

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843



April 1, 1999

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CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Gary Gill, Director
Office of Environmental Quality Control
235 South Beretania Street, #702
Honolulu, Hawaii 96813

Dear Mr. Gill:


Subject: Finding of No Significant Impact for the Board of Water Supply's
Proposed Windward Transmission Main Project from Punaluu to
Kualoa Park, Koolauloa, Koolaupoko, Oahu, TMK: 4-9, 5-1, 5-2, 5-3

The Board of Water Supply has reviewed the comments received during the public comment period which began on November 8, 1998. We have determined that the environmental impacts of this project have been adequately addressed as discussed in the final environmental assessment (EA) and are therefore, issuing a finding of no significant impact. We request that the proposed project be published as finding of no significant impact in the next Office of Environmental Quality Control (OEQC) Bulletin.

Attached are the completed OEQC bulletin publication form and four (4) copies of the final EA for your review.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,


CLIFFORD S. JAMILE
Manager and Chief Engineer

REC'D
APR 13 1999
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

Attachments

cc: George Yuen, George Yuen and Associates

APR 23 1999

FILE COPY

1999-04-23-DA-~~FEA~~ - Kamehameha Highway
Transmission Mains from Punaluu to Kualoa Park

Environmental Assessment
for the
Punaluu to Kualoa Park Transmission Pipeline
Koolauloa, Koolaupoko, Oahu

Tax Map Key 4-9; 5-1; 5-2; 5-3.

Board of Water Supply
City and County of Honolulu.
630 South Beretania Street
Honolulu, Hawaii 96843

Prepared By
George A.L. Yuen & Associates

April, 1999

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I. INTRODUCTION

The Board of Water Supply (BWS), City and County of Honolulu plans to undertake construction projects to install a water transmission pipeline in the Koolauloa District and extending slightly into the Koolaupoko District. The BWS has prepared this Environmental Assessment (EA) to address plans and the implementation, as well as the potential impacts and mitigative measures of the proposed project. This Environmental Assessment is 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.

No significant impacts are foreseen and the BWS has declared a Finding of No Significant Impact (FONSI).

The proposing agency is the BWS, City and County of Honolulu; the approving agency is the BWS, City and County of Honolulu.

The "Final Environmental Impact Statement, Windward Oahu Regional Water System Improvements Plan", August 1988, provides additional information regarding the relationship of this project to the Windward System.

II. PROPOSED ACTION

A. Purpose

The City and County of Honolulu Board of Water Supply (BWS) proposes to install 36-inch and 30-inch diameter transmission mains along the Kamehameha Highway right-of-way from the junction of Haleaha Road in Punaluu to Kualoa Park. The 36-inch pipeline portion is approximately 13,000 linear feet and begins at the junction of Haleaha Road and ends at Kahana Beach Park. The 30-inch pipeline portion is approximately 30,000 linear feet and begins at Kahana Beach Park and ends at Kualoa Park. Construction will be implemented in various phases beginning in the year 1999-2000. The proposed project provides a parallel transmission main for reliability of service in case the existing transmission main along Kamehameha Highway requires servicing. The Windward 272' Low Service System is the highest pressure water system on Oahu. Static pressures often exceed 135 psi in the Punaluu to Waihee segments and large portions are near mean sea level. The high pressure and salt water environment of the existing single line transmission main along Kamehameha Highway have drawn concerns on the severity of main breaks and its associated disruptions of water service. When high pressure mains break, the water damage can be severe and repairs can take longer. The lack of sufficient source and storage in the Kaneohe and Kailua areas magnify the importance of a reliable water transmission system. The proposed transmission main

project will therefore provide a parallel main along the existing transmission main alignment for reliability of service.

The transmission of water is allowed in the State Water Code if reasonable and beneficial. The transmission of excess water to the designated growth areas of South Oahu is consistent with the City's development plans. In addition, it keeps rural area rural maintaining environmental values. Water developed on the windward side is available for windward needs. Any excess should be available for transmission to other regions consistent with the State Water Code and the City's development plan.

B. Location and Description

The proposed pipeline will be routed along the existing right-of-way of Kamehameha Highway from Punaluu, through Kahana, Kaaawa and thence to Kualoa. The 36-inch pipeline commences at the junction of Haleaha Road and Kamehameha Highway along the highway to Kahana Beach Park totalling 13,000 linear feet in two projects.

The 30-inch pipeline starts at Kahana Beach Park and follows Kamehameha Highway to Kaaawa past Kualoa Park to Molii Pond for a total of 30,000 linear feet in five projects.

Construction in phases is scheduled to begin in the 1999-2000 period at a total estimated cost of \$44,730,000. The tentative phasing, start dates and costs are shown in the table in Figure 10.

Figure 1 is a map showing the location of the pipeline. Figure 2 is a schematic diagram showing the essential elements of the Windward Water System and the point of connection. With one exception, the entire pipeline route is within the 100-year flood plain. In addition, part of the pipeline route at the Punaluu end is within the coastal flood plain. Kamehameha Highway fronting Kahana Valley State Park is in an area where flood hazards are undetermined.

The pipeline route will pass through areas designated "Urban", "Agricultural", and "Conservation" under the State land use classification. Two stretches are designated "Conservation"; from the Punaluu border of Kahana Valley State Park around Kahana Bay to Mahie Point, and from Kaaawa Beach Park to Kaoio Point. Figures 3 and 3A are maps showing State Land Use designations along the pipeline route.

The pipeline will cross a number of streams and highway drainage outlets along its route. In Punaluu, the 36-inch pipeline will cross two outlet channels of Punaluu Stream, a culvert at Punaluu Beach Park and Maipuna Stream. At Kahana where the 30-inch pipeline starts, the crossings include a box culvert at Kahana Beach Park, two channels of Kahana Stream and a small culvert on the Kaaawa side of the valley. At Kaaawa, the route crosses Makaua Stream and Kaaawa Stream. Figures 4, 5, 6, 7, and 8 are photographs of some of the crossings taken on February 22, 1995.

III. DESCRIPTION OF THE PROPOSED ACTION

A. Proposed Action

The proposed pipeline will parallel an existing water main on Kamehameha Highway and will be hydraulically connected to it so both existing and proposed pipelines can operate under common hydraulic conditions.

B. Construction Materials and Methods

The pipe material has not yet been selected. In the past, such pipelines have been constructed of either concrete-cylinder pipe (CCP), or poly-wrapped ductile iron pipe. Valves will be installed along the length of the water main to allow for sections of the line to be isolated for maintenance and repair. The main will be laid at various depths to avoid existing facilities, but will have a minimum cover of three feet. A typical trench cross section is provided in Figure 9.

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 holiday. At all times, there will be at least one through-lane open. Access into and out of driveways will be provided. Where conditions warrant, flow of traffic can be routed around the construction area by contractor personnel. All applicable construction work will be in accordance with "Standard Specifications for Public Works Construction" (September 1986) of the Department of Public Works, City and County of Honolulu, the "Standard Details (September 1984 as amended), and the Revised

Ordinances of Honolulu (ROH), 1978 as amended. Pipeline and related construction work will be in accordance with BWS System Standards (Vol 1 and 2 and all subsequent amendments) 1985. Construction and restoration of Kamehameha Highway right-of-way will be in accordance with applicable portions of "Standard Specifications for Road and Bridge Construction" (1976), and "Specifications for Installation of Miscellaneous Improvements Within State Highways" (1974), of the State Highways Division.

Traffic flow at the construction sites on the highway will conform with "Administrative Rules of Hawaii Governing 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 Operations." In addition, construction plans must be submitted for review and approval by the State Highway Division.

Pipe installation will involve removal of pavement, trench excavation, pipe placement, backfilling, compaction and pavement restoration. Trenches will be approximately 4 feet 6 inches wide for 36-inch pipe and 4 feet wide for 30-inch pipe. A maximum of 150 feet of roadway will be trenched at any given time. Excavated material will not be stockpiled along the trench but will be removed and later returned during the backfilling phase. All excess and/or unsuitable material will be the responsibility of the contractor.

Micro-tunnelling to reduce impact to surface facilities will not be necessary as there are no concentrations of

surface facilities to bypass. In addition, groundwater will be encountered throughout most of the route. Micro-tunnelling to install the pipe will confer no significant advantage. However, at stream crossings, micro-tunnelling may preclude the need for the Stream Channel Alteration Permit process.

The contractor must deal with water in various forms in his operations. Ground water will be encountered in excavations. Storm water will flow across his construction sites and water must be used in various hydro-testing operations.

Disposal of water associated with construction is governed by Hawaii Administrative Rules (HAR) Chapter 11-55, October 15, 1992, under the National Pollutant Disposal Elimination System (NPDES). Ground water encountered in excavations is covered under Appendix "G". Storm water associated with construction sites exceeding five acres in area is covered under Appendix "C". For those areas less than 5 acres, BMPs such as swales and berms will be utilized to control storm water runoff. Hydro-testing water is covered under Appendix "F". NPDES is administered by the State Department of Health (DOH). The above mentioned provisions cover disposal to all state waters except discharges to Class 1 Inland waters, Class AA Marine waters, and areas restricted in accordance with State "No Discharge" policy identified in Chapter 11-54 HAR, entitled "Water Quality Standards."

In addition, a State Water Quality Certification pursuant to Section 401 of the Clean Water Act (CWA) of 1977 is required to construct and operate any facility which may result in any discharge into the navigable waters of the State of Hawaii. Section 401 is also administered by the State DOH. However, the U.S. Army Corps of Engineers' General Permit GP95-002 covers this requirement.

C. Stream Crossings

At streams and other drainage crossings, the manner of carrying the pipeline at each crossing has yet to be decided. The pipe can be installed beneath the stream bed surrounded by a concrete jacket, supported on pile bents, or hung under th bridge. Each site will be evaluated to determine the most appropriate means of crossing.

There are two crossing sites that require special attention because they discharge into sensitive coastal waters. At Kahana Bay, the two stream outlets enter "Class AA" receiving waters. These waters are protected under Title 11, Chapter 54, HAR, DOH Water Quality Standards and require "Individual NPDES Permits," that are specially processed, require public notification, and allowance for public comment.

Punaluu, Kahana and Kaaawa Streams empty into coastal waters and are influenced by tides. These streams come within the purview of the U.S. Army Corps of Engineers under the River and Harbors Act of 1899. Permission to perform construction in these streams must be obtained from the U.S.

Corps of Engineers prior to the commencement of work.

The Corps of Engineers has a general permit (GP95-002) for utility lines in, under or above waters of the United States including navigable waters in the State of Hawaii. The permit includes the Coastal Zone Management (CZM) Program and State DOH Water Quality Certification (WQC). Applicants for the general permit GP95-002 do not require CZM or WQC consistency determination. The Corps will also notify the National Marine Fisheries Service, the State Department of Land and Natural Resources (DLNR), the Office of Planning and the DOH and will consider their comments before authorizing the project.

At the State level, three agencies have interests in stream crossings and the pipeline route. The Office of Planning which is under the State Department of Business, Economic Development and Tourism, coordinates a review process to assure consistency of the action with the State's Coastal Zone Management Plan. GP95-002 covers this requirement.

The DLNR is involved in stream crossings where the stream channel is altered. A "Stream Channel Alteration Permit" (SCAP) is required where any portion of the stream channel or bank is disturbed. If the pipe is carried across the stream without altering the channel or banks, no permit is required. Micro-tunnelling under the stream channel may preclude the need for the SCAP process.

As previously stated, the DOH administers the NPDES,

Section 401 Water Quality Certification, and Title 11, Chapter 54, HAR. These rules also cover stream crossings and discharges into navigable waters of the State. Section 401 requirements are covered by GP95-002.

At the City level, the Department of Planning and Permitting (DPP) has the the shoreline management function under Chapter 25 of the Revised Ordinances of Honolulu (ROH). The installation of underground utility lines and appurtenant above ground structures less than four feet in height in existing corridors are excluded and no permit is required. However, the construction of a pipe support structure for a stream crossing above the water level requires a permit under this chapter.

IV. AFFECTED ENVIRONMENT

A. Physical Environment

1. Geology

The project site is at the northern half of the Koolau Shield Volcano, along the windward (northeastern) shoreline of Oahu. Windward Oahu is the remnant of a deeply eroded basaltic shield volcano which was initially broad-shaped, like Mauna Loa on the island of Hawaii. Oahu underwent a series of submergences and emergences resulting from changes in the ocean level during glacial and interglacial phases. Fluvial erosion carved a series of valleys in the Koolau shield which, combined with wave erosion of cliffs, may have reduced its height by as much as one thousand feet. Alluvium accumulated in valley floors and coral reefs grew over low lying coastal areas during higher stands of the ocean. Along portions of the windward coast, deposits of terrestrial and marine sediments formed a relatively impermeable wedge of sedimentary material known as a caprock. (Source: Final Environmental Impact Statement for Windward Oahu Regional Water System Improvements, BWS, August, 1988.)

2. Soils

Most of Windward Oahu including the pipeline route is covered by clay soils originating from old alluvium and colluvium from the Koolau Range or residuum from the ridges between streams.

The primary soil series found along the proposed alignment from Punaluu to Kualoa Point is described as Jaucus

Sand (JaC) by the U.S. Soil Conservation Service. This type of soil consists of excessively-drained calcareous soils that occur as narrow strips on coastal plains adjacent to the ocean. Slopes associated with JaC soil type range from 0 to 15 percent but generally do not exceed 7 percent. Its coloration is pale brown to very pale brown or sandy, extending to depths of more than 5 feet, but its composition is neutral to moderately alkaline throughout its profile.

South of Kualoa Point the primary soil series is described as the Waikane Series by the U.S. Soil Conservation Service. This series consists of well drained soils on alluvial fans and terraces on the island of Oahu and are developed in alluvium and colluvium derived from basic igneous rocks.

The pipeline route does not encounter any prime agricultural land. According to the classifications in the "Agricultural Lands of Importance to the State of Hawaii" (ALISH), the land adjacent to Kamehameha Highway between Haleaha Road to Kaoio Point at the Koolauloa-Koolaupoko District boundary is unclassified. Between Kaoio Point and Molii Pond, the land along the highway is classified as "Other Important Agricultural Land." These lands are important to agriculture but they exhibit certain properties that exclude them from "Prime" or "Unique" agricultural lands.

3. Climate and Air Quality

Windward coastal temperatures vary little over the

annual weather cycle. At the Kahuku monitoring station, the average temperature for the coolest month is 71.6 degrees F and for the warmest, 78.8 degrees F.

Along the coastal area, rainfall averages around sixty inches per year. Rainfall peaks during cooler months from November to March and is lower for the warmer months, May to September.

Air quality on the windward coast of Oahu is generally affected by vehicular traffic. The general lack of high volumes of traffic plus the flow of normal trade winds mitigate the effects of vehicular traffic on air quality.

4. Hydrology

a. Surface Water

The pipeline route crosses three perennial streams and two intermittent streams. In addition, there are a few culverts that drain small marshy areas along the coast line.

At the north end, the 36-inch pipeline crosses two outlet channels of Punaluu Stream. The headwaters of this large perennial stream rise in the dike zone of the Koolau Range and drains Punaluu Valley. Figure 4 shows two photographs of the crossings at Kamehameha Highway. Farther south, the 36-inch pipeline crosses Maipuna Stream--an intermittent stream that drains a flood plain mauka of Kamehameha Highway.

At Kahana Bay where the 30-inch pipeline begins, the crossings include a box culvert across Kamehameha Highway (Figure 5, lower photograph) and two outlet channels of

Kahana Stream (Figure 6). Kahana Stream is a large perennial stream rising in the dike zone of the Koolau Range. The Waiahole Ditch system starts at the headwaters of this stream.

At Kaaawa, the 30-inch pipeline crosses two streams, Makaua and Kaaawa. Makaua is an intermittent stream that drains a small gulch mauka of Swanzy Beach Park. Kaaawa Stream is perennial and drains Kaaawa Valley.

A single section of wetlands meeting the definition in Chapter 25 of the ROH along the route of the pipeline was identified by the Division of Forestry and Wildlife, DLNR. This occurs at Kahana Bay where the main channel of Kahana Stream crosses Kamehameha Highway (Figure 6, lower photograph). The State Commission on Water Resources Management (CWRM) and the Division of Land Management, DLNR and the City DPP have special requirements for this area. Applications for permits must be submitted to the above three agencies.

b. Ground Water

Windward Oahu is underlain by Koolau basalt which is saturated with basal water. The basal water flows outward from its origin as rainfall seeping through the Koolau basalt to the sea under artesian pressure. At low elevations, a coastal plain consisting of alluvial and marine sediments behave as a leaky caprock. It covers the basal aquifer below a surface elevation of about ten feet. The basal aquifer, under artesian pressure discharges into the sediments,

preferentially flowing in fossil coral strata to ultimate drainage to the sea. In the absence of coral, the artesian leakage saturates clayey sediments to the level of the ground surface.

5. Noise Quality

The existing ambient noise levels in the project area are dominated by vehicular activity along Kamehameha Highway. On week days, vehicular activity is sporadic and contributes relatively insignificant levels of noise with the exception of occasional trucks, vans, or buses. During weekends, noise levels increase with the influx of beach and park users.

B. Biological Environment

1. Flora

Although a detailed botanical survey for the project was not undertaken, review of the Final Environmental Impact Statement of 1988 by the BWS and information provided by the U.S. Department of Interior Fish and Wildlife Service (USFWS) indicate that there are no Federal or State listed candidates for threatened or endangered plant species within the highway right-of-way. Introduced species of plants used for landscaping can be found along the route. Typical plants include the kamani tree, ironwood tree, norfolk pine tree, coconut tree, spider lily, croton, hibiscus, fern, hao, plumeria aloe, widelia, various palm trees, taro vine and various plants.

2. Fauna

Introduced animal species such a dogs, cats, mongoose,

rats, mice, chickens, cattle, horses, sandpipers, mynahs, sparrows, doves, cardinals, pigeons and bulbuls exist within or near the proposed pipeline route. None of these is on, or are candidates for the Federal or State list of endangered species.

3. Stream Fauna

A biological survey of twenty-one major streams in windward Oahu was prepared in August 1983 in conjunction with the Final EIS for the Windward Oahu Regional Water System Improvements. Four species of marine biota were recorded in abundance at elevations between 20 and 400 feet during the survey: the native o'pae kala'ole (*Atyoida bisulcata*); the introduced Tahitian prawn (*Macrobrachium lar*); introduced stream guppies, mollies (*Poecilia* spp.); and the introduced swordtail fish (*Xiphorus helleri*). The criteria for the ratings are the presence and abundance of native fauna and the physico-chemical factors (including substantial vegetative canopy to prevent or reduce algal mat growth, high water flow velocity, clear to slightly turbid water, and substrata consisting of cobbles and boulders with little silt accumulations). In addition, the Division of Aquatic Resources, DLNR, indicate presence of four varieties of o'opu (*O'opu naniha*, *o'opu nopili*, *O'opu akupa*, and *O'opu nakea*).

C. Social Environment

1. Population

Census Tracts 102.01 and 103.03 span the pipeline route. Census Tract 102.01 extends from Kaipapau to Kaaawa at the

district boundary. Most of the pipeline is in this census tract. In 1980, the population was 3,952 persons as compared to 4,608 in 1990, an increase of 16.6 percent.

Census Tract 103.03 extends from Kaaawa to Kahaluu. In 1980, the population was 3,593 while in 1990, it was 4,660, an increase of 29.7 percent.

Combined, these two census tracts have undergone a population gain of 1,723 persons or 22.84 percent in the ten-year period from 1980 to 1990. (Source: State of Hawaii Reference Books, 1987, and 1991.)

2. Surrounding Land Use

Most of the proposed pipeline route along Kamehameha Highway can be characterized as rural. Low density residential and light commercial areas with varying setbacks are interspersed with agricultural uses. The shore line contains many fine beaches that are recreational and scenic resources. Some of the light commercial areas are located close to public recreational facilities. At Punaluu Beach Park, there is a small commercial area on the mauka side of Kamehameha Highway. Near Mahie Point, there is a restaurant that is a popular tourist stop. At Swanzy Beach Park, there is a small convenience store and gasoline station on the mauka side of the highway.

Beginning at the Punaluu end of the pipeline route, public recreational facilities include Punaluu Beach Park, Kahana Bay Beach Park, Kahana Valley State Park, Makaua Beach Park, Swanzy Beach Park, Kaaawa Beach Park and Kualoa

Regional Park. All except Kahana Valley State Park are on the makai side of Kamehameha Highway. The Kahana Valley State Park entrance is on the mauka side of the highway.

A privately operated recreational area at Kualoa Ranch is a popular tourist destination. The Kualoa Ranch Activity Club offers a variety of activities including trail biking, horse back riding and a number of water sports at the beach across the highway.

3. Scenic and Visual Resources

Residents and visitors of this area have ready access to clear views of the shoreline, the mountains and verdant areas. The entire route is highly visible to nearby residents as well as vehicular traffic on the highway.

4. Archeological and Historical Resources

The pipeline route is along or close to the coast line and was inhabited since pre-contact times. Previous work in adjacent and nearby areas have uncovered artifacts, human remains and archeological sites.

5. Traffic and Transportation Systems

Kamehameha Highway is a two-lane asphaltic concrete roadway under the jurisdiction of the State Department of Transportation. The thirty-feet of paved roadway is contained in a right-of-way fifty-feet wide. The speed limit is 35 miles per hour except near public recreational areas where it is 25 miles per hour.

6. 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. 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 Traffic Safety Branch, Highway Division, DOT, and the U.S. Federal Highway Administration.

7. Land Use Plans, Policies, and Controls

The project is within three State of Hawaii Land Use Districts designated as Agricultural, Urban and Conservation. Public facilities are permitted on the three designated land use districts and as such, the project is consistent with the State of Hawaii land use plans and policies.

The project lies within the City and County of Honolulu Special Management Area (SMA) and will comply with the provisions set forth in Chapter 25, ROH as amended.

The project is consistent with the City and County Development Plan Public Facilities Map (DPPFM) which indicates water system improvements as "determined for construction within 6 years." Additionally, the designations for the project area as dictated by the Development Plan Land Use (DPLU) Map are Agriculture and Residential. Under the City and County Zoning map, the pipeline route is zoned Ag-2 and R-5 which permits public facilities such as waterlines. Hence, the project is consistent with City and County of

Honolulu land use plans and policies,

V. POTENTIAL IMPACTS AND MITIGATIVE MEASURES

A. Physical Environment

1. Geology

The laying of the 36-inch and 30-inch pipelines will involve excavation to depths of six to eight feet. At stream crossings, excavation depths may be greater. Upon completion of the installation, the ground surface will be restored to the pre-construction condition or better. There should be no significant impact to the geology of the proposed pipeline route.

2. Soils

No significant negative impact to soils along the proposed pipeline route is anticipated. There are no prime agricultural lands and the pipeline is confined within the highway right-of-way. This minimizes any negative impacts to soils devoted to agricultural purposes. In addition, the ground surface will be restored to the pre-construction conditions.

3. Air Quality

During construction, exhaust from the operation of internal combustion engines and fugitive dust created by earth moving and excavation will cause some deterioration of air quality. Normal flow of trade winds prevalent on the windward side should effectively disperse polluting emissions generated by construction activity. Dust control measures such as water sprinkling can alleviate problems created by earth moving and excavation.

The contractor will be required to maintain internal combustion equipment in excellent working condition to minimize emission of noxious fumes. In addition, the contractor is required to comply with Title 11, DOH, Chapters 59 and 60.1, Air Pollution Control. After the pipeline is laid, pre-construction conditions are restored and the project is completed, there should be no long-term effects on air quality.

4. Hydrology

a. Surface Water

The impact on surface water along the proposed pipeline route will be at stream crossings. The impact will depend on the method of carrying the pipeline across the stream. If the pipe is to be hung on the bridge, there should be little or no effect on the stream. Some construction debris may drop into the stream channel. This can be minimized by exercising care in executing the work. Prompt clearing of the debris from the channel will minimize the impact.

If the pipe is to be supported on pile bents, the stream channel bottom will be disturbed when the piles are driven but flow diversion is not needed. There may be some construction debris during the pile driving and work on the superstructure. Prompt clearing of the debris will minimize the impact.

The greatest impact will occur when the pipe is to be laid under the stream channel in a reinforced concrete jacket. A cofferdam must be emplaced to allow dewatering of

the excavation. Flow in the stream channel must be temporarily diverted for the pipe laying and concrete jacket placement. Work in the channel must proceed in sections to allow continued stream flow. During the construction period, stream flow around the site will be turbid and some debris will be in the water. The contractor must comply with the U.S. Army Corps of Engineers General Permit GP95-002. In addition, the CWRM requires a "Stream Channel Alteration Permit" (SCAP). However, once construction at the stream crossing is completed and the channel bottom is restored, the natural regime should be re-established in a short period and no long-term impact should be felt.

Micro-tunnelling to pass under the stream channel may preclude the SCAP requirement. However, this method requires greater depth of the crossing to provide the overburden required. In addition, deep pits must be kept dewatered to drive the micro-tunnel.

b. Ground Water

Dewatering of excavations will be the chief impact on ground water. There will be a temporary lowering of the ground water table in the proximity of the excavation for the period of construction. Once construction operations are completed, ambient ground water conditions should recover within a day. Dewatering operations will contribute water of higher nitrate concentration and lower salinity than near shore waters. These substances normally enter the near shore environment during rainy periods and through ground water

springs and seeps. Brackish water and nutrients from the dewatering will not significantly affect the near shore environment because the quantities will be low relative to natural sources. The receiving waters may become quite turbid during and following storms that generate high runoff on local streams. The best management practices prepared for the State DOH Notice of Intent (NOI) addresses methods designed to keep turbidity low in the discharge from dewatering, thereby reducing the contribution of particulates. NPDES requirements can be bypassed in some instances by pumping water from dewatering operations back into the ground at another location. In this case, the method may be effective only if the water from the trench has sufficient head to overcome the ambient head of the ground water. Pumping rates must be matched to infiltration rates.

5. Noise Quality

Noise from construction equipment and other activities will temporarily increase ambient noise levels for the duration of the construction work. To minimize adverse noise levels from the construction equipment, the contractor will be required to install or maintain sound attenuating devices on equipment. Construction activities will be limited to the hours of 8:30 a.m. and 3:00 p.m. to minimize disturbance to nearby residences. In addition, the contractor shall conform to the various Public Health Regulations in Title 11, Chapters 42, and 46 regarding noise control for Oahu.

B. Biological Environment

1. Flora

None of the plant species noted within the project area are in, or are candidates for the threatened or endangered category. To the extent possible, vegetation removal will be kept to a minimum, and the project is not expected to have a significant adverse effect on the flora of this locality. If necessary, the proposed alignment of the main will be adjusted to avoid the removal of or damage to trees along the pipeline route.

2. Fauna

None of the aforementioned animal species are listed on, or are candidates for the Federal or State threatened or endangered species lists. Some wildlife species may be displaced into surrounding areas during construction as a result of increased activity and noise in the area, but could return to the site upon completion of the project. Thus, the project will not have a significant adverse effect on the fauna of this area of the island.

3. Stream Fauna

The native stream fauna as noted earlier are not classified under, or considered candidates for the threatened or endangered species designation listed by Federal or State agencies. To minimize the potential for any disturbance to stream biota, construction near the stream banks will be scheduled for completion in the shortest possible time. Waste materials from construction will not be discarded in

the stream beds or flood plains.

Discharge of chlorinated water used for disinfection of pipeline must meet the requirements of the NPDES permit.

C. Socio-Economic Environment

1. Population

The pipeline construction will be contracted by the BWS to contractors who will be responsible for all aspects of the project, including supplying a construction crew. Crew members will most likely come from all areas of Oahu including some from the windward area. However, the crew size is not significant when compared to the population of the windward area. Hence, no adverse impacts on the population of the windward area are anticipated.

Demand for water in Windward Oahu is projected to increase from 20.79 million gallons per day (mgd) in 1990 to 22.89 mgd in the year 2020--an estimated increase of ten percent. The proposed water line is expected to provide the extra capacity and reliability to accommodate the demand in the windward area, thereby alleviating the growing dependence on the aging water system and insuring adequate long-term service of water to the area.

2. Surrounding Land Uses

Any impact on surrounding land uses will be temporary. Disruption to individual businesses and residences will last only as long as it takes to install each phase of the transmission main. The contractor will provide access to driveways and public streets at all times

3. Scenic and Visual Resources

Visual impact of the excavated roadside corridor for the proposed water line is anticipated during the construction period. However, no addition of permanent structures or appurtenances are included as part of this project. Hence, long-term impacts to scenic and visual resources are not expected.

4. Archaeological and Historical Resources

The uncovering of artifacts and human remains in excavations of nearby and adjacent areas indicates the potential for further discoveries along the pipeline route. To mitigate the impact, an archaeological monitoring plan will be prepared and submitted to SHPD for review and acceptance before beginning any ground disturbance.

5. Public Health, Safety and Convenience

Measures necessary to assure public health, safety, and convenience will be provided throughout all phases of construction. The contractor shall install and maintain all necessary signs, lights, flares, barricades, markers, cones and other protective facilities. Such safety precautions shall conform with the "Use of Traffic Control Devices at Work Sites on or Adjacent to Public Streets and Highways," as stipulated by the Traffic Branch, Highway Division, State DOT.

6. Land Use Plans, Policies and Controls

The project is within two State of Hawaii Land Use Districts designated as Agricultural and Urban. Public

facilities are a permitted use on both designated lands, and as such, the project is consistent with State of Hawaii land use plans and policies.

The pipeline route also crosses two Conservation District stretches; from the Punaluu boundary of Kahana Valley State Park around Kahana Bay to Mahie Point, and from Kaaawa Beach Park to Kaoio Point. These stretches are under the jurisdiction of the State Department of Land and Natural Resources. Construction should have no long-term impact on Conservation land use. Some inconvenience may be experienced in gaining access to the land but this is only for the period of construction. Once construction is completed the ground surface will be restored to its original condition. DLNR will require property maps showing the boundary between the State Highway right-of-way and the Conservation District. After review and evaluation, DLNR will determine whether a Conservation District Use Application is required.

The project lies within the City and County of Honolulu Special Management Area (SMA) and will comply with the provisions set forth in Chapter 25, ROH as amended.

The project is consistent with the City and County Development Plan Public Facilities Map (DPPFM) which indicates water improvements as "determined for construction within 6 years." Additionally, the designation for the project as dictated by the Development Plan Land Use (DPLU) Map is Agriculture and Residential. Under the City and County Zoning map, the project area is zoned Ag-2 and R-5

which permit public facilities such as water lines. Hence, the water main project is consistent with City and County of Honolulu land use plans and policies.

7. Traffic

Some traffic congestion is expected once construction begins. To minimize traffic impacts, the contractor will schedule work activity between the hours of 8:30 a.m. and 3:00 p.m., Monday through Friday, excluding any State holidays. Public health, safety and convenience will be provided for throughout all phases of construction. The contractor must provide, install and maintain all necessary devices and protective facilities. Safety precautions will conform to all applicable regulations as stipulated by the Traffic branch, Highway Division, State DOT. The construction schedule will help to minimize conflicts with morning and afternoon traffic periods. During construction, at least one through-lane will be open to traffic. Should conditions warrant, the contractor may hire personnel to control the flow of traffic around the construction area. The contractor will provide access to driveways and public streets at all times.

Since Kamehameha Highway is a public highway, a permit is required from the State DOT prior to any construction work performed on the project. In addition, a construction permit must be obtained prior to commencement of construction for work performed within the highway right-of-way. Furthermore, a Traffic Control Plan will be required as part of the

construction plans, subject to review and approval in conjunction with the permit process.

It should be noted that the State DOT has future plans to widen and realign Kamehameha Highway. Accordingly, the location of the proposed pipeline will be coordinated with the Highways Division of the DOT.

VI. POSSIBLE ALTERNATIVES

A. No Action

The proposed pipeline is part of an overall ground water development program to meet anticipated consumer demands for potable water within the State Windward Groundwater Management Area. The objectives of the main are to increase transmission capacity, to reduce pipeline pressures which increase the reliability of the Windward Oahu Water System by reducing service loss during main breaks. Under a "no action" alternative, these objectives would not be achieved. The "no action" alternative is not considered a feasible option to the proposed pipeline.

B. Delayed Action

Delay of the proposed pipeline will not materially alter the environmental impacts of the pipeline and has the potential of increasing costs. In addition, delaying the pipeline would not rule out its need in the near future. Thus, the "delayed action" alternative is not considered a feasible option to the proposed pipeline.

C. Alternative Alignments

No consideration was given to install the pipeline outside the 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.

D. Alternative Main Sizes

The proposed main sizes are based on system hydraulic analysis. Installing a larger pipe would lower the

frictional head loss and result in lower operational costs. However, the higher construction costs would outweigh any operational cost savings. Overall construction costs may be lower for installing a smaller pipe but this may not reduce frictional head loss sufficiently.

VII. FINDINGS AND DETERMINATION

1. There are no known endangered species of flora or fauna along the pipeline route.

2. There are no significant environmental impacts resulting from the project.

3. Dust, noise, and minimal traffic problems may be expected but they will be temporary and controllable.

In summary, the proposed project will not affect any endangered species of flora or fauna since none is extant along the pipeline route. It will involve no irreversible commitment to loss or destruction of any natural resource, and it will result in no long-term environmental degradation. There would be no serious or long-term detrimental effects on public health in regard to sanitation, air quality, water quality, ambient noise levels, dust, etc.

Therefore, the BWS has determined that the proposed project will have no significant effect on the environment and that an Environmental Impact Statement is not required under Chapter 343, Hawaii Revised Statutes. A Finding of No Significant Impact (FONSI) is declared for the project.

REFERENCES

1. Final Environmental Impact Statement, Windward Oahu Regional Water System Improvements.
2. U.S. Army Corps of Engineers Regulatory Program, 1985.
3. Special Public Notice, General GP95-002 Permit for Utility Lines In, Under, or Above Waters of the United States, Including Navigable Waters in the State of Hawaii, May 20, 1996.
4. Environmental Assessment for a 16-Inch Transmission Main from Hauula to Kaipapau, BWS, September, 1991.
5. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, USDA, SCS, August 1972.

APPENDIX A

Agencies to be Contacted for Comments on the
Proposed Project

Federal Agencies:

U.S. Department of Agriculture, U.S. Natural Resource
Conservation Service. *

U.S. Army Corps of Engineers, Pacific Ocean Division. *

U.S. Department of Interior, Fish and Wildlife Service.

U.S. Department of Interior, U.S. Geological Survey. *

State Agencies:

Department of Agriculture.

Department of Hawaiian Homelands. *

Department of Land and Natural Resources.

State Historic Preservation Division. *

Department of Health. *

Department of Transportation. *

Office of State Planning. *

University of Hawaii Water Resources Research Center.

University of Hawaii Environmental Center.

State Senator, 23rd Senate District.

State Representative, 46th Representative District.

State Representative, 47th Representative District.

* Responded to DEA

City and County of Honolulu Agencies:

Planning Department

Department of Planning and Permitting. *

Department of Parks and Recreation. *

Department of Facility Management.

Department of Transportation Services. *

Neighborhood Board 28 (Koolauloa).

Neighborhood Board 29 (Kahaluu).

Councilman, City Council District II.

Other Agencies:

The Nature Conservancy of Hawaii.

* Responded to DEA

NOT LOGGED



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

P.O. Box 50004
Honolulu, HI
96850

Our People...Our Islands...In Harmony

December 10, 1998

Mr. John Chang
George A.L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, Hawaii 96817

Dear Mr. Chang:

Subject: Draft Environmental Assessment (DEA) - Punaluu to Kualoa Park
Transmission Pipeline, Koolauloko, Oahu

We have reviewed the above mentioned document and have no comments to offer at this time.

Thank you for the opportunity to review this document.

Sincerely,


KENNETH M. KANESHIRO
State Conservationist

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
30 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714



February 3, 1999

COPY

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
JONATHAN K. SHIMADA, PhD
BARBARA KIM STANTON
CHARLES A. STED
~~SIDRO M. DAGUITAR, Acting~~
CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Kenneth M. Kaneshiro
State Conservationist
Natural Resources Conservation Service
United States Department of Agriculture
P. O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Kaneshiro:


Subject: Draft Environmental Assessment for the Punaluu to Kualoa Park Transmission Pipeline, Koolauloa, Koolaupoko, Oahu, Hawaii, TMK: 4-9; 5-1; 5-2; 5-3

Thank you for reviewing the Draft Environmental Assessment for the proposed transmission main project.

We acknowledge that you have no comments to offer at this time.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,


CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: ~~John Chang, George Yuen & Associates, Inc.~~
Office of Environmental Quality Control

36.b



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

P-1048e/98

November 25, 1998

REPLY TO
ATTENTION OF

Civil Works Branch

Mr. John Chang
George A. L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, Hawaii 96817

Dear Mr. Chang:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (DEA) for the Punaluu to Kualoa Park Transmission Pipeline Project, Oahu (TMKs 4-9, 5-1, 5-2, and 5-3). The following comments are provided in accordance with U.S. Army Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Work in streams and wetlands will require a DA permit. Once construction plans and methodologies are finalized, the Regulatory Section will determine if the project can be authorized through a general permit or an individual DA permit. Please forward the final plans once they become available. For further information, please contact Mr. Alan Everson at 438-9258 (extension 11).

b. The flood hazard information provided on pages 13-14 and 22-23 of the DEA is correct.

Sincerely,

Paul Mizue, P.E.
Chief, Civil Works Branch

DEC 18 9 42 AM '98

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843



March 22, 1999

JEREMY HARRIS Mayor **COPY**

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Paul Mizue, Chief
Civil Works Branch
U.S. Army Engineer District, Honolulu
Corps of Engineers
Department of the Army
Fort Shafter, Hawaii 96858-5440

Dear Mr. Mizue:

Subject: Draft Environmental Assessment for the Punaluu
to Kualoa Park Transmission Pipeline, Koolauloa,
Koolaupoko, Oahu, Hawaii, TMK: 4-9; 5-1; 5-2; 5-3


Thank you for reviewing the Draft Environmental Assessment for the subject project.

We understand that work in streams and wetlands will require a Department of the Army permit. In addition, we understand the Regulatory Section will determine whether authorization for the project will be through an individual or general permit. The appropriate permit application and construction plans will be submitted for your review and approval.

We also note your concurrence that the flood hazard information provided in the document is correct.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,


CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: George Yuen & Associates

36.d

NOT LOGGED



United States Department of the Interior

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

November 18, 1998

Mr. John Chang
George A.L. Yuen and Associates, Inc.
100 North Beretania St., Suite 303
Honolulu, Hawaii 96817

Dear Mr. Chang:

Subject: Draft Environmental Assessment
Punaluu to Kualoa Park Transmission Pipeline
Koolauloa, Koolaupoko, Oahu

The staff of the U.S. Geological Survey, Water Resources Division, Hawaii District, has reviewed the Draft Environmental Assessment, and we have no comments to offer at this time.

Thank you for allowing us to review the report. We are returning it for your future use.

Sincerely,

A handwritten signature in cursive script, appearing to read "William Meyer".

William Meyer
District Chief

Enc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
10 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714



February 3, 1999

COPY

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
JONATHAN K. SHIMADA, PhD
BARBARA KIM STANTON
CHARLES A. STED
~~ISIDRO M. BACULAR, Acting~~
CLIFFORD S. JAMILE
Manager and Chief Engineer

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

Dear Mr. Meyer:

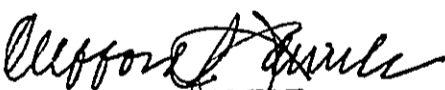
Subject: Draft Environmental Assessment for the Punaluu to Kualoa Park Transmission Pipeline, Koolauloa, Koolaupoko, Oahu, Hawaii, TMK: 4-9; 5-1; 5-2; 5-3

Thank you for reviewing the Draft Environmental Assessment for the proposed transmission main project.

We acknowledge that you have no comments to offer at this time.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,


CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: John Chang, George Yuen & Associates, Inc.
Office of Environmental Quality Control

36.f

JAN-07-99 03:04 AM

Not Logged

Re: [unclear]

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

KALI WATSON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOEIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

November 19, 1998

Mr. John Chang
George A.L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, HI 96817

Dear Mr. Chang:

Subject: Draft Environmental Assessment, Punaluu to Kualoa Park
Transmission Pipeline, TMK 4-9, 5-1, 5-2, 5-3, Dated
October, 1998

Thank you for the opportunity to review the subject application.
The Department of Hawaiian Home Lands has no comment to offer.

If you have any questions, please call Daniel Ornellas at
586-3837.

Aloha,

Kali Watson
KALI WATSON, Chairman
Hawaiian Homes Commission

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
30 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714



February 3, 1999

COPY

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
JONATHAN K. SHIMADA, PhD
BARBARA KIM STANTON
CHARLES A. STED
IGBRO M. BAGUIAR, Acting
CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Raynard Soon, Chairman
Hawaiian Homes Commission
Department of Hawaiian Home Lands
State of Hawaii
P. O. Box 1879
Honolulu, Hawaii 96805

Dear Mr. Soon:

Subject: Draft Environmental Assessment for the Punaluu to Kualoa Park Transmission Pipeline, Koolauloa, Koolaupoko, Oahu, Hawaii, TMK: 4-9; 5-1; 5-2; 5-3

Thank you for reviewing the Draft Environmental Assessment for the proposed transmission main project.

We acknowledge that you have no comments to offer.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: John Chang, George Yuen & Associates, Inc.
Office of Environmental Quality Control

36.h

BERNARD I. CAYetano
GOVERNOR OF HAWAII



STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamehameha Boulevard
Honolulu, Hawaii 96807

P-1076/98
MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
GILBERT COLOMA-AGAAAN
TIMOTHY E. JOHNS

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES

ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

December 8, 1998

Mr. John Chang
George A. L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, Hawaii 96817

LOG NO: 22607 ✓
DOC NO: 9812EJ02

DEC 29 8 29 AM '98

Dear Mr. Chang:

SUBJECT: Chapter 6E-8 Historic Preservation Review -- Draft Environmental Assessment, Punaluu to Kualoa Park Transmission Pipeline Punalu'u to Kualoa, Ko'olaupoko and Ko'olaupoko, O'ahu
TMK: 4-9; 5-1; 5-2; 5-3

Thank you for the opportunity to review the DEA for this project. The Board of Water Supply (BWS) plans to install a 36-inch and 30-inch water transmission pipeline along the Kamehameha Highway right-of-way extending from Haleaha Road in Punaluu to Kualoa park. The DEA recognizes the potential for finding buried historic sites within the proposed corridor. However, the mitigation proposed in section C.4 does not adequately address historic preservation concerns.

A review of our records shows that historic sites including subsurface habitation deposits and human burials were found during archaeological monitoring of the BWS's installation of a 16-inch transmission water main along Kamehameha Highway between Hau'ula and La'ie. Also, historic sites have been found within jaucus sands which dominant the soils found within the current project corridor. Given these findings, it is likely that this project may impact historic sites and may have an "adverse effect" on buried significant historic sites.

Thus, we request that on-site archaeological monitoring be conducted in order to identify, document and properly mitigate (should mitigation be needed) any significant historic sites that may be in the project area. Such an action would mitigate any adverse effects that the project would have on such historic sites. (We note that archaeological monitoring was a condition under Chapter 6-E attached to all permits required for the Board of Water Supply during installation of the 16-inch water transmission line for the Hau'ula to La'ie corridor.)

A handwritten signature or set of initials, possibly "P" or "A", located at the bottom right of the page.

Mr. John Chang
Page Two

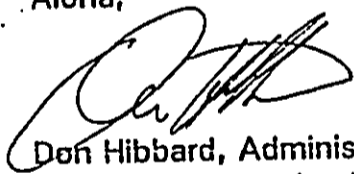
An acceptable archaeological monitoring plan should be prepared and submitted to this office for review and acceptance prior to beginning any ground disturbance. In addition, provisions must be made for the treatment of human burial remains in accordance with Chapter 6E-43.6 Hawaii Revised Statutes, should any burials be discovered inadvertently during routine construction activities.

An archaeological monitoring plan must contain the following eight specifications: 1) The kinds of remains that are anticipated; 2) Where in the construction area the remains are likely to be found; 3) How the expected types of remains will be documented and treated, if found; 4) The archaeologist conducting the monitoring has the authority to halt construction in the immediate area of a find in order to carry out the plan; 5) A coordination meeting between the archaeologist and construction crew is scheduled, so that the construction team is aware of the plan; 6) What laboratory work will be done on remains that are collected; 7) A schedule for report preparation; and 8) Details concerning the archiving of any collections that are made.

If an acceptable archaeological monitoring plan is prepared which addresses these concerns, and if the plan is implemented, then again we believe that the proposed undertaking's impacts on any on significant historic sites which may be present in the project area will be adequately mitigated.

If you have any questions please call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027.

Aloha,



Don Hibbard, Administrator
Historic Preservation Division

EJ:jk

c: Clifford S. Jamile, Manager and Chief Engineer, Board of Water Supply, City and County of Honolulu, 630 S. Beretania St. Honolulu, HI 96813
Director, OEQC, 235 South Beretania Street, Suite 702, Honolulu, HI 96813

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
530 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714



January 8, 1999

COPY

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMI
JONATHAN K. SHIMADA, PhD
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

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

Dear Mr. Hibbard:

Subject: Your Letter of December 8, 1998 Regarding the Draft Environmental Assessment for the Board of Water Supply's Proposed Windward Transmission Pipeline from Punaluu to Kualoa, Koolauloa and Koolaupoko, Oahu

Thank you for reviewing the Draft Environmental Assessment for the proposed Windward Transmission Main project.

We acknowledge that the proposed pipeline project may impact historic sites and may have an "adverse effect" on buried significant historic sites. Therefore, we will prepare and submit an acceptable archaeological monitoring plan for your review and acceptance prior to beginning any ground disturbance.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: George Yuen, Yuen and Associates, Inc.

36.k

BEIJAMIN J. CAYETANO
GOVERNOR OF HAWAII



P-1048/98

LAWRENCE MIKE
DIRECTOR OF HEALTH

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

In reply, please refer to:

December 4, 1998

98-240/epo

DEC 18 9 41 AM '98

Mr. John Chang
George A. L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, Hawaii 96817

Dear Mr. Chang:

Subject: Draft Environmental Assessment
Punaluu to Kualoa Beach Park Transmission Pipeline
Oahu, Hawaii
TMK: 4-9, 5-1, 5-2, 5-3

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

Noise Concerns

1. Activities associated with the construction phase of the project must comply with the Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control."
 - a. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the rules as stated in Section 11-46-6(a).
 - b. Construction equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers as stated in Section 11-46-6(b)(1)(A).
 - c. The contractor must comply with the requirements pertaining to construction activities as specified in the rules and the conditions issued with the permit as stated in Section 11-46-7(d)(4).
2. Heavy vehicles travelling to and from the project site must comply with the provisions of the Administrative Rules, Chapter 11-42, "Vehicular Noise Control for Oahu."

2

Mr. John Chang
December 4, 1998
Page 2

98-240/epo

Should there be any questions on this matter, please call
Mr. Jerry Haruno, Environmental Health Program Manager of the
Noise, Radiation and Indoor Air Quality Branch at 586-4701.

Sincerely,



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

c: NR&IAQB

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843



March 22, 1999

COPY

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. Gary Gill, Deputy Director
for Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Attention: Jerry Haruno

Dear Mr. Gill:

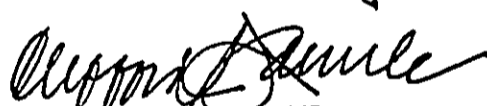
Subject: Draft Environmental Assessment for the Punaluu to Kualoa Park Transmission Pipeline, Koolauloa, Koolaupoko, Oahu, Hawaii TMK: 4-9; 5-1; 5-2; 5-3

Thank you for reviewing the Draft Environmental Assessment for the subject project.

The contractor will be required to comply with all applicable Noise Control regulations of Chapters 42 and 46 of Title 11, Department of Health Administrative Rules.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,


CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: George Yuen & Associates

BENJAMIN J. CAYETANO
GOVERNOR



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

DEC - 8 1998

KAZU HAYASHIDA
DIRECTOR
PE-1048b/98
DEPUTY DIRECTORS
BRIAN K. MINAII
GLENN M. OKIMOTO

IN REPLY REFER TO:
HWY-PS
2.1918

DEC 18 9 41 AM '98

Mr. John Chang
George A. L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, Hawaii 96817

Dear Mr. Chang:

Subject: Draft Environmental Assessment (EA), Punaluu to Kualoa Park
Transmission Pipeline, Koolaupoko, TMK: 4-9; 5-1; 5-2; 5-3

Thank you for requesting our review of the draft EA for the proposed pipeline.

The proposed pipeline is not anticipated to have a significant impact on Kamehameha Highway, our State facility.

We recommend, though, that the pipeline be installed as close to the edge of our right-of-way as possible. Equipment and material storage should be kept outside of our right-of-way.

Plans for construction work within the right-of-way must be submitted for our review and approval.

If there are any questions regarding our comments and recommendations, please contact Ronald Tsuzuki, Head Planning Engineer, at 587-1830.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

2

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843



March 22, 1999

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

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

Attention: Mr. Ronald Tsuzuki

Dear Mr. Hayashida:

Subject: Draft Environmental Assessment for the Punaluu
to Kualoa Park Transmission Pipeline, Koolaupoko,
Oahu, Hawaii, TMK: 4-9; 5-1; 5-2; 5-3

Thank you for reviewing the Draft Environmental Assessment for the subject project.

We acknowledge that the project is not anticipated to have a significant impact on Kamehameha Highway.

Our design consultants for the eight phases will be informed that the pipeline alignment should be as close to the edge of the right-of-way as possible. The construction plans will be submitted for your review and approval to ensure your concerns are addressed. Furthermore, the contractor will be required to keep equipment and material storage outside the right-of-way.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,


CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: George Yuen & Associates

36.p



**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

OFFICE OF PLANNING

235 South Beretania Street, 6th Flr., Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

P-1048a/98

BENJAMIN J. CAYETANO
GOVERNOR
SEJIF. NAYA
DIRECTOR
BRADLEY J. MOSSMAN
DEPUTY DIRECTOR
RICK EGGED
DIRECTOR, OFFICE OF PLANNING

Tel.: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-7803

November 16, 1998

Mr. John Chang
George A.L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, Hawaii 96817

Dear Mr. Chang:

Subject: Draft Environmental Assessment
Punaluu to Kualoa Park Transmission Pipeline

The Draft Environmental Assessment indicates that the pipeline will cross a number of streams which will be covered by the U.S. Army Corps of Engineers General Permit GP95-002 for utility line crossings of navigable waters (p. 8). In addition, the EA indicates that applicants for the general permit GP95-002 do not require CZM consistency concurrence (p. 9). This is generally correct because CZM consistency concurrence was previously issued for the general permit and individual CZM consistency reviews are not generally required. However, we routinely review pre-construction notices for projects proposed for GP authorization to determine conformance with the CZM-related elements of the general permit's scope, limitations and conditions. This process allows us to file an objection to a proposed general permit authorization and request an individual CZM consistency submission.

Thank you for the opportunity to review this EA. If you have any questions, please call John Nakagawa of our CZM Program at 587-2878.

Sincerely

Bradley J. Mossman for

Bradley J. Mossman
Director
Office of Planning

DEC 18 9 42 AM '98

Mr. John Chang
Page 2
November 16, 1998

cc: U.S. Army Corps of Engineers, Operations Branch
U.S. National Marine Fisheries Service, Pacific Area Office
U.S. Fish and Wildlife Service, Pacific Islands Ecoregion
Department of Health, Clean Water Branch
Department of Land & Natural Resources,
Planning & Technical Services Branch
Commission on Water Resource Management
Department of Planning and Permitting, City & County of Honolulu

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843



March 22, 1999

JEREMY HARRIS, Mayor **COPY**
EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

Mr. David W. Blane, Director
Office of Planning
Department of Business, Economic
Development and Tourism
State of Hawaii
P. O. Box 2359
Honolulu, Hawaii 96804

Attention: John Nakagawa

Dear Mr. Blane:

Subject: Draft Environmental Assessment for the Punaluu to Kualoa Park Transmission Pipeline, Koolauloa, Koolaupoko, Oahu, Hawaii, TMK: 4-9; 5-1; 5-2; 5-3

Thank you for reviewing the Draft Environmental Assessment for the subject project.

We acknowledge your office reviews pre-construction notices for projects proposing Army Corps of Engineers (COE) General Permit (GP) authorization to determine conformance with Coastal Zone Management requirements. We also understand that when the GP application is submitted, the COE will coordinate the review process with your office.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,


CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: George Yuen & Associates

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

P-1048d/98

650 SOUTH KING STREET • HONOLULU, HAWAII 96813
PHONE: (808) 523-4414 • FAX: (808) 527-6743



JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

December 7, 1998

1998/CLOG-69 (ST)
'98 EA Comment - Zones 4 & 5

DEC 18 9 42 AM '98

Mr. John Chang
George A.L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, Hawaii 96817

Dear Mr. Chang:

Draft Environmental Assessment (EA)
30-Inch and 36-Inch Transmission Main from Punaluu to Kualoa
Regional Park, Koolauloa and Koolaupoko, Oahu
Tax Map Keys: 4-9; 5-1; 5-2; 5-3

We have reviewed your Draft EA for the above-referenced project received on November 4, 1998, and have the following comments:

SECTION II - PROPOSED ACTION

It is unclear how the construction of this transmission line will be phased (page 3) and when it is anticipated to be completed. The final EA should elaborate on the project's construction time frame and anticipated completion date. We also suggest that figures illustrating project details be attached within the section that they are discussed, rather than attached as an appendix.

SECTION III - DESCRIPTION OF PROPOSED ACTION

The description of the project's construction activities should be separated from the discussion on the permits and approvals that are required to conduct such activities. The final EA should contain a separate subsection that lists and describes the permits and approvals that will be required.

We note that insofar as the proposed waterline will be constructed within existing utility corridors and highway rights-of-way, no special management area use permits will be required pursuant to Section 25-1.3(2)(D), Revised Ordinances of Honolulu.

A handwritten signature or set of initials, possibly "JN", located at the bottom right of the page.

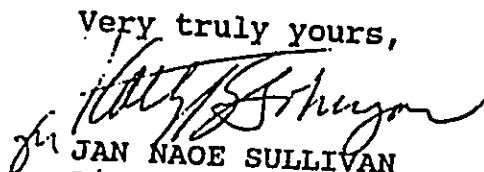
Mr. John Chang
Page 2
December 7, 1998

SECTION V - POTENTIAL IMPACTS AND MITIGATIVE MEASURES

2. Soils. The final EA should clarify where excavated materials will be stored and how storm water runoff will be controlled in such areas.

Should you have any questions, please contact Steve Tagawa of our Coastal Lands Branch at 523-4817.

Very truly yours,


for JAN NAOE SULLIVAN
Director of Planning
and Permitting

JNS:am

cc: Clifford S. Jamile, Board of Water Supply
Office of Environmental Quality Control

posse doc no. 662

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843



March 22, 1999


JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
BARBARA KIM STANTON
CHARLES A. STED

CLIFFORD S. JAMILE
Manager and Chief Engineer

COPY

TO: MS. JAN NAOE SULLIVAN, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: 
CLIFFORD S. JAMILE

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PUNALUU TO
KUALOA PARK TRANSMISSION PIPELINE, KOOLAULOA,
KOOLAUPOKO, OAHU, HAWAII, TMK: 4-9; 5-1; 5-3

Thank you for reviewing the Draft Environmental Assessment (EA) for the subject project.

We have the following responses to your concerns:

1. The Final EA will include a table showing the phasing, tentative construction schedule and costs for the proposed project. Each phase is anticipated to take approximately one year to complete. We will consider your suggestion of incorporating figures within the pertinent section for future documents.
2. The construction plans have not been completed nor has the contractor been selected at this time. As a result, we have disclosed all possible permits with a discussion of their applicability to the project and associated construction activities in a general format.

We also acknowledge that construction of the transmission main within the highway right-of-way negates the need for special management area use permits.

3. Section IIIB discusses the stockpiling of excavated material and storm water runoff. The contractor will store the material off-site at a yet to be determined location suitable for this purpose. The stockpile location will be less than five acres in area and therefore exempt from the National Pollutant Discharge Elimination System requirements. However, the contractor will be required to implement best management practices such as swales and berms to control surface runoff at the site.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc: George Yuen & Associates

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Not Logged

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 10TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 523-4182 • FAX: (808) 523-4054

JEREMY HARRIS
MAYOR



WILLIAM D. BALFOUR, JR.
DIRECTOR

MICHAEL T. AMII
DEPUTY DIRECTOR

November 30, 1998

Mr. John Chang
George A. L. Yuen and Associates, Inc.
100 North Beretania Street, Suite 303
Honolulu, Hawaii 96817

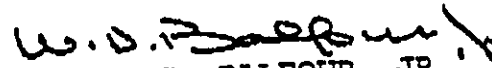
Dear Mr. Chang:

Re: Draft Environmental Assessment, Punaluu to Kualoa Park
Transmission Pipeline (TMK 4-9; 5-1; 5-2; 5-3)

We have reviewed the above-referenced document and find that the proposed project will have little affect on our recreation facilities and programs in the described project site.

Thank you for the opportunity to review and comment on the subject draft environmental assessment.

If you have any questions, please contact Mr. John Eveland, Executive Assistant, at 527-6038.


WILLIAM D. BALFOUR, JR.
Director

WDB:CU
(98-2666GT)

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
130 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714




February 3, 1999

COPY

JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
~~JONATHAN K. SHIMADA, PhD~~
BARBARA KIM STANTON
CHARLES A. STED
~~IGOR M. BAGUIAR, Acting~~
CLIFFORD S. JAMILE
Manager and Chief Engineer

TO: WILLIAM D. BALFOUR, JR., DIRECTOR
DEPARTMENT OF PARKS AND RECREATION


FROM: 
CLIFFORD S. JAMILE

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PUNALUU TO
KUALOA PARK TRANSMISSION PIPELINE, KOOLAULOA, .
KOOLAUPOKO, OAHU, HAWAII, TMK: 4-9; 5-1; 5-2; 5-3

Thank you for reviewing the Draft Environmental Assessment for the proposed transmission main project.

We acknowledge that the proposed project will have little effect on your park facilities and operations.

If you have any questions, please contact Barry Usagawa at 527-5235.

cc:  John Chang, George Yuen & Associates, Inc.
Office of Environmental Quality Control

36.x

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

P-1048c/98

PACIFIC PARK PLAZA • 711 KAPIOLANI BOULEVARD, SUITE 1200 • HONOLULU, HAWAII 96813
PHONE: (808) 523-4529 • FAX: (808) 523-4730

JEREMY HARRIS
MAYOR



CHERYL D. SOON
DIRECTOR

JOSEPH M. MAGALDI, JR.
DEPUTY DIRECTOR

December 9, 1998

TPD11/98-06624R

Dec 18 9 41 AM '98
FACILITY DIVISION

Mr. John Chang
George A.L. Yuen and Associates, Inc.
100 N. Beretania St., Suite 303
Honolulu, Hawaii 96817

Dear Mr. Chang:

Subject: Punaluu to Kualoa Park Transmission Pipeline

In response to the October 29, 1998 letter from George A.L. Yuen, the draft environmental assessment (EA) for the subject project was reviewed. The following comments are the result of this review:

1. The Traffic section on pages 29 and 30 of the draft EA should address the traffic impacts at Kamehameha Highway's intersections with City streets, especially in the Kaaawa area, during the construction phase of the project. Possible measures to mitigate the traffic impacts at these intersections should also be discussed and coordinated with this department.
2. Area residents and the neighborhood board should be apprised of the project and its traffic impacts prior to commencement of construction. Any required closure of private driveways should be coordinated with affected property owners prior to such closure.
3. Should any detours or street closures be required during the construction phase of this project, the emergency services (fire, ambulance and police) should be notified prior to implementation of the detours or street closures. We also ask that this department be notified so that we can then alert Oahu Transit Services of the construction activity.

A handwritten signature or set of initials, possibly "A", is located in the bottom right corner of the page.

Mr. John Chang
December 9, 1998
Page 2

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,



CHERYL D. SOON
Director

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843



March 24, 1999


JEREMY HARRIS, Mayor

EDDIE FLORES, JR., Chairman
FORREST C. MURPHY, Vice Chairman
KAZU HAYASHIDA
JAN M.L.Y. AMII
BARBARA KIM STANTON
CHARLES A. STED

COPY

CLIFFORD S. JAMILE
Manager and Chief Engineer

TO: MS. CHERYL D. SOON, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

FROM: 
CLIFFORD S. JAMILE

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PUNALUU
TO KUALOA PARK TRANSMISSION PIPELINE, KOOLAULOA,
KOOLAUPOKO, OAHU, HAWAII, TMK: 4-9, 5-1, 5-2, 5-3

Thank you for reviewing the Draft Environmental Assessment for the subject project.

We have the following responses to your concerns:

1. Section 7 on Traffic indicates that the contractor will follow all applicable regulations regarding traffic control in a construction area. In conjunction with this, the contractor will be required to file a traffic control plan as part of the construction plans review and permitting process. The State Department of Transportation and City Department of Transportation Services (DTS) will have the opportunity to review and comment on the plans to ensure all concerns are addressed prior to the start of construction.
2. The Board of Water Supply will inform the affected Neighborhood Boards prior to the start of construction. It is not anticipated that there will be closures of any private driveways. However, should it be required, proper notification will be given and coordinated with the property owner(s).
3. The traffic control plan will indicate any required street closures and detours. The contractor will be required to notify the emergency services and DTS of any planned or unforeseen closures and detours and the associated scheduling.

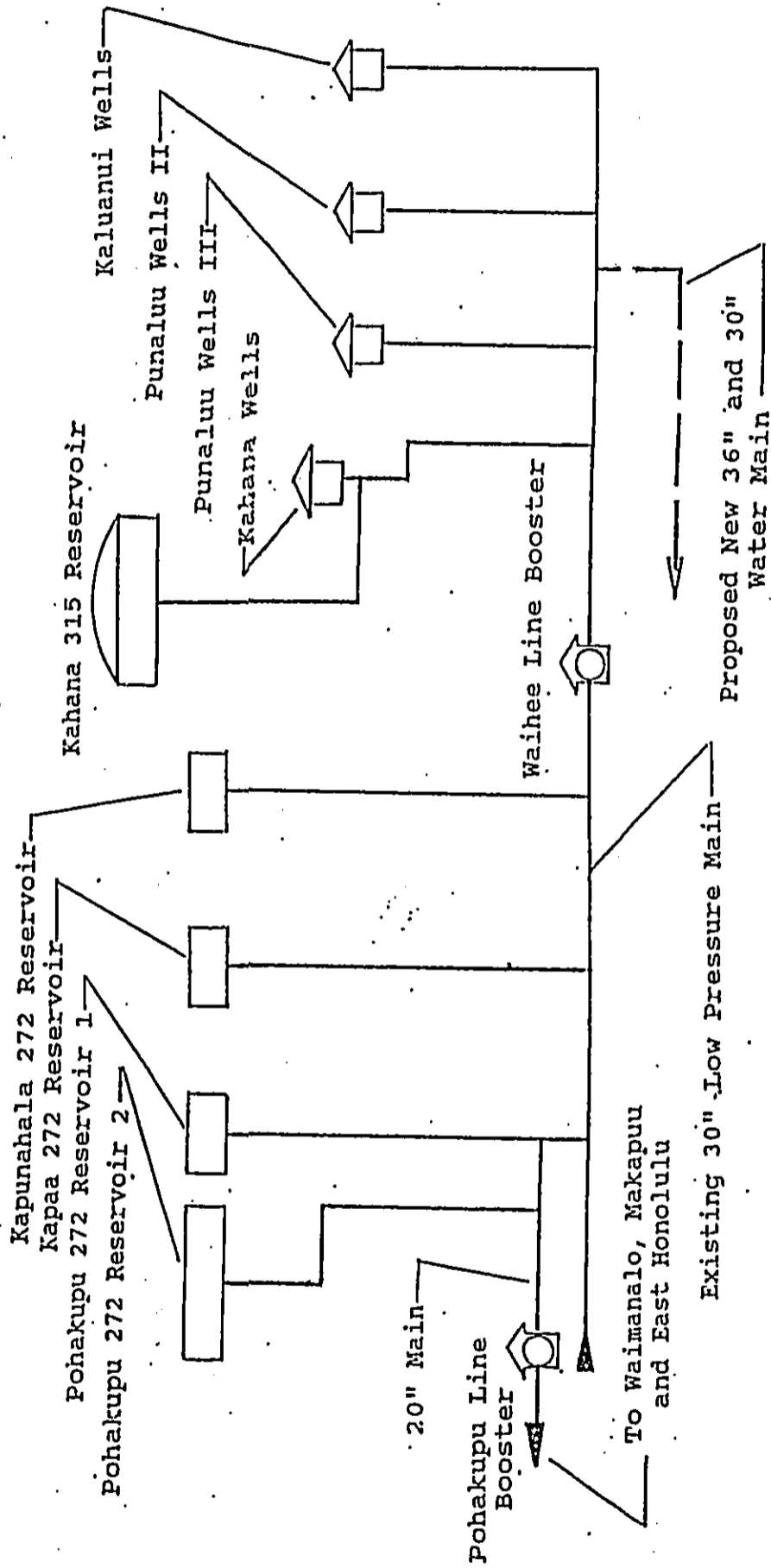
If you have any questions, please contact Barry Usagawa at 527-5235.

cc:  George Yuen & Associates
Office of Environmental Quality Control

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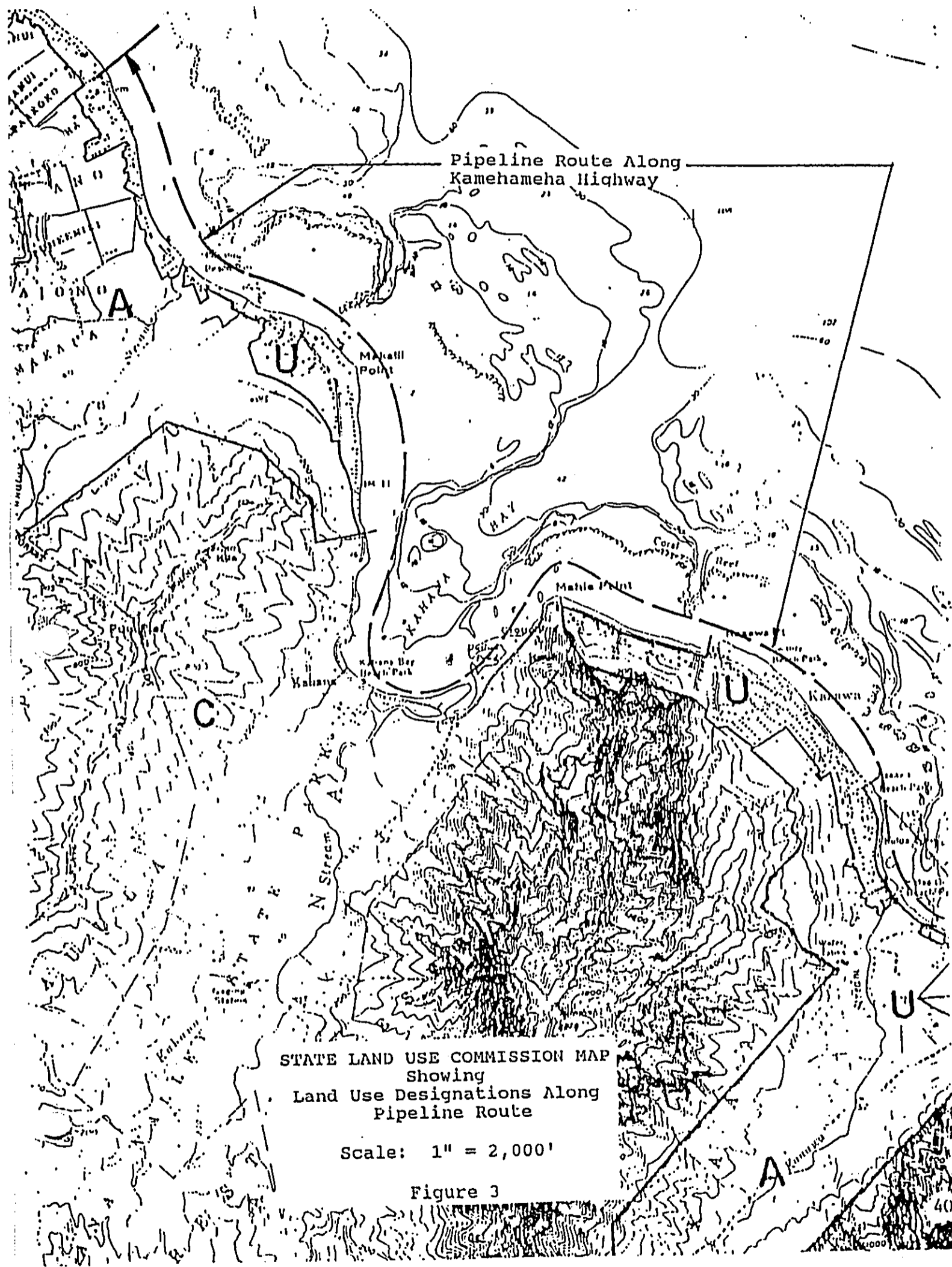
List of Figures

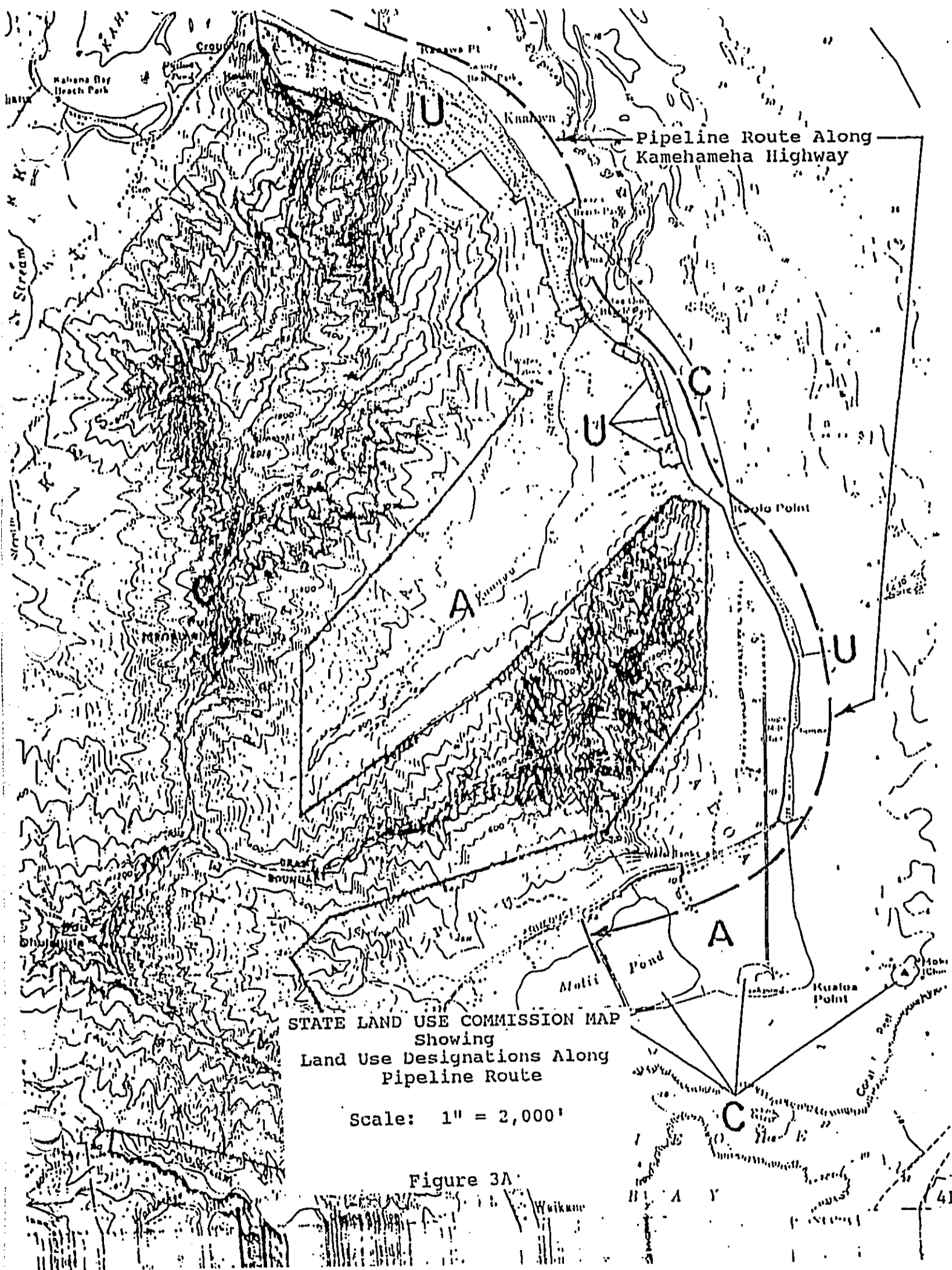
1. Map of Windward Oahu Showing Route of Proposed BWS Pipeline-----	38
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3 & 3A. State Land Use Designations Along Pipeline Route-----	40
4. Photographs of crossings at Punaluu Stream-----	42
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9. Typical Trench Detail-----	47
10. Table of Project Phasing, Start Dates and Costs-----	48

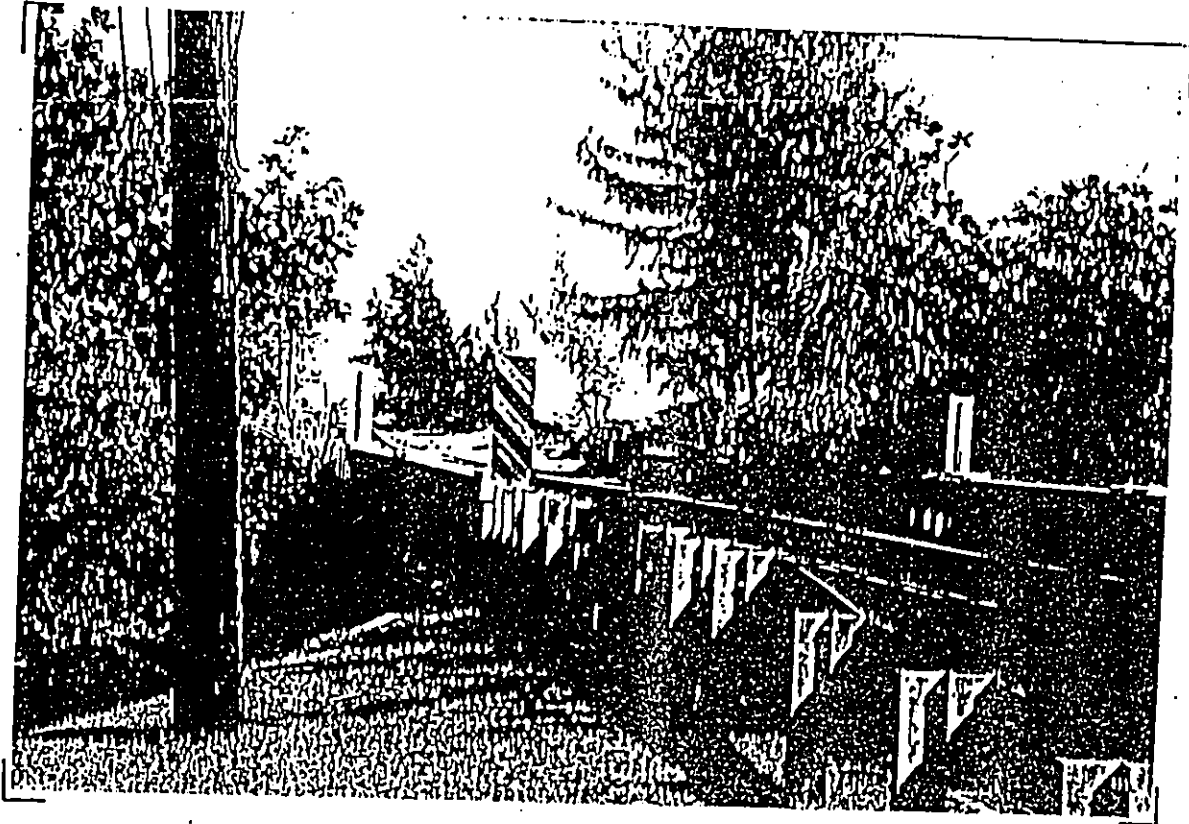


SCHEMATIC DIAGRAM OF
LOW PRESSURE WINDWARD WATER SYSTEM

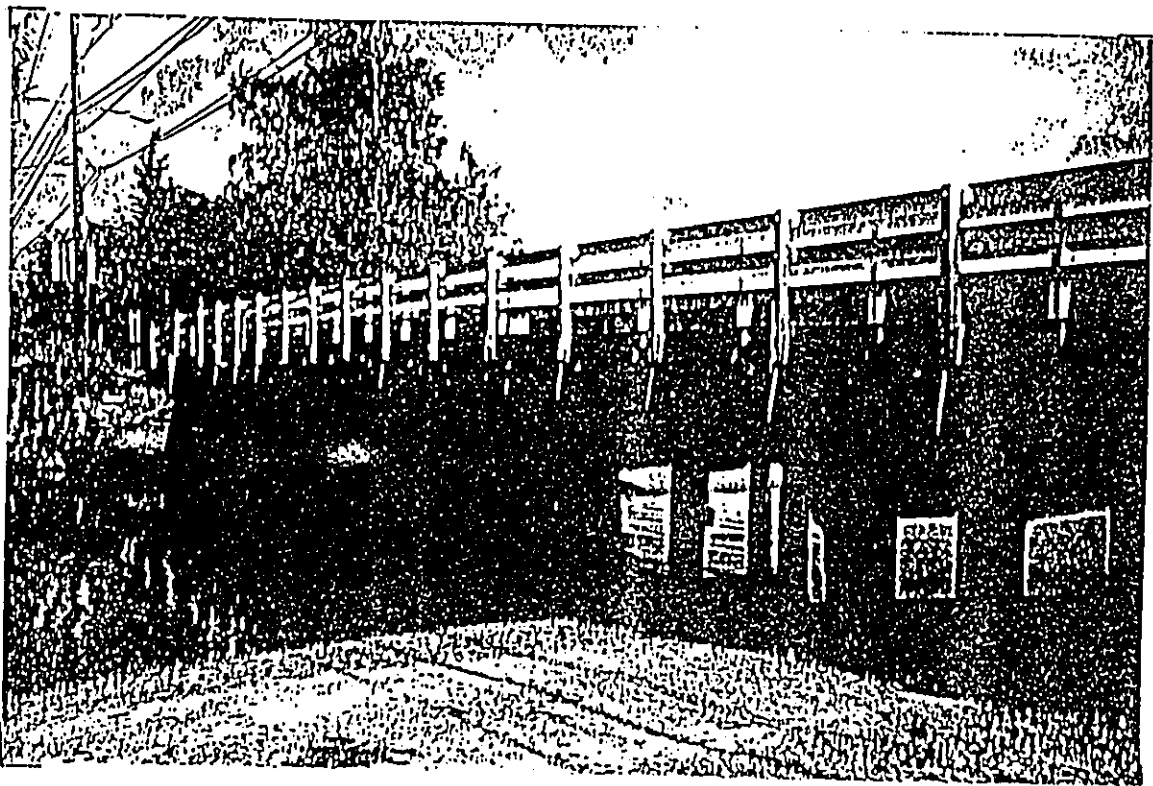
Figure 2.





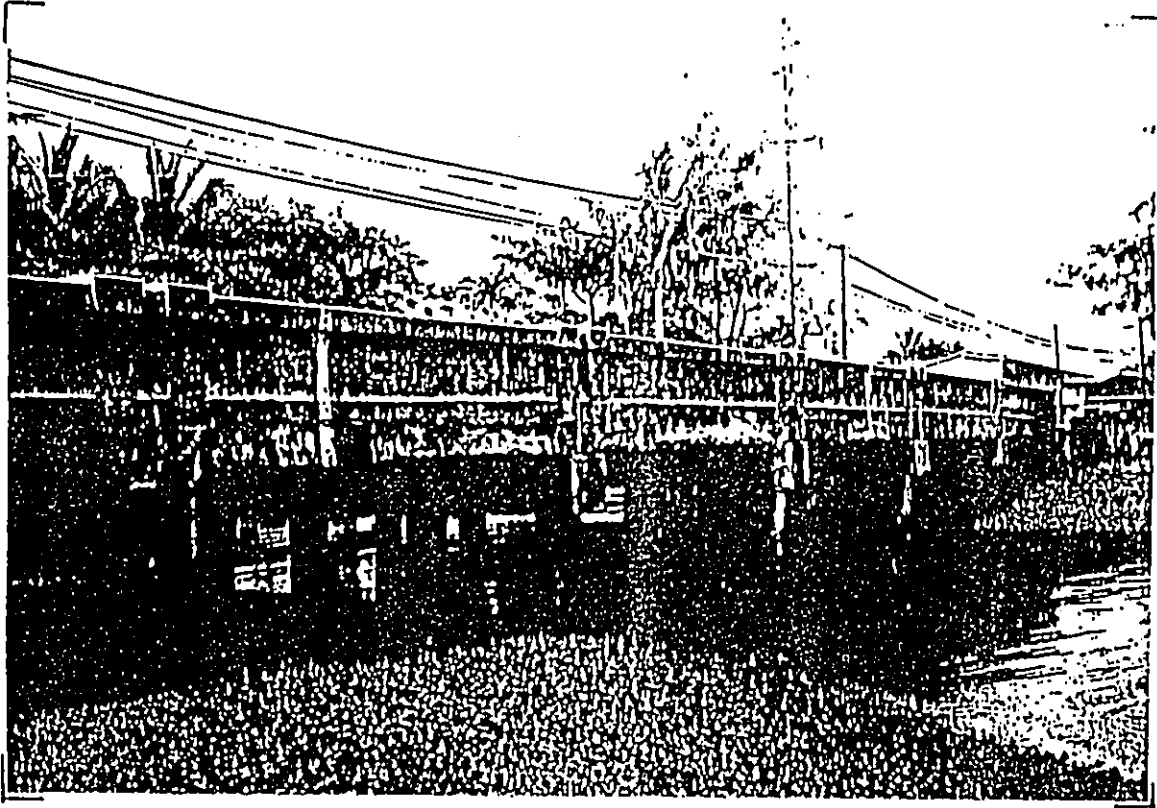


Punaluu Stream--Small Channel.

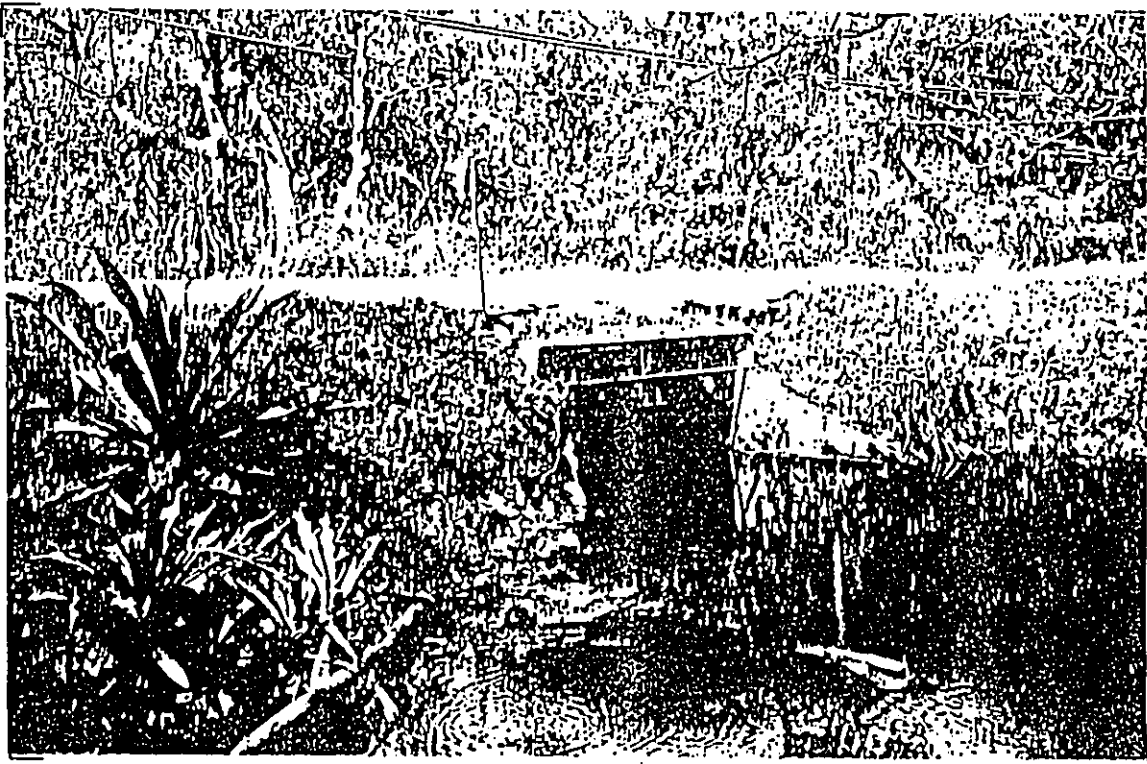


Punaluu Stream--Main Channel, Hauka Side.

Figure 4

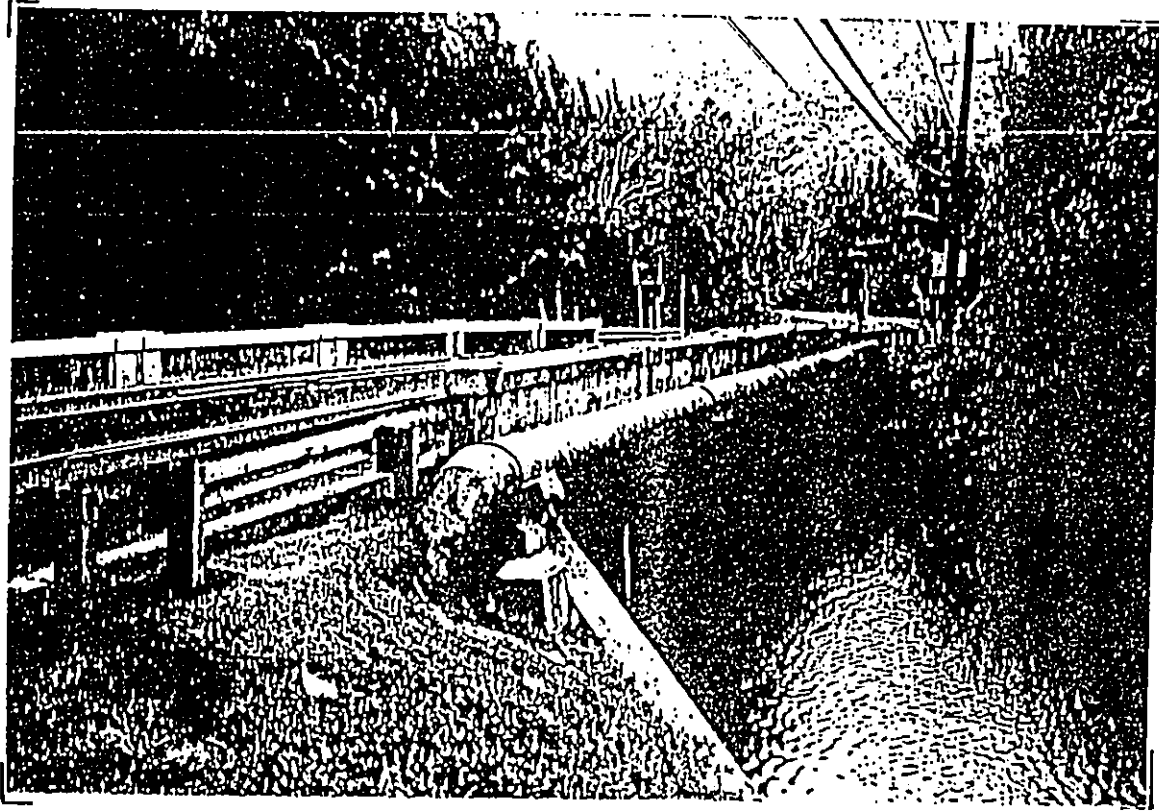


Punaluu Stream--Main Channel, Makai Side.

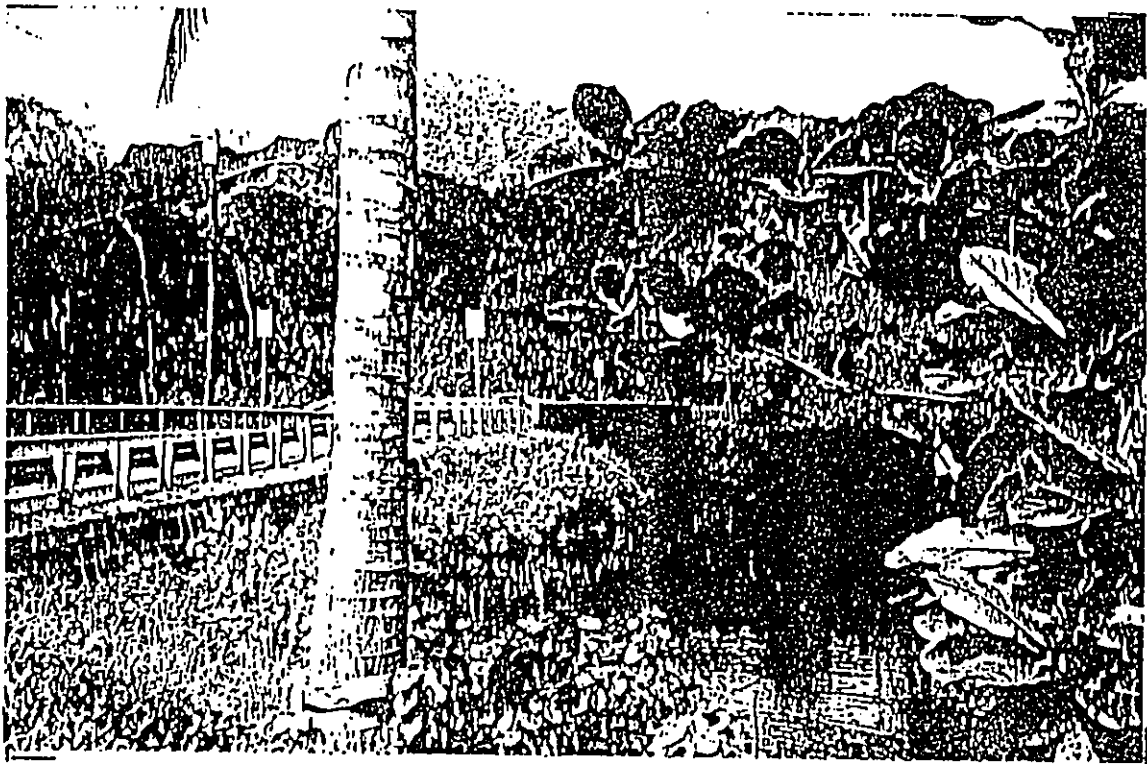


Box Culvert--Kahana Valley Beach Park.

Figure 5

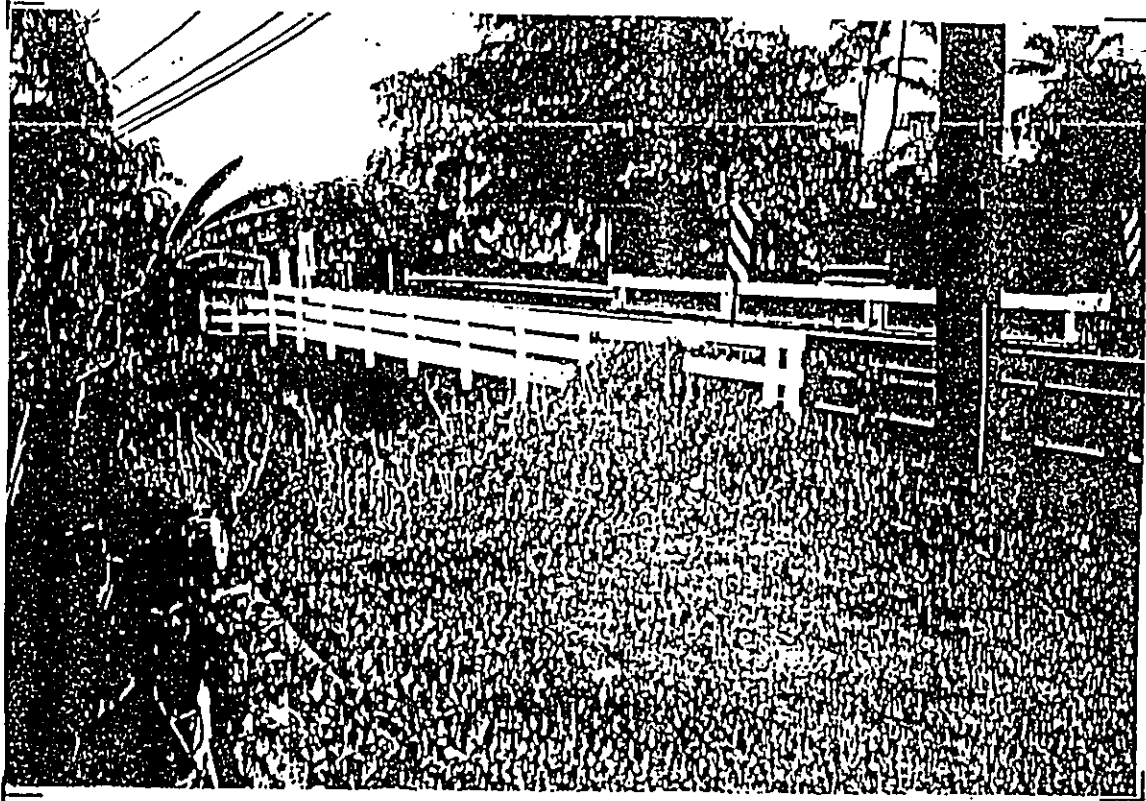


Kahana Stream by Kahana Valley State Park Entrance.

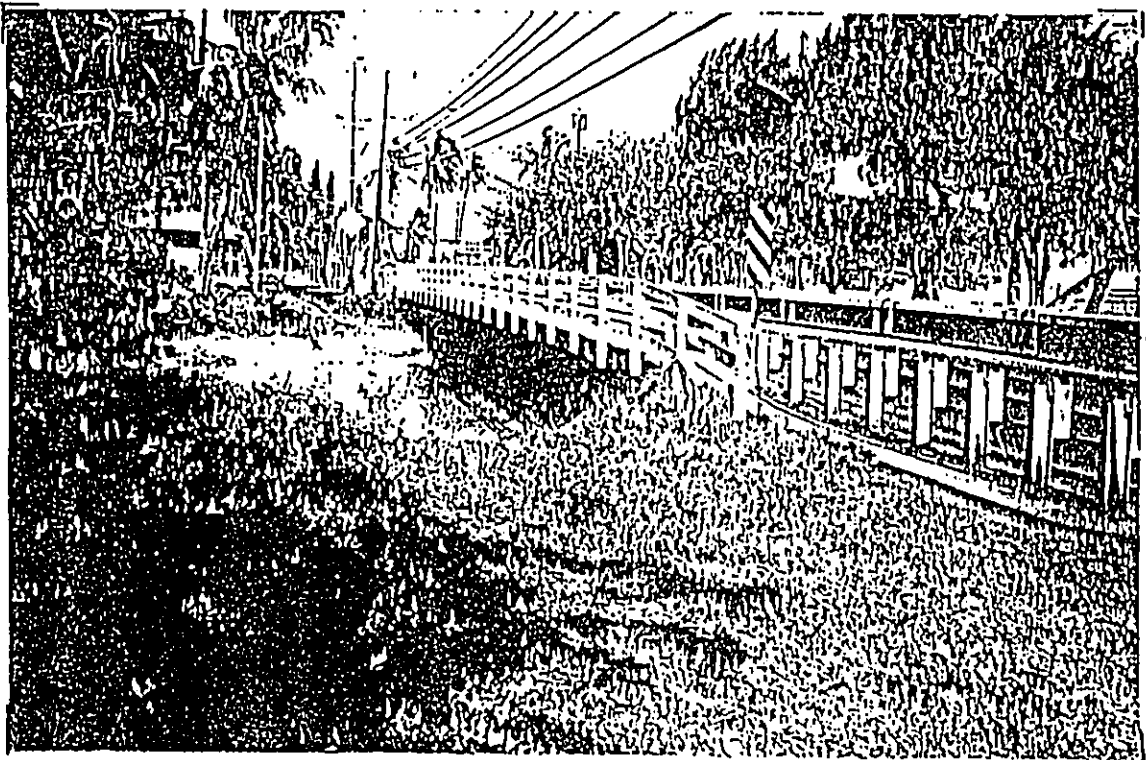


Kahana Stream--Main Channel.

Figure 6

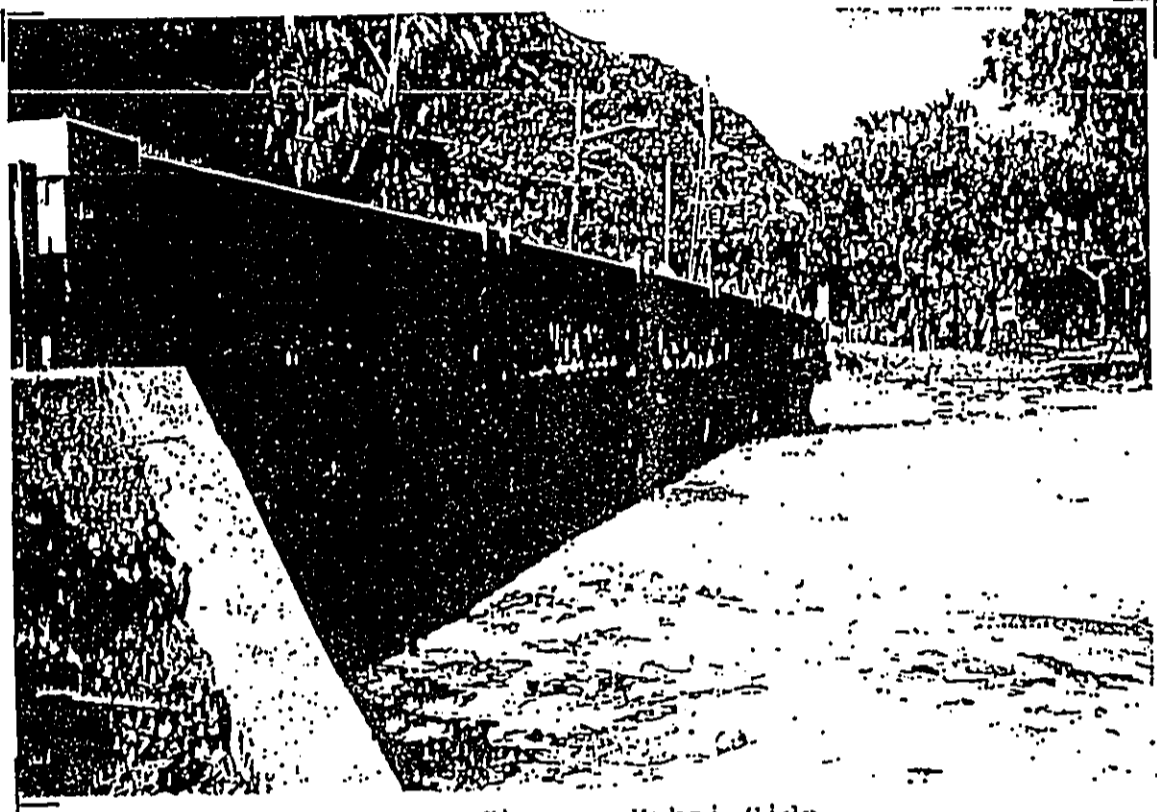


Makaua Stream (Stream Bed Dry).



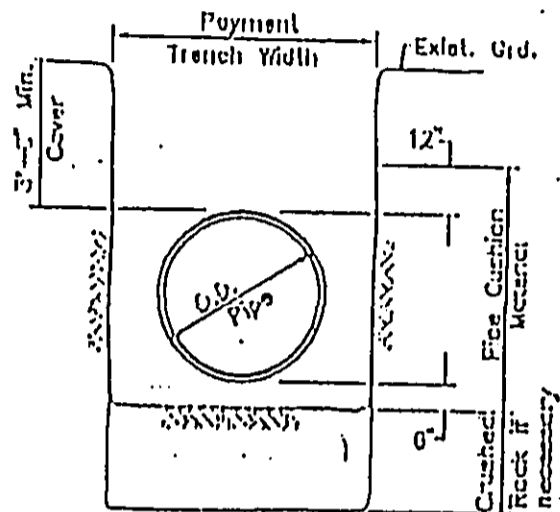
Kaaawa Stream--Mauka Side.

Figure 7



Kaaawa Stream--Makai Side.

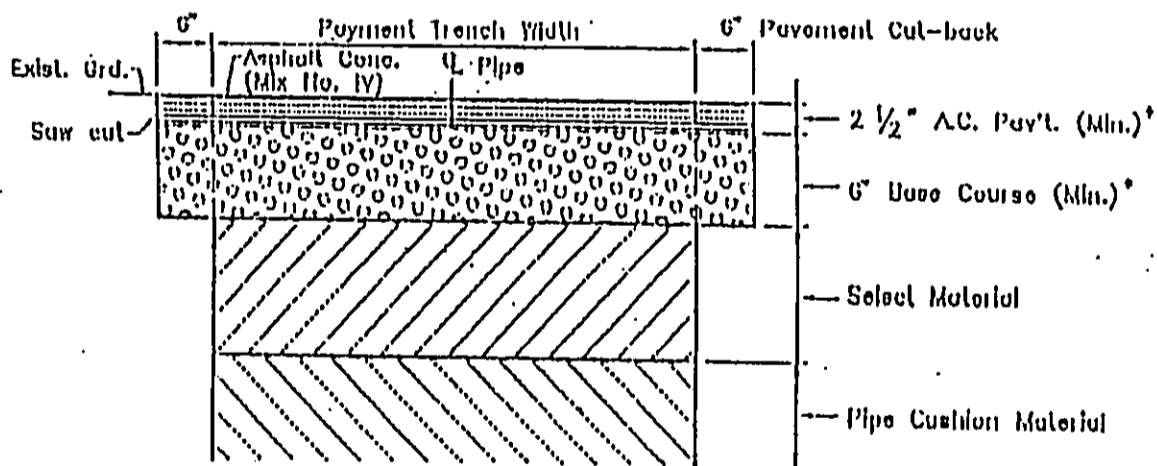
Figure 8



TRENCH WIDTHS
 36" Pipe-----4'-6"
 30" Pipe-----4'-0"

TYPICAL TRENCH DETAIL

Not To Scale



*Note: If existing thickness is greater, then match existing.

TYPICAL PAVEMENT RESTORATION DETAIL

Not To Scale

Figure 9

KAMEHAMEHA HIGHWAY: PUNALUU TO KUALOA		
Phase	Fiscal Year Construction Scheduled	Cost (in thousand dollars)
36" Haleaha Road to Maipuna Stream	2000	5,670
36" Maipuna Stream to Kahana Beach park	2000	6,400
30" Kahana Beach Park to Kina Place	2002	8,320
30" Kina Place to Ohelokai Road	2002	4,550
30" Kualoa Regional Park to Old Sugar Mill	2002	7,860
30" Old Sugar Mill to Kaaawa Valley Road	2003	7,430
30" Kaaawa Valley Road to Ohelokai Road	2003	4,500

TOTAL: 44,730

Figure 10