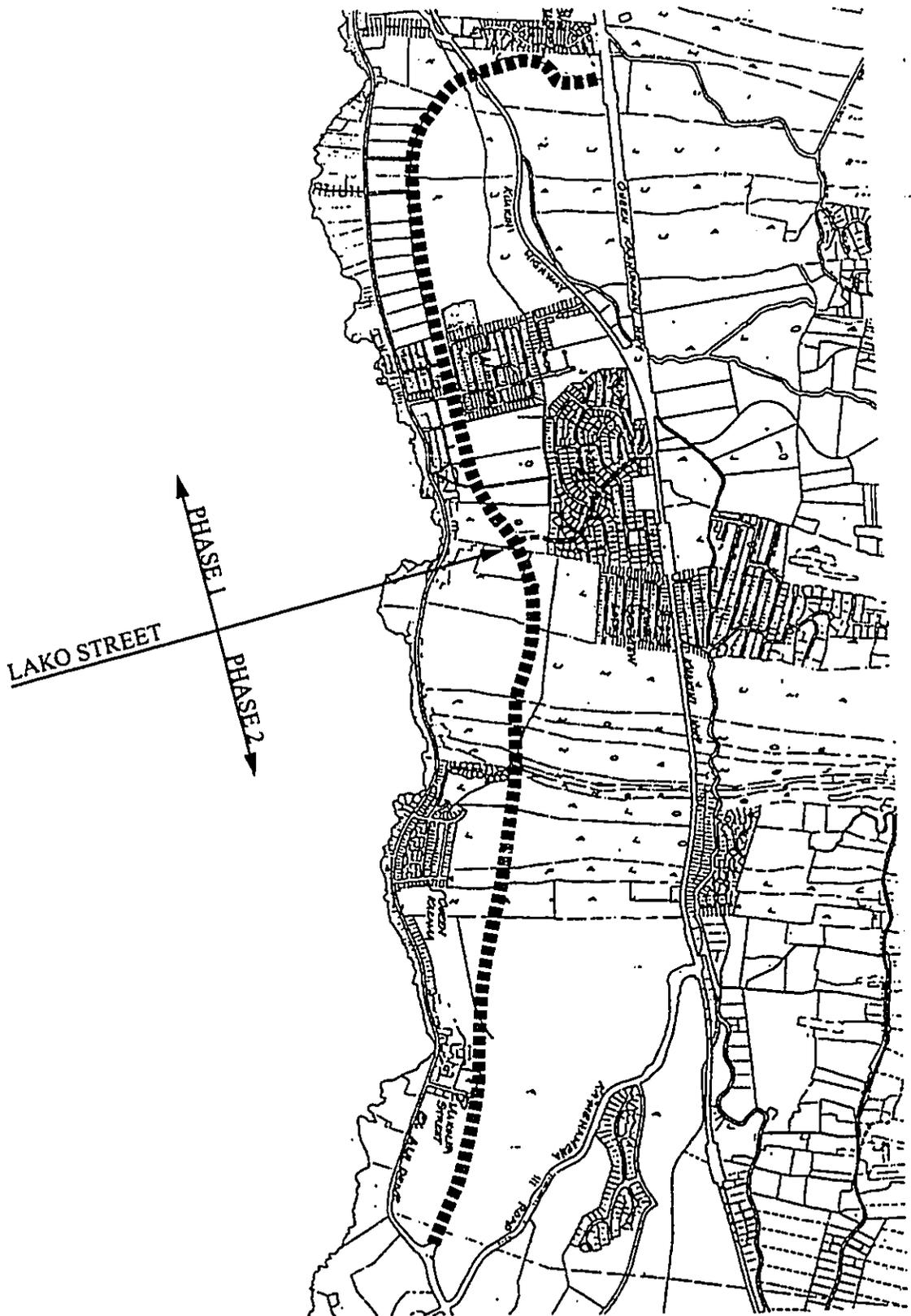


EXHIBIT 2-4  
CONSTRUCTION PHASES 1 & 2  
Alii Highway, North Kona, Hawaii



NOT TO SCALE

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April 2001

The contractor shall perform all applicable construction work in accordance with the Department of Water Supply Water System Standards. Construction work will be conducted in accordance with the County of Hawaii, Department of Public Works, "Standard Details for Public Works Construction" (September 1984) and "Standard Specifications for Public Works Construction" (September 1986). The contractor will schedule work activity between the hours of 8:30 a.m. to 3:00 p.m., Monday through Friday, excluding any State holidays. At least one through-lane on existing roadways will be open during all periods of construction. Trenches shall be covered during non-working hours with safe, non-skid bridging material to accommodate all types of vehicular traffic, and not more than the maximum permissible trenching length shall be exposed at any one time. In addition, the contractor shall provide ingress to and egress from driveways and public streets at all times. Should conditions warrant, the contractor may hire personnel to control the flow of traffic around the construction area.

Additionally, construction and restoration of the existing roadway shall be performed in accordance with all applicable sections of the "Standard Specifications for Road and Bridge Construction" (1994). All work shall also conform with the "Administrative Rules of Hawaii Governing the Use of Traffic Control Devices at Work Sites on or Adjacent to Public Streets and Highways" and the "Manual of Uniform Traffic Control Devices for Street Maintenance Operation."

Construction work on Phase 1 of the 16-inch main is tentatively scheduled to begin in Fall 2001. Construction on Phase 2 is tentatively scheduled to begin early Spring 2002. The estimated cost of the project is approximately \$5.1 million for Phase 1, and \$5.5 million for Phase 2. Funding will come from the DWS's Capital Improvements Program budget.

SECTION 3  
AFFECTED ENVIRONMENT

3.1 SOCIO-ECONOMIC ENVIRONMENT

3.1.1 Population Characteristics and Projection

The study area is located within the North Kona district on the Island of Hawaii. According to the 1990 census, the residential populations within the North Kona district numbered 22,284 and the total population for the County of Hawaii numbered 120,317. As of 1994, the population of the North Kona district was 24,900, and the island total was 135,500 (County of Hawaii Data Book, 1995). This represented a significant increase over earlier decades when the North Kona district had a 1980 population of 13,748, and a 1970 population of only 4,832 (1970, 1980, and 1990 U.S. Census). The dramatic growth of this period was primarily due to increased activity in the visitor industry. In 1970 statewide visitor arrivals was about 1.7 million. In 1980, the number increased to 3.9 million, and by 1990, it was almost 7 million (Hawaii Visitors Bureau, 1993). Approximately 29 percent of the visitors in 1990 traveled to the Big Island. Kona visitor accommodations, as measured by hotel and condominium units, experienced a similar dramatic increase. In 1970 the occupancy level was 1,460. In 1980, there was a modest increase to 1,729, but by 1990 the number had more than doubled to 3,708 (Hawaii Visitors Bureau, 1993). This trend is expected to continue since Keahole-Kona International Airport has become one of the two airports in the State to accept direct flights from overseas.

Many of North Kona's residents are young Caucasians who had moved to the district from out of state or from other counties within the state. About 59 percent of the North Kona population is Caucasian and about 16 percent is Hawaiian or part Hawaiian. The change in ethnic composition of North Kona residents is identified in Table 3-1. The North Kona population also consists of a moderately higher proportion of people in the 25-44 age group than the County of Hawaii as a whole.

Table 3-1 ETHNIC CHARACTERISTICS OF NORTH KONA POPULATION 1960 TO 1990								
Ethnicity	1960		1970		1980		1990	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Chinese	51	1.1%	177	3.7%	210	1.5%	409	1.8%
Caucasian	550	12.4%	2,125	43.9%	7,202	52.4%	13,124	58.9%
Filipino	631	14.2%	406	8.4%	1,031	7.5%	1,686	7.6%
Hawn/Part	1,510	33.9%	934	19.3%	2,991	21.8%	3,655	16.4%
Japanese	1,695	38.1%	1,118	23.1%	1,698	12.4%	2,328	10.4%
Other	14	0.3%	79	1.6%	606	4.4%	1,028	4.9%
<b>TOTALS</b>	<b>4,451</b>	<b>100.0%</b>	<b>4,839</b>	<b>100.0%</b>	<b>13,738</b>	<b>100.0%</b>	<b>22,284</b>	<b>100.0%</b>

Future population levels in North Kona will depend largely on the distribution of tourism activities in West Hawaii, further economic development of other sectors, and State and County growth policy directions. This variability is reflected in the County of Hawaii General Plan's overall population projections for the island, which, for the year 2005, ranges from 173,000 to 258,000 persons. Increases in tourism are expected to drive some of this growth. According to the General Plan, 9.1% of the Countys employees currently work in hotels. Expectations are that by 2005, hotel workers will account for 10.7% to 14.8% of the Big Island work force.

### 3.1.2 Surrounding Land Uses

The dramatic increase in Konas population between 1970 and 1980 had significant impacts on land use. Until the late 1950's agriculture was the primary economic activity. Development in Kailua was limited primarily to harbor and shipping activities in support of agriculture. Residents lived on and farmed the mauka lands. Today, residents still prefer to live in mauka Kona. Coffee and macadamia nuts are still the primary crops grown on the cool rainy slopes. The coastal area has the necessary climatic conditions to attract visitors - sunny skies, warm temperatures and low rainfall.

Lands that are designated as Urban District in the State Land Use Commission are located primarily makai of Mamalahoa Highway. Areas classified as Agricultural District are interspersed along Kuakini Highway and the Queen Kaahumanu Highway, with scattered pockets of Rural District lands.

Single-family and multi-family residential parcels (as zoned by County of Hawaii Land Use Pattern Allocation Guides maps) occur between Kuakini Highway and Ali'i Drive and along Mamalahoa Highway. Various agricultural zoned lands ranging between 1 and 5 acres in size are also interspersed throughout the area. Multi-family residential, resort hotel, commercial and industrial uses are concentrated in Kailua with multi-family and resort use stretching from Kailua to Keauhou. Light industrial uses including storage, baseyards, material supply houses, and repair services are located north of Kailua in an expanded industrial subdivision. No heavy industry is located in Kailua.

### 3.1.3 Housing

The North Kona housing inventory was 11,108 units in 1992. This represented approximately 24% of all Big Island housing which was then 46,958 units. Only the South Hilo district had more housing at 16,187 units. The composition of North Kona housing includes the following: 6,457 units are single family dwellings, 276 are duplexes, and 4,375 consists of structures with 3 or more attached units (Hawaii County Planning Department, December 10, 1992). The above data indicates there are only moderately more single family dwellings to multifamily dwellings at a ratio of about 1.4:1.

While multi-unit condominium developments are largely concentrated in Kailua-Kona and along Ali'i Drive, most of the single-family units are in subdivisions mauka of the coastal roads.

### 3.1.4 Transportation Facilities

There are five major highways serving the North Kona region: Ali'i Drive, Mamalahoa Highway, Kuakini Highway, Queen Kaahumanu Highway, and Kamehameha III Road. The orientation of the roadways are primarily north to south which were developed in response to the steep mauka-makai slopes of the area.

Rapid growth in the Kona District over the past several decades has placed heavy demands on all regional infrastructure systems. Roadway improvements along the Queen Kaahumanu Highway and Kamehameha III Highway have already been completed. Other roadway improvements are still in the planning stage and will require additional funding for planning and construction. All highway and mauka-makai connector roads between Ali'i Highway and Kuakini Highway have already been

identified and are designated on the roadway plan for the County of Hawaii, Kona Regional Plan (Exhibit 3-1).

### 3.1.5 Recreational Resources

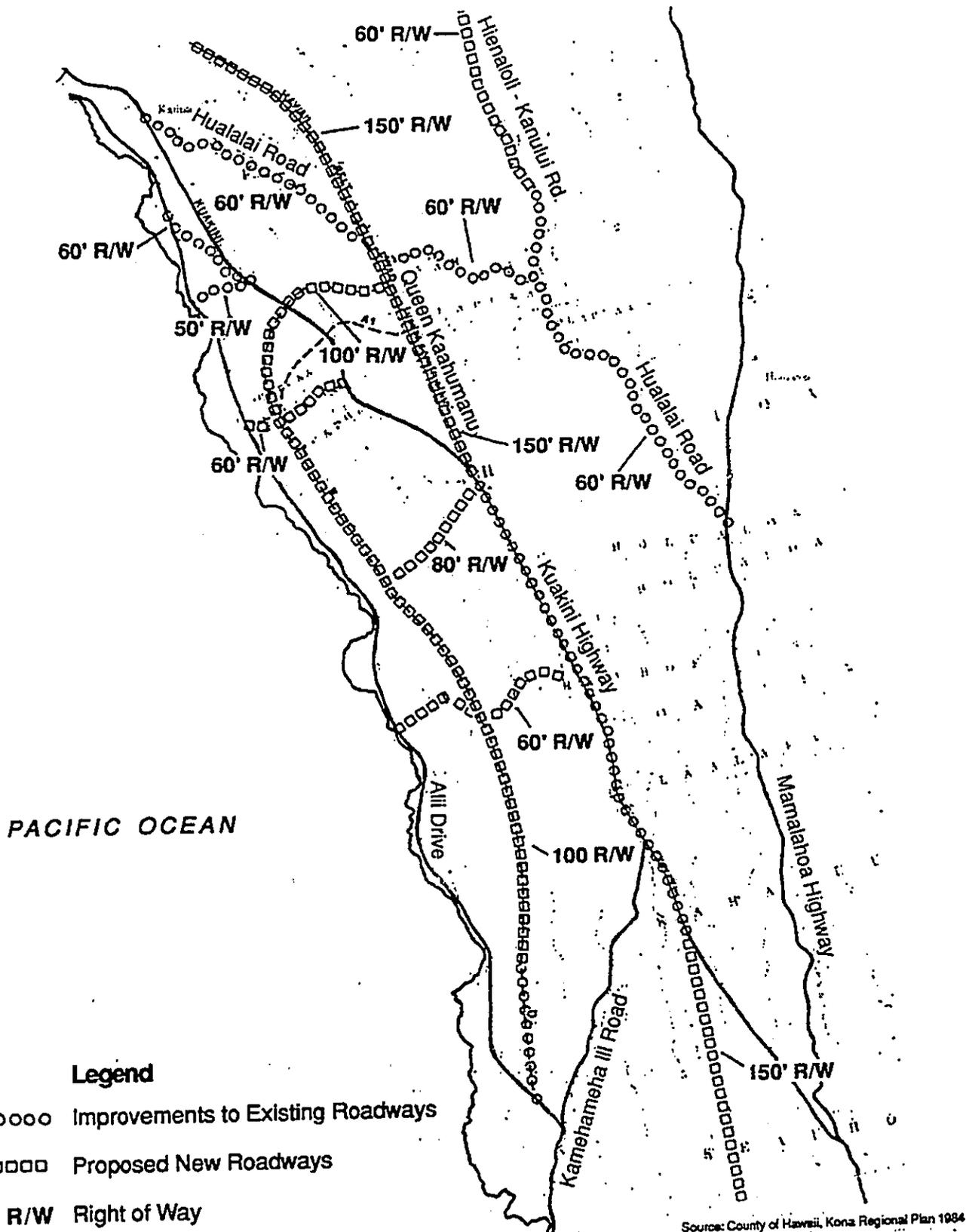
Existing State and County park facilities in the North Kona District total 166 acres. The Old Kona Airport Park of almost 120 acres, and the Kamoia Point Historic site of over 12 acres, are both State facilities. County recreational facilities are primarily beach parks and community centers. There are presently no Federal parks in the North Kona District although the Kaloko-Honokohau area north of Kailua is proposed for a National Historic Monument under the U.S. National Park system (Exhibit 3-2). Coastal recreational activities are the most popular activities. Good beaches on the Island of Hawaii are scarce since the island is geologically quite young and therefore lack extensive deposits of white sand. Beach parks are concentrated between Kailua-Kona and Keauhou, and both resident and visitor usage remains high.

## 3.2 NATURAL ENVIRONMENT

### 3.2.1 Geology/Physiography

The island of Hawaii was built by the volcanic eruptions of five volcanoes; Mauna Kea, Mauna Loa, Kohala, Kilauea, and Hualalai. The Ali'i Highway corridor is situated on the west coast of the island between Kailua-Kona and Keauhou, on the southwest slope of Hualalai volcano. Hualalai is the fourth largest of Hawaii's five volcanos and last erupted in 1800-1801. Its summit is 8,271 feet above sea level and is located approximately eight miles northeast of Kailua. Lava flows from Mt. Hualalai consist of alkali basalt and hawaiite and contain no known economic mineral resources. The flows are geologically young, and erosional processes have not yet carved well-developed drainage channels. Mt. Hualalai is situated in the saddle between Mauna Kea (13,796 feet) and Mauna Loa (13,677 feet above sea level). The regional topography is dominated by these features. In the highway corridor, slopes vary from 0 to 10 percent.

The area traversed by Ali'i Highway is classified in zone "DE" of overall relative risk from volcanic hazards (Mullineaux and Peterson, 1974:52). The zones of risk increase from "A" through "F" Hualalai Volcano has lower overall risk than the flanks of Mauna Kea and Mauna Loa because it has



PACIFIC OCEAN

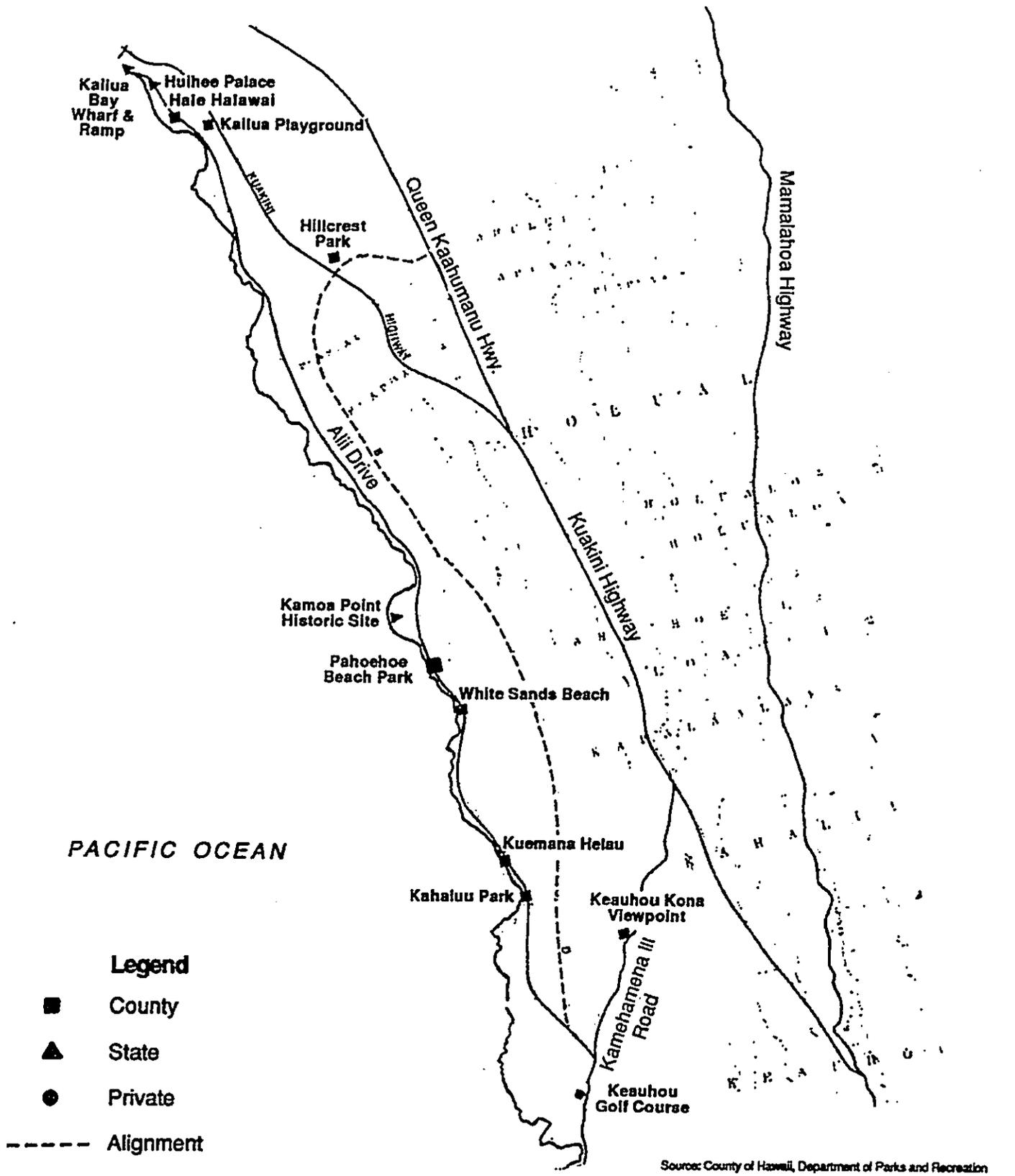
- Legend**
- o o o o o Improvements to Existing Roadways
  - s s s s s Proposed New Roadways
  - R/W Right of Way

Source: County of Hawaii, Kona Regional Plan 1994

**EXHIBIT 3-1  
ROADWAY PLAN  
Alii Highway, North Kona, Hawaii**

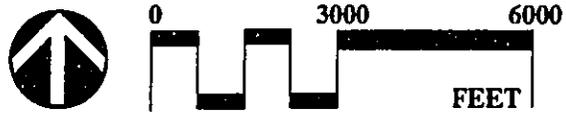


**R. M. TOWILL CORPORATION**  
April 2001



Source: County of Hawaii, Department of Parks and Recreation

**EXHIBIT 3-2  
RECREATIONAL RESOURCES  
Alii Highway, North Kona, Hawaii**



**R. M. TOWILL CORPORATION**  
April 2001

a lower frequency of eruption. However, it has a higher overall risk than zone "D" because it has erupted in historic times.

The island of Hawaii is seismically active. The largest historic earthquakes to affect the Kailua-Kona area occurred on April 2, 1868 with a magnitude of approximately 7.5 on the Richter Scale. The second largest earthquake occurred on August 21, 1951 with a magnitude of approximately 6.9 (Furamoto, February 1966). Records from the 1951 event indicate that there was some damage to structures in the study area, but no major earth cracking or slumping.

### 3.2.2 Soils

Soils in the project area are in the Puu Pa-Pakini-Waiaha Association (Exhibit 3-3). According to the U.S. Department of Agriculture Soil Conservation Service (December 1973) soil survey report, soils in this association are moderately fine soils that formed in volcanic ash; receive 20-60 inches of rainfall annually; are well drained to excessively-drained; and, are used mainly for pasture.

Characteristics associated with specific soils include:

#### **Punaluu extremely rocky peat, 6 to 20 percent slopes (rPYD)**

This soil is black peat, four inches thick over pahoehoe lava. The peat is rapidly permeable; the pahoehoe lava very slowly permeable, although water moves rapidly through cracks. Runoff is slow and the erosion hazard is slight. The shrink-swell potential is high unless thoroughly dried. Pahoehoe lava exists at a depth of less than 10 inches.

#### **Waiaha extremely stony silt loam, 6 to 12 percent slopes (WHC)**

The surface layer of this soil is a dark brown, extremely stony silty loam about four inches thick. The subsoil is dark brown, very stony silty loam about fourteen inches thick. The substratum is pahoehoe bedrock. Permeability is moderately rapid, runoff is slow and erosion hazard is slight. The shrink-swell potential is low, and bedrock exists at a depth of less than 18 inches. Slopes tend to be unstable, and the erodibility is high.

#### **Kaimu extremely stony clay, 6 to 20 percent slopes (rKED)**

The surface layer of this soil is a very dark brown, extremely stony peat about three inches thick. It is underlain by fragmental aa lava. Permeability is rapid, runoff is slow and erosion hazard is slight. The shrink-swell potential is high unless the soil is thoroughly dried.



### **Pahoehoe lava flows (rLW)**

Pahoehoe lava has no soil covering and is typically bare of vegetation except mosses and lichens. Uses of this area are restricted to recreation, wildlife, water supply, or aesthetic purposes. The Land Study Bureau (LSB) similarly established a productivity rating based on factors including slope, drainage, climate, water supply, and soil nutrients. All lands in the project area were assigned an overall productivity rating of E, the lowest rating. The primary reason for this poor rating is the lack of soil material covering the geologically recent lava flows.

### **3.2.3 Climate**

The climate in Kona is influenced more by local heating and cooling of ground than by the effect of the tradewinds that are prevalent in the rest of the state. Normal tradewinds are blocked by the mountain masses of Mauna Kea, Mauna Loa and Hualalai. During the day, the land is warmer than the ocean and the pressure gradient created causes winds to blow from the ocean toward the land. In the evening, the reverse occurs. As the land cools, the evening and night breezes blow from the land toward the warmer ocean.

The average annual rainfall in the project area is less than 40 inches and temperatures average about 75 degrees F. Rainfall is greater in the summer months and less in the winter months, a pattern that is unique in the state.

### **3.2.4 Hydrology**

Four major drainageways intersect the proposed Ali'i Highway route. All begin at or near the top of Mount Hualalai, and all are relatively long and narrow. They are Waiaha Stream, Horseshoe Bend-Holualoa Gulch, Kaumalumalu Gulch, and an unnamed gulch south of Holualoa Gulch. Stream gage records for Waiaha Stream (U.S. Geological Survey Gage #7593) show that there are small flows on Waiaha Stream at elevations above 2,500 feet approximately 30% to 40% of each year. However, except during periods of intense rainfall, this water infiltrates into the streambed before reaching the coastline. Average groundwater discharge along the coastline has been estimated at less than 0.5 million gallons per day (Technical Committee on Water Quality Standards, December 1, 1977).

The western slopes of Hualalai, through which the drainageways pass, consists of geologically recent, unweathered lava flows. Drainage courses are poorly developed and drainage basin boundaries are not easily delineated. No perennial stream exists. Occasionally intense rain storms do occur and these can produce overland sheet flow. Most rainfall percolates into the ground to the underlying groundwater body and moves slowly seaward to be discharged at the coast. Groundwater underlying the highway is brackish basal water and is not suitable for potable water supply.

### 3.2.5 Flora and Fauna

Flora and fauna in the region are mostly introduced with few remaining native species due to the largely urbanized and developed character of the area. The *Ali'i Highway Project, Kailua-Keaouhou, Environmental Impact Statement* (1988) prepared by Belt Collins & Associates included a field survey conducted by EARTHWATCH in February 1983. According to the Ali'i Highway EIS, six major vegetation cover types occur within the project area. These include grassland, open mixed scrub, koa haole woodland, kiawe forest, mixed forest and recent lava flow vegetation. Plant species are primarily exotic or introduced plants commonly found in dry lowlands throughout the state. A variety of birdlife occurs in the Kailua-Kona region and mammals include the mouse, cat and mongoose. Dogs and rats are probably present, and the area is a known habitat for the Hawaiian Hoary Bat, although none were observed.

## 3.3 ECONOMY

Agriculture was once the dominant economic activity in the Big Island through the first 60 years of the century. The early visitor industry was relatively small and concentrated in locations such as Hilo and Kailua-Kona. By the 1970s, however, the relative position between agriculture and the visitor industry was completely reversed. Revenues generated from the visitor industry was soon surpassing revenues from agriculture. Moreover, growth in the visitor industry was accompanied by significant expansion in retail and construction sectors.

According to the 1990 Census for North Kona (Census Tracts 215 and 216), the existing civilian labor force included 14,080 persons, with an unemployment rate of 4.6%. This compares favorably to the Big Island labor force of 68,100 persons, which has a higher unemployment rate of 7.7% (Table 3-2).

Location/ Census Tracts	Civilian Labor Force	Employment	Unemployment	Unemployment Rate
Hawaii County	68,100	62,800	5,250	7.7%
North Kona	14,050	13,300	650	4.6%
215	7,700	7,300	350	4.5%
216	6,350	6,000	300	4.9%

It is anticipated that the resultant growth in employment due to the visitor industry will continue for the foreseeable future. Projections for future employment point to increasing opportunities in services, retail, and construction, while the agricultural sector is expected to continue to decline. The most promising growth fields include: Service (e.g., visitor industry); Clerical/Administrative Support; Sales; and, Production, Operations, and Maintenance. The lowest growth opportunities are expected in Agriculture, Forestry and Fishing, and Executive related fields (Table 3-3).

	1992 Base Year Employment	1997 Projected Employment	Total Job Openings	Average Job Openings
All Occupations	47,210	52,060	11,601	2,320
Executive, Admin. & Mgmt.	2,120	2,340	372	74
Professional & Technical	7,510	8,150	1,216	243
Sales & Related	6,300	7,050	1,899	380
Clerical/Admin. Support	7,640	8,520	2,043	409
Service	12,190	13,740	4,073	815
Agriculture, Forestry, Fishing	1,120	1,120	205	41
Production, Operating, Maint.	10,330	11,060	1,793	359

The agricultural sector which remains in Kona is famous for Kona Coffee. The coffee plantations, and newer crops such as orchid and macadamia nuts, are located at elevations well above the proposed Ali'i Highway Corridor where the proposed water line will be installed. Flowers, foliage, and nursery plants are high value crops that are also cultivated in the area. Cattle, which once grazed

in small numbers on the slopes crossed by the proposed project, are now pasturaged primarily in upland areas where the soil is richer and interference from urban development more limited.

There is little primary-sector industrial activity in Kailua-Kona town. Instead, the industry consists of storage, wholesaling, baseyards, material supply houses, and repair services that are visitor industry and/or resident population supportive. The continued health of this industrial activity in the Kona area is dependent on the continued health of the primary-sector tourism activities. These industrial activities are in the Queen Liliuokalani Trust industrial subdivision located near the old airport, north of Kona town. According to the Kona Regional Plan, this area contains over 650,000 square feet of industrial floor area.

## SECTION 4

### POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

#### 4.1 SOCIO-ECONOMIC ENVIRONMENT

##### 4.1.1 Population

Population in North Kona has increased due to the employment opportunities created by the expanding visitor industry. This trend is anticipated to continue to the future. However, high real estate prices for existing properties have made it difficult to attract labor and provide housing for employees. According to the Hawaii County General Plan (1989), most of the population of this district is concentrated along the major highways.

State and County approvals have already been granted for extensive urban development within the area served by the proposed Ali'i Highway. The proposed waterline is a basic infrastructure necessary to support planned future development along the highway. The proposed 16-inch waterline will be connected to existing waterlines within Queen Kaahumanu Highway and Ali'i Drive that are presently being served from existing sources at the Kahaluu Shaft and/or the Kahaluu Well. Upon completion, this waterline will ensure a more reliable and efficient water system within the boundaries of an existing service area. In addition, water service will also become available to consumers along this proposed highway corridor.

A contractor, hired by DWS, will be responsible for all aspects of the transmission line construction, including supplying a construction crew. Crew members will likely come from all areas of Hawaii, including some workers from the North Kona area. The relocation of construction crews to the North Kona district for the duration of the project will not significantly increase the local population or influence population trends in the district.

#### 4.1.2 Surrounding Land Uses

Ali'i Highway and surrounding urban developments were planned as part of a long range strategy calling for consistency with existing State and County land use plans for the region.

Examples of planning documents which support the highway include the Hawaii County General Plan and the Kona Regional Plan. Growth that would be associated with the highway would be consistent with existing growth policies making it possible to realize the objectives of existing public and private sector plans in the least disruptive manner.

The proposed water line will expand water service for existing and future residential, commercial, resort, and light industrial development along the Ali'i Highway corridor. The waterline is a necessary infrastructure improvement to support expected public and private sector development in the area served by the new highway.

#### 4.1.3 Scenic and Visual Resources

The water line will be buried in the proposed highway right-of-way throughout its alignment, except for an approximately 100-foot long elevated section of roadway spanning Ohia Cave. The elevated road structure will intrude on existing views, especially from the lookout on Kamehameha III Road. The water main will be hung on the structural span where it will not be visible. Visual impacts from the elevated roadway are discussed in the Environmental Impact Statement prepared for Ali'i Highway. No addition of permanent structures such as fire hydrants, pumping stations, or other appurtenances is included in this project. The waterline itself will have no significant adverse impacts on visual resources along its alignment.

#### 4.1.4 Public Health, Safety, and Convenience

Necessary measures to assure public health, safety, and convenience will be provided throughout all phases of construction. The contractor shall provide, install, and maintain all necessary signs, lights, flares, barricades, markers, cones and other protective facilities. Such safety precautions shall conform with the "Rules and Regulations Governing the Use of Traffic Control Devices at Work Sites on or Adjacent to Public Streets and Highways," as adopted by the Highway Safety Coordinator and the U.S. Federal Highway Administration.

## 4.2 PHYSICAL ENVIRONMENT

### 4.2.1 Geology and Soils

There will be no significant impact to the geology of the project area. The 16-inch transmission main will maintain a minimum three feet of cover and will be installed along the makai side in the paved shoulder of the proposed highway (see Exhibit 2-3). The installation of the water line will involve excavation to a depth of approximately 5 to 8 feet deep within the Alii Highway right-of-way. Upon completion of the installation, the trench will be backfilled up to the proposed finished grade of Alii Highway. The installation of the water line and backfill operation will meet the approval of the Department of Water Supply and the Department of Public Works.

No significant negative impact to soils in the project area is anticipated. Clearing and grubbing activities during construction will temporarily disturb the soil retention values of existing vegetation and expose the soil to erosional forces. Plans for the proposed highway call for fill slopes and cut slopes through soils to be planted with groundcover and irrigated until the groundcover is established. Only cuts through rock, where the erosion potential is insignificant, would be left bare. In addition, the impact of construction activities on soils will be mitigated by several measures, as outlined in the following regulations:

1. Department of Public Work's Soil Erosion Standards and Guidelines, (1975);
2. USDA Soil Conservation Services Erosion and Sediment Control Guide for Hawaii, (1968).

### 4.2.2 Air Quality

Major source of air pollutants in the project is emissions from vehicular traffic. The climate in Kona is influenced more by the local heating and cooling of the ground than by the effect of the tradewinds prevalent in the rest of the State. Normal tradewinds are blocked by the mountain masses of Mauna Kea, Mauna Loa and Hualalai. The potential for an air pollution problem exists because an air mass holding pollutants could move in and out from land to ocean and ocean to land without getting dispersed by the tradewinds. However, because there are no major stationary sources of pollutants, no agricultural burning, and no intense urbanization, the air quality in Kailua-Kona remains good.

Temporary and very localized negative impacts on air quality will occur in areas adjacent to the construction site. Equipment that will be used during the construction phase will emit exhaust and airborne particulates, and the construction work will also produce dust. These impacts will be reduced through the use of mitigative measures such as dust control by watering, use of dust screens, proper vehicle maintenance and work scheduling to avoid peak traffic periods on adjoining highways.

#### 4.2.3 Noise Quality

A temporary increase in noise levels due to construction activities is likely to occur adjacent to areas being worked on. Any increase in noise due to construction will be eliminated as work is completed along the alignment. It is not expected that noise associated with this project will adversely affect the normal activities of the public located nearby.

Short term impacts from noise will be controlled by application of appropriate noise control measures in compliance with the provisions of Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control." Such mitigation measures include the use of mufflers and limiting construction to daylight hours.

#### 4.2.4 Hydrology

The proposed Ali'i Highway corridor crosses base flood areas identified on the National Flood Insurance Program Flood Insurance Rate Maps at several points. Four of these crossings are associated with four major drainageways; Waihaha Stream, Horseshoe Bend-Holualoa Gulch, Kaumalumu Gulch, and an unnamed gulch south of Holualoa Gulch.

In addition to the floodplains, intense storms also generate runoff within the small drainage basins lying completely below Kuakini Highway. The area of these basins is quite limited, however, and the topography is such that most of the runoff occurs as sheet flow rather than concentrated flow within defined drainage courses.

Installation of the water main will take place in conjunction with the proposed Ali'i Highway construction (See Exhibit 2-3). Permanent drainage structures will be put in place prior to filling of the highway structure. Further the Ali'i Highway project includes mitigation measures to eliminate

existing drainage deficiencies and ensure that any flow concentration that could result from construction of the proposed highway would not adversely affect downstream properties. In addition, the total sediment load reaching the ocean would remain virtually unchanged. As a result, significant adverse impacts from the project is not anticipated.

Upon installation, the water main will be disinfected with chlorine at a concentration of 50 milligrams per liter (mg/L) after being hydrostatically tested and checked for leaks. This chlorinated water will be retained in the pipeline for a sufficient period to allow disinfection. Disposal of the effluent will be handled by the contractor in accordance with requirements of the State Department of Health's National Pollutant Discharge Elimination System permit process.

### 4.3 BIOLOGICAL ENVIRONMENT

#### 4.3.1 Flora

The proposed project is not expected to have a significant adverse effect on flora. None of the plant species noted within the project site are Federal or State of Hawaii listed, or are candidates for threatened or endangered status. At the southern end of the proposed alignment, cover consists of scattered vegetation over aa lava flows. The endemic species, pua-pilo, is found scattered throughout this cover type. Although not endangered or threatened, it is found less commonly today throughout most of its range.

Since clearing and grading necessary for the proposed highway will be conducted prior to the development of the water main, no additional vegetation removal will be required for this project.

#### 4.3.2 Fauna

No impacts to fauna in the project area are expected to result from the project since the area will be urbanized for the construction of Ali'i Highway. The loss of vegetation due to clearing and grading for highway construction will cause displacement of faunal species in the project area. However, only a small portion of the total habitat would be affected, and it is expected that displaced fauna will relocate to adjacent or nearby lands.

Chlorinated water used for pipeline disinfection will be dechlorinated to water quality standards prior to discharge into the storm water drain system. Discharge of this water will be undertaken so

that it will not adversely impact aquatic resources. The water main will be tested for integrity against leakage followed by preflushing of hydrostatic test water. All hydrostatic testing, preflushing, and chlorination will be undertaken using potable source water. Chlorination will be introduced to the section of water main to be disinfected. Dechlorination procedures will include the following: section of water main being disinfected will be dechlorinated using sodium thiosulfate. The solution will be mixed to an average concentration of 60 lbs/100,000 gallons. Upon satisfactory flushing of all trace levels of chlorine, use of sodium thiosulfate will be terminated. Following dechlorination, testing for bacteria will be conducted by DWS.

#### 4.4 HISTORIC AND ARCHAEOLOGICAL IMPACTS

The 1988 EIS prepared for Ali'i Highway construction contains a phased archaeological resource mitigation program that has been continuing subsequent to the inventory survey findings.

Installation of the 16-inch main will be conducted as part of the Ali'i Highway construction. The following provides a summary of this ongoing phased archaeological resources mitigation program.

##### 4.4.1 Phase I(d) - Intensive Survey: Data Collection

The results of Phase I(d) program, conducted in accordance with a Memorandum of Agreement (MOA) dated July 1987, and executed among the Federal Highways Administration-Hawaii Division, the Hawaii State Historic Preservation Officer, and the Advisory Council on Historic Preservation (ACHP), with the concurrence of the County of Hawaii, the Hawaii State Department of Transportation, and the Office of Hawaiian Affairs (OHA), are reported as follow.

Phase I constitutes the initial phase of the Ali'i Highway Phased Mitigation Program. The overall objective of the program is to provide information necessary to complete the federal historic preservation review process required under Section 106 of the National Historic Preservation Act of 1966 (as amended). The specific objective of the fourth step of work (Phase I(d) - Data Collection) was the completion of appropriate data collection to satisfy current intensive (inventory) survey level standards. Phase I(d) of the Intensive Survey (Phase I) of the Mitigation Plan follows three previously completed elements of Phase I work, the initial step - Phase I(a) - Site Identification - conducted in May 1991 (PHRI Report 900-052191), the subsequent step - Phase I(b) - Testing of Potential Burial Features - conducted by PHRI in February - May 1992 (PHRI Report 1170 -

08179), and Phase I(c) - Burial Treatment Plan and Related Consultant Services (PHRI Report No. 1319-102093).

The intensive survey and data collection was carried out in accordance with the appropriate guidelines and standards recommended by the Department of Land and Natural Resources (DLNR)-State Historical Preservation Division (SHPD) for conducting intensive (inventory) level survey (1994). The significance of all archaeological remains identified within the highway corridor project area were assessed in terms of; (a) the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60); and, (b) the criteria for evaluation of traditional cultural values prepared by the National Advisory Council on Historic Preservation. DLNR-SHPD/SHPO uses these criteria to evaluate eligibility for both the Hawaii State and National Registers of Historic Places.

It should be noted that State and County approvals have already been granted for extensive urban development within the area to be served by the proposed highway, and the County government has indicated that urbanization of the area will occur even if Federal Highway Aid funds are not made available. Land development will proceed on a piecemeal basis, with individual landowners implementing their plans as market conditions warrant. Once sufficient right-of-way for the proposed highway has been acquired, the additional land needed to complete a Kailua-Keauhou route will be secured.

#### 4.4.1.1 Findings of Intensive Survey: Data Collection (1994)

During the intensive survey, approximately 137 sites consisting of 1,296 component features were identified within or immediately adjacent to the project area. Formal feature types identified include alignment, cairn, C-shape, cave, cupboard, enclosure, filled depression, modified lava tube, modified outcrop, mound, pavement, petroglyph, platform, road, terrace, trail, and wall.

Sites identified during this survey were assessed for significance based on the National Register Criteria for Evaluation, as outlined in the Code of Federal Regulations (CFR Title 36, Part 60). The DLNR-SHPD uses these criteria for evaluating cultural resources. To be assessed as significant, a site must possess integrity of locations, design, setting, materials, workmanship, feeling, and association and must be characterized by one or more of the following criteria:

- (A) It must be assessed with events that have made a significant contribution to broad patterns of our history;
- (B) It must be assessed with the lives of persons significant in the past;
- (C) It must embody distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or passes high artistic value or represent a significant and distinguishable entity whose components may lack individual distinction; or
- (D) It must have yield or may be likely to yield, information important in prehistory or history.

The Hawaii State guidelines include an additional fifth criterion (E) which defines significant cultural resources as one that "have an important traditional cultural contribution or value to the native Hawaiian people or to other ethnic groups of the state" (DLNR Draft Rules 1994).

Based on these criteria, 60 of the 137 identified sites are tentatively assessed as no longer significant, with no further work recommended. Sites in this category were significant only for their information content which has been adequately recorded during the survey.

Twenty-eight sites are tentatively assessed significant solely for information content, and further data collection is recommended for all 28 sites. For those sites requiring additional field work, a data recovery plan is to be prepared and implemented for sites not recommended for preservation or interpretation.

Of the remaining 49 sites, 16 are tentatively assessed as significant for information content and for traditional cultural values. These 16 sites have features that contain burials. Further data collection and preservation "as is" are tentatively recommended for these sites.

Twelve sites are assessed as significant for information content and are provisionally assessed as having traditional cultural value. These 12 sites have features that may contain human burials. Further data collection and provisional preservation "as is" are tentatively recommended for these sites.

Five sites are assessed as significant for information content, and for traditional cultural value. Further data collection followed by preservation with some level of interpretive development is recommended for these sites.

Four sites are assessed as significant for information content, and for traditional cultural value. These four sites also contain burials, and preservation "as is" is tentatively recommended for these sites.

Three sites are assessed as significant, with no further work recommended, but with provisional traditional cultural significance. This single feature site once contained a human burial that was exhumed prior to the completion of intensive survey fieldwork.

To date, most of the archaeological sites identified during the survey were only plotted approximately located; they have not been located by professional surveyors. The sites and features that have been accurately located by professional surveyors are those that were interpreted in previous archaeological surveys of the project area as either confirmed burials, confirmed ceremonial features, possible burials, or possible ceremonial features. These sites and feature locations are indicated in the construction drawing of the 16-inch transmission main.

The religious features identified are structures which were intended chiefly for the performance of religious ceremonies or which appear, on the basis of available archaeological evidence, to have been built for such purposes. Included in this category are Pa-o-umi Heiau, Haelaau Heiau, and two other unnamed heiau.

Site 37-7962, Ohia Cave, which has been included in the burial category, is an extremely large lava tube, a portion of which passes under the proposed roadway. In addition to the burials, it contains other archaeological material. Concern for the cave and its contents has been expressed at public meetings held to discuss the proposed highway project. As a result the interior of the cave in the

vicinity of the proposed alignment has been mapped. The entrance to Ohia Cave is sealed with a locked gate. Access to the gate is under the authority of the State Historic Preservation Division and Kamehameha Investment Corporation, which owns the property.

A Memorandum of Agreement (MOA) between the State Historic Preservation Officer, the Advisory Council on Historic Preservation, the Federal Highway Administration, and the County of Hawaii provides for preservation of Ohia Cave (Ali'i Highway Project EIS, Appendix D, 1988). Detailed engineering studies indicate that roadway can be carried over the cave on a structural span which would support the weight of the road and the vehicles traveling on it. The water line will be hung on the bridge that spans the cave.

#### 4.4.2 Phase I(e) - Intensive Survey: Oral History Component

The historical documentary and oral historical study, Phase 1(e), for the Ali'i Realignment project area was prepared by Paul H. Rosendahl, Ph.D., Inc. (PHRI), Draft, November 1996.

The oral historical component of this study was conducted in an effort to gather legendary and historical accounts from knowledgeable individuals, familiar with the lands, cultural resources, and families of *ahupuaa* of Kahului to Keauhou, North Kona. In December 1987, the Federal Highways Administration, Hawaii Division (FHWA) executed a Memorandum of Agreement with State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP), in concurrence with the County of Hawaii, State of Hawaii Department of Transportation (Hawaii DOT), and Office of Hawaiian Affairs (OHA) to ensure that proper consideration be given to the proposed highways effect on historic properties.

The basic goal of the oral historical component of this program was to identify culturally significant sites associated with the practices, beliefs, and customs of native Hawaiians that may be in or adjacent to the study area. Additionally, this program seeks to conform with the regulatory review requirements regarding the identification, evaluation, and documentation of potential traditional cultural properties present within or immediately adjacent to the project area.

The proposed Ali'i Highway oral history interviews, both formal recorded interviews and informal "talk story" interviews for which hand-written notes were taken, were conducted between January 8

through May 31, 1996. Additionally, the archival and historical documentary research was conducted as a part of the preparation and researching of historical references from interviews between November 1995 through May 1996. The three important sources of information include numerous archaeological studies conducted in the region, recently translated articles from early Hawaiian language newspapers, and the personal knowledge of individuals familiar with the lore, history, and cultural resources of Kona.

Twenty individuals participated in seventeen (17) taped interviews, and eleven (11) other individuals provided detail information for which hand-written notes were taken. Approximately sixty (60) individuals were contacted for the oral history study.

#### 4.4.2.1 Findings of Intensive Survey: Oral History Component (1996)

As a result of conducting the Ali'i Highway oral history interviews, rich historical resources were collected (**Exhibit 4-1**). The findings are summarized below while the report in its entirety can be found as *Ali'i Highway Phased Mitigation Program Phase I(e) - Intensive Survey*, Draft November 1996, under separate cover. The people interviewed provided site specific information for features and land use in lands of Kahului to Keauhou and for the larger region of Kona. The interviews also provided rich details on cultural practices and beliefs, with informants speaking of activities such as fishing, dryland agriculture, canoe making, customs at death, various forms of healing arts, honoring of *aumakua* or family gods and guardians, and sorcery practices.

While much of the information referenced features, makai of the proposed Ali'i Highway corridor, several individuals had specific knowledge about sites crossed by the proposed highway alignment. Field site visits were conducted with Mr. Valentine A'ko, Mrs. Lily Namakaokaia Kong, Mrs. Ruby Keanaaina-McDonald, Mrs. Luciana Makuakane-Tripp, Mr. Al Makuakane, Mr. J. Curtis Tyler III, and Mr. Mitchell Fujisaka. Two of the site visits have direct relevance to the proposed development of the Ali'i Highway, and address concerns about family burial sites:

1. On July 1, 1996, a field site visit with Mr. Mitchell Fujisaka (a descendant of the Kahulamu family of Kahaluu) was done with Joe Jimenez, PHRI Supervisory Field Archaeologist, and was specifically conducted to identify family sites in Kahaluu situated

Pa Kuakini Wall  
(site 6302)

Unmarked Family Graves  
(site 6315)  
Petrograph Cave  
(site 2037)

Keakealaniwahine Heiau  
and Adjoining Sites  
(sites 6327, 6319, 6328,  
6326, & 6320)

Judd Trail  
(site 6343)

Kipapa-Kekapahaukea Family  
Multiple Grave Sites (ilina)

Hale Laau Refuge Cave  
Lava Tube Extension  
(site 2077)

Ohia Cave  
(site 7962)



EXHIBIT 4-1  
ORAL HISTORY FINDINGS  
Alii Highway, North Kona, Hawaii



NOT TO SCALE

R. M. TOWILL CORPORATION

April 2001

mauka of the Kahulamu Family Estate. Mr. Fujisakas knowledge of the site was handed down to him from his father and *kupuna* (elders). Perhaps of great concern and direct relevance to the proposed highway alignment is a concealed lava tube extension of the Hale Laau Refuge Cave (Site 2077), in which family remains have been interred for generations.

2. Mr. J. Curtis Tyler III, is a direct descendant of the Kipapa-Kekapahaukea lines of Pahoehoe 3 district. The proposed Ali'i Highway corridor crosses through Grant lands (grants 1749 and 1927) belonging to the Kipapa-Kekapahaukea families. These lands which are known to contain multiple grave sites. While the PHRI archaeological surveys have not identified burials where the proposed highway corridor crosses the Kipapa lands, an as yet unpublished report by the firm of Hallett Hammatt has identified grave sites (*ilina*) in the vicinity of the corridor (Borthwick and Hammatt et al., TMK:7-7-08:20,31, & 100. Prepared for John Kingman, October 1994). The exact location of *ilina* in proximity to the actual highway and its border footprint, must be determined through consultation with lineal descendants, H. Hammatt, PHRI, and DLNR-SHPD. There is concern about the current foot print of the highway, and the placement of drainage, as indicated on maps, that would funnel run-off down the slope into the *ilina*. The family has clearly stated their desire to preserve remains in-place.

It should also be noted that in the lands of Holualoa 1-2, Site 6315 (unmarked family graves) and Site 2037 (a petroglyph cave), are of specific concern to members of the Kalawa and Makuakane families. The graves and one known entrance to the petroglyph cave are situated within a *pa hale kuleana* (kuleana house lot, LCA 7990), awarded to Pupuka in the Mahele in c. 1850. Pupuka is believed to be a *kupuna* of the Kalawa and Makuakane lines. The known portion of the petroglyph cave extends mauka, and is crossed by the proposed highway route, thus preserving of the site will be difficult. Though the identified graves are just outside of the 300 foot corridor, there is concern about the protection of the *pa ilina* (grave enclosure) because the two "Hawaiian" coral mortar crypts are already in a state of disrepair (more traditional rock paved *ilina* are situated next to the crypts). Additionally, the interview with Mitchell Fujisaka documents that elder members of his family knew that on the flat lands immediately mauka of the wall that encircles the cave and grave sites was a traditional Hawaiian games and contest field. This presence of such a feature is also recorded in the

legendary account of Ka-Miki, which describes the area known as Kahelo, famed as the site of the contest arena called Hinakahua, as extending between the lands of Puapuaa-Holualoa.

Other sites that are of particular concern to individuals interviewed, and that will be impacted by the proposed development of the Ali'i Highway, include, but are not limited to, the Ohia Cave (Site 7962) and burial sites in general; the Pa Kuakini (Site 6302); the Judd Trail corridor (Site 6343) (e.g., interviews with V. Ako; D. Roy; A. Mahi; and S. Greenwell); and the Keakealaniwahine *heiau* and the residential complex and adjoining sites (among which are Site 6372, identified as a "Burial Heiau;" Site 6319, reportedly an agricultural enclosure; Sites 6328 and 6326, habitation features; Site 6320, an enclosure with a platform). All of the people interviewed expressed some level of concern about protection and preservation of Hawaiian cultural resources, with particular emphasis on Hawaiian burial sites, heiau, residential and agricultural complexes, and trails. Also, the importance of maintaining access to cultural and natural resources was also discussed. It should be noted, that only the portion of an informant's knowledge can be collected during any oral history interview. It is usually possible to learn more through further interviews.

#### 4.4.3 Eligibility for State and National Registers of Historic Places

The project passes through the area that was an important center of population and economic and political power in the pre-contact and early monarchy period. All sites within the Ali'i Highway right-of-way are eligible for inclusion on the National Register of Historic Places by virtue of their location within the Kahaluu Historic District (Site 37-4150) and/or the Kona Field System (Site 37-6601). The Kona Field System boundary encompasses the Kahaluu Historic District and the entire realignment corridor. In addition, the Great Wall of Kuakini (Site 28-7276 or 28-6302), which is also crossed by the project was determined eligible for inclusion on the National Register in 1978. These districts and sites are also eligible for inclusion on the State Register of Historic Places. The following is a brief summary of these sites:

##### Kona Field System (Site 37-6601)

Kona Field System consists of dryland agricultural fields. It is offered as a physical demonstration of the highly developed farming economy of ancient Hawaii and illustrative of the complexity and advanced state of aboriginal Hawaiian culture. In addition to the field themselves, the extensive habitation remains within the context of other physical features

such as burial area, religious structures, cave shelters, refuge caves, animal enclosures, and work platforms are cited as contributing to research importance of this system.

#### Kahaluu Historic District

This district encompasses the seaward half of the *ahupuaa* of Kahaluu, as well as small portion of the *ahupuaa* of Keauhou. This district is most noteworthy for the presence of at least ten major heiau. There are massive structures of staked stone dedicated to worship and propitiation of Hawaiian gods.

#### Great Wall of Kuakini

The Great Wall of Kuakini is the third National Register site within the Ali'i Highway corridor. It is a core-filled wall that extends through all of the *ahupuaa* which the proposed highway would traverse. The wall was built in Kuakinis time to protect the cultivated land from pigs.

#### 4.4.4 Impacts

The 16-inch waterline is to be located within the proposed Ali'i Highway alignment and is scheduled for construction simultaneously with the highway project. Impacts associated with the proposed action are not expected to exceed those of the proposed Ali'i Highway construction.

The proposed Ali'i Highway would traverse an area containing numerous properties listed on or eligible for inclusion on the National and State Registers of Historic Places. The high density and wide geographic distribution of these historic properties make it impossible to route the roadway in such a way as to avoid them entirely.

Hence, for the purpose of determining compliance with 36 CFR 800.3, the Phased Mitigation Program for the Ali'i Highway development was prepared to mitigate a potential adverse effect on National Register Properties. The nature of these effects and the extent to which they can be effectively mitigated are summarized in the following sections.

#### 4.4.4.1 Effect on Research Value of Properties

The importance of most of the sites that would be directly or indirectly affected by the proposed Ali'i Highway lies primarily in the scientific information which they can provide concerning the material and spiritual aspects of aboriginal Hawaiian culture, i.e., in their research value. While preservation in place is generally the preferred course of action for significant historic properties, the National Advisory Council on Historic Preservation regulations indicates that this is not always possible or even appropriate. Hence, 36 CFR 800 provides for mitigation of impacts on sites with research value through the development and implementation of an archaeological data recovery program involving intense survey and appropriate salvage in lieu of preservation in place. So only as implementation of an approved program is completed prior to construction, no significant adverse impacts to the research value of sites are deemed to occur.

The procedures for dealing properties important for their research value have been specified in the Memorandum of Agreement (MOA) in the Ali'i Highway EIS (1988). The MOAs Data Recovery Plan follows the standard set forth in the National Advisory Council handbook, Treatment of Archaeological Properties.

#### 4.4.4.2 Effect on Preservation Value of Properties

Hommon and Rosendahl (September 1983) identified a total of five sites within the archaeological study corridors that they believe warranted preservation: Heiau (Site 37-2078); Halelaau Heiau (Site 37-3822); Pa-o-Umi Heiau (Site 37-3823); Heiau (Site 37-6414); and, Ohia Cave (Site 37-7962). The final highway layout has been realigned to avoid all of these sites except Ohia Cave. The proposed alignment will cross Ohia Cave, however the road and waterline will traverse the lava tube on an approximately 100-foot long elevated span that will leave the cave and its contents unmolested.

While routing the proposed highway within the makai portion of the 300 foot corridor and bridging Ohia Cave will make it possible to avoid direct effects on the sites recommended for preservation, the edge of the right-of-way would still approach within a few feet of the two closest preservation Sites 37-6414 and 37-3823. The other two heiau recommended for preservation would be only 75 to 100 feet from the edge of the right-of-way. This proximity would lead to indirect effects by altering noise levels, air quality, and the aesthetic environment; however, installation of the 16-inch

transmission main itself is not expected to trigger any significant indirect effects on the surrounding areas.

#### 4.5 LAND USE PLANS, POLICIES, AND CONTROLS

##### 4.5.1 State Land Use Commission

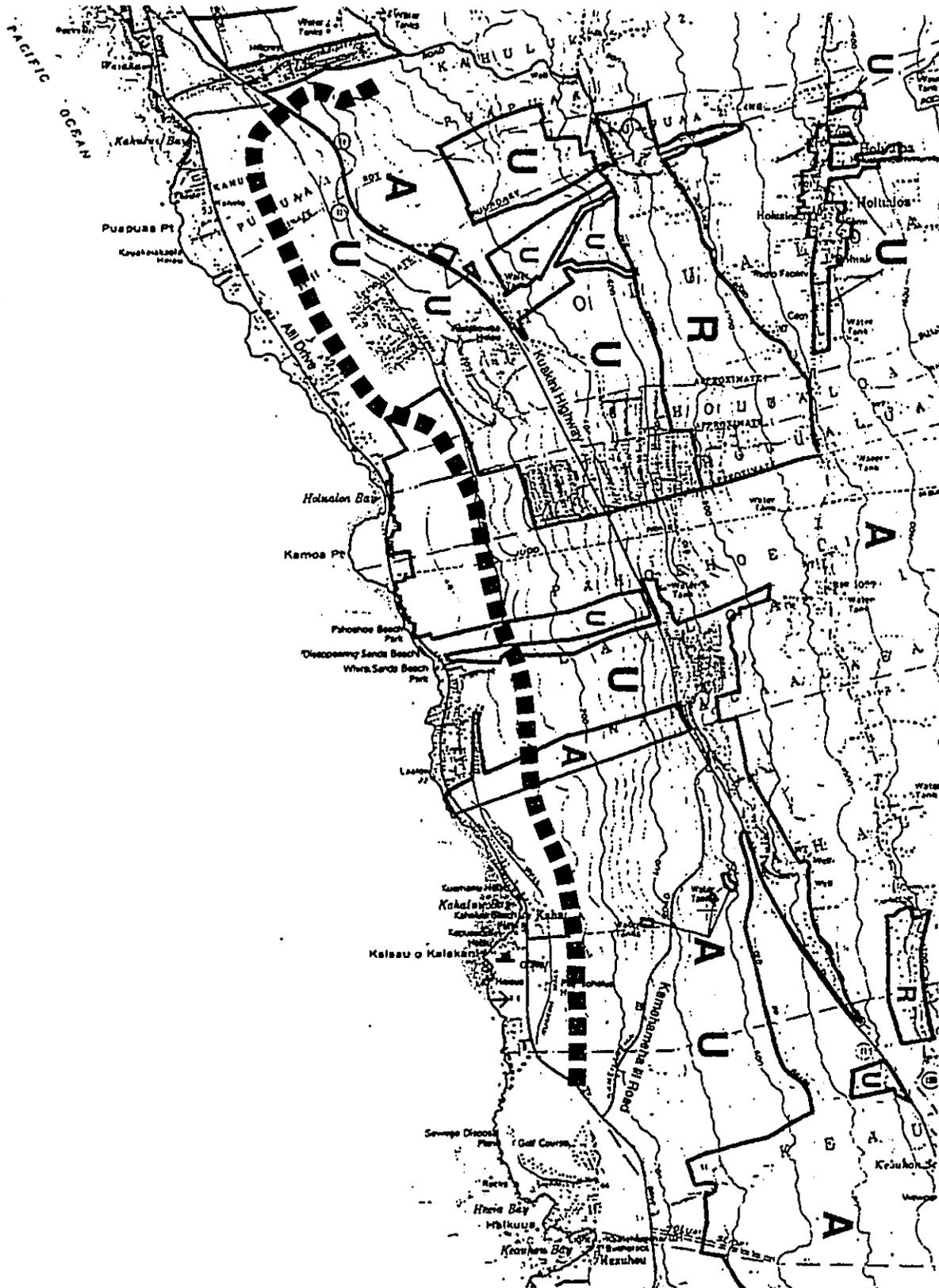
Bishop Estate/Kamehameha Development Corporation has obtained incremental redistricting of the area subject only to demonstration of substantial development of their Keauhou lands in earlier increments. For practical purposes, this area will be considered to be within the State Urban District. Also, according to the State Land Use District Boundaries Map of this area, the majority of the proposed Ali'i Highway Corridor is located within the areas designated as Urban District (Exhibit 4-2). Public facilities are a permitted use on Urban designated lands, and as such, the project is consistent with State of Hawaii land use plans and policies.

##### 4.5.2 County Comprehensive Ordinance

The minimum 100-foot right-of-way for the proposed Ali'i Drive Realignment has been granted by the County of Hawaii through the Change of Zone process. Between Lunapule Road and Kamehameha III Road, nearly all parcels makai of Ali'i Drive are zoned for either resort, residential, or commercial use. Just a few areas are designated on the map for open space. Between Ali'i Drive and Kuakini Highway (mauka of Ali'i Drive), parcels are also zoned for resort, residential, or commercial use. However, the bulk of the area is in "Unplanned" district. This designation applies to areas where insufficient studies have been conducted to adapt specific classifications. Permitted uses in the unplanned district include one single-family dwelling per five-acre building site.

##### 4.5.3 County Special Management Area (SMA)

In accordance with Chapter 205 A, Hawaii Revised Statutes, the County of Hawaii delineated a Special Management Area (SMA) boundary a minimum of 100 yards inland from the shoreline. Some portions of the transmission main alignment are located within the SMA zone. However, according to Section 9-4(10)(B)(xiv) of Rule No.9 of the Planning Commission regarding Special Management Area, "Installation of underground utility lines and appurtenant above ground fixtures less than four feet in height along existing corridors" is not regarded as "development." Therefore, the Countys Special Management Area (SMA) use permit will not be required.



**LEGEND**

Proposed Alignment 

U - Urban

A - Agricultural

R - Rural

Source: State Land Use Commission

EXHIBIT 4-2  
LAND USE BOUNDARIES  
Alii Highway, North Kona, Hawaii



NOT TO SCALE

R. M. TOWILL CORPORATION

April 2001

#### 4.5.4 County of Hawaii General Plan

The goals and policies of the County General Plan Public Utilities Water element implementing actions stated for the Kona District are relevant to the water line construction along Ali'i Highway. Included in the General Plan are Land Use Pattern Allocation Guide (LUPAG) maps that show the general location of land use categories. They are not intended to designate sites for specific uses but show the desirable direction and pattern of future development. With the exception of floodplains, a small agricultural area inland of Holualoa Bay, and an open area near Kamehameha III Road and Ali'i Drive, all the land between Kuakini Highway and its extension, Queen Kaahumanu Highway, is allocated for urban, resort, or alternative expansion use. All of these zoning designations permit utility installation, such as water lines. Hence, the water main project is consistent with County of Hawaii land use plans and policies.

SECTION 5  
POSSIBLE ALTERNATIVES

5.1 NO ACTION

The no action alternative is not considered a feasible option to the proposed project. State and county approvals have already been granted for extensive urban development within the area served by the proposed Ali'i Highway. The Ali'i Highway and urban development in this area would occur even without the proposed project. The no action alternative would result in the Department of Water Supply (DWS) being unable to enhance its existing potable water delivery system and to meet future water demands for zoned, proposed urban development.

5.2 DELAYED ACTION

The project is planned to be conducted with the Ali'i Highway construction. Delay of the project will not materially alter the environmental impacts of the project and will significantly increase project costs. In addition, delaying the project would not rule out its necessity in the near future.

5.3 ALTERNATIVE ALIGNMENTS

No consideration was given to install the waterline outside of the Ali'i Highway right-of-way as it would require the taking or condemnation of portions of privately-owned lands, and remove land from the tax base.

5.4 ALTERNATIVE MAIN SIZES

The proposed main size is based on the estimated optimum yield from existing water sources, and thus, there will be no advantage in installing a larger or smaller sized pipe. Installing a larger pipe would lower the head loss due to friction and result in lower operational costs. However, the higher construction costs would outweigh any operational cost savings. Although overall construction costs may be lower, installing a smaller pipe may result in a higher than normal line pressure, leading to frequent main breaks and may require an additional waterline if the yield from the proposed sources are much greater than the designed capacity of the pipe.

## 5.5 ALTERNATIVE SOURCES

The DWS has considered a number of alternatives to potable groundwater sources, such as direct use of streamflow, desalination, blending and development of surface and brackish water sources, and the recycling of treated wastewater. However, until these alternatives become acceptable from a technical, health, environmental and/or cost perspective, DWS will continue its emphasis on the development of groundwater sources.

SECTION 6

NECESSARY PERMITS AND APPROVALS

6.1 STATE

Department of Health

National Pollutant Discharge Elimination System (NPDES)

Notices of Intent (NOI) for Stormwater Runoff During Construction

Notices of Intent (NOI) for Hydrotesting

Department of Land and Natural Resources (DLNR)

Right-of-Entry for Construction on State of Hawaii property

Department of Transportation

Permit for Work in State Highways

Coastal Zone Management (CZM) when a COE 404/10 is required

Easements

6.2 COUNTY OF HAWAII

Department of Public Works, Building Division

# CORRECTION

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

SECTION 6

NECESSARY PERMITS AND APPROVALS

6.1 STATE

Department of Health

National Pollutant Discharge Elimination System (NPDES)

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Permit for Work in State Highways

Coastal Zone Management (CZM) when a COE 404/10 is required

Easements

6.2 COUNTY OF HAWAII

Department of Public Works, Building Division

SECTION 7  
DETERMINATION

This Draft Environmental Assessment, prepared in accordance with Chapter 343, Hawaii Revised Statutes as amended, has preliminarily concluded that the potential for impacts associated with the proposed action will be minimal.

The potential effects of the proposed project are evaluated based on the significance criteria in Section 11-200-12 (Hawaii Administrative Rules, revised in 1996). The following is a summary of the potential effects of the action.

**(1) *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource:***

Development of the project will involve the irrevocable loss of certain cultural resources. However, the potential impacts from this project are considerably less as comparison to the Ali'i Highway construction. The Environmental Impact Statement prepared for the proposed Ali'i Highway in 1988 included a phased archaeological resource mitigation program that has been continuing subsequent to the inventory survey findings. The phased mitigation program is described in Section 4.4 of this Draft Environmental Assessment.

**(2) *Curtails the range of beneficial uses of the environment:***

The project will not curtail the range of beneficial uses of the environment. The 16-inch water line will be maintained a minimum of 3 feet of cover within the Ali'i Highway right-of-way. Installation of the water line will take place in conjunction with the Ali'i Highway construction. Ali'i Highway and surrounding urban developments were planned as part of a long range strategy calling for consistency with existing State and County land use plans for the region.

**(3) *Conflicts with the States long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS:***

The project is in conformance to the Chapter 344, HRS, State Environmental Policy, to maintain an integrated system of state land use planning which coordinates the state and county general plan. State and County approvals have already been granted for extensive urban development within the area served by the new highway. The purpose of the project is to provide a basic infrastructure necessary for planned and zoned future development along the highway.

**(4) *Substantially affects the economic or social welfare of the community or State:***

The project is not anticipated to have significant effects on the economic or social welfare of the community or the state. The proposed 16-inch waterline will ensure a more reliable and efficient water system within the boundaries of an existing service area. In addition, water service will also become available to consumers along this proposed highway corridor.

**(5) *Substantially affects public health:***

The project is not anticipated to have substantial effects on public health. Necessary measures to assure public health, safety, and convenience will be provided throughout all phases of construction. The contractor shall provide, install, and maintain all necessary signs, lights, flares, barricades, markers, cones and other protective facilities. Such safety precautions shall conform with the "Rules and Regulations Governing the Use of Traffic Control Devices at Work Sites on or adjacent to Public Streets and Highways," as adopted by the Highway Safety Coordinator and the U.S. Federal Highway Administration.

**(6) *Involves substantial secondary impacts, such as population changes or effects on public facilities:***

The proposed water line is not anticipated to result in substantial secondary impacts. State and County approvals have already been granted for extensive urban development within the area served by the new highway. Growth that would be associated with the project would be consistent with existing growth policies making it possible to realize the objectives of existing public and private plans in the least destructive manner.

**(7) *Involves a substantial degradation of environmental quality:***

The proposed project is not anticipated to involve a substantial degradation of environmental quality. The installation of the water line will maintain a minimum of 3 feet

of cover within the Ali'i Highway right-of-way. Clearing and grubbing activities during construction activity will be minor compared to the Ali'i Highway construction. Plans for the highway include adequate mitigation measures described in Section 4.2.1 of this Draft Environmental Assessment.

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

The proposed small scale of development is not anticipated to result in cumulative effects; therefore, it would not involve a commitment to larger actions.

**(9) *Substantially affects a rare, threatened, or endangered species, or its habitat:***

The proposed project is not anticipated to have substantial effects on a rare, threatened, or endangered species, or their habitat. According to *The Ali'i Highway Project, Kailua-Keauhou, Environmental Impact Statement* (1988), none of the plant species noted within the project site are Federal or State of Hawaii listed, or are candidates for threatened or endangered status.

A variety of birdlife occurs in the Kailua-Kona region and mammals includes the mouse, cat and mongoose. Only a small portion of the total habitat would be affected due to the construction. It is expected that displaced fauna will relocate to adjacent or nearby lands.

**(10) *Detrimentially affects air or water quality or ambient noise levels:***

No significant impacts on the areas long-term air or water quality or ambient noise levels are anticipated to result from the project. There will be some short-term impacts on the air quality and noise levels as a result of project construction. Adequate mitigation measures will be taken as described in Section 4.2.2 and 4.2.3 of this Draft Environmental Assessment.

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

The project is not anticipated to affect environmentally sensitive areas. The project crosses base flood areas identified on the National Flood Insurance Program Flood Insurance Rate Maps at several points. However, impacts from the 16-inch transmission main is minor compared with the Ali'i Highway development. Section 4.2.4 of this Draft Environmental Assessment describes mitigation measures provided by the Ali'i Highway.

**(12) *Substantially affects scenic vistas and viewplanes identified in county or states plans or studies:***

The project will not significantly affect the areas visual resource. The 16-inch transmission main will be buried in the right-of-way of Ali'i Highway. No addition of permanent structures such as fire hydrants, pumping stations, or other appurtenances are included as part of this project.

**(13) *Requires substantial energy consumption:***

The proposed 16-inch water line is not anticipated to result in substantial energy consumption.

Perhaps, the major concern of the proposed action is its impacts on the cultural resources of the area. The proposed Ali'i Highway would traverse an area containing numerous properties listed on or eligible for inclusion on the National and State Registers of Historic Places. The high density and wide geographic distribution of these historic properties make it impossible to route the roadway in such a way as to avoid them entirely.

Hence, the phased Mitigation Program for the Ali'i Highway development was prepared to provide guidance for the recovery of significant archaeological data and for the in-place preservation of significant historic sites in accordance with a Memorandum of Agreement (MOA) dated July 1987, and executed among the Federal Highways Administration-Hawaii Division, the Hawaii State Historic Preservation Officer, and the Advisory Council on Historic Preservation (ACHP), with the concurrence of the County of Hawaii, the Hawaii State Department of Transportation, and the Office of Hawaiian Affairs (OHA). Section 4.4 of this Draft EA provides a summary of this on-going phased archaeological resources mitigation program.

In accordance with the provision set forth in Chapter 343, Hawaii Revised Statutes, this Draft Environmental Assessment has preliminarily determined that the project will not have significant adverse impacts on the environment. The Department of Water Supply is considering the issuance of a Finding of No Significant Impact (FONSI). Anticipated impacts will be temporary and will not adversely impact the environmental quality of the area. Therefore, it is recommended that an Environmental Impact Statement (EIS) not be required.

SECTION 8  
AGENCIES CONSULTED IN DRAFT EA

8.1 FEDERAL AGENCIES

Department of the Interior, Fish and Wildlife Service  
Department of the Interior, Geological Survey  
Department of Agriculture, Natural Resources Conservation Service  
U.S. Army Corps of Engineers

8.2 STATE AGENCIES

Department of Hawaiian Home Lands  
Department of Health  
Department of Land and Natural Resources  
Office of Governor  
University of Hawaii, Water Resources Research Center

8.3 HAWAII COUNTY AGENCIES

Department of Public Works  
Department of Water Supply  
Department of Finance  
Planning Department

8.4 OTHER GROUPS/ORGANIZATIONS

Hawaii Leeward Planning Conference  
Kamehameha Schools/Bernice Pauahi Bishop Estate  
Kona Outdoor Circle  
Kona Traffic Safety Committee  
West Hawaii Committee  
West Hawaii Humane Society

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Ali'i Highway Project, Kailua-Keauhou, County of Hawaii, State of Hawaii, Final Environmental Impact Statement and Section 4(f) Statement, U.S. Department of Transportation, Federal Highway Administration and State of Hawaii Department of Transportation, Highways Division and County of Hawaii Department of Public Works, December 1996

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The County of Hawaii Data Book 1995, Department of Research and Development, County of Hawaii, 1996.

The General Plan, County of Hawaii, November 1989

APPENDIX

Appendix A Responses to Comments Received During the Draft Environmental  
Assessment 30-Day Comment Period

BENJAMIN J. CAYETANO  
GOVERNOR



REC'D	FEB 09 2001	RATC
[Handwritten initials]		

GENEVIEVE SALMONSON  
DIRECTOR

STATE OF HAWAII

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

236 SOUTH BERETANIA STREET  
SUITE 702  
HONOLULU, HAWAII 96813  
TELEPHONE (808) 586-4186  
FACSIMILE (808) 586-4186

February 7, 2001

Mr. Milton D. Pavao, P.E., Manager  
Department of Water Supply, County of Hawai'i  
25 Aupuni Street  
Hilo, Hawai'i 96720

*You need to pt.  
out that the  
concerns are or have  
been addressed in  
the road project.*

Dear Mr. Pavao:

The Office of Environmental Quality Control (OEQC) has reviewed the draft environmental assessment (DEA) for the Ali'i Highway 16-inch Water Transmission Main, South Kona, Tax Map Keys, 3<sup>rd</sup> Division, 7-5-19, 20 (portion); 7-6:13, 14, 15, 16, 17, 18, 19 and 25 (portion); 7-7:4, 8 (portion); and 7-8:10 (portion), and offers the following comments for your consideration.

- *Cultural Impact Assessment pursuant to Act 50, Session Laws of Hawai'i for 2000.* The DEA contains an extensive discussion of historic and archaeological impacts, with particular reference to the 'Ohi'a Cave whose location is now public knowledge. Please discuss mitigative measures to ensure that unauthorized visits to the cave will not occur. Also, please consult with neighbors and the surrounding community to ascertain if the proposed action will impact any cultural activities occurring along the pipeline route (flower/fern gathering, picking of guavas, avocados, uhaloa (*Waltheria sp.*), noni (*Morinda citrifolia*), etc.) and please document in the environmental assessment the results of consulting with neighbors and surrounding community members.

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

Sincerely,

GENEVIEVE SALMONSON  
Director

copies: Mr. Glenn Ahuna, Department of Water Supply  
Mr. Chester Koga, R. M. Towill Corporation

420 Waiakamilo Road  
Suite 411  
Honolulu Hawaii 96817-4941  
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R. M. TOWILL CORPORATION  
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Environmental Services  
Photogrammetry  
Surveying  
Construction Management

April 25, 2001  
1-17788-0E

Ms. Genevieve Salmonson, Director  
Office of Environmental Quality Control  
235 S. Beretania Street  
State Office Tower, Suite 702  
Honolulu, HI 96813

Dear Ms. Salmonson:

**Environmental Assessment (EA) for Ali'i Highway  
16-Inch Water Transmission Main, Kailua to Keauhou, island of Hawaii**

Thank you for your letter dated February 7, 2001 responding to requests for comments on the Draft EA for the subject project. In response to your comments (*in italics*) we offer the following information:

*Please discuss mitigative measures to ensure that unauthorized visits to the (O'hi'a) cave will not occur.*

'Ohi'a Cave is part of an historic district. It's location is identified by interpretative signage on Kamehameha III Road. The entrance to 'Ohi'a Cave is sealed with a locked gate. Access to the cave is under the authority of the State Historic Preservation Division, Burials Program and Kamehameha Investments Corporation, which owns the property.

*Also, please consult with neighbors and the surrounding community to ascertain if the proposed action will impact any cultural activities occurring along the pipeline route, and please document in the environmental assessment the results of consulting with neighbors and surround community members.*

The proposed water main is being constructed simultaneously and in conjunction with the Ali'i Highway Project for which a Final Environmental Impact Statement (EIS) has been published. Extensive interviews were conducted with community members in the project area during the preparation of the EIS. The goal of the interviews was to identify culturally significant sites in or adjacent to the project area associated with practices, beliefs, and customs of native Hawaiians.

Approximately 60 people were contacted for interviews, of which 20 participated in taped interviews and 11 others provided information taken by hand-written notes. Community interviews are documented in *Ali'i Highway Phased Mitigation Program, Phase 1(e) - Intensive Survey, Oral History Component, North Kona District, Island of Hawaii, Vol I, IIa, and IIb*, Paul H. Rosendahl, Ph.D., Inc., November 1996. This reference is cited in Section 4.4.2 of the Draft and Final EA for the proposed Ali'i Highway 16-Inch Water Transmission Main. A summary of the interview findings are also summarized in this section.

Ms. Genevieve Salmonson  
April 25, 2001  
Page 2

Should you have questions or require additional information, please do not hesitate to contact Mr. Jim Niemann or Mr. Chester Koga of R. M. Towill Corporation at 842-1133.

Very truly yours,



Chester T. Koga, AICP  
Project Manager

CK:jn:k\plan\17788\EA\correspondence\

cc: Department of Water Supply, County of Hawaii