HALEIWA BYPASS
FINAL
Environmental Impact Statement

KAMEHAMEHA HIGHWAY REALIGNMENT
FROM
WEED JUNCTION TO HALEIWA BEACH PARK

FAP ROUTE 83
ISLAND OF OAHU, HAWAII

U.S. DEPARTMENT OF TRANSPORTATION
Federal Highway Administration

and

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION
Highways Division
HALEIWA BYPASS

Kamehameha Highway Realignment
FAP Route 83 Weed Junction to Haleiwa Beach Park
City and County of Honolulu, State of Hawaii
Project Number F-083-1(5)

FINAL

ENVIRONMENTAL IMPACT STATEMENT

Pursuant to Section 102(2)(C), PL 91-90
and Chapter 343, Hawaii Revised Statutes

US DEPARTMENT OF TRANSPORTATION
Federal Highway Administration
and
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION
Highways Division

This action complies with Executive Order 11988, Floodplain Management
and Executive Order 11990, Protection of Wetlands

August 18, 1981

Date

Willis Karchberg
Federal Highway Administration
Region 9

The following persons may be contacted for additional information
concerning this document:

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The proposed Federal action is approval of a grant application to construct
a new two-lane highway around the town of Haleiwa on the Island of Oahu,
Hawaii, for the purpose of relieving traffic congestion.
Mr. Donald A. Bremner, Chairman  
Environmental Quality Commission  
550 Halekauwila Street  
Honolulu, Hawaii 96813

Dear Mr. Bremner:

Based upon the recommendation of the Office of Environmental Quality Control, I am pleased to accept the document, "Haleiwa Bypass Final Environmental Impact Statement," as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. This environmental impact statement will be a useful tool in the process of deciding whether or not the action described therein should or should not be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws, and does not constitute an endorsement of the proposed action.

When the decision is made regarding the proposed action itself, I expect the proposing agency to weigh carefully whether the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and, together with the comments made by the reviewers, provide a useful analysis of alternatives to the proposed action.

With warm personal regards, I remain,

Yours very truly,

George Y. Ariyoshi

cc: Honorable R. Higashionna
SUMMARY

A. DESCRIPTION OF THE PROPOSED ACTION

The proposed project involves the construction of a new highway around the town of Haleiwa on the Island of Oahu, Hawaii. The Haleiwa Bypass will begin at the Weed Junction Traffic Circle and rejoin Kamehameha Highway (FAP Route 83) near the Haleiwa Beach Park, a distance of approximately 2.3 miles. Initial construction will provide two 12-foot traffic lanes and 10-foot paved shoulders. Right-of-way will be acquired to accommodate an additional two lanes, should the need arise. There is no definite schedule for construction of the additional two lanes. The bypass is expected to carry 60% of the traffic flow, while Kamehameha Highway will continue to be used by local traffic and some through traffic.

B. MAJOR ALTERNATIVES CONSIDERED

1. Alternative Alignments. Three alignments were proposed for evaluation. (See Figure 7, pg. II-2) They begin and end at the same point, but differ in their distance inland from Haleiwa and the point at which they cross the Anahulu River. Alternate A is over 1,000 feet from Kamehameha Highway at the central portion of town and crosses the Anahulu River below the bend. Alternate D comes closest to town (500 feet from the highway) but crosses the Anahulu River above the bend. Alternate C would require the least excavation of the bluff above the Anahulu River. Alternate C has been selected as the recommended alignment. (See Figure 7A)
2. **No Project.** The impact of not constructing a bypass around Haleiwa has been evaluated. The resulting congestion would cause long delays, high air pollution emissions, and a deterioration of the rural character of Haleiwa that is valued by its residents.

3. **Other Alternatives.** Widening Kamehameha Highway is not feasible, since it would require the removal of most of the businesses in Haleiwa. Increased mass transportation is desirable, but a new system is not warranted by the traffic volume to the North Shore. Expanding the existing bus service would increase the need for a bypass.

### C. SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

1. The Haleiwa Bypass will significantly reduce congestion on Kamehameha Highway through Haleiwa.

2. Commuting times to and from Honolulu through the Haleiwa area will be reduced, but not enough for the new highway to have a significant growth-inducing impact throughout the North Shore. However, the bypass will create several remnant parcels of cane land, facilitating their conversion to other land uses. The bypass will most likely define the inland (east) boundary of future expansion for Haleiwa.

3. The selected Alternate C will remove forty five (45) acres of sugar cane lands. The gross value of this lost productivity is around $343,000 on a bi-annual basis.

4. Diversion of through traffic around Haleiwa may result in sales losses for traffic-oriented businesses, but reduced traffic congestion may encourage more shopping by North Shore residents.
5. The recommended alignment (Alternate C) will displace two residences. Equivalent (or better) replacement housing will be provided by the State.

6. By reducing congestion, automobile air pollutant emissions in Haleiwa will be reduced well below existing levels.

7. The bypass will cross three streams and the outlet of a marsh. Erosion from graded areas may cause a temporary increase in turbidity, but this will be minimized by planting slopes as soon as possible. The bridges will not aggravate flooding, interfere with the movement of fish, or alter the hydraulic characteristics of the marsh.

D. AREAS OF CONTROVERSY

The responses to the EIS Preparation Notice raised a number of concerns regarding the potential environmental effects of the proposed project. (This document, required by State environmental law, serves the same purpose as the "scoping process" outlined in the revised CEQ guidelines.) The primary issues are: 1) the effect of the highway on future population distribution through the creation of remnant agricultural lands, 2) impacts on properties and sites of historical or cultural significance, 3) impact on wetlands, aquatic life, and endangered waterbirds, 4) effects of the new stream crossings on flooding, 5) effects of the bypass on business activity in Haleiwa, and 6) aesthetic impact of a new bridge across the Anahulu River. Specific locations in the EIS where these issues are discussed are listed in the Index.

E. ORGANIZATIONS AND PERSONS CONSULTED

The Draft EIS has been reviewed at the State and Federal levels, and has been made available to community residents and organizations (see the Draft EIS Mailing List, page VI-34). Copies of the evaluation of comments have been submitted to all respective commentors.
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CHAPTER 1

NEED FOR PROJECT
CHAPTER I. PURPOSE AND NEED FOR THE PROJECT

A. DEFICIENCIES OF THE EXISTING HIGHWAY

Kamehameha Highway is a two-lane Federal Aid Primary facility which serves as the major route to the North Shore of Oahu (Figures 1 and 2). The existing roadway through Haleiwa provides two 10-foot wide lanes with shoulders from 3 to 10 feet in width. It was constructed in 1949, with some improvements made near the Weed Junction traffic circle in 1965. There are four bridges in the project area: over Helemeño and Opaekua Streams (the "twin bridges"), and over the Anahulu River, and over the Loko Ea outlet (Figure 2). They were constructed in the 1920's, but are still in good structural condition.

Kamehameha Highway is also a two-lane highway outside of Haleiwa Town. The vertical and horizontal roadway alignment is adequate, but the roadway width is substandard. The travel lanes vary between 10 to 11 feet with shoulders of 8 to 9 feet.

The roadways outside of Haleiwa adequately accommodate present traffic conditions. However, the highway through town is not adequate for present traffic volumes. The present capacity of Kamehameha Highway through Haleiwa is approximately 1,265 vehicles per hour (vph) assuming free-flowing traffic, or 1,440 vph under stop-and-go conditions. However, the present peak hour traffic demand is 10% to 25% over the capacity of the highway (Tables 1 and 2). The result is traffic congestion. The capacity is limited by the width of the roadway, the narrow shoulders, and the cross-traffic and turning movements into the businesses in Haleiwa. The Anahulu River bridge is also a significant constraint to traffic flow, since it is barely wide enough (17 feet) for two autos, but not wide enough for an auto and a truck or a bus to pass. Therefore, traffic must stop when a truck or bus approaches. This is a hazardous situation, since the bridge is located on a curve in the highway, making it difficult to see approaching traffic.

A clear indication of the need for improving traffic flow through Haleiwa is the high rate of accidents that have occurred in town as opposed to adjacent highway segments. This is graphically portrayed on Figures 3 and 4. The first graph (Figure 3) shows the average accident rates for the years 1973 to 1977 by one-mile segments along Kamehameha Highway from Mililani to Laie (15 miles on either side of Haleiwa). There is a distinct pattern of higher accident rates in the towns (Wahiawa, Haleiwa, Sunset Beach), with the rate in Haleiwa being the highest on this 33 miles of highway. From Wahiawa to Weed Junction traffic circle, the average accident rate for the years 1973 through 1977 was only 1.72 accidents per million vehicle miles (mvm). From the
FIGURE I
KAMEHAMEHA HIGHWAY

SCALE: 1" = 4.5 Mi. Approx.
### TABLE 1  AVERAGE DAILY TRAFFIC

(Vehicles per 24 Hours, Total of Both Directions)

<table>
<thead>
<tr>
<th>Segment</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
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<tr>
<td>Kam Highway Without Bypass</td>
<td>14,500</td>
<td>17,000</td>
<td>23,000</td>
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<tr>
<td>Kam Highway With Bypass</td>
<td>6,800 (40%)</td>
<td>9,200 (40%)</td>
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<tr>
<td>Bypass Alignment</td>
<td>10,200 (60%)</td>
<td>13,800 (60%)</td>
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Note: 1. Average Weekday traffic = 0.952 x ADT  
       Average Weekend traffic = 1.120 x ADT  

2. Average daily truck traffic is 5.0% of ADT.  

3. Annual increase is 2.5%.

### TABLE 2  PEAK HOUR TRAFFIC VOLUME VS CAPACITY

(Vehicles per Hour, Total of Both Directions)

<table>
<thead>
<tr>
<th>Segment</th>
<th>Capacity</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
</tr>
<tr>
<td>Kam Highway Without Bypass</td>
<td>1,265-1,440</td>
<td>1,310</td>
<td>1,590</td>
<td>1,555</td>
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<tr>
<td>Kam Highway With Bypass</td>
<td>1,235-1,440</td>
<td>610</td>
<td>745</td>
<td>630</td>
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<tr>
<td>Bypass Alignment</td>
<td>1,700</td>
<td>925</td>
<td>1,125</td>
<td>1,250</td>
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Note: 1. Morning peak hour is 9.0% of ADT, and afternoon peak hour is 11.0% of ADT.  

2. Morning distribution is 60% toward Honolulu and 40% toward Waimea, while afternoon distribution is 45% toward Honolulu and 55% toward Waimea (Based on traffic counts).  

3. Peak hour truck traffic is 3.0% of Design Hourly Volume.

I-8
AVERAGE DAILY TRAFFIC
15,000
10,000
5,000

KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK

FIGURE 5
1985 TRAFFIC
WITHOUT BYPASS
BASE SCALE: 1" = 2000'
The average rate of traffic increase represented in Table 1 is approximately 2.5% per year, while the annual growth rate of Oahu for the same time span is 1.2%. It is typical for traffic to increase at a faster rate than population, though the use of current population growth forecasts for the traffic study might lessen the discrepancy slightly. It can be seen from Table 2 that the present peak hour traffic volume is significantly higher than the capacity of the highway, resulting in congestion. In future years, congestion will worsen if the capacity is not improved. (The traffic volume on Kamehameha Highway indicated for the year 2001 with or without a bypass would probably never be attained, unless the adjacent highway segments are also improved.)

2. Other Studies. A number of detailed investigations were conducted for this project in order to provide data for the evaluation of the environmental impacts of the project. These included a survey of stream fauna, an air pollution study using the HIWAY dispersion model, a noise study based on short-term monitoring and predictions, and a cultural resources assessment (archaeology and history). The methods and results of these studies are presented in the appendices, and summarized in appropriate sections of the EIS text (e.g. Chapters III, and IV). In addition, a study of business activity in Haleiwa was conducted to determine the impacts of the bypass on the Haleiwa Business community. Data on the businesses was compiled through the Hawaii Business Directory, and merchants and shoppers were interviewed in order to evaluate the effects of reduced traffic volume through Haleiwa. The results of this study are discussed in Chapter IV.

D. THE BACKGROUND OF THE PROJECT, PRESENT STATUS, AND FUTURE PLANS

The increase in traffic to the North Shore and the subsequent need for a bypass around Haleiwa was anticipated by the State Department of Transportation in the early 1960's. In 1962, a corridor public hearing was held in Haleiwa to obtain public input on a possible future bypass alignment. There were no major objections
to the proposal, and the Bishop Estate, Waialua Businessmen's Association, and the Kawaiola Property Owners Association expressed their support. Although the necessary funds were not appropriated for construction as scheduled, the proposed corridor was incorporated into the 1964 Oahu General Plan and Detailed Land Use Maps.

In July of 1970, a design public hearing was held at the Haleiwa Elementary School, for an alignment within the corridor proposed in 1962. Although there was public support for the concept of the bypass, objections were raised with regard to the proximity of the alignment to the town and the location of the Anahulu River crossing. Further work on preparation of construction plans was suspended.

The project was reactivated in November, 1978. The objective of the present activity on the project is to re-evaluate the previous proposals and testimony to come up with a recommended alignment, submit an Environmental Impact Statement for that alignment, hold a second design public hearing, and prepare final construction plans. A series of community information meetings were held in February and March, 1979. The concerns expressed at these meetings were taken into account in the development of the proposed alternates described in the Draft Environmental Impact Statement circulated in May, 1980. Finally, agency and public comments on the EIS, and public testimony at a hearing held in June, 1980 have been incorporated into this Final EIS which describes the recommended alternative (modified Alternate C).

The current schedule projects planning to be completed by the second quarter of 1981. Preparation of the final right-of-way maps and construction plans will take another 18 months, placing the commencement of right-of-way acquisition about mid 1983 and construction sometime in 1984. The projected completion date for the two-lane highway is 1986. However, the proposed schedule is contingent upon appropriation of additional State and Federal funds.

Expansion of the Bypass to four lanes will be undertaken when it becomes necessary to widen the adjacent highway segments to four lanes. There is no definite schedule for the four lane expansion, however, the need is anticipated in the 1990's.
CHAPTER II
PROJECT DESCRIPTION
CHAPTER II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

The proposed Federal action is approval of a grant application to construct a new 2-lane highway around the town of Haleiwa on the Island of Oahu, Hawaii. The purpose of the bypass route is to relieve congestion on the existing highway through town.

A. RECOMMENDED ALIGNMENT

1. Route. The proposed realignment of Kamehameha Highway is located on the North Shore (Waialua District) of the Island of Oahu, at the town of Haleiwa (Figures 1 and 2). Virtually all traffic from Honolulu to the North Shore passes through the central business district of Haleiwa, creating an undesirable situation in terms of safety and congestion. The proposed action is to rectify this situation by constructing a bypass around Haleiwa on the inland (east) side of town. The bypass will primarily carry through traffic which constitutes approximately 60% of the total traffic flow. The new section of Kamehameha Highway will begin approximately 1,600 feet (0.30 mile) from the Wahiawa side of the Weed Junction traffic circle, and will rejoin the existing highway approximately 1,800 feet (0.34 mile) north of Kahalewai Place (entrance to Haleiwa Beach Park). The length of the bypass will be approximately 2.3 miles (Figure 7).

The recommended alignment is Alternate C, which is approximately 600 feet from Kamehameha Highway at its closest point near the central business area. It crosses the Anahulu River below the bend, approximately 1,100 feet upstream from the existing bridge. The route cuts through several rocky waste areas to reduce the amount of productive cane land taken. Alternate C is 2.34 miles in length, requires 45 acres of right-of-way, and creates 16 acres of remnant cane land. As originally proposed, Alternate C would have resulted in the loss of six dwelling units. To avoid this, the alignment has been shifted 50 feet seaward and retaining walls will be used to reduce the right-of-way to 130 feet, so that only two homes will require relocation (one on Emerson Road and one on the north side of the Anahulu River). The recommended alignment is shown on Figure 7A, and its characteristics are compared in Table 3 with the two other alternates considered.
ENVIRONMENTAL CONSTRAINTS

TOPOGRAPHIC
1. Anahulu River Bluff
2. Helemano Stream Bluff

STREAMS AND WETLANDS
3. Helemano Stream
4. Opaeula Stream
5. Anahulu River Bend
6. Ukoa Pond Outlet
7. Ukoa Pond Marsh

CULTURAL
8. Businesses and Residences
9. Emerson Homestead Historical Site
10. Cane Haul Roads
11. Water Well

See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth

FIGURE 7
PROPOSED ALTERNATE ALIGNMENTS
SCALE: 1" = 2000'
FIGURE 7A
PLAN OF MODIFIED ALTERNATE C
KAMEHAMEHA HIGHWAY REALIGNMENT
HALEIWA BYPASS
WEED JUNCTION TO HALEIWA BEACH PARK
PROJECT F-083-1(5)
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
0-8-80
### TABLE 3 SUMMARY OF ALTERNATES (1980 Prices)

<table>
<thead>
<tr>
<th>Alternate Alignments</th>
<th>Physical Characteristics</th>
<th>Costs (x $1,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length (Miles)</td>
<td>ROW (acres)</td>
</tr>
<tr>
<td>Alternate A</td>
<td>2.35</td>
<td>47.6</td>
</tr>
<tr>
<td>Alternate C</td>
<td>2.34</td>
<td>45.2</td>
</tr>
<tr>
<td>Alternate D</td>
<td>2.43</td>
<td>52.1</td>
</tr>
</tbody>
</table>

### B.

<table>
<thead>
<tr>
<th>Bridges</th>
<th>(Alt's)</th>
<th>Length</th>
<th>Width</th>
<th>Av. Railing Elevation</th>
<th>Number and Spacing of Piers</th>
<th>Total Cost (x $1,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helemano</td>
<td>(all)</td>
<td>970'</td>
<td>47'</td>
<td>32'</td>
<td>10 @ 90', on banks</td>
<td>$2,890</td>
</tr>
<tr>
<td>Opaepua</td>
<td>(all)</td>
<td>120'</td>
<td>47'</td>
<td>28'</td>
<td>none, abutments on banks</td>
<td>$568</td>
</tr>
<tr>
<td>Anahulu (A &amp; C)</td>
<td>210'</td>
<td>47'</td>
<td>27'</td>
<td></td>
<td>2 @ 60'-90'-60', partly in stream</td>
<td>$576</td>
</tr>
<tr>
<td>Anahulu (D)</td>
<td>810'</td>
<td>47'</td>
<td>31'</td>
<td></td>
<td>8 @ 90', viaduct</td>
<td>$2,414</td>
</tr>
<tr>
<td>Ukoa Outlet (all)</td>
<td>200'</td>
<td>47'</td>
<td>18'</td>
<td></td>
<td>4 @ 40', none in outlet</td>
<td>$549</td>
</tr>
<tr>
<td>Cane Haul (A)</td>
<td>50'</td>
<td>47'</td>
<td>76'</td>
<td></td>
<td>None</td>
<td>$137</td>
</tr>
<tr>
<td>Cane Haul (C)</td>
<td>60'</td>
<td>47'</td>
<td>61'</td>
<td></td>
<td>None</td>
<td>$165</td>
</tr>
<tr>
<td>Cane Haul (D)</td>
<td>70'</td>
<td>47'</td>
<td>55'</td>
<td></td>
<td>None</td>
<td>$192</td>
</tr>
</tbody>
</table>
The earthmoving requirements for the three alternates are presented in Table 4. Alternate D requires the most cut and fill with a total of 464,300 cubic yards, followed by Alternates A and C, which require 307,800 and 354,200 cubic yards of earthmoving, respectively. The cut and fill is not balanced on any of the alignments, but Alternate A requires the smallest amount of borrow material. Imported borrow material will be obtained from private sources, the locations of which can not be determined at this time.

TABLE 4. EARTHMOVING REQUIREMENTS (cubic yards)
(Excluding Surcharge Fill and Removal)

<table>
<thead>
<tr>
<th></th>
<th>Cut</th>
<th>Fill</th>
<th>Total</th>
<th>Imported Borrow</th>
<th>Max. Cut</th>
<th>Max. Fill</th>
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<tbody>
<tr>
<td>A</td>
<td>63,600</td>
<td>162,300</td>
<td>98,700</td>
<td>98,700</td>
<td>20'</td>
<td>35'</td>
</tr>
<tr>
<td>C*</td>
<td>37,800</td>
<td>150,600</td>
<td>112,800</td>
<td>112,800</td>
<td>15'</td>
<td>35'</td>
</tr>
<tr>
<td>D</td>
<td>18,400</td>
<td>259,600</td>
<td>241,200</td>
<td>241,200</td>
<td>15'</td>
<td>35'</td>
</tr>
</tbody>
</table>

(Figures rounded-off)
* Recommended Alternate with Helemano viaduct

5. Bridges. Bridges will be required over Helemano Stream, Opaekula Stream, the Anahulu River, the outlet of the Ukoa Pond, and over the cane haul road (Figure 7 and Table 3). The Helemano crossing will be on a viaduct approximately 970 feet long (Figure 9). The Opaekula bridge will be approximately 120 feet long, constructed with prestressed concrete girders in a single span (Figure 9). The Anahulu River crossing for the recommended Alternate will have a straight 210-foot bridge constructed of prestressed concrete girders in three spans with two sets of piers in the river near the banks (Figure 10). The bridge over the Ukoa Pond outlet will be approximately 200 feet long, with five spans supported by four sets of piers (Figure 10). This bridge will be made of concrete slabs, and will not require construction in swampy ground, nor will the outlet be altered. The bridge over the cane haul road will be a single span approximately 200 feet in length (Figure 11).
TYPICAL CANE HAUL ROAD SECTION

SCALE IN FEET

CANE HAUL ROAD UNDERCROSSING AT BYPASS

SCALE IN FEET

KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK

FIGURE 11
CANÉ HAUL ROAD SECTION AND BRIDGE
6. **Cane Haul Roads.** The bypass will cross three major roads owned by the Waialua Sugar Company and used to transport harvested sugar cane to the mill. Because of the hazards involved in mixing vehicular and cane haul traffic, the cane haul roads will be realigned and provided with a single underpass crossing. The typical section for the new cane haul roads is shown on Figure 11, which also shows a perspective drawing of the underpass. The proposed cane haul road relocation for the recommended alternate is given on Figure 7A (Figure 12 shows the rejected alternates). The major change in the cane haul road system will be to bring the primary collector road to the inland (east) side of the bypass, abandoning the road that presently passes immediately behind Haleiwa. Alternate C has been shifted slightly seaward from the original alignment, which improves the alignment on the cane haul road up the Anahulu River bluff. The maximum uphill grade for loaded trucks will be 6% and the maximum downhill grade will be 8%. The cost of relocating the cane haul roads is included in the construction budget.

7. **Connector Roads.** The intersections with Kamehameha Highway at the beginning and end of the project will be designed to give preference to through traffic using the bypass. They will not be signalized, but acceleration, deceleration, and left-turn lanes will be provided. The intersections will be clearly signed to identify Haleiwa. The typical section (Figure 8) and preliminary plans (Figure 13) for the two intersections are the same for all three alternates.

To provide for efficient traffic circulation, a connection between the bypass and Kamehameha Highway will be provided at Emerson Road. This will also provide convenient access without having to use the cane haul road, as at present, for the residents in Anahulu Valley. The typical section of the connector road from the bypass to Emerson Road is shown on Figure 8. The at-grade intersection will be controlled by stop signs on Emerson Road, and caution lights and signs will be placed on the bypass to warn drivers of an intersection and pedestrian crossing. The preliminary plans for this connector road on the recommended alternate is shown on Figure 14A (the rejected alternates are shown on Figure 14B). These plans will be referred to in the discussion of impacts (Chapter V), since they show in detail the relationship of the alternate alignments to the Emerson Homestead and the residences between Emerson Road and the Anahulu River.
LEGEND:

- REMAINING ROADS
- ABANDONED ROADS
- ELECTRIC LINES

KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK

FIGURE 12
CANE HAUL ROADS
ALTERNATES A and D

SCALE: 1" = 800'

II-12
NOTE:
DETAILED PLANS WILL
BE DEVELOPED IN THE
DESIGN STAGE.

FIGURE 13
KAMEHAMEHA HIGHWAY
INTERSECTIONS
SCALE 1" = 400'

KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK

UKOA POND OUTLET
OUTLET BRIDGE

BEGIN PROJECT

HALEIWA
CONNECTOR

KAMEHAMEHA HWY

VIADUCT

WAIALUA CONNECTOR

HELEMANO STREAM

NORTH
(Haleiwa)

NORTH
(Waimea)

END PROJECT
KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK

FIGURE 14B
EMERSON RD. CONNECTOR
REJECTED ALTERNATES
8. **Environmental Constraints.** The major environmental constraints identified for the Haleiwa area are listed below. The specific constraints that restrict possible bypass alignments are identified on Figure 7.

a. **Prime Agricultural Lands.** The use of prime agricultural lands has been minimized.

b. **Taro Lands.** A 177 State Senate Concurrent Resolution urges preservation of agricultural lands where taro can be grown. Such lands have been avoided.

c. **Homes.** Care has been taken to minimize the need to remove housing and to avoid impacting nearby housing with highway noise.

d. **Businesses.** Removal of existing businesses, or disruption of access, has been avoided.

e. **Cane Haul Roads.** Provisions have been made to accommodate cane haul traffic.

f. **Wells, Irrigation Systems, and Utilities.** Public services will not be disrupted and convenient relocation of affected facilities will be provided.

g. **Parks.** Parks or proposed park sites have been avoided (see Figure 23).

h. **Noise Sensitive Areas.** In order to minimize the impact of noise, the new highway has been placed at an adequate distance from businesses and housing where possible.

i. **Aesthetic Impact.** Care has been taken to choose a route which will minimize the highway's visual intrusion into the natural environment. Stream crossings have been chosen so as to minimize the visual impact of bridge structures.

j. **Historic Sites.** The route avoids registered and potential historic or archaeologic sites.

k. **Wildlife Habitat.** The removal of wildlife habitat has been minimized, and any disturbance of endangered species will be strictly avoided.

l. **Natural Hazards.** Structures in flood plains or tsunami inundation areas will be designed to withstand maximum forces, and will not aggravate flooding.
A major physical constraint that has restricted the development of the alternate alignments is the bluff on the south side of the Anahulu River (Figure 7 and Plate 1). The base of the bluff is approximately 700 feet inland from Kamehameha Highway, and rises steeply to a height of 70 feet at a distance of 1,000 feet from the highway. As a result, the farther inland the alignment is placed, the more excavation is required. The recommended alternate strikes a favorable balance between cutting into the bluff and maintaining a suitable distance from town.

9. Community Concerns. A number of important criteria that have guided the design study were derived from public input at meetings held in 1962, 1970, 1979, and 1980. At the earlier meetings it was expressed that the alignment should be as far inland as possible and should cross the Anahulu River above the bend. This first criteria has been met in so far as possible while keeping landform modification to a minimum. It is not practical to cross above the bend since the cut in Anahulu River bluff would be excessive and a long viaduct would be required. These points have apparently been addressed to the satisfaction of the community, since they have not been raised at the more recent hearings. However, the proposed crossing below the bend has brought up the concern of relocating the families located in that area. This problem has been mitigated by using retaining walls to reduce the right-of-way required, so that only two residences will be removed. Full relocation assistance will be provided to these families. A concern frequently raised regards maintaining access to as much cane land as possible. The preferred alignment takes the least cane land of the three alternates. Furthermore, the relocated cane haul roads will be provided with grades and surfacing compatible with the requirements of the cane trucks.
Plate 1. View of the Anahulu River bluff looking south. The river flows from left to right between the sugar cane (foreground) and the row of trees (middle).

Plate 2. View up the Anahulu River from the existing bridge (compare with Plate 5).
B. PROJECT COST AND BENEFIT/COST RATIO

The characteristics and costs of the three proposed alternates are summarized in Table 3. The total cost (at 1980 prices) of the two lanes of the recommended Alternate C would be $12,683 million. Cost estimates to bring the highway up to four lanes have not been derived, since this ultimate development would be well into the future, if at all. It is anticipated that the cost of the project will be shared between the Federal Government (approximately 75%) and the State of Hawaii (approximately 25%)

The benefit/cost ratios of the recommended alternate is shown in Table 5. This was calculated according to the methodology prescribed in the American Association of State Highway Officials publication, "Road User Benefit/Cost Analyses for Highway Improvements". On the basis of annual user benefits versus annually pro-rated right-of-way and construction costs, Alternate C shows significant benefits. The user benefits are primarily an expression of savings through reduced driving time and a decrease in the number of accidents. The benefit/cost ratio only evaluates user benefits and highway-related costs. Other costs and benefits such as environmental impacts, economic impacts, and non-user benefits are evaluated throughout the EIS. The purpose of the benefit/cost ratio is to determine the cost effectiveness of a particular project for comparison purposes. The purpose of the EIS is to present all of the costs and benefits of a project, without attempting to reduce them to dollar terms.

<table>
<thead>
<tr>
<th>TABLE 5  BENEFIT/COST RATIOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Benefits*</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Alternate C</td>
</tr>
</tbody>
</table>

* Annual savings relative to the "Do Nothing" alternative amounting to a 28% decrease in user costs (e.g. time and fuel).
C. **REJECTED ALTERNATE ALIGNMENTS**

On the basis of the design criteria and constraints discussed above, three feasible alternates were developed. The three proposed alternates share a common alignment for several thousand feet at the beginning and at the end of the project. The major differences between them arise in relationship to their distance inland from Kamehameha Highway and the point at which they cross the Anahulu River. None of the alternates satisfies all of the different environmental and community concerns, since some are conflicting. The characteristics of the alternates are summarized in Table 3, and their impacts are compared in Chapter IV. The two alternates that were rejected following review of the Draft EIS are described below.

1. **Alternate A.** Alternate A was developed to examine an alignment as far inland from Kamehameha Highway as possible. This alternate is approximately 1,000 feet from Kamehameha Highway at its closest point to the central busines area. Alternate A crosses the Anahulu River below the bend, approximately 1,300 feet upstream from the existing Anahulu Bridge. Alternate A is 2.35 miles in length, requires 52 acres for right-of-way, and creates 29 acres of remnant cane land. The cost of Alternate A is $12.71 million.

Alternate A was rejected primarily because of the adverse impact it would have on homes between Emerson Road and the Anahulu River. (Alternate B, a variation of Alternate A, was discarded prior to circulation of the Draft EIS.)

2. **Alternate D.** Alternate D is a modification of Alternate C to provide a crossing above the bend in the Anahulu River. To accomplish this, and negotiate the river bluff, the section south of the river has to be much closer to town (450 feet), and a long viaduct is required across the Anahulu River. Alternate D is 2.43 miles in length, requires 57 acres of right-of-way, and creates 20 acres of remnant cane land. The cost of Alternate D is $16.57 million.

Alternate D was rejected because it would adversely affect a marsh and historic taro complex at the bend in the Anahulu River. Both the U.S. Fish and Wildlife Service and the State Historic Preservation Officer recommended against this alignment.
D. NO BUILD ALTERNATIVE

The existing Kamehameha Highway through Haleiwa now acts as a traffic bottleneck causing congestion during weekend peak hours. If the bypass road is not constructed, traffic congestion will worsen. Increased traffic congestion will result in greater air pollution, pedestrian-vehicle conflicts, and longer travel times. The traffic-related impacts of the no-build alternative would frustrate efforts to preserve the rural atmosphere of Haleiwa (see Appendix F).

Traffic jams in Haleiwa Town resulting from the no-build alternative would spread traffic-related impacts into areas outside of Haleiwa. Drivers seeking to drive around the traffic tie-up on Kamehameha Highway would take alternative routes through Waialua or on Haleiwa Road, impacting these quiet residential neighborhoods. Some Honolulu drivers, wanting to visit the North Shore on weekends, would utilize the Windward route to the North Shore, increasing traffic volumes on that side of the island.

Traffic tie-ups in Haleiwa Town during peak periods would restrict the mobility of North Shore residents. Residents wishing to travel into Haleiwa Town or to points south, such as Wahiawa and Honolulu, would have three choices: 1) endure the traffic jam in Haleiwa; 2) take the Windward Route; or 3) stay home.

The no-build alternative would reduce the travel options of Honolulu residents as well. Unpleasant traffic conditions in Haleiwa would discourage many weekend travelers who would otherwise have visited the North Shore. However, this negative impact on Honolulu residents could be a benefit for North Shore residents, since the no-build alternative could eventually make for less crowded conditions at North Shore beaches and parks. But these benefits would be at the expense of other areas on Oahu.

The no-build alternative would avoid the loss of the agricultural land required for the bypass. This would be one of the most important benefits of the no-build alternative, as the loss of valuable agricultural land is an important concern in the State of Hawaii.

If the highway realignment is not constructed, the State of Hawaii would save up to $12 million, and the economic impact of the bypass on Haleiwa businesses would be avoided. Congested traffic conditions in Haleiwa could increase the level of "off-the-road" purchases, as weary drivers seek temporary respite in local businesses. However, higher levels of weekend traffic will impact non-roadway oriented business,
as North Shore residents avoid Haleiwa during times of high traffic volumes. On the other hand, user costs, in terms of time and fuel consumption, would be 28% higher than with the bypass (Table 5).

As with the evaluation of project-related impacts, the evaluation of the impacts of the no-project alternative assumes that existing patterns persist and that present North Shore economic conditions remain unchanged. Should rising gasoline prices or restricted availability of fuel cause Oahu residents to drive less, the impacts of the no-project alternative will not be as pronounced. If consumers are forced to reduce fuel consumption due to high prices or rationing, weekend recreational driving will be cut back. Should this occur, weekend traffic in Haleiwa would not necessarily improve, but would probably increase at a slower pace than projected.

Since there is a clear present need for relief of congestion in Haleiwa, and there is no indication that the situation will change unaided, the no-action alternative has been rejected.

E. WIDEN KAMEHAMEHA HIGHWAY ALTERNATIVE

The existing Kamehameha Highway through Haleiwa is only 20 feet wide, with narrow shoulders and no sidewalks, curbs, or gutters. The right of way varies from 50 to 60 feet in width, though many buildings have almost no set-back from the highway (Plate 3, Chapter III). The present traffic volume through Haleiwa requires four traffic lanes, and projections indicate that this need will increase. The proposed bypass will provide the needed four lanes (2 on the bypass and 2 on Kamehameha Highway), or Kamehameha Highway could be widened. Four 12-foot lanes, two 10-foot shoulders, and two 8-foot sidewalks would require an 84-foot right of way. This alternative would take a 24 to 34-foot strip on either side of the highway (7.4 acres).

To implement this alternative, nearly all of the buildings (approximately 30) along one side of Kamehameha Highway would have to be removed. Also, the Anahulu River bridge would have to be replaced, or a second bridge built adjacent to it; either choice would destroy the bridge's scenic value. This alternative would eliminate the rural character of Haleiwa, so it has not been given serious consideration.
F. ALTERNATIVE MODES OF TRANSPORTATION

1. Bus Service. An alternative to the construction of the proposed Kamehaeha Highway realignment is the provision of additional bus service to the North Shore. In order to be successful as an alternative, expanded bus service would have to attract enough riders to prevent traffic congestion from increasing. To accomplish this, travelers' attitudes toward bus travel would have to be drastically altered, since drivers have proven very resistant to giving up their automobiles.

The bus service alternative would have its best chance of success in attracting weekday commuters who travel from the North Shore into Wahiawa and Honolulu. If bus service were expanded to the point where wait times were greatly shortened, some commuters might be wooed out of their autos. But even if this alternative were to be successful in preventing increases in weekday traffic, it would not solve all of the problems to which the bypass road is addressed. The greatest traffic problems occur on weekends when visitors from urban areas flock to the North Shore. Recreational drivers are especially resistant to alteration of their method of travel. Based on the past behavior of weekend travelers it appears unlikely that significant numbers would give up the private automobile for the bus. Without a significant change in recreational travel preferences, the expanded bus service alternative would be unable to prevent weekend traffic from growing to undesirable proportions.

However, drivers' past unwillingness to switch from their automobiles into buses may not hold true in the future. Continuing increases in fuel prices or gas rationing could change travel preferences sufficiently to make expanded bus service a more feasible alternative.

If successful, the bus alternative would result in energy savings, as buses are more efficient than automobiles. But the bus alternative would not solve the problems inherent in maintaining a busy highway through a small rural community. Haleiwa would still be impacted by traffic noise, air pollution, and pedestrian/vehicle conflicts. Furthermore, the inadequate roadway and shoulder widths, poor geometry, and conflicts at side streets, would continue to cause problems.

While expanded bus service is desirable, it is not a viable substitution for a new highway around Haleiwa.
2. **Fixed Rail.** A fixed guideway rapid transit system would be faster than existing automobile or bus transportation and would not be subject to adverse traffic conditions. Because of its speed, and the possible reduction in travel time, this type of transit would have the greatest chance of superseding the automobile. However, a fixed guideway system would be much more expensive than any other alternative and is dependent on the previous establishment of such a system in Honolulu. Though a fixed guideway system is being considered for Honolulu, its eventual implementation is far from certain. Such a system would have to be constructed and proven over a period of time in Honolulu before extension of rail service to the North Shore could be considered. Even with the existence of a Honolulu system, the low population of the North Shore might not justify the large capital expense. A fixed guideway system, due to its speed and comfort, would have a very large growth inducing impact on the North Shore. At this time, it appears that a fixed guideway system is too far off in the future to resolve the existing traffic problems on Kamehameha Highway through Haleiwa.

3. **Small Scale Programs.** Nationally, small-scale programs to encourage van pooling and car pooling have been attempted in order to conserve energy and reduce traffic congestion. However, these programs have faced strong commuter resistance to abandoning the individual use of private automobiles. Van pools and car pools primarily appeal to commuters and could help to reduce weekday traffic, but would be of little help in reducing weekend traffic. Due to the distance between the North Shore and urban job centers, walking and bicycling are not viable alternatives. Should the bypass road not be constructed, van pools or car pools would not, by themselves, be an adequate alternative. It is possible that van pooling and car pooling, combined with other "non-structural" alternatives such as expanded bus service, could help to prevent traffic congestion from worsening. However, the inadequacies of the existing highway would continue to cause problems.
CHAPTER III

ENVIRONMENTAL SETTING
CHAPTER III. SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONTEXT OF THE AREA

A. TERRAIN

1. Topography. The proposed bypass around Haleiwa is located on the gradual transitional area between the Schofield Plateau and the coastal plain (Figure 15). The plateau is cut by the steep-sided valleys of Helemano Stream, Opaekua Stream and the Anahulu River. The ridges between these streams are broad and slope at a rate of 5%-10% toward the base of the Koolau Range. The coastal plain on which Haleiwa Town is situated is relatively level, and only 10-20 feet above sea level. Significant topographic features of the coastal plain include the tidal portions of the three above-mentioned streams, several marshes, and the Loko Ea fishpond. The transition from the plateau to the coastal plain is a gentle slope in the project area behind Haleiwa, but is marked by steep bluffs north of the Anahulu River.

The alternate alignments begin at an elevation of 130 feet, and descend to an average elevation of 30 feet in the vicinity of Helemano and Opaekua Streams. Alternate A crosses the Anahulu River bluff at an elevation of 80 feet, while Alternates C and D reach elevations of 70 feet and 40 feet, respectively, at this point. From the north side of the river to Kamehameha Highway, Alternates A and C have an average elevation of 20 feet, while Alternate D is farther inland at an elevation of 40 feet. The three alternates rejoin Kamehameha Highway at an elevation of approximately 8 feet above sea level.

2. Geology and Soils. The landform described above is a result of erosional forces (stream, ocean, landslide, and wind) acting on the Koolau Volcanoes. The Schofield Plateau was formed by coalescing lava flows from the Koolau and Waianae Volcanoes, although the portion of the plateau in the project area is made up entirely of Koolau flows (1, 2). The coastal plain was created during the Pleistocene age, when the sea was at a higher level than at present. A broad coral reef was developed, waves cut low sea cliffs in the plateau, and the river valleys were submerged (3). Then, the sea receded to its present level, exposing the reef and the level.

* References are listed at the end of this Chapter.
LEGEND:

- SLOPES GREATER THAN 20%
- MARSH

See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth.

FIGURE 15
TOPOGRAPHIC FEATURES
SCALE: 1" = 2000'
valley floors filled with sediment. Further erosion of the plateau caused sediment to be deposited on the coastal plain, covering the reef with a thick layer in the vicinity of the stream mouths and a fairly thin layer elsewhere. A portion of the former reef is exposed at Haleiwa Beach Park. Depressions in the reef became shallow lakes or estuaries, which gradually filled with sediment to form the present marshes.

The soils of the Haleiwa area clearly reflect this geologic history. The fourteen soil series and miscellaneous types mapped in the area by the Soil Conservation Service (4) can be placed into three groups; upland, coastal, and transition (Figure 16A). The upland soil series include Wahiawa, Lahaina, and Helemano silty clays. Lahaina and Wahiawa soils were formed in place on the relatively gentle slopes of weathered basaltic lava flows and ancient alluvium, while the Helemano series developed on the steep valley walls. Rocky slopes in the valleys, where little or no soil has developed, are also included in the upland soil grouping delineated on Figure 15. (Helemano soils and rock lands roughly correspond to the areas of slopes over 20% mapped on Figure 15.) The coastal soils are represented by a single series in the project area, Jaucas sand, which developed on the coral sand left behind when the sea receded. Present beach sand and the coral outcrops are also included in this group. The transition soils are found between the upland and coastal soils, having developed on the sediments that were eroded from the upland areas and deposited on the coastal plain at the base of the sea cliffs and at the stream mouths. The soils that are placed in this group include Ewa, Waialua, Kawaihapai, Haleiwa, and Mamala; most are silty clays, with some having loam or stony components. The transition area also includes marshy soils and soils (termed tropaquepts) that are periodically flooded for crops such as taro, rice, or lotus.

The proposed bypass crosses six soil types, plus rock land and a small area mapped as tropaquept soils, as indicated on Figure 16. With the exception of Lahaina silty clay, these are all soils of the transition area. The soils encountered from the beginning of the project to the Anahulu River have properties that are well-suited for highway construction (5). However, the soils north of the Anahulu River (Waialua, Mamala and tropaquept) are less desirable, so the bypass will require imported fill for a suitable base. The erosion potential of the soils crossed by the proposed highway falls
See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth.

FIGURE 16A
SOIL TYPES
SCALE: 1" = 2000'
FIGURE 16B

AGRICULTURAL LANDS
(State Dept. of Agriculture)

SCALE: 1" = 2000'

KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK

LEGEND:

- PRIME AGRICULTURAL LAND
- UNIQUE AGRICULTURAL LAND
- OTHER IMPORTANT AGRICULTURAL LAND
- EXISTING URBAN DEVELOPMENT
- U.S. GOVERNMENT
in the moderate to high range. The normal annual rate of soil loss on the cane lands in the project area ranges from 2 to 6 tons per acre, as calculated using the universal soil loss equation (6).

The bypass highway will cross soils that are classified by the State Department of Agriculture as being "Prime Agricultural Land" (7). These are lands which have a combination of soil quality, growing season, and moisture supply which is capable of sustained high yields of crops. The Prime Land is found on the broad ridges of the Schofield Plateau and on the coastal plain around Haleiwa (Figure 16). The bypass will also encounter "Other Important Agricultural Land", which is considered to be of state-wide or local importance. This class includes the pasture land around Ukao Pond and a portion of the cane field behind Haleiwa. The project area has no agricultural land classified as "Unique". The impact of the alternate alignments on agricultural land is discussed in Chapter IV.

3. Meteorology. Haleiwa, being located on the North Shore of Oahu, is exposed to the northeasterly trade winds, which are one of the primary determinants of Hawaii's weather. According to wind records from stations at Mokuleia Field and at Waialua (8, 9), the dominant winds are from the east and east southeast, respectively, indicating deflection of the trade winds by the Koolau and Waianae mountain ranges. These modified trade winds occur more than 75% of the time, and have a velocity of 10-25 mph. The temperature at Haleiwa, like other coastal stations in Hawaii, is fairly uniform, with average monthly minimum temperatures ranging between 60° and 65° (Fahrenheit) and average monthly maximums around 75° - 85°; relative humidity varies between 65% and 90% (10). The average rainfall in the project area is 30 inches per year, while the headwaters of the Anahulu River watershed at the crest of the Koolau range may receive as much as 300 inches per year (11). Rainfall occurs most frequently from trade wind showers, although "Kona Storms" (persistent low-pressure storms with southerly winds) contribute large amounts of rain in the winter months. The wettest months are January and February, and the driest months are July and September (12), when the trades are not as strong.
4. **Hydrology.** As previously noted, the major surface waters in the project area are Helemano Stream, Opaeula Stream, the Anahulu River, Loko Ea fishpond, and the Ukoa Pond marsh. All three streams are diverted, in their upper reaches, for sugar cane irrigation. Helemano and Opaeula Streams are periodically dry above the proposed bypass crossings, as is the Anahulu River, though less frequently. Where crossed by the bypass, the Helemano Stream bed is approximately 80 feet wide, Opaeula Stream is 30 feet wide, and the Anahulu River is 120 feet wide. The Ukoa Pond outlet is approximately 80 feet wide at the proposed crossing, but it is marshy and only appears to flow from storm runoff. At the bypass crossings, the three streams are at or near sea level, so are subject to the upper edge of tidal action. As a result, the water at the crossings is occasionally brackish when stream flow is minimal. The Ukoa Pond outlet is separated from Loko Ea fishpond and the ocean by a system of dikes, so it is not directly subject to tidal action.

The Ukoa Pond marsh is roughly 115 acres in extent (Figures 15 and 18). Ukoa Pond itself covers less than 3 acres and has a maximum depth of roughly 10 feet. The several water sources for the marsh have been diverted for sugar cane irrigation, and wells have reduced the flow of the springs which feed the marsh (13). As a result of water diversion and cultivation, the area of the marsh has been reduced, and the remaining permanent marsh is surrounded by former marsh land that is dry during a portion of the year. In this condition, the marsh is very sensitive to changes in water level. The relationship of the alternate alignments to the marsh is shown on Figure 18.

Loko Ea is an historic fishpond and it is still in use. It is fed by freshwater springs and Ukoa Pond. Dikes and water gates are used to control flow between the Ukoa Pond outlet and the fishpond, so that Ukoa Pond does not normally discharge through the fishpond. The fish raised in Loko Ea are listed in Appendix B.

The principal flood hazard in the area is from peak flows overtopping the banks at Kamehameha Highway near the
confluence of Helemano and Opaeula Streams and further downstream (Paukauila Stream). The most recent serious flood in the Waialua-Haleiwa area, which occurred in April 1974, resulted in three deaths and caused considerable damage. A record discharge of 18,200 cubic feet per second (cfs) was estimated for Helemano Stream, Opaeula Stream reached 6,670 cfs, and the Anahulu River had a record discharge of 16,300 cfs (14). The 100-year flood plains of these streams are delineated on Figure 17, which also delineates the 100-year tsunami zone. Approximate maximum flood elevations at the proposed highway crossings are 15 feet on Helemano and Opaeula Streams and 11 feet on the Anahulu River (15). The 100-year flood discharges of Helemano, Opaeula and Anahulu Streams are 16,000 cfs, 10,000 cfs, and 16,400 cfs, respectively.

The southerly portion of the bypass corridor is underlain by the Waialua basal water body and the northerly portion is underlain by the Kawailoa basal water body. The dividing line between these two ground water zones is the deep valley fill of the Anahulu River (37). The caprock over the Waialua basal water body is thicker and more efficient at confining the ground water than that over the Kawailoa basal water body, so the former has artesian water while the latter has little or no artesian pressure (38). The basal water head in the Waialua body is 11-12 feet above sea level (39). The upper edge (contact) of the caprock approximately corresponds to the dashed line on Figure 16 separating the "transition" and "upland" soil series. It can be seen that over much of its length, the bypass lies near the upper edge of the caprock. All three streams crossed by the bypass gain flow by basal water leaking through the caprock. This leakage occurs at the proposed Helemano Stream crossing, but ceases slightly upstream from the other proposed crossings. Basal water also leaks out at the marshes on the coastal plain (Figure 15). Alternate D crosses a small, cultivated spring-fed marsh on the south bank of the Anahulu River, and all three alternates span the outlet of Ukoa Marsh.

5. Vegetation. The natural vegetation of the project area is dry scrub and mixed lowland forest (16). However, virtually all suitable sites are now cultivated in sugar cane. Approximately one-half (47%) of the bypass corridor crosses sugar cane fields. The remainder encounters kiawe "forest" (28%), koa haole scrub (17%), riparian (streamside) forest
See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth

Fig. 17
RIVER AND TSUNAMI FLOOD HAZARD ZONE

Legend
- Coastal High Hazard Area (100-Year Tsunami)
- 100-Year Riverine Flood Zone
- 500-Year Riverine Flood Zone

Source:
"Flood Insurance Rate Map"
US Dept. of Housing and Urban Development

SCALE: 1" = 2000'

KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK

III-8
(4%), developed lands (3%), and the marshy outlet of Ukoa Pond (1%). With the exception of some of the marsh plants, virtually none of the vegetation encountered by the bypass is native to Hawaii. Likewise, rare or endangered plants are not found in the project area due to the long history of cultivation. The different vegetation types that would be crossed by the highway are briefly described below.

Kiawe (Prosopsis pallida) occurs on the coral outcrops north of the Anahulu River where it forms fairly dense stands with an undergrowth of grasses. Other trees growing in this area include koa haole (Leucaena leucocephala), Java plum (Eugenia cumini) and date palm (Phoenix dactylifera). The date palms are well established around the perimeter of Ukoa Marsh. The kiawe forest is thickest on either side of the marsh, and opens up into cleared pasture with scattered trees and koa haole thickets toward the inland edge of the coastal plain. The forest and open area is subdivided into several pastures where cattle are grazed.

The koa haole scrub vegetation type is found on the steep slopes of the stream valleys, and on disturbed areas such as rock piles in the cane fields and pastures. Some areas are exclusively koa haole, while other sites also have some Java plum, kiawe, and guava (Psidium guajava). A population of sisal (Agave sp.) has become established on the Anahulu River bluff.

The upper banks of the streams in the project area support a dense growth of koa haole and pluchea (Pluchea spp.). Closer to the water, the banks are lined with hau (Hibiscus tiliaceus). The banks of the Anahulu River also have mango trees (Mangifera indica) coconut (Cocos nucifera), a few monkeypod trees (Samanea saman), and numerous ornamentals (Plate 2). A small marsh, now cultivated in lotus is located on the south bank of the Anahulu River at the bend (Figure 18).

Ukoa Pond and its surrounding marsh comprise one of the larger freshwater wetlands on Oahu. The maximum extent of the marsh is approximately 115 acres, including the outlet, as shown on Figure 18 which was drawn from a December, 1969 aerial photograph. The marsh is described by Elliott and Hall (17) as being dominated by a sedge (Cladium leptostachyum), two species of bulrush (Scirpus californicus, and S. validus), and California grass (Brachiaria mutica). Roughly 10-15 acres in the southeastern portion of the marsh were formerly
NOTE:
The width of the bypass shown (80') includes two traffic lanes and shoulders, plus the immediate zone of construction impact.

UKOA MARSH
(FROM 12/69 AERIAL PHOTO)
cultivated in taro and lotus (neither of which remain), and large areas of the southerly and westerly portion are accessible to cattle (Figure 18). As a result of these disturbances, plus irrigation water diversion, the southerly and westerly portions of the marsh are periodically dry (at least to several inches below the soil surface), and "facultative" wetland plants (i.e. not requiring constantly waterlogged soil) are important constituents. Two shrubby species, _Pluchea indica_ and _P. odorata_, give these marginal areas a very non-marshy appearance, but the presence of water hyssop (_Bacopa monnieria_) confirms that the areas are frequently inundated. The outlet of the marsh, where the bypass corridor crosses, is approximately 80 feet wide, and clearly demarcated by coral outcrops forming banks on both sides. The outlet is completely filled with large bulrushes and California grass floating in a tight mat of roots and old stems. The water in the channel is at least several feet deep, with the level being controlled by a dike and weir at the Loko Ea fishpond.

6. Fish and Wildlife. As previously noted, the alternate bypass routes cross Helemano and Opaeula Streams (tributaries of Paukauila Stream), the Anahulu River, and the outlet of Ukua Pond. The two streams and the river are crossed in their estuarine zones, that is, where stream flow and tidal action mix to produce a fluctuation between fresh and brackish conditions. The fish and other aquatic species occurring in these streams and in the marsh were inventoried, the results of which are reported in Appendix B. A total of nineteen species were found, including four species of prawns and shrimps, three species of crabs, and twelve species of fish. Of these, nine species are native to Hawaii, and two of the fish are endemic (occurring naturally in Hawaii only). The streams are characterized by the presence of one native prawn (_Opae oeha'a_), one native swimming crab (_papa'i maku'e_), and three native fishes (_ama'ama, o'opu oku-e, aholo-ole_). The dominant species in Ukua marsh are introduced guppies, mollys, and swordtails (family poeciliidae), and crayfish. Only one goby fish (_o'opu naniha_) was found in the areas sampled. However, it is expected that another goby (_o'opu nakea_), which lives in the mid and upper reaches of streams, is present at least during its juvenile stage. A third goby (_o'opu nopili_) that requires strongly flowing, clear, cool water, is most likely absent. (See Appendix B, page 11, for a complete listing of species by local and scientific name.) None of the fish found in the project area are listed as endangered, rare or threatened.
The canefields and dry scrub vegetation types primarily support common, introduced species of wildlife (eg rat, mongoose, feral dogs and cats, Common Mynah, Cardinal, Barred Dove, House Finch), although Hawaiian Owls (Pueo) have been sighted flying over Ukoa Marsh (18), and probably forage in the pastures and other open areas. Ukoa Marsh is one of the more important wildlife habitats on the island, as it is frequented by three species of endangered waterbirds; the marsh supports a breeding population of around 30 Hawaiian Gallinule, and is utilized as feeding habitat by Hawaiian Coots (which may also nest there) and Hawaiian Stilts. The primary feeding and nesting area for the gallinule is centered around the open water of Ukoa Pond at the northerly end of the marsh, but the entire marsh is undoubtedly utilized. During high water, a flooded pasture to the east of the marsh has provided temporary feeding habitat for large numbers of stilts. Hawaiian Ducks (Koloa), which are also endangered, may occasionally visit the marsh.

Ukoa Marsh is also regularly frequented by Black-crowned Night Herons. Although not considered to be endangered or threatened, these birds may be adversely affected by diminishing wetland feeding habitat. They roost and nest in trees at secluded locations. A fourth resident "wetland" bird found in the area is the introduced Cattle Egret, though it is as much attracted to the area by the cattle and by the landfill at the north end of the marsh, as it is attracted to the marsh itself. Ukoa Marsh and the associated mudflats and flooded pasture are also reported to be utilized by migratory waterfowl and shorebirds, including Pintails, Green-winged Teal, Northern Shovelers, Golden Plovers, Sanderlings, and Ruddy Turnstones.

Although Ukoa Marsh has been adversely affected by past land and water management practices, the draft "Hawaiian Waterbirds Recovery Plan" (U.S. Fish and Wildlife Service) has suggested it for acquisition and development as a wildlife refuge, since there is a good potential for habitat improvement under proper management. (Ukoa Marsh was surveyed as part of a statewide investigation of wetlands for the Corps of Engineers; the resulting report (19) forms the basis of the above discussion.)
B. AESTHETIC AND RECREATIONAL VALUES

Central Oahu, between the Koolau and Waianae Mountain Ranges, is a broad plateau known as the Schofield Saddle. The road from Honolulu to Haleiwa and the rest of the North Shore traverses this saddle and, with the exception of Wahiawa, the drive is almost entirely through unused open space and agricultural land. The lack of urbanization affords an unbroken view of the broad plain and the mountains beyond. The saddle is the only place on Oahu where one can view a large expanse of open land. Past Wahiawa, where the saddle descends to the Waialua Plain, the landscape opens to a dramatic view of the North Shore and the ocean. From the high saddle one can look down on the coastal communities and the white wash of waves breaking along the fringing reef on either side of Waialua Bay.

Upon entering Haleiwa Town, the open landscape is exchanged for the environment of a small rural town. Though the densely populated City of Honolulu is just 20 miles distant, Haleiwa retains a pleasant atmosphere. Weatherbeaten false front stores make up the bulk of the town along Kamehameha Highway (Plate 3). Aside from a small shopping center (Plate 4), there has been little recent development in Haleiwa. Of all the rural communities on Oahu, Haleiwa bears the closest resemblance to the sleepy plantation towns of the early part of this century. Only 20% of the structures in the town of Haleiwa (census tract 99.02) have been constructed since 1960, while 55% of all structures on Oahu were constructed since 1960. In fact, 40% of Haleiwa's structures are over 40 years old, while only 16% of all structures on Oahu have reached this age (20).

Haleiwa residents value the quiet, rural flavor of old Hawaii and have worked to retain it. New development has been encouraged to adapt the architectural style of older buildings, and some existing buildings have been renovated to better fit the architectural style of Haleiwa (Appendix F). The City and County of Honolulu Department of Land Utilization is currently working to establish an Historic Design District for Haleiwa which would protect the town's architectural integrity (see Page III-39).

Occasionally visible above and between the buildings, are the higher elevation canefields and the Koolau and Waianae Mountain Ranges. Exiting town on Kamehameha Highway, the ocean returns to sight and a view of the Haleiwa Small Boat Harbor is offered. The harbor is located near the mouth of the Anahulu
Plate 3. Typical Haleiwa storefront. Note proximity of the building to Kamehameha Highway.

Plate 4. New shopping center with compatible architectural style.
River, and is administered by the State. Facilities include a bathhouse, restrooms, drinking water, parking, marina, and boat ramp.

Upon leaving town, one crosses the Anahulu River Bridge, a concrete arch constructed in the 1930's. This bridge is an important visual resource. The view upstream from the bridge is one of the most beautiful scenes on Oahu, with small shelters along the bank at which small fishing boats are moored in the still waters (Plate 2).

Several small streams running through the area add to the rural atmosphere as do the two ponds, Loko Ea and Ukoa Pond. Hawaiian legends say that the menehune caught fish in the ponds of Ukoa and in the bays of Haleiwa and Waialua. It is also said that on certain dark nights one can hear the voices of the menehune and see the flickering lights of their torches on the sea waters (21).

The drive along the North Shore affords views of the many fine beaches and Kaena Point in the distance. Haleiwa's greatest recreational assets are its beautiful beaches. Pu'uliki Beach Park, Kaiaka Bay Beach, Ali'i Beach Park, and Haleiwa Beach Park are all close by. Swimming, diving, surfing, fishing, picnicking, and sunbathing are all popular activities at these beaches. Further up the coast are internationally-famous Waimea Bay and Sunset Beach, renown for their winter waves reputed to be the largest surfing waves in the world. When a big swell appears, surfers and spectators from all over Oahu gather on the beaches to watch some of the world's best surfers challenge the waves. These North Shore beaches have been featured in many surfing films, and surfers from all over the world have been attracted to the area. Some have come as transients while others have remained as permanent residents.

The beautiful beaches and quiet country atmosphere of Haleiwa are an important recreational resource for all of Oahu. This is evidenced by the weekend traffic jams of Honolulu residents seeking to escape the city for a day. This country atmosphere also provides an important alternative for those who dislike the more urban life style of Honolulu. The need for this alternative is felt by those North Shore residents who are willing to commute over the long drive to Honolulu in order to live the "country" life style.
C. CULTURAL AND HISTORIC FEATURES

The Waialua / Haleiwa area has been continuously occupied since prehistoric times, as evidenced by the numerous heiau (pre-Christian places of worship), burial sites, and traditional sites throughout the region. The archaeological report prepared for this project (Appendix E) presents a map and description of the previously-recorded sites in the area; unfortunately, most have been destroyed. The Haleiwa area is believed to have been a favorite spot of the Hawaiian royalty. The fish from Loko Ea are reported to have been reserved for Queen Liliuokalani, whose house site and private swimming pond were located on the edge of the fishpond. This small pond has been filled in, and a residence is now located on the site. However, the fishpond is still in use. The archaeological survey located several previously-unrecorded sites in the vicinity of the proposed bypass alternates. These consist of a shallow deposit of bottles and other historic materials, a wall remnant, and a large complex of wet agricultural terraces. These terraces are located in a marshy area on the south bank of the Anahulu River, and are presently cultivated in lotus (hasu) and taro. They were previously cultivated in taro and rice, and it is possible that they are the remnant of a much older taro terrace system that has been modified in recent times.

During the 1830's, American Protestant missionaries extended their influence to the rural areas of Oahu, including the Waialua District. In 1834, John S. Emerson and his wife completed construction of their mission home on the south bank of Anahulu River. Later, the Waialua Female Seminary was established on the other side of the river. The school's two-story dormitory was named Haleiwa, "house of the frigate bird". It closed in 1882, but seventeen years later, in 1899, a new hotel constructed near the ruins of the old school adopted its name and was known as the Haleiwa Hotel. Local Hawaiians thought that the hotel would bring bad luck, because it was constructed over the ruins of Kaimani heiau. However, the hotel became so prosperous and well known that the community around it was eventually known as Haleiwa. The hotel is long gone and the site is now occupied by the Sea View Inn (22).

The original Emerson homestead was demolished in 1904, but another structure, apparently made of coral block in the same fashion as the homestead, remains and is still occupied. This building, which may have been contemporaneous with the homestead, is located across from the City and County maintenance yard on Emerson Road (see Appendix E for further details). The State has acquired
some of the property east of this structure, but the building itself is on private property. It is not listed as a State or National Historic Site, but a preliminary opinion by the State Historic Preservation Officer indicates that the structure might meet the criteria for inclusion on the National Register (23). The project area also contains a wood structure reputed to be an old church. Its style of construction dates from the turn of the century, but the building does not contain enough architectural significance to warrant National Register designation for architectural reasons alone (see Appendix E).
D. ECONOMIC FACTORS

The Waialua District (census tracts 99-100, Figure 19) is a sparsely-populated rural area lacking in employment opportunities. The area suffers from a high unemployment rate, and most workers commute to other areas of Oahu for employment. Less than 40% of the Waialua District's resident job holders are locally employed (Table 6). Fully 29% of the labor force commutes an average of 10 miles to Wahiawa, while the rest travel distances greater than 20 miles to other parts of Oahu. The 1970 census reveals that, while 2,798 workers live in the Waialua District, only 1,391 persons were employed within the area.

Growth of employment within the Waialua District has been slightly better than Oahu as a whole (53.8% versus 48.1% for 1964-1975). Much of this increase is due to growth in the manufacturing sector, which is primarily food processing (24). Manufacturing is the largest employer in the Waialua District, followed by agriculture and retail trade (Table 7). Government and services are also significant areas of employment. The Waialua Sugar Company is the largest single employer in the Waialua District, while Waimea Falls Park is the second largest.

The make-up of the labor force is not restricted by the local job market, since large numbers of workers commute to jobs outside of the Waialua District. Craftsmen and professionals are the largest occupational groups (Table 8), while only 9.6% of the Waialua District's residents are employed as farm workers.

The lack of local employment opportunities, and the remoteness of the large employment centers in Honolulu, have resulted in persistent high levels of unemployment in the Waialua District. During the second quarter of 1978, the unemployment rate was 13.5% in the Waialua District, almost twice Oahu's overall rate of 6.2%.

Most of the nonagricultural businesses in Haleiwa are located along the existing Kamehameha Highway. A guava orchard and an egg farm are located within the alignment study corridor but most land within the corridor is used for growing sugar cane.
### TABLE 6

**AREA OF EMPLOYMENT FOR THE WAIALUA DISTRICT RESIDENTS**

<table>
<thead>
<tr>
<th>Division</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waialua Division</td>
<td>38.4%</td>
</tr>
<tr>
<td>Honolulu-Central Business District</td>
<td>.5%</td>
</tr>
<tr>
<td>Remainder of Honolulu</td>
<td>18.3%</td>
</tr>
<tr>
<td>Koolaupoko Division (Windward)</td>
<td>1.4%</td>
</tr>
<tr>
<td>Ewa Division</td>
<td>11.3%</td>
</tr>
<tr>
<td>Wahiawa Division</td>
<td>29.0%</td>
</tr>
<tr>
<td>Waianae Division</td>
<td>.5%</td>
</tr>
<tr>
<td>Koolauloa Division (Kahuku-Kaaawa)</td>
<td>.6%</td>
</tr>
</tbody>
</table>

100.0%

Source: 1970 census

1 Census Tracts 99-100

### TABLE 7

**EMPLOYMENT WITHIN THE WAIALUA DISTRICT BY INDUSTRY**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>39.4%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>19.9%</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>13.8%</td>
</tr>
<tr>
<td>Government</td>
<td>9.6%</td>
</tr>
<tr>
<td>Services</td>
<td>4.9%</td>
</tr>
<tr>
<td>Finance, Insurance &amp; Real Estate</td>
<td>1.3%</td>
</tr>
<tr>
<td>Transportation, Communications, Gas, Electric, and Sanitary Services</td>
<td>.9%</td>
</tr>
<tr>
<td>Other</td>
<td>10.2%</td>
</tr>
</tbody>
</table>

100.0%

Source: DLIR, 1977

1 Census Tracts 99-100
### TABLE 8

**OCCUPATIONS OF WAIALUA DISTRICT RESIDENTS**

<table>
<thead>
<tr>
<th>OCCUPATION CATEGORY</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>12.8%</td>
</tr>
<tr>
<td>Managers and Administrators</td>
<td>5.8%</td>
</tr>
<tr>
<td>Sales Workers</td>
<td>3.4%</td>
</tr>
<tr>
<td>Clerical</td>
<td>11.9%</td>
</tr>
<tr>
<td>Craftsmen</td>
<td>19.7%</td>
</tr>
<tr>
<td>Operatives</td>
<td>11.1%</td>
</tr>
<tr>
<td>Transport Operatives</td>
<td>5.1%</td>
</tr>
<tr>
<td>Non-Farm Laborers</td>
<td>6.2%</td>
</tr>
<tr>
<td>Farm Workers</td>
<td>9.6%</td>
</tr>
<tr>
<td>Service Workers</td>
<td>13.6%</td>
</tr>
<tr>
<td>Private Household Workers</td>
<td>0.8%</td>
</tr>
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<td></td>
<td>100.0%</td>
</tr>
</tbody>
</table>


1 census tract 99-100
E. SURROUNDING SETTLEMENT PATTERNS

The lands of the Waialua District of Oahu are primarily in agriculture use or preserved as open space for conservation purposes. The few existing residential areas are located in the towns of Waialua and Haleiwa and scattered along the coastline (see Section H for further information on land use). Nonagricultural land uses have spread only one-half mile beyond the commercial centers of Haleiwa and Waialua. North Shore development patterns are typical of small rural towns with housing centrally located around a small business district. Haleiwa, having grown around Kamehameha Highway and Goodale Road, has taken a linear land development pattern. Development in Waialua has concentrated around the sugar mill.

Land ownership in the Waialua District is similar to other rural areas of Hawaii, with most land in the hands of government or a few large estates. Most of the agricultural land is under the control of Bishop Estate or Castle and Cook. Much of the land in urban use is leasehold with Bishop Estate holding title.

The 1977 population of the Waialua District (census tracts 99-100) was 10,131 and has grown from a 1960 population of 8,043 (25). During the 1960's and early 1970's, the Haleiwa District grew at a slower rate than Oahu as a whole, and its relative proportion of the islands population has declined (Table 9). The present population of the Waialua District makes up 1.4% of total population for Oahu. The year 2000 population figures for the Waialua District given in Table 9, are not extrapolations of current trends, but are desired population levels based on land use and population distribution policy. The 1977 General Plan set a population distribution goal for the Waialua District of 1.4% of Oahu's population for the year 2000. This population share would give the Waialua District a population of 12,800 for the year 2000 (Table 20, Chapter IV). Preliminary population distribution figures developed from the preliminary Development Plans (see Chapter IV for explanation of Development Plans) assign the Waialua District 2.2% of Oahu's population with a total population of 20,200 by the year 2000. The Development Plan figures are preliminary and subject to change.

The population of the North Shore-Waialua area (census tracts 99-101, Figure 19) is younger, less educated, and has a lower income than the Oahu population as a whole (Table 10). The median age
### TABLE 9

**POPULATION GROWTH (Census Tracts 99-100)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Oahu</th>
<th>Annual Δ%</th>
<th>Waialua</th>
<th>Annual Δ%</th>
<th>% of Oahu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>500,409</td>
<td>2.6</td>
<td>8,043</td>
<td>1.4</td>
<td>1.6</td>
</tr>
<tr>
<td>1970</td>
<td>630,528</td>
<td>2.4</td>
<td>9,171</td>
<td>1.4</td>
<td>1.5</td>
</tr>
<tr>
<td>1975</td>
<td>705,400</td>
<td>1.3</td>
<td>9,800</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>1977</td>
<td>723,422</td>
<td>1.2</td>
<td>10,131</td>
<td>1.7</td>
<td>1.4</td>
</tr>
<tr>
<td>2000 Preliminary Development Plan</td>
<td>917,400</td>
<td>20,200</td>
<td></td>
<td>2.2</td>
<td></td>
</tr>
</tbody>
</table>

Sources: DPED and Department of General Planning

Annual Δ% = Average Annual Growth Rate

### TABLE 10

**POPULATION CHARACTERISTICS 1975**

<table>
<thead>
<tr>
<th></th>
<th>North Shore-Waialua</th>
<th>Oahu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Age</td>
<td>24.3</td>
<td>25.9</td>
</tr>
<tr>
<td>Percent High School Graduates</td>
<td>58.2</td>
<td>73.7</td>
</tr>
<tr>
<td>1975 Median Household Income</td>
<td>11,732.00</td>
<td>14,139.00</td>
</tr>
<tr>
<td>Percent Born Out of State</td>
<td>41.7</td>
<td>41.2</td>
</tr>
</tbody>
</table>

Source: DPED 1978
of North Shore-Waialua residents is 24.3, younger than the Oahu average of 25.9. High School graduates make up only 58.2% of the areas population, considerably lower than the Oahu total of 73.7%. As discussed earlier (see D; Economic Factors), unemployment is high and job opportunities are not numerous in the North Shore area. With these economic conditions, combined with the low level of educational achievement, it is not surprising that the median annual household income is lower than for Oahu as a whole ($11,732 versus $14,139 in 1975). However, these basic economic problems have not resulted in a large number of persons receiving welfare assistance. In 1974, welfare recipients made up 12% of the Waialua District population while the island-wide average was 9%. The welfare rate in Waialua District is less than half that of other areas with similar economic problems, such as the Waianae and Koolauloa Districts (26). The ethnic composition of the area is primarily Filipino, Caucasian, and Japanese (Table 11).

There does not appear to be a housing shortage in the North Shore-Waialua area (census tracts 99-101). The vacancy rate was 2.7% in 1978, almost twice the rate of 1.4% for Oahu as a whole. Housing costs are also lower than the average for Oahu (Table 12). The high vacancy rate and low housing costs are due, in part, to the distance of the area from major employment centers. Centrally-located housing in Honolulu is more expensive and scarce. Despite the high vacancy rates, the number of housing units in the North Shore-Waialua area has increased at a rate slightly higher than the island as a whole (Table 12). A larger proportion of area residents are renters than for Oahu as a whole. Though the cost of housing is low for Oahu, North Shore residents have expressed concern about the need for low cost housing and the dilapidated condition of existing housing stocks. Single family residences are the predominant type of housing; only a small number of apartments and no low density multi-family units exist in the Waialua District (Table 13).
### TABLE 11

**ETHNIC COMPOSITION**

<table>
<thead>
<tr>
<th>Ethnic Group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>22</td>
<td>14</td>
<td>36 (0.4%)</td>
</tr>
<tr>
<td>Caucasian</td>
<td>1,563</td>
<td>1,352</td>
<td>2,915 (31.8%)</td>
</tr>
<tr>
<td>Chinese</td>
<td>90</td>
<td>91</td>
<td>181 (2.0%)</td>
</tr>
<tr>
<td>Filipino</td>
<td>1,664</td>
<td>1,270</td>
<td>2,934 (32.0%)</td>
</tr>
<tr>
<td>Hawaiian/Part Hawaiian</td>
<td>327</td>
<td>290</td>
<td>617 (6.7%)</td>
</tr>
<tr>
<td>Japanese</td>
<td>1,077</td>
<td>1,134</td>
<td>2,211 (24.1%)</td>
</tr>
<tr>
<td>Korean</td>
<td>16</td>
<td>28</td>
<td>44 (0.5%)</td>
</tr>
<tr>
<td>Other</td>
<td>102</td>
<td>131</td>
<td>233 (2.5%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>4,861</td>
<td>4,310</td>
<td>9,171 (100.0%)</td>
</tr>
</tbody>
</table>


### TABLE 12

**HOUSING CHARACTERISTICS**

<table>
<thead>
<tr>
<th></th>
<th>North Shore-Waialua (Census Tracts 99-101)</th>
<th>Oahu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Units 1970</td>
<td>3,677</td>
<td>174,742</td>
</tr>
<tr>
<td>Housing Units 1977</td>
<td>4,477</td>
<td>217,476</td>
</tr>
<tr>
<td>% Increase</td>
<td>82%</td>
<td>80%</td>
</tr>
<tr>
<td>Vacancy Rates (1978)</td>
<td>2.7%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Occupied Housing Units (1975)</td>
<td>39.8%</td>
<td>48.8%</td>
</tr>
<tr>
<td>% Owner Occupied</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Cost Owned</td>
<td>$157.00</td>
<td>$256.00</td>
</tr>
<tr>
<td></td>
<td>$183.00</td>
<td>$197.00</td>
</tr>
</tbody>
</table>

1, 2, 4 Source: DPED 1978

3 Source: Department of Housing and Community Development 1977

III-26
<table>
<thead>
<tr>
<th>Item</th>
<th>Neighborhood Area</th>
<th>Oahu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Units</td>
<td>%</td>
</tr>
<tr>
<td>Single Family Units*</td>
<td>3,821</td>
<td>87.6</td>
</tr>
<tr>
<td>Low Density Multi-Family**</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>High Density Multi-Family</td>
<td>543</td>
<td>12.4</td>
</tr>
<tr>
<td>Total Dwelling Units</td>
<td>4,364</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Net Residential Density
(Dwelling Units per Urban Zoned Acre)

<table>
<thead>
<tr>
<th></th>
<th>Neighborhood Area</th>
<th>Oahu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.3</td>
<td>2.6</td>
</tr>
</tbody>
</table>

* Single family & duplex
** Townhouse units

Source: Department of General Planning 1977
F. PUBLIC FACILITIES AND SERVICES

There are three public schools in the combined Waialua-Haleiwa Districts; Two grade schools, Haleiwa School (K-6) and Waialua School (K-6), and Waialua High School (7-12). There are also two licensed private schools which accept students from Kindergarten to eighth grade. No private schools for special education exist within the Waialua-Haleiwa area, but two such centers are located in Wahiawa (27).

Medical facilities in the area include the Waialua Hospital operated by Castle and Cooke Inc. and the Haleiwa Family Medical Center at 66-125 Kamehameha Highway. Twenty-four hour emergency service is available at Wahiawa General Hospital and Kahuku Community Hospital. Dental services are provided by several private practices in the area.

Fire and police protection for Haleiwa are provided by the Honolulu Fire Department and the Honolulu Police Department. The fire station for the area is the Waialua Fire Station No. 14 at 66-420 Haleiwa Road.

Haleiwa has a post office, located near the center of town (zip code 96712). The Waialua Community Association Building, located in Haleiwa, provides facilities for public meetings. Plans are being considered for a new civic center building in town, though a site has not been selected.

Haleiwa is within the Honolulu City and County Board of Water Supply's (BWS) Waialua-Kahuku Water Use District (Census Tracts 99-101). BWS facilities service the town of Waialua, Haleiwa, and coastal communities as far as Waialee. 68% of the district's residents receive water from the BWS, the rest being served by private systems including the former Kahuku Plantation, Campbell Estate, Waialua Sugar Company, and other small ranch systems. All BWS water sources are wells within the district and ground water resources are more than sufficient to meet existing and projected demand (28).

There are no municipal sewer facilities in the Waialua-Haleiwa area. Sewage disposal is in the form of cesspools and small package treatment plants in high density areas. Presently, cesspools in the area have a 63% failure rate. Separate sewage treatment plants for Waialua and Haleiwa are planned and cesspools will only be retained for isolated areas (29). Hawaiian Electric provides electricity for Haleiwa.
Government in the State of Hawaii is unique that it has only two tiers, the State Government and the County Government. In Hawaii, the State government has assumed many responsibilities that are carried out by the County or City governments in other states. One of these responsibilities is land use planning and regulation. While the counties do have some planning and regulatory authority, the responsibility for state-wide land use planning in Hawaii rests with the State Land Use Commission.

The Land Use Commission has classified the lands of Hawaii into four major districts. These are: Conservation, Rural, Agricultural, and Urban. The distribution of these districts on Oahu is shown on Figure 20.

Conservation districts are administered by the State Department of Land and Natural Resources and include forest reserve and watershed reserve zones along with other protected lands. The Rural districts are regulated by the State Land Use Commission, but are administered by the Counties. These districts are composed of small farms and low density residential areas. There are no Rural districts on Oahu. Agricultural districts are also regulated by the State Land Use Commission but administered by the counties. These districts include lands with the capacity for intensive cultivation. Urban districts are regulated and administered by the counties and are defined as lands in urban use with reserve areas to accommodate an estimated 10-year growth.

In 1964 the City and County of Honolulu adopted a General Plan to guide the long range development of all lands designated as urban and agriculture on Oahu. This General Plan is presented in graphic form in the Detailed Land Use Maps adopted by the City Council which indicate the locations of planned land uses, public facilities, and major streets and highways.

A new General Plan adopted by the City Council in 1977 set forth broad objectives and policies in nine areas of concern.
FIGURE 20
STATE LAND USE DISTRICTS (OAHU)

KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK
1977 General Plan did not contain land use maps indicating allowable planned land uses in the different parts of Oahu. Part of the planning process established in the 1977 General Plan is the preparation of individual development plans for Oahu's neighborhoods. These development plans are presently in preparation, with some preliminary proposals completed, but subject to change. In the interim, until the development plans are adopted by the City Council, the existing Detailed Land Use Maps (DLUM) are being used to guide the City in evaluating land use changes.

The Comprehensive Zoning Code of the City and County of Honolulu is Oahu's basic zoning law, the intent of which is to implement the General Plan by regulating land uses, densities, building location, heights, and activities.

The Hawaii Shoreline Protection Act of 1975 established a Special Management Area (SMA) extending at least 100 yards inland from the shoreline vegetation. Developments within the SMA which exceed $25,000, or would significantly affect the shoreline, now require County approval.

Transportation planning in the State of Hawaii is coordinated by the Oahu Metropolitan Planning Organization (OMPO). The OMPO Policy Committee is made up of members of the Honolulu City Council and 10 members of the State Legislature. The Technical Advisory Committee includes the heads of planning and transportation for the State and the City and County of Honolulu. Through the vehicle of OMPO, transportation planning is coordinated, and is compatible with the policies of the Hawaii State Plan and the General Plan of the City and County of Honolulu. The Long Range Plan for Oahu, which identifies transportation needs for Oahu through 1985, was prepared by the Oahu Transportation Planning Program in 1967. The OMPO reaffirms the Long Range Plan each year until the plan is revised, or a new plan is prepared. The proposed Kamehameha Highway Realignment is part of the Long Range Plan and is listed as a proposed arterial.
H. EXISTING AND PLANNED LAND USE

The Waialua District is primarily rural in character. The existing and planned land uses are principally agriculture and conservation. The State Land Use Commission has classified over sixty percent of the land within the Waialua District as Agricultural (Table 14). Agricultural lands are located on the broad Schofield Saddle and Waialua Plain, sugar cane and pineapple being the main crops (Figure 21). Thirty-seven percent of the district is classified as Conservation land and less than two percent of the area is classified Urban (Table 14). Less than two percent of the land area is currently devoted to residential uses, and less than one percent is devoted to commercial and industrial uses (Table 15).

TABLE 14

ACREAGES OF 1975 STATE LAND USE DISTRICTS IN THE WAIALUA DISTRICT (in acres)

<table>
<thead>
<tr>
<th>State Land Use District</th>
<th>Waialua Acres</th>
<th>%</th>
<th>Oahu Acres</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>1,471.754</td>
<td>1.9</td>
<td>79,690.665</td>
<td>21.3</td>
</tr>
<tr>
<td>Agriculture</td>
<td>46,074.026</td>
<td>60.8</td>
<td>139,165.633</td>
<td>37.3</td>
</tr>
<tr>
<td>Conservation</td>
<td>28,236.668</td>
<td>37.3</td>
<td>154,736.777</td>
<td>41.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>75,782.448</td>
<td>100.0</td>
<td>373,593.075</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Department of General Planning 1977
<table>
<thead>
<tr>
<th>Existing Land Use</th>
<th>Urban</th>
<th>Agricultural</th>
<th>State Land Use District</th>
<th>Conservation</th>
<th>District Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family</td>
<td>561,639</td>
<td>683,713</td>
<td>1.5</td>
<td>15.743</td>
<td>0.1</td>
</tr>
<tr>
<td>Multi-Family</td>
<td>14.654</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>14.654</td>
</tr>
<tr>
<td>Industrial</td>
<td>27.684</td>
<td>279.866</td>
<td>0.5</td>
<td>2.860</td>
<td>*</td>
</tr>
<tr>
<td>Commercial</td>
<td>55.370</td>
<td>11.349</td>
<td>0.1</td>
<td>0.009</td>
<td>*</td>
</tr>
<tr>
<td>Agriculture</td>
<td>222.320</td>
<td>25,567.682</td>
<td>55.5</td>
<td>154.480</td>
<td>0.5</td>
</tr>
<tr>
<td>Vacant Usable</td>
<td>338.382</td>
<td>4,594.402</td>
<td>10.0</td>
<td>194.410</td>
<td>0.7</td>
</tr>
<tr>
<td>Other</td>
<td>251.705</td>
<td>14,937.014</td>
<td>32.4</td>
<td>27,869.166</td>
<td>98.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,471,754</td>
<td>46,074,026</td>
<td>100.0</td>
<td>28,236,868</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Department of General Planning 1977

* Less than 0.1%
LEGEND:
U = URBAN
A = AGRICULTURE
C = CONSERVATION

FIGURE 21
STATE LAND USE
DISTRICTS (NORTH SHORE)
The Conservation districts are located in the uplands of the Waialua District while the Urban districts are located at Haleiwa, Waialua, and in a narrow strip along the North Shore Coastline. As would be expected, agriculture is the primary existing land use within the Agricultural district, and open space is the primary existing land use within the Conservation district. Urban uses are minimal within the Waialua District (Table 15). Single family residential use is the greatest existing land use within the Urban districts, accounting for about thirty-eight percent of total acreage. Multiple family dwellings make up only one percent of urban district land use and industrial and commercial uses make up less than six percent of land uses within the Urban districts. Fifteen percent of the land in Urban districts is still in agricultural use and twenty-three percent is vacant usable land.

The Waialua District has been zoned to preserve its rural atmosphere. Most of the Waialua District has been zoned agriculture or preservation by the City and County of Oahu. Less than five percent of the acreage is zoned for urban uses, and the urban zonings are for low intensity uses in contrast to the high intensity of land use typical of Honolulu. Within the Urban districts, over ninety-one percent of the acreage is zoned for residential use, while relatively little land (1.2%) is zoned for apartment use. Almost five percent of the land in Urban districts is zoned for agricultural use. Most of this land is in Haleiwa Town (census tract 99.2) where fifty-two percent of the land area is zoned for agricultural use (Figure 22).

Possibly in anticipation of future growth, over two thousand acres of land in Agricultural districts has been zoned for residential use. The city has chosen to give a higher level of protection to some land within the Agricultural district by zoning 5,398 acres of this land for preservation status. Within the Conservation district, almost all (99.7%) of the land area is zoned for preservation (Table 16).

As expected, planned land uses in the Waialua District are quite similar to existing zoning (Table 17). Over 95% of the district is planned for agricultural or open space use, while two percent of the area planned for residential use. In the Urban districts, approximately 50% of the land area is planned for residential and over 21.9% of the area is planned for open space. The planned open space allocation is much greater than present zoning shows.
See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth.

LEGEND:

AG-1 AGRICULTURE
B-1 BUSINESS
H-1 HOTEL
R-6 RESIDENTIAL
SMA SPECIAL MANAGEMENT AREA

KAMEHAMEHA HWY. REALIGNMENT
WEED JCT. - HALEIWA BEACH PARK

FIGURE 22
ZONING MAP

SCALE: 1" = 2000'
<table>
<thead>
<tr>
<th>CZC District</th>
<th>Waialua District Total</th>
<th>%</th>
<th>Urban</th>
<th>%</th>
<th>Agriculture</th>
<th>%</th>
<th>Conservation</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>3,614.339</td>
<td>4.8</td>
<td>1,350.892</td>
<td>91.8</td>
<td>2,263.447</td>
<td>4.9</td>
<td>.000</td>
<td>---</td>
</tr>
<tr>
<td>Apartment</td>
<td>17.815 *</td>
<td>*</td>
<td>17.815</td>
<td>1.2</td>
<td>.000</td>
<td>*</td>
<td>.000</td>
<td>---</td>
</tr>
<tr>
<td>Hotel</td>
<td>2.131 *</td>
<td>*</td>
<td>2.131</td>
<td>.1</td>
<td>.000</td>
<td>*</td>
<td>.000</td>
<td>---</td>
</tr>
<tr>
<td>Business</td>
<td>21.091 *</td>
<td>*</td>
<td>19.930</td>
<td>1.4</td>
<td>1.161 *</td>
<td>.000</td>
<td>.000</td>
<td>---</td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural</td>
<td>38,567.860</td>
<td>50.9</td>
<td>71.996</td>
<td>4.9</td>
<td>38,410.611</td>
<td>83.4</td>
<td>85.253</td>
<td>.3</td>
</tr>
<tr>
<td>Preservation</td>
<td>33,550.222</td>
<td>44.3</td>
<td>.000</td>
<td>-----</td>
<td>5,398.807</td>
<td>11.7</td>
<td>28,151.415</td>
<td>99.7</td>
</tr>
<tr>
<td>Planned Devel.</td>
<td>8.990 *</td>
<td>*</td>
<td>8.990</td>
<td>.6</td>
<td>.000</td>
<td>---</td>
<td>.000</td>
<td>---</td>
</tr>
<tr>
<td>TOTAL</td>
<td>75,782.448</td>
<td>100.0</td>
<td>1,471.754</td>
<td>100.0</td>
<td>46,074.026</td>
<td>100.0</td>
<td>28,236.668</td>
<td>100.0</td>
</tr>
</tbody>
</table>

+ Census tracts 99-100
* Less than .1%

Source: Department of General Planning 1977
### TABLE 17

<table>
<thead>
<tr>
<th>Planned Use</th>
<th>Waialua District Total</th>
<th>%</th>
<th>Urban</th>
<th>%</th>
<th>Agriculture</th>
<th>%</th>
<th>Conservation</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1,420.582</td>
<td>1.9</td>
<td>743.606</td>
<td>50.5</td>
<td>589.325</td>
<td>1.3</td>
<td>87.651</td>
<td>.3</td>
</tr>
<tr>
<td>Multi-Family</td>
<td>49.567</td>
<td>.1</td>
<td>42.149</td>
<td>2.9</td>
<td>7.418</td>
<td>*</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Resort</td>
<td>93.460</td>
<td>.1</td>
<td>93.460</td>
<td>6.4</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Commercial</td>
<td>45.781</td>
<td>.1</td>
<td>39.634</td>
<td>2.7</td>
<td>6.147</td>
<td>*</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Industrial</td>
<td>35.603</td>
<td>*</td>
<td>35.603</td>
<td>2.4</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Agriculture</td>
<td>34,311.767</td>
<td>45.3</td>
<td>117.453</td>
<td>7.9</td>
<td>33,842.744</td>
<td>73.5</td>
<td>351.570</td>
<td>1.2</td>
</tr>
<tr>
<td>Open Space</td>
<td>37,669.694</td>
<td>49.7</td>
<td>322.345</td>
<td>21.9</td>
<td>9,668.352</td>
<td>21.0</td>
<td>27,678.997</td>
<td>98.1</td>
</tr>
<tr>
<td>Public Facility</td>
<td>103.464</td>
<td>.1</td>
<td>77.504</td>
<td>5.3</td>
<td>25.020</td>
<td>*</td>
<td>.940</td>
<td>*</td>
</tr>
<tr>
<td>Military</td>
<td>2,052.530</td>
<td>2.7</td>
<td>---</td>
<td>---</td>
<td>1,935.020</td>
<td>4.2</td>
<td>117.510</td>
<td>.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>75,782.448</strong></td>
<td><strong>100.0</strong></td>
<td><strong>1,471.754</strong></td>
<td><strong>100.0</strong></td>
<td><strong>46,074.026</strong></td>
<td><strong>100.0</strong></td>
<td><strong>28,236.668</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

* Less than .1%
+ Census tracts 99-100

Source: Department of General Planning 1977
The highway alignment intersects the Special Management Area (SMA) along the North Shore. The SMA boundaries are indicated on Figure 22. The Department of Land Utilization administers zoning ordinances for Oahu and is presently working on the establishment of a Historic Design District for the Town of Haleiwa (see Appendix F, Newspaper articles). This special district would establish architectural controls to preserve and enhance the rustic flavor of Haleiwa Town. The purpose of the Historic Design District is to prevent uncontrolled development of Haleiwa Town which, without architectural controls, could eventually result in the loss of the town's rural character.

As part of the ongoing development plan process, the Department of General Planning has developed a preliminary Development Plan Ordinance and a Development Plan Map for the North Shore Neighborhood (Waialua District). These documents were developed after neighborhood boards were consulted and opinion surveys on local concerns were conducted. On the subject of residential land use, the opinion survey revealed that North Shore residents strongly preferred single family residences and had negative feelings toward town houses, low rise apartments, and high rises (30). The Neighborhood Board felt that more low cost housing was needed on the North Shore. Residents also felt that the area is growing too fast and development needs to be controlled. Few residents saw the need for more stores. It is not surprising, considering the large number of North Shore residents who commute long distances to work, that residents felt jobs were too far away.

On the subject of agriculture, residents considered the preservation and perpetuation of agricultural lands a high priority.

Major urban design issues identified were:

1. Preservation of historic sites.
2. Development controls and design standards to maintain the area's rural characteristics.
3. Preservation of the rural lifestyle by maintaining a low population density.
4. Protecting views and scenic areas.
5. A Special Design District for Haleiwa.

Transportation priority issues indicated by surveys were; too much traffic, the need for more bus service, and street paving and repair. The neighborhood association outlined the following traffic problems and remedies:

III-39
1. Kamehameha Highway traffic congestion.
2. The need for a bypass road around Haleiwa.
3. Widening and improving road shoulders.
4. Improving sidewalks.
5. Improve bus service - present service is inadequate to reach job and education centers.

Several tracts of land which had been planned as residential land on the Detailed Land Use Map are re-assigned to agricultural use on the Development Plan Map. The Development Plan Map has removed urban uses such as residential and commercial from State Preservation and Agricultural Districts. The Development Plan Map is more consistent with State land use designations than existing zoning and DLU maps, which sometimes designate urban uses for Agricultural and Conservation districts (Table 17).

Should the Development Plan for the North Shore be adopted by the City Council in its present form, it will result in extensive re-zoning to lower intensity uses. Despite the lower intensity land use foreseen by the Development Plan, preliminary population projections are higher than 1977 General Plan population goals (Table 18). As part of their work program for the Development Plans, the Department of General Planning prepared a resort options report (31). The report recommends 8,400 new hotel units for Oahu by the year 2000. The Kahuku area is assigned 2,700 of these units. This is considerably lower than the Prudential proposal of 4,700 additional hotel rooms at Kuilima. The Development Plan Map does not indicate any additional resort development for the Waialua District. The Detailed Land Use Map assigns the Puaena Point area to future resort development, while the New Development Plan Map retains the area for agricultural use (Figures 23 and 24). The Development Plan states "the area designated for hotel in Haleiwa is considered fully developed. Increased development within the designated area should not be permitted" (32). The Detailed Land Use Map shows a large park inland along the Anahulu River, but this has been substantially reduced in the proposed Development Plan.

The 1977 General Plan established a year 2000 population distribution goal for the North Shore of 12,800 or 1.4% of the Oahu population. The Development Plan projects a population of 20,000 or 2.2% of Oahu's population, by the year 2000. The 1977 General Plan population projections were based on a desired population distribution rather than on planned land use. The General Plan policy regarding rural areas such as the Waialua District is to "reduce, or at most maintain, the 1975 proportions of the Island's rural and urban-fringe populations" (1977 General Plan Objective C - Policy 3). The Development Plan population objective is
**TABLE 18**

COMPARISON OF YEAR 2000 POPULATION

<table>
<thead>
<tr>
<th>DP Area</th>
<th>General Plan Population</th>
<th>%</th>
<th>Development Plan Population</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUC</td>
<td>458,700</td>
<td>50.0</td>
<td>457,300</td>
<td>49.8</td>
</tr>
<tr>
<td>Ewa</td>
<td>100,900</td>
<td>11.0</td>
<td>37,400</td>
<td>4.1</td>
</tr>
<tr>
<td>Central Oahu</td>
<td>122,900</td>
<td>13.4</td>
<td>136,800</td>
<td>14.9</td>
</tr>
<tr>
<td>East Honolulu</td>
<td>57,800</td>
<td>6.3</td>
<td>59,500</td>
<td>6.5</td>
</tr>
<tr>
<td>Koolaupoko</td>
<td>119,300</td>
<td>13.0</td>
<td>134,600</td>
<td>14.7</td>
</tr>
<tr>
<td>Koolauloa</td>
<td>10,100</td>
<td>1.1</td>
<td>22,800</td>
<td>2.5</td>
</tr>
<tr>
<td>North Shore</td>
<td>12,800</td>
<td>1.4</td>
<td>20,200</td>
<td>2.2</td>
</tr>
<tr>
<td>Waianae</td>
<td>34,900</td>
<td>3.8</td>
<td>49,300</td>
<td>5.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>917,400</strong></td>
<td><strong>100.0</strong></td>
<td><strong>917,900</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Department of General Planning, 1979
See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth

FIGURE 23
PROPOSED DEVELOPMENT PLAN MAP
SCALE: 1" = 2000'
See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth.
based on the full development of the land uses presented in the Development Plans. These population goals do not include induced growth from resort developments such as the proposed development at Kuilima. The General Plan states that population distribution goals may be further adjusted to accommodate housing necessary to support the resort industry in the various sections of Oahu (33).

I. FUTURE RESORT DEVELOPMENT

A large expansion of the resort industry on the North Shore could significantly change the existing environment as outlined in this chapter. Though no large resort developments are proposed for the Waialua District, resort development in nearby Kahuku would impact Haleiwa and the rest of the Waialua District. The Prudential Insurance Company has proposed an expansion of the Kuilima Resort Community (KRC) in Kahuku which would affect traffic, employment, population growth, and housing along the entire North Shore. As Prudential's plans have not yet obtained all necessary government approvals, the project is still tentative. Therefore, the impacts of the development are not included in our estimates of future population growth traffic, and other conditions in the Waialua District. A summary of the probable impacts of the proposed KRC expansion are presented here. Comprehensive assessments of the KRC expansion impacts are available in several reports on Waikiki Resort Development by the Department of General Planning (34) and in the developer's Environmental Impact Statement (35).

Prudential has proposed an additional 4,700 hotel rooms, 100,000 square feet of commercial space, 1,700 resort condominiums, 50 single family resort residential units, a second 18 hole golf course, and 9 additional tennis courts by the year 2000.

The Kuilima EIS predicts that the proposed Kuilima Resort Community expansion will have significant impacts on North Shore traffic. Projected peak volumes on Kamehameha Highway for the year 2000 would exceed the highway's capacity. Kuilima Resort Community-related traffic would make up 57% of peak hour volumes. The Department of General Planning predicts that peak hour traffic volumes for the year 2000 on the Kamehameha Highway Realignment will almost double, from 1,264 to 2,375 if
the Kuilima Resort Community is constructed (Table 19). Construction of the KRC will require extensive highway improvements estimated by the Department of General Planning at over 50 million dollars. This estimate does not include the cost of the Kamehameha Highway Realignment at Haleiwa.

The Kuilima EIS estimates that the KRC expansion will result in the creation of 5,600 direct, indirect, and induced jobs in the North Shore area by the year 2000. The creation of additional employment opportunities would help to ease the persistent job shortage on the North Shore. The KRC would provide a needed "local" source of opportunities and would be a shorter commute for Haleiwa residents. Increased job opportunities would result in additional population growth. High and low estimates of the additional population impact of the KRC expansion by the Department of General Planning are given in Table 20. Some of this resort-induced population growth would occur in Haleiwa. Increased population growth would result in lower vacancy rates and higher rents.

If the KRC expansion is eventually implemented, which is by no means a certainty, development at levels indicated might not occur. The Department of General Planning's "Resort Options Report" (36) recommends 2,700 additional units for Kuilima, less than 60% of Prudential's proposal. Political tradeoff could result in a greater or smaller number of units than recommended by General Planning. The impact of the KRC development on growth and traffic volumes on the North Shore will ultimately depend on the number of units constructed.
### TABLE 19

**TRAFFIC IMPACTS RESULTING FROM THE KUILIMA RESORT COMMUNITY**

<table>
<thead>
<tr>
<th>Resort/Highway</th>
<th>Section</th>
<th>Existing Service Vol. (Level)</th>
<th>PEAK HOUR VOLUME 2000w/o Resort</th>
<th>2000 Serv. Vol. w/o Resort</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAMEHAMEHA HWY.</td>
<td>Kaawa to Kahuku</td>
<td>1360 (C)</td>
<td>526</td>
<td>1247</td>
</tr>
<tr>
<td>KAMEHAMEHA HWY.</td>
<td>Kahuku to Kualima</td>
<td>1360 (C)</td>
<td>587</td>
<td>1809</td>
</tr>
<tr>
<td>KAMEHAMEHA HWY.</td>
<td>Kualima to Pupukea</td>
<td>1360 (C)</td>
<td>483</td>
<td>1987</td>
</tr>
<tr>
<td>KAMEHAMEHA HWY.</td>
<td>Pupukea to Haleiwa</td>
<td>1360 (C)</td>
<td>1001</td>
<td>2357</td>
</tr>
<tr>
<td>KAMEHAMEHA &amp; BYPASS</td>
<td>Haleiwa to Weed Jct.</td>
<td>1500 (D)</td>
<td>1117</td>
<td>2373</td>
</tr>
<tr>
<td>KAMEHAMEHA HWY.</td>
<td>Weed Jct. to Wahiawa</td>
<td>1224 (C)</td>
<td>951</td>
<td>1730</td>
</tr>
<tr>
<td>KAMANANUI ROAD</td>
<td>Wahiawa to Around Wahiawa</td>
<td>2860 (C)</td>
<td>2632</td>
<td>4296</td>
</tr>
</tbody>
</table>

1 Phase III development for West Beach & Queen's Beach assumed for traffic volumes.

Source: Department of General Planning

### TABLE 20

**POPULATION IMPACT OF THE KUILIMA RESORT COMMUNITY**

1. Maximum potential additional population impact. 1/

<table>
<thead>
<tr>
<th>Year</th>
<th>Onsite Visitor Population</th>
<th>Additional Resident Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>1985</td>
<td>1,600</td>
<td>1,900</td>
</tr>
<tr>
<td>1990</td>
<td>3,300</td>
<td>3,800</td>
</tr>
<tr>
<td>1995</td>
<td>5,100</td>
<td>5,900</td>
</tr>
<tr>
<td>2000</td>
<td>6,400</td>
<td>7,300</td>
</tr>
</tbody>
</table>

1/ This data does not include an additional 200 condominium units planned for the Kahuku Resort, since the study was undertaken nor does it account for 475 housing units to be provided for the employees on the site.

Source: Department of General Planning
J. COMPATIBILITY OF THE PROJECT WITH LAND USE PLANS AND POLICIES

The Kamehameha Highway Realignment is part of the OMPO Long Range Plan which is a product of a joint County-State transportation planning process. As a product of this process, the proposed project is part of, and compatible with, City and County of Honolulu and State of Hawaii land use plans and policies. The bypass road is delineated on the existing Detailed Land Use Map. At present, the preliminary Development Plan Map does not show proposed roadways. However, the proposed project is compatible with, and addresses some of, the needs of North Shore residents as expressed through the Development Plan. The local neighborhood board supported the concept of the highway realignment, and the poll conducted for the Development Plan found that residents considered the traffic through Haleiwa to be a problem. The proposed realignment will protect the quiet rural atmosphere by reducing traffic through Haleiwa Town. However, the proposed highway will remove some prime agricultural land (Figure 16). The consistency of the proposed project with Hawaii's Coastal Zone Management Program is discussed on page IV-45.
REFERENCES

CHAPTER III.


(9) Wind Speed and Directional Data from Waialua Sugar Company Inc. Gage number 847 (office), for 1977-1978.


(19) Ibid.

(20) Department of General Planning, City and County of Honolulu. Planning Data for Oahu 1978; 1975 Land Use Data by Small Area.


(23) Silverman, Jane L. Communication with H. Kusumoto of U.S. Department of Transportation, April 11, 1978. (See pg E-44)


(26) Department of Housing and Community Development, City and County of Honolulu, 1977. Housing and Community Development Research.


(30) Department of General Planning. Internal memo 15 May 1979, "North Shore Citizens Issues as Related to Proposed Map/Text". City and County of Honolulu


(36) Department of General Planning, City and County of Honolulu, 1979. The Future of Resort Development on Oahu.


CHAPTER IV

ENVIRONMENTAL IMPACTS
AND MITIGATION MEASURES
CHAPTER IV. PROBABLE IMPACTS OF THE PROPOSED ACTION ON THE ENVIRONMENT, AND MITIGATING MEASURES

A. SECONDARY IMPACTS

Secondary impacts are changes which will indirectly result from the proposed highway realignment. Secondary impacts may not be apparent during or immediately after the highway construction, but are changes which take place as a result of the highway's long term use. Highway construction can generate secondary impacts affecting community growth, land use, and development patterns.

1. Growth. By reducing the commute time from the North Shore to Honolulu, the new bypass route will have a small growth inducing impact. Transportation facilities are a major determinant of the location and density of urban development. In urban areas, population densities are high close to employment centers where commuting costs, in terms of time and fuel costs, are low. At greater distances from city centers, where commuting costs are higher, population densities are lower. Historically, many new highways have induced growth in outlying areas by reducing commuting costs, making those areas more desirable for residential development.

Population density in the Waialua District is low, partly because of the lack of local job opportunities and the distance from job centers in Honolulu. Low rents and high vacancy rates (see Page III-25) indicate that demand for housing is lower in the Waialua District than in Honolulu and suburban residential areas. The Waialua District is a very beautiful area, and the population would be much higher were it not for the long commute (at least 45 minutes) to job centers in Honolulu.

The proposed bypass road will remove one of the many traffic bottlenecks along the North Shore. This will reduce commuting times, but the time savings, and the growth inducing impact, will be small. The average weekday time savings resulting from highway realignment will be approximately 3 minutes. The average commuting time to Honolulu from Haleiwa is over 45 minutes, so the project will only produce a 7% reduction in travel time when compared to existing commute times. The percent reduction in travel time will be even lower for communities north of Haleiwa, since the capacity of the roadway will still be limited by the two-lane highway segments adjacent to the bypass.
A slight reduction in commute time might encourage a few Honolulu residents to relocate to the North Shore, but such a small reduction is unlikely to cause a significant population increase.

With or without highway construction, population on the North Shore will continue to grow. However, if the bypass is not constructed, traffic congestion through Haleiwa will continue to worsen, making the North Shore a less desirable place in which to live. Unpleasant traffic conditions could discourage potential residents, so by reducing traffic congestion, the bypass removes a hinderance to growth.

All of the growth inducing impacts discussed above assume that existing conditions remain the same. However, there are several factors which could negate the growth inducing impacts of the project. In particular, increasing gasoline and automobile prices could offset the fuel savings produced by the cutoff. Very high gasoline prices or gas rationing could reduce commuting from the North Shore to job centers in Honolulu and Wahiawa. To date, consumers have shown little response to gasoline price increase. However, this may change as gasoline prices continue to rise.

2. Development Patterns. A major highway can affect the development patterns of a community by acting as a catalyst for development or as a physical and psychological barrier. Many new highways have stimulated development along their corridors, producing linear development patterns. However, the Kamehameha Highway, in its present design, will not stimulate growth along its corridor, since the roadway will have partially controlled access. Without unlimited access, property along the highway corridor will not gain any significant transportation benefits. However, if access is constructed at some point in the future, the proposed realignment could act as a catalyst to development along its corridor. The State Department of Transportation has no plans to allow additional future access.
Although businesses can not be located on the bypass, the section of Kamehameha Highway beyond the Haleiwa Beach Park end of the project could become more attractive to highway-oriented businesses. For example, sites along Kawailoa Beach could attract service stations, curio stands, fast food franchises, and other enterprises catering to drivers who have bypassed Haleiwa. The area is presently zoned for agriculture and residential use, so rezoning would be necessary for commercial development to occur. The highway between Haleiwa Beach Park and Kawailoa Beach has partially controlled access, which would also limit such development.

Construction of the bypass road, connecting roads, and new cane haul roads will create remnant parcels of sugar cane land on which cultivation will not be practical (see discussion of agricultural impacts in Social Impacts below). These remnant parcels are located between the proposed highway alignment and Haleiwa Town (Figure 25). Though the remnant parcels are classified by the State and County as agricultural lands, the cessation of sugar cane production on these parcels could lead to their eventual conversion to urban use. The long term result could be the urbanization of all of the lands between Haleiwa Town and the bypass.

New highways have been known to form outer barriers to development. The bypass road could, if land use policy permitted, become the outer boundary to urban encroachment of agricultural land in Haleiwa. The current Detailed Land Use Maps show residential development in the southern portion of Haleiwa extending inland to a previously-considered bypass alignment; the current bypass alignments are 300-600 feet farther inland (Figure 24). The new Development Plan Maps, which have not yet been adopted, show this area as agriculture (Figure 23).
See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth.

The remnant cane fields created by each alignment are indicated by the shaded area to the west of the alignment (except for the two southern most parcels).

Total cane land affected:

- Alt. A: 58.0 acres
- Alt. C: 44.6 acres
- Alt. D: 51.9 acres

Kamehameha Hwy. Realignment
Weed Jct. - Haleiwa Beach Park

Figure 25
Remnant Sugar Cane Lands

Scale: 1" = 2,000'
3. Public Facilities. When highway construction induces growth, communities must provide new public facilities to serve the additional population. However, as the growth inducing impacts of the proposed realignment are small, no major expansion of public facilities will be required as a result of the project. Reduction of traffic on the existing realignment through Haleiwa should reduce the frequency of repairs needed on that roadway.

4. Mitigation Measures. The Kamehameha Highway Realignment could, but need not, influence the spatial development of Haleiwa. None of the bypass alignments will affect the growth of Haleiwa if development is confined to areas designated for urban use on the development plan map, the Detailed Land Use Map, and the Zoning Map. Any development of remnant agricultural parcels or of lands near the termini of the bypass road will require a zoning change. Existing land use controls can be sufficient mitigation measures for any highway-induced land use impacts.
B. PRIMARY IMPACTS

1. Ecological Impacts. The majority of the bypass route passes through lands which have been highly disturbed by agriculture for many years. Converting this land to highway use will therefore have no direct effect on natural ecosystems. The only significant natural ecosystem encountered by the bypass is Ukoa Marsh, which provides habitat for three endangered species of waterbirds.

2. Wetlands. Several wetlands are encountered in the project area, as previously noted. All three alternates span the outlet of Ukoa Marsh, and Alternate D crosses a small marsh on the bank of the Anahulu River (Figures 15 and 18). Environmental analysis of these wetlands has included field investigations, review of current literature, and consultation with the U.S. Fish and Wildlife Service and State Division of Fish and Game. The objectives of Executive Order 11990, "Protection of Wetlands", have been pursued in this evaluation.

Because of the importance of Ukoa Marsh, and its sensitivity to changes in water level, the recommended alignment, Alternate C, has been designed to cross the marsh at its outlet channel, which, with a width of 80-100 feet, is the marsh's narrowest point (Figure 18). This channel is presently clogged with aquatic vegetation. Flow out of the marsh is controlled by a weir at the Loko Ea fishpond. The highway will be slightly elevated on piers (instead of fill) on both sides of the channel, and the channel itself will not be altered. With some types of soils, the weight of a new highway can cause a slight uplift ("bulge") of the adjacent ground surface on the order of several inches or even several feet, which would be enough to affect the water balance of a nearby marsh. Fortunately the Waialua Stony Clay on the southerly side of Ukoa Marsh and the coral outcrop on the northerly side will provide a rigid base for the highway so that no uplift is expected. Furthermore, the bypass is downstream from the main body of the marsh, so it will not cut off any sources of water to the marsh.

Since the bypass will not involve any dredging or filling in the marsh, and the water balance will not be affected, it can be concluded that there will be no direct adverse impact to the size or water level of the marsh. Therefore, the project will not reduce the habitat of the three species of endangered
waterbirds (Hawaiian Stilt, Hawaiian Coot, and Hawaiian Gallinule). An indirect impact to the marsh would be water pollution from highway litter and roadway chemicals (e.g. hydrocarbons, lead, rubber, asbestos). Since the marsh is already receiving wind blown litter (and probably leachate) from the Kawaiola Landfill, any additional stress is undesirable. However, because the highway will be downstream from the main body of the marsh, this impact will not affect the primary waterbird habitat. The same is true for silt and other potential water pollutants generated during the construction phase.

An indirect impact to the endangered waterbirds could occur from making the marsh more visible. The marsh is presently screened from Kamehameha Highway by a row of trees, so the majority of motorists are unaware of it, and this provides a measure of security for the waterbirds. The marsh will be partially screened from view along the bypass by the remaining kiawe forest, but not where it crosses the outlet, at which point the entire marsh will be briefly visible. Although the bypass will not make the marsh any more accessible than it now is, an increased awareness could lead to more people visiting it and disturbing the waterbirds. This impact can not be avoided, since the marsh is easily accessible from many points. The air and noise impacts from the highway will not be severe enough to have any effect on wildlife.

Alternate D crosses through a small (approximately 3.5 acre), spring-fed marsh on the south bank of the Anahulu River (Figure 18). Roughly half of this marsh is cultivated in lotus (hasu) and ‘aro. The remainder is presently overgrown with grass, but was probably cultivated in the past (see Appendix E). Constructing a viaduct across this area would unavoidably eliminate some, but not necessarily all, of the cultivated terraces. The viaduct will be located downslope from the springs that feed this marsh, but there is a possibility that highway construction could decrease their flow. It is difficult to predict the nature of this potential impact without test borings and detailed plans for the viaduct footings (see Ground Water, below). This marsh is considered by the USFWS to be important feeding and nesting habitat for the Hawaiian gallinule.

By aligning the alternates to avoid major impact to Ukoa Marsh, the project is consistent with the U.S. Fish and Wildlife Services desire to possibly maintain it in the future as a waterbird habitat.
The USFWS has concluded that neither Alternate A nor C would jeopardize the continued existence of the listed species (see their formal Biological Opinion, page V-5).

3. Stream Modification. Where the alternate alignments cross the three streams, bridge construction will modify the stream bed and banks. No piers will be placed in Helemano or Opaeula Streams, but two sets of piers will be constructed in the Anahulu River. Rock or cement facing will be placed on the banks to protect the bridge abutments from erosion, but no obstructions will be placed in the stream which would inhibit the movement of fish.

Construction in and near the three streams will produce silt which will increase the turbidity of the streams. Since soil loss from sugar cane fields is high, the streams are already turbid; so any increase is undesirable. One of the effects of the silt would be to discourage young gobies (o'opu nakea) from reaching their adult habitat in the mid and upper reaches of the streams. However, this is a speculative impact, since this species was not confirmed to be present in the project area. If the silt reaches a high enough level, the respiration of some organisms could be hampered. This impact will be effectively controlled through the application of erosion control measures such as immediately seeding cut and fill slopes and protecting them with straw or burlap mat, constructing siltation ponds, temporarily directing runoff with hay bales, and other practices suited to the site.

The bypass does not enter the immediate coastal zone or directly affect any associated features such as sand dunes. The highway does encounter the Special Management Area (SMA) in the vicinity of Helemano and Opaeula Streams and north of the Anahulu River. The relationship between the highway and tsunamis is discussed in the following paragraph.

4. Flood Hazard Evaluation. As described in Chapter III, the bypass alignments pass through the floodplain of Helemano and Opaeula Streams and the flood plain of the Anahulu River (Figure 17). The coastline is subject to tsunami inundation.
but the bypass will not be located in the designated "coastal high hazard area". The goals of Executive Order 11988, "Floodplain Management", have guided the planning and preliminary design of these stream crossings. A written finding in accordance with this Executive Order is provided on page V-10, and a summary of coordination with involved agencies is given on page V-16. Since these streams are perpendicular to the bypass route, it is not physically possible to construct a bypass around Haleiwa without encroachment on their floodplains. Therefore, every effort has been made to minimize impact to the base (100 year) floodplain. At each stream, either fill or structures will be placed within the base floodplain, and at the Anahulu River, fill will be placed within the floodway (Figure 17B). Helemano Stream will be crossed on a viaduct. The anticipated backwater effect at the Anahulu River is less than 4 inches (0.31 feet). The Helemano and Opaeula crossings would have negligible effect on flood elevations.

On Helemano and Opaeula Streams, the proposed bypass alternatives do not pose any risk to health or safety, since there are no homes or regular activity (other than occasional agricultural access) upstream from the crossings, nor are these narrow valleys suitable for future development. There are seven residences and a number of outbuildings upstream from the Anahulu River crossing which are presently within the 100-year floodplain (Figures 14 and 17B). The ground elevation at these residences is approximately 9-10 feet, and the 100-year flood elevation is 12-13 feet (from the Flood Insurance Rate Map). Therefore, the potential inundation depth is 2-4 feet. Most of the buildings are of light wood frame construction, so a flood of this magnitude would probably result in total loss. Constructing the bypass will slightly increase this risk by raising the potential inundation depth by less than 4 inches. A 100-year flood would isolate Haleiwa by cutting off Kamehameha Highway at the Twin Bridges and at the Anahulu River. However, the bypass would not be affected, and the connection at Emerson Road would provide an evacuation route.

The proposed project will have no effect on natural and beneficial floodplain values such as moderation of floods, water quality, groundwater recharge, fish, wildlife, plants, scientific
study, outdoor recreation, aquaculture, or forestry. The bypass will, however, intrude into a region of open space, and may affect the natural beauty of the view upstream on the Anahulu River (see Scenic Impacts, below). The bypass will also affect agricultural land through direct taking and by the creation of remnant parcels. These impacts to floodplain values will be minimized by selecting a route that has a low profile and that preserves as much agricultural land as possible.

The proposed project will not encourage future development in the base floodplains of the three streams. Access will be partially controlled, preventing "strip" development, and no new access will be created into the floodplains. Furthermore, existing zoning does not allow development in the floodplains upstream from the bypass.

5. Ground Water. The proposed bypass alternates lie along the upper edge of the caprock confining the basal water body. Therefore, there is a possibility that excavations or pilings for deep bridge footings could penetrate into the basal aquifer and encounter artesian water. This could occur in the Kawaiola basal water body north of the Anahulu River, where the caprock is much thinner than over the Wailua body. Also, footings for the viaduct required on Alternate D would almost certainly encounter artesian water in crossing the small cultivated marsh on the south bank of the Anahulu River (Figures 15 and 18). At this location, the basal water head is higher than on the other side of the valley alluvium. If artesian water was encountered during construction, there would be the possibility of leakage from the aquifer, or even contamination. Although the current Board of Water Supply wells are located upslope from the area of concern (at Opaeula Camp, see Figure 2), it is important not to waste or jeopardize the quality of this water source. Furthermore, if artesian water was encountered during construction, it could create serious engineering difficulties. To avoid these impacts, footings and pilings will be kept within the caprock in areas where the State Division of Land and Water Development and the U.S. Geological Survey recommend caution. Where there is uncertainty, test borings will be made. Preliminary plans will be coordinated with these agencies.
6. Air Quality. The effect of the proposed project on the air quality of Haleiwa was investigated using the HIWAY computer model (Appendix C). The results show that the critical year for Carbon Monoxide air pollution is 1985. If the bypass is not constructed, "worst case" traffic and meteorological conditions could result in the State 1-hour and 9-hour CO standards being exceeded with 300 feet of Kamehameha Highway, and the Federal standard being exceeded within 25 feet of the highway. If the bypass is operational in 1985, the CO concentration will be approximately 1/7 of what it would be without the bypass, with no danger of the standards being exceeded.

7. Noise Impacts. The present noise environment of Haleiwa is typical of a rural community. The daytime background noise level is around 45-50 dBA. Away from the highway, the dominant noise source is normal neighborhood activity. However, traffic on Kamehameha Highway presently has a significant effect on the community noise level for 300-400 feet on either side (L_{eq} at least 5 dB over ambient), and is noticeable (L_{10} at least 5 dB over ambient) for as much as a mile away under optimum conditions. (Refer to the noise assessment in Appendix D for a detailed discussion and noise contours.)

The present and predicted "peak" (L_{10}) highway noise levels in the community are graphically shown on Figure 26 for 1978 and 1985 without the bypass, and on Figure 27 for 1985 with the bypass. Key points for comparison are two "sensitive receptors" near the highway, the Liliuokalani Church and the Waialua Community Association building. The Church is 150 feet from the edge of the highway, and the Community building is 100 feet from the highway. At present, the exterior L_{10} sound levels are 60 dBA and 62 dBA, respectively at the front of the buildings. The FHWA standard in this case is 70 dBA (Table D-3). If all of the anticipated 1985 traffic is carried by Kamehameha Highway (i.e. no bypass), the noise levels will actually decrease by several decibels, since the traffic will move more slowly, and engine and tire noise will be lower.

It is estimated that the interior noise level in the Church is reduced by around 15 decibels below the exterior level, and the Community building experiences an attenuation of around 10 decibels (according to the type of construction of the buildings and assuming that windows and doors are open).
See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth.
See Fig 17B, pg III-9 for Correct Shoreline at Anahulu River Mouth
On this basis, the peak ($L_{10}$) interior noise levels in 1985, attributable to traffic on Kamehameha Highway without a bypass, should be around 45 dBA in the Church, and 50 dBA in the Community building. Both of these noise levels are acceptable under both Federal and State standards. Technically, the State standard applies only to new highway construction, but it is a useful guideline to illustrate the consequence of allowing traffic to increase on Kamehameha Highway.

The Draft EIS reported that reducing traffic on Kamehameha Highway by constructing the bypass would reduce noise levels through town by as much as 10 decibels. However, this earlier analysis did not take into account the increased speeds that will be possible when congestion in town is reduced. In reality, the increased speeds (from less than 10 to 25 mph) cancel any noise benefit from reduced traffic flow, so that only a 1-2 decibel change can be expected with the bypass (Figure D-2).

There will be significant noise impact along the bypass itself. Peak traffic noise will exceed 70 dBA (the Federal Design Noise Level) within 75 feet of either side of the edge of the roadway. For most of its length, there are no sensitive receptors, but between Emerson Road and the Anahulu River, Alternate C passes through a residential area. Two homes on the seaward side of the highway fall within this 70 dBA impact zone, and one lies just beyond it on the inland side. A preliminary acoustic barrier design was developed for this section of the highway (Appendix D). It was found that an 8-foot wall along the seaward edge of the highway that extended for 175 feet (20 feet beyond the edge of either house) would reduce the exterior noise level at the two closest houses to 60 dBA ($L_{10}$). Allowing a 10 decibel loss inside, the resulting interior noise level would be 5 decibels less than the Federal criteria. A lower wall (4-5 feet) along the inland side would offer similar protection to the homes on that side of the highway. The design of these acoustic barriers must be finalized after the highway construction plans are settled, and more precise distances and elevations are known.

An estimate of construction noise (Appendix D) indicates that peak noise levels of 70-85 dBA could be experienced at the residences on the inland side of Haleiwa, with Alternate D producing the higher levels. Because this short-term impact would exceed the State's standard, construction would be limited to the hours between 7:00 A.M. and 6:00 P.M. (Public Health Regulations Chapter 44B, "Community Noise Control for Oahu").
8. **Scenic Impacts.** The Kamehameha Highway Realignment will be a visual intrusion into the agricultural lands through which it passes. Cuts and fills will be visible as scars on the green hillsides until revegetation is completed.

The intrusive aspects of the bypass will be most greatly felt by persons in closest proximity to the new highway. The roadway will create a visual separation within a residential neighborhood on the south bank of Anahulu Stream (see Social Impacts, below). The bridge for the new Anahulu Stream crossing will block stream views for nearby residences and its close physical presence will clash with the rural setting.

Downstream residences and persons using the existing bridge will also be affected. From the Anahulu Stream Bridge, the upstream view is one of quiet beauty with the rustic shelters, small boats, lush foliage, and still waters (Plate 2). This view would be altered by the introduction of a bridge for the highway's Anahulu Stream crossing. The bridges for Alignments A and C would be plainly visible from the old bridge (Plate 5). The bridge for Alignment D would be located behind the bend in the stream (Figure 7), and would not be visible above the trees, although the alignment along the bluff might be visible. This impact can be mitigated by the strategic planting of trees along the roadway.

The bypass road will serve as a vehicle for the enjoyment of the natural beauty of the North Shore. From its location above Haleiwa, the bypass road will offer panoramic views of Haleiwa Town, Kaena Point, and Waialua Bay which are unavailable from the existing Kamehameha Highway alignment through Haleiwa.

9. **Relocation Impacts.** A detailed report on the lands to be taken for the highway realignment and the relocation program is contained in Appendix A.

Alternate A will require portions of 26 parcels of land, four of which will be whole takings while the remainder will be partial takings. Seven residential homes and one farm will be affected by this route (Figure 14B).
Plate 5 View up the Anahulu River with the new bridge superimposed (Alternate A or C). Some trees at the bridge site will be removed, but the screening trees in the foreground will remain.
Alternate C will require the whole taking of three parcels and the partial taking of 30 parcels. This route will also result in the loss of two residences and one farm (Figure 14A).

Alternate D involves thirty-three parcels of land, ten of which will be whole takings. This route will only displace one family (Figure 14B).

Displaced families will be relocated into equivalent housing as required by Federal law. The relocation will result in a disruption in the lives of the displaced families. The small number of families displaced will not significantly impact the North Shore housing market and the single displaced farm will not impact the local economy. Financial assistance and relocation services provided by the Department of Transportation cannot make up for the loss of a home.

The bypass will cross beneath the Hawaiian Electric Company's Wahiawa-Waimea 46 kv circuit and their Waimea-Kahuku 46 kv circuit which are the major sources of power to the North Shore (Figures 12 and 13). Telephone distribution cables will also be crossed at Paliuli Road (cane haul) and Emerson Road. The intersection with Kamehameha Highway near the traffic circle may affect a telephone facility, and the intersection near Haleiwa Beach Park will encounter power distribution circuits, telephone feeder cables, and the military's Joint Trunking System communications cables. Any relocations required to accommodate the bypass will be coordinated with the affected utilities. The alternate alignments have been designed to avoid all water wells in the project area whether actively used or abandoned. No natural gas systems will be affected.

10. Social Impacts. Upon completion of the Kamehameha Highway Realignment, traffic volumes will be divided between the existing alignment through Haleiwa and the new bypass road. In addition to the initial reduction of traffic volume through Haleiwa, the bypass will prevent increases in traffic congestion over the long term. Reducing the traffic volume through Haleiwa will reduce noise, air pollution, pedestrian-vehicle conflicts, and improve in-town traffic movement. Improvement in all of these categories will make for a more quiet and pleasant atmosphere in Haleiwa Town. This will benefit community residents who have been working to preserve the quiet, "country" life style of the North Shore.
The transportation benefits provided by the highway realignment will influence the travel patterns of both North Shore residents and drivers from other sections of Oahu. Many North Shore residents, who dislike heavy traffic, avoid traveling to Haleiwa on weekends. Reduction of traffic volume on the existing alignment would make the trip more pleasant, encouraging more residents to visit Haleiwa on weekends. Weekend trips to Honolulu would also be easier for North Shore residents with construction of the bypass road.

As the population of Oahu grows, the use of the island's recreational resources will also expand. Many of these resources, such as beaches and natural areas, cannot grow with the population and will be subject to higher intensities of use. The beaches and parks of the North Shore are popular destinations for weekend travelers from Honolulu. As the population of Honolulu continues to grow, weekend visitation of North Shore recreational resources will expand, generating higher weekend traffic through Haleiwa.

However, weekend traffic through Haleiwa cannot continue to grow indefinitely with existing facilities. Without the bypass, traffic congestion would grow for a time and then level off at a point where drivers begin to avoid Haleiwa. The impact of the bypass road will be to allow the growth of weekend recreational traffic up to the capacity of adjoining highway sections.

The actual magnitude of the impact of the bypass on recreational resources will be equivalent to the difference between increased visitation which will result with the bypass and the level of visitation which could result if the bypass were not constructed.

It is difficult to predict when traffic congestion might level off without the realignment. That volume would depend on the patience and tenacity of Hawaii's drivers. However, if traffic growth is not restricted by inadequate facilities, the weekend ADT through Haleiwa is expected to grow from 14,500 in 1978 to 23,000 by the year 2001.

While the increased accessibility of the North Shore will be a benefit to weekend travelers seeking escape from the urban environment of Honolulu, increased use of beaches, parks, and roadways north of Haleiwa will have a negative impact on North Shore residents.
The bypass road will have beneficial impacts for nondrivers in the Haleiwa area. Lower traffic volumes through Haleiwa will result in a reduced level of pedestrian-vehicle conflict, making for a safer and more enjoyable environment for all pedestrians, particularly the elderly and children. The safety of bicycle travelers will be improved, encouraging this form of transportation. Bus riders will travel more quickly with lower traffic volumes, and all residents will benefit from lower transportation costs. Unemployed North Shore residents will enjoy a small improvement in accessibility to urban employment centers, and may enjoy some short term job opportunities from highway construction.

The Kamehameha Highway Realignment will not adversely affect overall community cohesion within Haleiwa, as the project traverses agricultural land over most of its length. In addition, diversion of through traffic to the bypass road will have a beneficial impact on social and commercial interaction within Haleiwa Town. The bypass road will divide a small residential/agricultural area on the south bank of the Anahulu Stream consisting of around 17 homes (Figure 14). Approximately 12 homes inland of the bypass road will be separated from the rest of the community. The presence of a controlled access highway within this rural neighborhood will degrade the quiet country atmosphere so prized by Haleiwa residents. However, this separation is not expected to have serious sociological implications. The area separated is not considered a cohesive community in itself and has always been somewhat physically isolated from the rest of Haleiwa. The residents' identification with Haleiwa, whether real or perceived, is not expected to change with construction of the bypass.

Emerson Road and a paralleled cane haul road provide access to residences along Anahulu Stream (Figure 14). The bypass will sever Emerson Road, but access across the bypass road will be provided via a new Emerson Road Connector (Figure 14). This connector will be two lanes wide and will be at-grade with the bypass. Utilizing the connector, however, will be less direct and less convenient than it is now.

11. Economic Impacts. The expenditure of Federal funds for the Haleiwa Bypass will have a beneficial impact on the Oahu economy. Economic benefits arising from Federal expenditures will be short term, lasting only as long as the period of construction. The Waialua District will capture only a portion of these benefits. Highway contractors will be Hono-
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<td>Art Gallery</td>
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<td>1</td>
<td>Liquor Store</td>
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<tr>
<td>4</td>
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<tr>
<td>1</td>
<td>Dive Shop</td>
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<td>2</td>
<td>Gardening Shop</td>
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<td>5</td>
<td>Hardware and A</td>
</tr>
<tr>
<td>2</td>
<td>Realty</td>
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<td>Business Type</td>
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<td>2</td>
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<td>Attorney</td>
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<td>Barber</td>
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<td>Washerette</td>
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<tr>
<td>1</td>
<td>Travel</td>
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<td>1</td>
<td>Paper Products</td>
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<td>2</td>
<td>Auto Parts</td>
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**TABLE 26**

**SUMMARY OF RETAIL SALES CHANGE**

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<thead>
<tr>
<th>POPULATION CATEGORY</th>
<th>AVG. CHANGE IN RETAIL SALES (%)</th>
<th>NO. OF TOWNS WITH</th>
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<td>Under 5,000</td>
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<td>5/7</td>
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<tr>
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<td>+22.6</td>
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<tr>
<th>POPULATION CATEGORY</th>
<th>AVG. CHANGE IN RETAIL SALES (%)</th>
<th>NO. OF TOWNS WITH</th>
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<tr>
<td>Under 5,000</td>
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<td>Over 5,000</td>
<td>+21.2</td>
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<td>+50.4</td>
<td>1/1</td>
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<td>25,000-50,000</td>
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<td>50,000-100,000</td>
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<td>100,000 &amp; over</td>
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<tr>
<td>All towns</td>
<td>+21.0</td>
<td>6/10</td>
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16/20 indicates “16 of 20.”

Source: David A. Cra

**TABLE 27**

**SUMMARY OF SERVICE STATION RETAIL SALES CHANGE**

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<th>POPULATION CATEGORY</th>
<th>AVG. CHANGE IN RETAIL SALES (%)</th>
<th>NO. OF TOWNS WITH</th>
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<td>2/4</td>
</tr>
<tr>
<td>10,000-25,000</td>
<td>- 4.2</td>
<td>3/7</td>
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<td>0/2</td>
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<td>50,000-100,000</td>
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<tr>
<td>100,000 &amp; over</td>
<td>+30.3</td>
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<tr>
<td>All towns</td>
<td>+ 2.3</td>
<td>15/32</td>
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9/17 indicates “9 of 17.”

Source: David A. Cra

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1 Weed Junction to Halawa B
TABLE 28
SUMMARY OF RESTAURANT SALES CHANGES IN BYPASSED TOWN

<table>
<thead>
<tr>
<th>POPULATION CATEGORY</th>
<th>AVG. CHANGE IN RETAIL SALES (%)</th>
<th>NO. OF TOWNS WITH</th>
<th>AVG. GAIN (%)</th>
<th>AVG. LOSS (%)</th>
<th>NO. OF TOWNS WITH</th>
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<td>GAIN IN SALES</td>
<td>LOSS IN SALES</td>
<td>RANGE (%)</td>
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<td>MORE GAIN OR LOSS</td>
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<td>11/15</td>
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<tr>
<td>Over 5,000</td>
<td>-8.9</td>
<td>3/11</td>
<td>8/11</td>
<td>-26.0 - + 2.4</td>
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<td>-9.2</td>
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<td>2/3</td>
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<td>11.0 - 8.3</td>
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<td>2/2</td>
<td>-14.6 - 2.0</td>
<td>-- - 8.3</td>
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<tr>
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11/15 indicates "11 of 15."

Source: David A. Crane and Partners, 1975. (5).

TABLE 29
SUMMARY OF HOTEL AND HOTEL SALES CHANGES IN BYPASSED TOWNS

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<th>POPULATION CATEGORY</th>
<th>AVG. CHANGE IN RETAIL SALES (%)</th>
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</tbody>
</table>

3/4 indicates "3 of 4."

Source: David A. Crane and Partners, 1975. (5).
TABLE 30
SUMMARY OF NONHIGHWAY-ORIENTED RETAIL SALES CHANGES IN BYPASSED TOWNS

<table>
<thead>
<tr>
<th>POPULATION CATEGORY</th>
<th>NO. OF TOWNS WITH</th>
<th>NO. OF TOWNS WITH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AVG. CHANGE IN RETAIL SALES (%)</td>
<td>GAIN IN SALES</td>
</tr>
<tr>
<td>Under 5,000</td>
<td>+6.7</td>
<td>11/13</td>
</tr>
<tr>
<td>Over 5,000</td>
<td>+14.6</td>
<td>10/11</td>
</tr>
<tr>
<td>5,000-10,000</td>
<td>+11.2</td>
<td>4/4</td>
</tr>
<tr>
<td>10,000-25,000</td>
<td>+11.2</td>
<td>3/4</td>
</tr>
<tr>
<td>25,000-50,000</td>
<td>+6.9</td>
<td>2/2</td>
</tr>
<tr>
<td>50,000-100,000</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>100,000 &amp; over</td>
<td>+55.0</td>
<td>1/1</td>
</tr>
<tr>
<td>All towns</td>
<td>+10.3</td>
<td>21/24</td>
</tr>
</tbody>
</table>

* 11/13 indicates "11 of 13."

Source: David A. Crane and Partners, 1975. (5).
The figures contained in the Horwood Study should not be looked upon as quantitative predictions of the impact of the bypass road on the Haleiwa business community. But they can be used as an indication of the relative effects of a bypass on the various sectors of a business community.

In addition to researching the available literature, Haleiwa merchants and shoppers were interviewed for their opinions. It was hoped that the interviews would afford a view of local conditions, which differ from the mainland communities examined in the bypass studies. All of the merchants agreed that highway-oriented businesses such as restaurants, boutiques, and gas stations would be most affected by the bypass, but held diverse opinions on the overall effect.

Managers of businesses with little or no highway orientation, such as apparel and grocery stores, were divided in their opinions. Though not oriented to highway trade, many of these store owners felt that some of their business was from passing visitors. Sales volumes attributed to visitors ranged from none to 50%. Some merchants with low roadway orientation felt that their businesses would be hurt, while others felt that the bypass would improve conditions or have no effect.

The managers of businesses with little or no roadway orientation who felt that their businesses would be hurt were somewhat concerned by the loss of visitor trade, but were more concerned over the potential loss of North Shore resident sales. These merchants were concerned that impulse buying would be reduced when North Shore residents utilize the bypass road and felt that this impulse buying was an important portion of their sales. Also of concern was the new shopping center planned for the Pupukea area. The bypass road would give the new shopping center a competitive advantage, as Haleiwa would be bypassed while traffic would continue to pass through Pupukea. The bypass road would make shopping in Pupukea more convenient for Sunset Beach residents than a stopoff in Haleiwa.

Other managers of businesses with low highway orientation felt that the bypass would have little effect, since visitors were not an important part of their sales, and North Shore residents would continue to stop in Haleiwa for their shopping. Merchants who were optimistic about the bypass believed that
to compete with Haleiwa for the North Shore trade. However, any sales losses from Haleiwa merchants to the new shopping center must be looked upon as a transfer of sales from one business to another, rather than a loss of revenue for the North Shore.

The reduction in traffic congestion will draw more North Shore residents to Haleiwa during weekends and have a positive effect on sales. Whether this positive influence will make up for other sales losses is dependent on the reaction of North Shore residents to improved traffic conditions resulting from the bypass road.

The segment of the Haleiwa economy most likely to be hurt by changes in consumer travel patterns, will be those businesses most highly oriented towards Kamehameha Highway. However, these businesses should not be as adversely affected as those highway oriented businesses examined in the previously cited bypass studies. Those towns were located on the mainland, they were not attractions, and the bypass roads resulted in the loss of most visitor traffic. Haleiwa is, and will remain, an attraction to visitors from other sections of Oahu. In addition, effective mitigation measures could entice out-of-State visitors off the bypass road and into Haleiwa.

The overall economy of Haleiwa should not be hurt by the bypass. The communities studied which suffered losses in total retail sales were small communities that were highly dependent on highway trade. The Haleiwa area has a solid enough industrial and agricultural base, in addition to businesses catering to resident trade, to withstand impacts to highway oriented businesses.

The principal reason that out-of-State visitors would utilize the bypass road rather than stop in Haleiwa is that they are unaware of its existence. If the highway signs at the termini of the bypass road indicated that the existing alignment was a scenic or historic route, tourist traffic would be diverted from the bypass road. In addition, Haleiwa could be promoted as one of Oahu's tourist attractions as is Lahaina on Maui. Should promotion be successful, the reduced traffic congestion would enhance Haleiwa's position as an attraction. If tourists were "aware" of Haleiwa, increased visitation and higher sales revenues would result. However, if such promotion were too successful, the quiet country atmosphere would disappear as Haleiwa became more tourist-oriented. A very high tourist orientation for Haleiwa would be displeasing to local residents who have voiced opposition to visitor industry development on the North Shore.

IV-34
12. **Energy Analysis.** In order to determine the net energy savings (or cost) of the proposed project, it is necessary to compare the energy used in the operation of the highway with the energy used to construct it. This is extremely difficult, since the true "energy equivalent" of a construction project involves large sectors of the economy. Using the Gross National Product, and the total energy expended to attain the GNP, one can equate any transaction (in dollars) to an energy equivalent (6). However, in Hawaii, the focus can be narrowed somewhat when dealing strictly with energy terms, since a great many "energy costs" are transferred to the mainland (e.g. steel production) and are not felt locally as direct oil consumption. The State must import all of its oil (mostly from foreign sources), and relies on this oil for over 90% of its energy needs. Therefore, this analysis is primarily directed toward the energy costs of highway construction and operation that can be related to the consumption of oil that has been imported to Hawaii.

The following is not a true Benefit/Cost analysis, since many factors are not included, only those that can be related back to the consumption of oil that has been imported to the State. A large-scale Benefit/Cost analysis has been previously presented (Table 5). The procedures used to derive these ratios include some terms, such as decreased driving time and improved engine efficiency, that are directly convertible to energy consumption, but most terms are more appropriately expressed in dollars. The overall B/C ratio for any of the three alternates indicates that user benefits significantly outweigh costs. The following analysis is only one aspect of the overall project benefits and costs.

The factors required to compute gasoline consumption without and with the bypass for the study years 1978, 1985, and 2001 were developed in the air quality study (see Appendix C). The fuel economy (miles per gallon per vehicle) for each year without and with the bypass was determined according to the methodology presented in an EPA publication (7). Included are corrections for speed, stop-and-go versus free-flowing traffic, and vehicle age mixture. The results are given in Table 31, along with the vehicle-miles traveled and the resulting consumption of gasoline in gallons per day.

Two factors result in a significant reduction in gasoline consumption with the bypass operational in 1985. First, anti-
### TABLE 31

**FUEL CONSUMPTION WITHOUT AND WITH THE BYPASS**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Fuel Economy (mi/gal)</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td>18.5</td>
<td>23.8</td>
<td>33.4</td>
<td>27.9</td>
<td>42.6</td>
</tr>
<tr>
<td><strong>Vehicle-Miles Traveled (mi/day)</strong></td>
<td>33,580</td>
<td>39,430</td>
<td>40,780</td>
<td>53,450</td>
<td>54,800</td>
</tr>
<tr>
<td><strong>Gasoline Consumption (gal/day)</strong></td>
<td>1,815</td>
<td>1,660</td>
<td>1,220</td>
<td>1,915</td>
<td>1,285</td>
</tr>
<tr>
<td><strong>Change Relative to 1978</strong></td>
<td>-8.5%</td>
<td>-32.8%</td>
<td>+5.5%</td>
<td>-29.2%</td>
<td></td>
</tr>
<tr>
<td><strong>Yearly Energy Equivalent (BTU)</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8.28x10&lt;sup&gt;10&lt;/sup&gt;</td>
<td>7.57x10&lt;sup&gt;10&lt;/sup&gt;</td>
<td>5.57x10&lt;sup&gt;10&lt;/sup&gt;</td>
<td>8.74x10&lt;sup&gt;10&lt;/sup&gt;</td>
<td>5.86x10&lt;sup&gt;10&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Yearly Energy Savings (BTU)</strong></td>
<td>2.00x10&lt;sup&gt;10&lt;/sup&gt;</td>
<td>2.88x10&lt;sup&gt;10&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

a. Weighted for peak hour vs. off hour and traffic split between Kamehameha Highway and the Bypass.

b. One gallon of gasoline has an energy value of 1.25 x 10<sup>5</sup> BTU.
icipated engine improvements and lighter vehicles will cause the national average fuel economy to improve significantly through the 1980's, tapering off to an average of around 26-28 mpg after 1990 (combined city and highway driving). Secondly, reducing congestion through Haleiwa by diverting 60% of the traffic to the bypass will result in increased speeds on both highways, and fuel economy increases with speed (up to around 40 mpg). This will result in 33% less gasoline consumed between the traffic circle and Haleiwa Beach Park in 1985 than over the same distance in 1978. By the year 2001, increasing traffic and slightly lower speeds on the 2-lane bypass begin to offset the improvement in fuel economy; even so, 29% less gasoline will be used on this section of road than in 1978.

By comparison, if the bypass is not constructed, the slower vehicle speeds resulting from increasing congestion will almost offset the gain in national fuel economy. In 1985, fuel consumption through Haleiwa without the bypass will be only 8% less than the 1978 level. If the year 2001 traffic projection is reached, fuel consumption will increase by around 6% over the 1978 volume for this stretch of highway. The gallons of gasoline used per day has been converted to British Thermal Units (BTU), a standard term used to compare different forms of energy (Table 31). The yearly energy savings from the more efficient vehicle operation made possible by the bypass will be compared with the construction energy costs in Table 32.

Three different methods have been used to estimate the energy expenditure required to construct the bypass, the results of which are present in Table 32. (Only Alternate C has been used for this analysis; Alternate A would be essentially the same, and Alternate D would be roughly 20% greater.) The first method is based on the gross energy/GPN ratio previously mentioned (8). This is the least precise approach, since the only variable involved is the cost of the project. Two variations are presented in Table 32, the first based on total project cost, and the second based on construction costs only. The difficulty with this approach, as far as the present analysis is concerned, is that it factors in many energy costs that are expended throughout the national economy, rather than in Hawaii alone. As a result, the gross energy/GPN ratio method yields the highest thermal values (Table 32). This may be considered the best approach to the "true" energy cost of the project, but
### Table 32

**Estimates of Construction Energy and Limited Energy Trade-Off Analysis**

<table>
<thead>
<tr>
<th>Estimate Method</th>
<th>Bypass Construction Energy (BTU)</th>
<th>Equivalent Fuel Oil (bbl)(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Gross Energy/GNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Total Project Cost</td>
<td>(6.16 \times 10^{11})</td>
<td>97,800*</td>
</tr>
<tr>
<td>B. Construction Cost</td>
<td>(4.85 \times 10^{11})</td>
<td>77,000*</td>
</tr>
<tr>
<td>II. Route H-3 Ratio</td>
<td>(2.57 \times 10^{11})</td>
<td>40,800*</td>
</tr>
<tr>
<td>III. Energy Equivalents</td>
<td>(1.49 \times 10^{11})</td>
<td>23,600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual Bypass Maintenance (BTU)(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Route H-3 Ratio</td>
</tr>
<tr>
<td>III. Energy Equivalents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Annual Savings With Bypass (BTU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Table 31</td>
</tr>
<tr>
<td>1985</td>
</tr>
<tr>
<td>2000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equivalent Fuel Oil Trade-Off (Method III)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction (\frac{\text{Annual Savings}}{\text{Maintenance}}) = Break-even Point</td>
</tr>
<tr>
<td>23,600 bbl (\frac{\text{3,436 bbl/Year}}{\text{45 bbl/Year}}) = 7.0 Years</td>
</tr>
</tbody>
</table>

**Notes:**

a. Equivalent Fuel Oil has a thermal value of \(6.3 \times 10^6\) BTU/Barrel

b. General maintenance only, no lighting.

* These methods include energy costs that can not be directly converted to Equivalent Fuel Oil Consumed in Hawaii.
the results can not be directly converted to an equivalent volume of oil imported to Hawaii, which is the focus of this present analysis.

The second estimate of construction energy cost uses a simple ratio (BTU/mile) derived from the "Energy Impact Analysis" performed for the Interstate Route H-3 EIS (9). The alternate route used for comparison is T-3, which consists of two lanes. This method produces a lower thermal value than the first method, but it is felt to be too high for the subject project. The T-3 alternate crosses mountainous terrain, is on structures for a relatively large percentage of its length, and has a long tunnel. These factors all result in high construction energy requirements, with steel and concrete making up 94% of the thermal value. By comparison, the proposed Haleiwa Bypass is on relatively level terrain, is not significantly elevated on structures (except Alternate D), and has no tunnels. Therefore, much less excavation and materials (steel and concrete) are required for the bypass. Since most steel production energy is expended on the mainland, the Route H-3 energy analysis can not be directly converted to an equivalent value of oil consumed in Hawaii for construction.

The third method used to derive a construction energy cost is the most precise, since it is based on the actual energy equivalents of the activities and materials that go into the construction of a highway. Prepared by the California Department of Transportation in 1978 (10), it is also the most current method found. This approach allows one to select any of a large number of energy parameters, to isolate specific aspects of construction energy. The parameters used in this analysis were: excavation and embankment, aggregates, asphalt-treated base, asphaltic-concrete paving, hauling (60 mile round trip from Barbers Point), base compacting, paving, and bridge structures. (The bridges include mainland steel costs, but are a small proportion of the energy consumption.) This method yields the lowest thermal value, but it can be directly related to local oil consumption. The results include direct energy use (asphalt, transportation, equipment operation) as well as indirect uses (aggregate drying, concrete production, bridge construction) that have multipliers through the local economy. The largest proportion of the energy goes into processing and applying the pavement (5.7 x 10^{10} BTU), followed by earthwork (4.8 x 10^{10} BTU). These values include the vehicle fuel used, but not the fuel used in transporting material to the site, which
amounts to $1.0 \times 10^{10}$ BTU. Construction of all of the bridges for Alternates A or C would expend $3.4 \times 10^{10}$ BTU, while construction of just the viaduct over the Anahulu River for Alternate D would require $3.6 \times 10^{9}$ BTU (this is also reflected in the bridge costs, Table 3).

An allowance for annual highway maintenance has also been included on Table 32. The Route H-3 energy analysis (method I) presents actual petroleum used in maintaining the Pali and Likelike Highways, in addition to energy expenditures for highway lighting and tunnel lighting and ventilation. (It is not specified whether or not the petroleum value includes asphalt as well as vehicle fuel.) The reference for method III also includes an energy equivalent for general highway maintenance, which comes out to more than twice the value reported in the Route H-3 analysis. Neither value includes highway lighting, since it is not intended to light the bypass, except at intersections. To be conservative, the higher thermal value ($2.8 \times 10^8$ BTU/year) has been used.

To provide a more familiar unit of comparison, the thermal values in Table 32 are also expressed in barrels (bbl) of "Equivalent Fuel Oil", a standard reference used in the petroleum industry that has a thermal value of $6.3 \times 10^6$ BTU/bbl EFO. Equivalent crude oil is sometimes used in energy analyses, but its thermal value per barrel varies widely depending on its source (eg. $5.6 - 6.0 \times 10^6$ BTU/bbl); using crude oil as a comparison would increase the oil equivalents by 5-10%. To put the oil quantities in Table 32 into perspective, the State used 39.6 million barrels of petroleum in 1976 (11) and roughly 48.5 million barrels in 1978 (12). A study conducted for the proposed Barbers Point Harbor projected that total State oil consumption would be 48.2 million barrels in 1980, 67.9 million barrels by 1990, and 92.0 million barrels by the year 2000 (13). The oil locally expended to construct the bypass (estimate method III) is 0.05% of the State's 1978 oil consumption.

The trade-off between the oil savings made possible by the bypass, and the oil used to construct and maintain it, has been determined by dividing the construction value by the prorated yearly savings (after subtracting maintenance). The results of this simple calculation show that it will take 7 years for the oil savings in vehicle efficiency to make up for the oil used in construction. After 7 years of use (1991 if the high-
way opens in 1985), the bypass will result in a net Equivalent Fuel Oil savings of approximately 3,740 to 4,525 barrels per year as fuel economy increases to the year 2001.

The State Energy Conservation Program has set energy savings goals for various categories of use (1980 State Energy Plan, Table 20). Under "Automobile Efficiency Promotion" the 1980 goal is $3 \times 10^{12}$ BTU ($4.76 \times 10^5$ bbl EFO). After the break-even point (1991), the energy savings on the bypass will represent roughly 1% of this 1980 goal. However, by this time, the goal will probably be higher, so the bypass savings will represent a smaller proportion.

C. IMPACTS ON PROPERTIES AND SITES OF HISTORICAL AND CULTURAL SIGNIFICANCE

The recommended alignment, Alternate C, will have no effect upon any known historic or archaeological site on or likely to be eligible for inclusion in the Hawaii Register and/or National Register of Historic Places. In the event any unanticipated sites or remains are uncovered during construction, construction will be halted and the State Historic Preservation Officer will be contacted immediately.

The four previously-unrecorded sites found in the project area are described in Appendix E. They consist of a shallow historic deposit of bottles and debris (Site 1439), a wall fragment (Site 1440), wet agricultural terraces (Site 1441), and an old wood frame building (Site 1443). Site 1442, a masonry and wooden structure is not the original house of the Emerson Homestead, but may have been contemporary. Further investigation on the Emerson Homestead indicate that it no longer exists. Therefore, the proposed roadway cannot have any impact upon it.

The proposed bypass will have no direct impact on Sites 1439, 1440, 1441, or 1443 since they are located well outside of the right-of-way. The same is true for the "Site 1442". (See letter from the State Historic Preservation Officer, page V-3).

Since the identified properties of actual or potential historical significance are not affected by the preferred Alternate C, Section 106 of the National Historic Preservation Act does not apply.
D. UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Any major public works project which affects a large area will have unavoidable and unmitigatable impacts, and the Kamehameha Highway Realignment is no exception. This section will not include all of the impacts previously discussed, since many of those impacts are avoidable or can be mitigated to an acceptable level.

The loss of agricultural land will be an unavoidable impact of the construction of the bypass highway. Cultivation of sugar cane will be terminated on the remnant agricultural lands created by the realignment. Though sugar cane production will no longer be possible, lower intensity agricultural activities, such as grazing, can be conducted on remnant agricultural lands.

Two residences are within the highway right-of-way and will have to be relocated. Though relocation assistance will be provided, affected residents will have their lives disrupted by moving and may suffer emotionally from the loss of their homes.

A residential neighborhood located on the south bank of Anahulu Stream will be divided by the bypass highway. Access to the portion of the neighborhood east of the new highway will be available via the Emerson Road Connector, but it will be less direct than the existing Road.

The visual impacts of the new highway will be partially mitigatable, but will still be very apparent. As viewed from a distance, the highway will be an intrusion into the lush green of the sugar cane fields through which it passes, especially in areas of cut and fills. The highway will be visible from the existing Anahulu River bridge, though the dense trees along the banks will provide screening. The greatest visual impact of the highway and bridge will be felt by those living in closest proximity. The presence of a large concrete structure will degrade the quiet pastoral setting of the neighborhood located along the south bank of Anahulu Stream.
Although local merchants may be able to adjust to changing conditions, the diversion of traffic around Haleiwa will initially result in a loss of sales for highway-oriented businesses.

As the population of urban Honolulu continues to grow, weekend visitation of the North Shore recreation areas will also increase. However, this growth will be limited by the capacity of bottlenecks on Kamehameha Highway such as Haleiwa Town. The proposed bypass at Haleiwa will enable traffic to increase up to the capacity of adjoining sections. The result will be that the North Shore will experience a greater volume of traffic and a correspondingly higher use of recreational resources, such as beaches and parks, than would have been possible without the bypass. This impact will be beneficial to Honolulu residents who wish to visit the North Shore, but will be an adverse impact on North Shore residents who prefer uncrowded conditions.

Construction of the highway will create noise, fugitive dust, silt, and exhaust emissions. Excess siltation from construction near streams may result if intense rainfall occurs prior to stabilization.

Vegetation within the right of way will be removed. No native vegetation will be affected.

Runoff waters from the highway surface will contain pollutants which will contribute slightly to degradation of downstream water quality.

E. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN’S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The use of agricultural land for the Kamehameha Highway Realignment will provide transportation benefits, but will also terminate the use of that land for agricultural production. This land will be removed from the stock of agricultural lands which future generations have available to them. While immediate transportation benefits will have been gained, the long-term agricultural production on this land will be foregone. In addition to the 50.6 acres of right-of-way needed, approximately 16 acres of remnant agricultural land will no longer be used to produce sugar cane.
F. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The construction of the Kamehameha Highway Realignment at Haleiwa will require the commitment of materials, manpower, energy resources, and public funds. None of the construction materials used for the bypass road will be recoverable. Public funds and labor, once expended, are irretrievable. None of these resources, with the exception of public funds, are in such short supply that their use for the highway realignment will necessitate a curtailment of their use for other purposes. Public funds are not unlimited, and their expenditure has an opportunity cost represented by the other government projects to which the money could have been devoted. In addition, the opportunity cost of any government expenditure is the lost income of the taxpayers who are paying for the project. However, as the Hawaii State Department of Transportation allocates funds on a priority basis, highway projects which will be denied funding are those which are of less importance than the Kamehameha Highway Realignment.

Agricultural land is another resource which will be committed to the highway project. Though the removal of land from agricultural use is theoretically not an irretrievable commitment, it is in practice. The principal difference between marginal and important agricultural lands is the cost of cultivation. Lands once used for highways could, at a high cost, be restored to agricultural use. However, the additional costs of restoring the land, above and beyond the normal costs of cultivation, make it unlikely that it would occur. Therefore, land devoted to highway should be considered an irretrievable commitment. Sugar cane cultivation will be abandoned on remnant agricultural lands due to increased agricultural production costs. For the same reasons as outlined above, the creation of remnant cane land should be considered a permanent commitment of agricultural resources.
G. GOVERNMENTAL POLICIES WHICH OFFSET ADVERSE ENVIRONMENTAL EFFECTS

Federal legislation and policies designed to protect the environment have been followed throughout the planning of this project. These include the National Environmental Policy Act, the Endangered Species Act, the Federal Water Pollution Control Act, Executive Order 11990 (Protection of Wetlands), Executive Order 11988 (Floodplain Management), and the Historic Preservation Act.

Major State environmental policies include Hawaii Revised Statutes Chapter 343 (EIS), and Public Health Regulations Chapters 37A (Water Pollution), 37B (Erosion Control), 42 and 43 (Air Quality), and 44B (Community Noise). These set guidelines and standards, of which contractors are held responsible, for the mitigation of environmental impacts. In addition, the State participates in the National Coastal Zone Management (CZM) Program through the Hawaii Coastal Zone Management Act of 1977 (Chapter 205A, HRS). This act is administered by the Department of Planning and Economic Development, which has established objectives and policies in seven categories: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards and managing development. Following is a summary of the project's consistency with the pertinent CZM objectives and policies in each of these categories.

1. Recreational Resources. The project will not reduce or degrade any coastal recreational opportunities. By greatly relieving traffic congestion in front of Haleiwa Beach Park, access to this park will be improved, and existing noise and air quality impacts will be reduced.

2. Historic Resources. The historic and cultural resources in the immediate project area have been identified, and the determination has been made by the State Historic Preservation Officer (page V-3) that the preferred route (Alternate C) will not adversely affect these resources.

3. Scenic and Open Space Resources. The proposed bypass will remove some agricultural open space and will be visible from the existing highway at several points in Haleiwa, including the Anahulu River Bridge. However, the view of the coastline from the new highway will be greatly improved.
4. Coastal Ecosystems. The proposed project will affect three streams at or near the upper tidal limit, and will cross the outlet of Ukoa Marsh. Construction of the stream crossings will temporarily increase silt levels, but no permanent barriers to fish movement will be created. The U.S. Fish and Wildlife Service has concluded that Alternate C will have no unacceptable adverse effect on endangered waterbirds utilizing Ukoa Marsh (page V-4).

5. Economic Uses. The proposed project will have no effect on economic uses of the coastline.

6. Coastal Hazards. The proposed project lies outside of the Coastal High Hazard Zone as delineated on the official Flood Insurance Rate Maps (Figure 17). The stream crossings will be designed so that the new structures do not result in any adverse increase in the regulatory flood elevations. The project is in conformance with the City and County of Honolulu flood hazard ordinance.

7. Managing Development. Full opportunity has been provided for agency and public participation in the planning and development of this project to insure coordination of regulatory goals.
REFERENCES

CHAPTER IV.


CHAPTER V. PROJECT APPROVALS AND CLEARANCES REQUIRED

The proposed highway improvements require the following clearances and permits:

1. Clearance from the Department of Land and Natural Resources.

2. Clearance from the State Historic Preservation Officer that the project would have no adverse impacts on features of historical or archaeological significance.

3. Clearance from the U.S. Fish and Wildlife Service that the project would have no unacceptable adverse effect on endangered waterbirds.

4. Finding of "only practicable alternative" pursuant to Executive Order 11988, Floodplain Management.

5. Wetlands finding in accordance with Executive Order 11990.

6. Clearance from City and County Department of Land Utilization for structures in Flood Hazard District. (Pending completion of construction plans.)

7. Special Management Area permit (under the Coastal Zone Management Act) from the City and County of Honolulu, Department of Land Utilization. (Pending completion of construction plans.)

8. Permits from the U.S. Army Corps of Engineers for the four stream crossings. (Pending completion of construction plans.)

9. Bridge permit from the U.S. Coast Guard for the construction of the Anahulu River Bridge, since it is over navigable tidewaters. (Pending completion of construction plans.)

10. Grading permit from City and County of Honolulu, Department of Public Works. (Pending completion of construction plans.)
TO: Department of Transportation  
FROM: Department of Land and Natural Resources

CLEARANCE FORM

COORDINATION OF HIGHWAY PROJECTS
WITH
LAND AND NATURAL RESOURCES INTERESTS

This is to certify that Project Kamehameha Highway Realignment has been reviewed by this Department and insofar as economically practicable, has been coordinated in terms of land and natural resources interests in accordance with Section 109, Title 23, United States Code.

Chairman and Member  
Board of Land and Natural Resources  
Department of Land Natural Resources

June 18, 1979
April 23, 1980

The Honorable Ryokichi Higashionnna
Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionnna:

Subject: Kamehameha Highway Realignment
Haleiwa Bypass Reconnaissance Survey
TMK 6-2-02:3, 4, 5, 6, 7, 12
6-2-04:18, 19, 20

In response to your letter of April 7, 1980, requesting our review of the Chiniago Inc. reconnaissance (REV March 1979) of the Kamehameha Highway Realignment, the following is offered:

It appears from the revised reconnaissance report that four sites were located within the study area boundary: Site 1439, 1440, 1441, and 1443. Of these, only Site 1441 appears to be potentially threatened by the proposed development, and then only if alternate B or alternate D were to be chosen for the highway alignment.

If either alternate Alignment B or Alignment D are chosen for development, it will be necessary for the Department of Transportation to initiate the National Register Eligibility Determination Process (36 CFR 63) for Site 1441 in consultation with the Historic Preservation Officer as the second step of conformance with 36 CFR 800.

It is our understanding that the realignment design furnished us and included in the reconnaissance are of a preliminary nature and do not necessarily reflect actual areas of impact. We therefore request that when you finalize your design for this proposed development that you transmit these final plans to this office for our review and comment.
For your information, the contractor has contacted Patricia Baggerly of our staff and has:

1. Transmitted the artifactual data to the Historic Preservation Office.

2. Included vertical and horizontal information for Sites 1439, 1440, 1441.

3. Prepared National Register documentation sites for 1439, 1440, 1441.

4. Included photographs for excavations within Site 1439.

5. Delivered the materials generated by the research to the Historic Preservation Office, Division of State Parks.

6. Included Figure 5 on draft report as Figure 6 in the revised report.

It might be noted that on both reports, the date of 1979 should be changed to 1980.

If further information is needed, please have your staff contact Patricia Baggerly at 548-7460.

Sincerely yours,

Susumu Ono
Chairman of the Board and State Historic Preservation Officer
May 23, 1980

In reply refer to:
AFA-SE, #1-2-80-F-3

Mr. Ralph T. Segawa
Division Administrator
Federal Highway Administration
Box 5206
Honolulu, Hawaii 96850

Dear Mr. Segawa;

This responds to your February 22, 1980, request for consultation under Section 7 of the Endangered Species Act of 1973, as amended, on your Project F-083-1(5), Kamehameha Highway Realignment, Weed Junction to the Haleiwa Beach Park, a construction project. At issue are the possible impacts the project may have on the endangered 'alae ke'o ke'o (Hawaiian coot), Fulica americana alai; ae'o (Hawaiian stilt), Himantopus mexicanus knudseni; koloa (Hawaiian duck), Anas wyvilliana; and 'alae 'ula (Hawaiian gallinule), Gallinula chloropus sandvicensis. This represents the biological opinion of the U.S. Fish and Wildlife Service in accordance with Section 7 "Interagency Cooperation Regulations" (Federal Register Vol. 43, No. 2, January 4, 1970), on three alternative route alignments for this project. We reviewed the biological information that you provided along with other pertinent information in our files. In addition, the following individuals were contacted:

Mr. Ronald Walker, Leader, Hawaiian Waterbirds Recovery Team;
Mr. Tim Burr, Hawaii Division of Fish & Game (Non-game biologist);
Mr. Eugene Kridler, U.S. Fish & Wildlife Service (Retired); and
Mr. David Woodside, Hawaii Division of Fish & Game (Retired non-game biologist).

Copies of pertinent documents and documentation of personal communications are contained in an administrative record maintained by the Pacific Islands Area Office of Endangered Species.
Species Account

The 'alae ke'o ke'o, ae'o, and koloa have been observed adjacent to the route alignment project in Ukoa Marsh. Only a small resident population of the 'alae ke'o ke'o is present in this marsh due to the minimal availability of the open water habitat that this species prefers. Ae'o have been observed in this area, particularly when portions of the marsh used as pastures are flooded. Koloa have been seen at Ukoa Marsh and the Haleiwa Wetlands. They are believed to have dispersed from Hawaii Fish and Game releases at Waimea Falls Park. The koloa are not thought to be permanent residents of Ukoa Marsh. Use of Ukoa Marsh by these three species is marginal. At the present time it does not have the quantity and quality of habitat required to sustain these species. It should be noted that the Hawaiian Waterbirds Recovery Team recommended that Ukoa Marsh be acquired and managed as a refuge in cognizance of its inherent value to these species, and that it is undergoing agency review for its consideration to be designated as critical habitat for Hawaiian waterbirds.

Ukoa Marsh is of greatest value to the 'alae 'ula; consequently, the possible impacts of the project on this species will be discussed in detail. The 'alae 'ula is presently known to occur only on the islands of Kauai and Oahu. Historically it was reported in the late 1880's as common throughout Hawaii, Oahu, Maui, and Kauai. Its decline was particularly noted in the late 1940's when it was reported that its status was precarious on Maui, Molokai, and Hawaii. Although this species was observed on Molokai as recently as 1971, it is believed to be absent from all of its former range except for Kauai and Oahu. The 'alae 'ula is probably the rarest of the endangered Hawaiian waterbirds.

Recent surveys of Ukoa Marsh indicate a resident population of between 18-30 'alae 'ula. Although no evidence of successful nesting has been recorded from this area since 1965, it is believed that this species utilizes bulrushes for nesting and the floating aquatic vegetation for feeding. Since this species is considered the rarest of the waterbirds, any adverse impacts to important nesting and feeding habitats could seriously affect the precarious status of this species. In this regard, it should be noted that the Hawaiian Waterbirds Recovery Team identified protection and acquisition of Ukoa Marsh as the fourth priority item, up from its former eleventh position.
May 23, 1980
Page Three

Analysis of Impacts

Three alternative route realignments for Kamehameha Highway are described in the project document furnished by your agency. We believe that Alternate D should be eliminated from consideration due to its greater potential for adversely impacting Ukoa Marsh by crossing over a wider portion of the outlet channel, and by being closer to the marsh proper than the other alternative routes. In addition, this alignment will result in the elimination of several lotus and taro ponds in the Haleiwa Wetlands. The lotus ponds of these wetlands have been identified as being important feeding and nesting areas for the 'alae 'ula. Consequently, such habitat losses may adversely impact this species.

All three alternative routes would result in greater visibility of Ukoa Marsh from the elevated bridge which would cross over the marsh outlet into Loko Ea pond. This may result in increased human disturbance due to a greater awareness of the pond. No greater accessibility is attributed to the route alignment since the marsh is presently readily accessible from many points, as indicated by the presence of fishermen and ornithologists. Control of this disturbance would best be addressed through establishment of a wildlife refuge at Ukoa Marsh, with appropriate management regulations.

Of major concern are the temporary fill and culverts that may be required for construction of the elevated bridge over the marsh outlet. We commend the design engineers for this project in selecting a route that crosses the outlet at its narrowest point and in using a single span bridge construction on piers (instead of fill) on both sides of the outlet channel. These design considerations intended to prevent constriction of the outlet channel so that the present existing flow characteristics will not be altered indicate your agency's commitment to promote conservation of endangered species as provided in Section 7(a)(1) of the Act.

It should be noted that the 'alae 'ula nests throughout the year, with a primary nesting period extending from March through September. It is imperative that construction activities do not result in increasing the water level of the marsh during this critical period. Removal of vegetation, mostly California grass (Brachiaria mutica) and the bulrushes (Scirpus californicus and S. validus) should be kept to a minimum. Although eventual creation of open water may be beneficial to the ke'o ke'o, it may adversely affect the 'alae 'ula. Upon completion of the bridge, the temporary crossing must be removed in such a manner that none of this material would add to the siltation problem at Ukoa Marsh.
Biological Opinion

In summary, it is the biological opinion of the U.S. Fish and Wildlife Service that only alternative routes A and C of Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, should be considered, and that selection of either route is not likely to jeopardize the continued existence of the listed species discussed in this opinion. Construction of alternative route D is likely to jeopardize the continued existence of the 'alae 'ula, but is not likely to jeopardize the continued existence of the 'alae ke'o ke'o, ae'o, and koloa.

The 1978 amendments to the Endangered Species Act require this Service to provide "reasonable and prudent alternatives" when a Biological Opinion indicates jeopardy to a listed species. "Reasonable and prudent alternatives" refer to alternative courses of action open to the Federal agency with respect to an activity or program that are technically capable of being implemented and consistent with the intended primary purpose of the activity. We believe it is unnecessary to provide any alternative to avoid jeopardy because alternative routes A and C fulfill the requirement of reasonable and prudent alternatives.

The Federal Highway Administration is reminded of its continuing responsibility to review its activities and programs in light of Section 7 and to reinitiate this consultation if new information becomes available which identifies that the Kamehameha Highway Realignment between Weed Junction and Haleiwa Beach Park may affect listed species, the action as described here is modified, or a new species or new critical habitat area is listed that may be affected by the proposed action.

Sincerely yours,

[Signature]

E. Kahler Martinson
Regional Director
REFERENCES

Burr, Tim. April 28, 1980. Telcon and meeting to discuss impacts of highway realignment on Ukoa Marsh and 'alae 'ula.

Federal Highway Administration (no date). Biological Assessment for the Haleiwa Bypass. Project Description for F-083-1(5).

Kridler, Eugene. April 16, 1980. Discussion regarding highway realignment between Weed Junction and Haleiwa Beach Park, on Ukoa Marsh and 'alae 'ula.

Proby, Fred (no date). Informal meeting regarding Haleiwa Road Realignment.


Walker, Ronald. April 28, 1980. Discussion regarding up-grading of priority for acquisition of Ukoa Marsh and critical habitat designation for that area.

Woodside, David. April 25, 1980. Telcon regarding highway realignment between Weed Junction and Haleiwa Beach Park on Ukoa Marsh and 'alae 'ula.
A. Reasons for Locating the Proposed Action in the Floodplain

The need for a Bypass around the town of Haleiwa has been thoroughly established. The present congestion on the highway through town causes long delays during weekend traffic and hampers the movement of emergency vehicles. Furthermore, the community has consistently supported the concept of a bypass.

The topography of the project area is that of a typical coastal plan, bisected by three streams; Helemano, Opaeula and Anahulu. To bypass Haleiwa, it is necessary to cross this coastal plain, which is impossible to do without crossing the three streams.

B. Alternatives Considered

There are no alternatives to crossing the three streams in the project area. However, several alternative schemes for the stream crossings have been considered. A bridge, which would have required the placement of fill in the floodway, was originally proposed for Helemano Stream. This has been rejected in favor of a viaduct structure, which will have a negligible backwater effect. At the Anahulu River, a viaduct crossing farther upstream (Alternate D) was considered which would have had a negligible backwater effect. However, this route would have crossed through a marsh important to endangered waterbirds, and would have affected several archaeological sites, so it was rejected.
The proposed bridge at the Anahulu River requires the placement of fill in the floodway, causing a backwater effect of approximately 4 inches (0.31 foot) with the 100-year flood flow. Doubling the width of the bridge would reduce the backwater effect to approximately 0.1 foot, but would add $350,000 to the cost of the project. The 100-year flood depths in a rural residential area (7 homes) upstream from the crossing would be 2-4 feet under existing conditions. The additional 4 inches added by the bridge would be insignificant with respect to the total anticipated flood damage under existing conditions.

C. Conformance to Floodplain Protection Standards

The City and County of Honolulu recently adopted an ordinance regulating activities in flood hazard districts as established on the Flood Insurance Rate Maps prepared by the Federal Insurance Administration. This ordinance specifically exempts "street, roadways, off-street parking lots, including private driveways, bridges and walkways" (Section 21-1115(k)) provided that a statement from a registered professional engineer or architect is submitted stating that "to the best available technical knowledge and information, the new structure does not result in any adverse increase in the regulatory flood elevations" (Section 21-1115). A drainage study has been prepared by a registered professional engineer which verifies that the proposed Anahulu Bridge will increase backwater from the regulatory (100-year) flood by approximately 4 inches, which is not considered to be an adverse increase in flood elevation. Similarly, the study concludes that the Helemano and Opaeula Stream crossings will have a negligible effect on flood elevations. The proposed project is therefore consistent with the applicable floodplain protection standards.
This statement sets forth the finding that there is no practicable alternative to construction in the wetland at the outlet of Ukoa Marsh, and that the highway proposal includes all practicable measures to minimize harm to the wetland which may result from such use. This finding is made in accordance with the requirements of Executive Order 11990 on the Protection of Wetlands, dated May 24, 1977.

DESCRIPTION OF THE PROJECT

The proposed project involves construction of a bypass highway around the inland side of Haleiwa on the Island of Oahu, Hawaii. The new road will begin at the Weed Junction Traffic circle and will rejoin Kamehameha Highway near the Haleiwa Beach Park. The total project length is approximately 2.3 miles. Right-of-way will be acquired for four lanes, but only two lanes will be constructed initially. Expansion to four lanes will depend on traffic demand and improvements to the adjacent highway segments.

DESCRIPTION OF THE WETLAND

Ukoa Pond and its surrounding marsh comprise one of the larger freshwater wetlands on Oahu. The maximum extent of the marsh is approximately 115
acres, including the narrow outlet. The marsh is dominated by a sedge (Cladium leptostachyum), two species of bulrush (Scripus californicus and S. validus), and California grass (Brachiaria mutica). Roughly 10-15 acres in the southeastern portion of the marsh were formerly cultivated in taro and lotus (neither of which remain), and large areas of the southerly and westerly portion are accessible to cattle. As a result of these disturbances, plus irrigation water diversion, the southerly and westerly portions of the marsh are periodically dry (at least to several inches below the soil surface), and "facultative" wetland plants (i.e. not requiring constantly waterlogged soil) are important constituents. Two shrubby species, (Pluchea indica and P. odorata), give these marginal areas a very non-marshy appearance, but the presence of water hyssop (Bacopa monniera) confirms that the areas are frequently inundated. The outlet of the marsh, where the bypass corridor crosses, is approximately 80 feet wide, and clearly demarcated by coral outcrops forming banks on both sides. The outlet is completely filled with large bulrushes and California grass floating in a tight mat of roots and old stems. The water in the channel is at least several feet deep, with the level being controlled by a dike and weir at the Loko Ea fishpond, near the point where the marsh discharges to the ocean.

WETLANDS AFFECTED

The recommended alignment, Alternate C, will cross the outlet of Ukoa Marsh just below the main body of the marsh. The outlet is 80-100 feet wide at this point, which is the narrowest part of the marsh. The highway will be elevated on piers (instead of fill) on both sides of the channel, and the channel itself will be crossed with a single span. No piers or fill will be permanently placed in the outlet channel, so the existing flow characteristics will not be altered. The bypass is downstream from the main body of the marsh, so it will not cut off any sources of water to the marsh.

ALTERNATIVES CONSIDERED

Do Nothing. If the present traffic situation through Haleiwa is not
changed, congestion will continue to worsen. This will adversely affect air quality and fuel consumption, and will seriously degrade the rural quality of Haleiwa which is highly valued by its residents. There would be no effect on wetlands from this alternative.

Other Alignments. Two other alignments were carefully evaluated. Alternate A would cross Ukoa Marsh at the same point as the recommended alignment, but would have greater landform modification impacts elsewhere. Alternate D would have adversely affected another marsh near the Anahulu River as well as crossing Ukoa Marsh at a wider point than Alternates A or C. It would not be practical to circumvent the marsh, since it would require a much longer roadway, and would place the highway upstream from the marsh. This could affect the marsh's water sources and subject the marsh to roadway pollutants.

Alternative To Do Least Harm To The Wetland. Alternate C, the recommended alignment, will cross Ukoa Marsh at its narrowest point, and will be elevated on piers. This will have the least possible impact on the marsh.

MEASURES TO MINIMIZE HARM

An alignment has been selected which crosses the least amount of wetland possible, and a bridge design has been adopted which will not result in any permanent filling of the wetland. Upon completion of the bridge, all temporary fill material will be removed.

COORDINATION AND PUBLIC INVOLVEMENT

The State Division of Fish and Game and the U.S. Fish and Wildlife Service were consulted prior to the preparation of the Draft EIS, when the alternatives were being developed and evaluated. The USFWS Endangered Species Coordinator has given clearance to the proposed project. Opportunity for early public review was provided at information meetings in the Haleiwa in 1962, 1970, 1979 and 1980.
CONCLUSION

The above factors and considerations establish that there is no practicable alternative to construction in the Ukoa Marsh located near Haleiwa, Oahu, Hawaii, and that the highway proposal includes all practical measures to minimize harm to the wetland which may result from such use.

3-25-81
Date

Division Administrator
Federal Highway Administration
DRAINAGE STUDY FOR HALEIWA BYPASS

Log of Contacts

September 29, 1978

Received from Albert Ching
Division of Water & Land Development
Department of Land & Natural Resources
State of Hawaii
1 set Flood Insurance Rate Maps, Proof, effective January 3, 1979
1 copy FIA Flood Insurance Study (Proof), dated July 3, 1978

December 4, 1978

Received copy of letter from
Kisuk Cheung, Chief
Engineering Division
US Army Engineer District
to R. Higashionna, Director
Department of Transportation
State of Hawaii
with Preliminary Flood Insurance Rate Map
of the general project site

January 22, 1980

Contacted Thomas Ushijima, Chief
Flood Plain Management Section
Corps of Engineers
US Army Engineer Division
by phone: 438-2883
in regard to flood insurance studies for
Waialua-Haleiwa area

February 4, 1980

Meeting with George Kimura
Corps of Engineers
US Army Engineer Division
Received copies of updated FIA maps:
Preliminary Floodway map and Preliminary
Flood Insurance Rate map, dated 25 January
1980

March 7, 1980

Meeting with George Kimura, COE
to obtain additional information

July 3, 1980

Obtained back-up data from
Corps of Engineers for "Frequency-Discharge
Drainage Area Curves, Waialua-Haleiwa
Streams, Figure 18."

August 13, 1980

Contacted Arthur Muraoka
Department of Land Utilization
City & County of Honolulu
in regard to FIA maps; obtained Ordinance
8062 relating to Flood Hazard Districts

V-16
A. COMMENTS ON THE EIS PREPARATION NOTICE

1. U.S. GOVERNMENT

Advisory Council on Historic Preservation
Department of Agriculture
    Agricultural Stabilization and Conservation Service
    Soil Conservation Service
Department of Defense
    U.S. Army Corps of Engineers
Department of Housing and Urban Development
    Federal Housing Administration
Department of the Interior
    Fish and Wildlife Service
    Geological Survey
Department of Transportation
    Federal Aviation Administration
    U.S. Coast Guard
Environmental Protection Agency

Response
Dated

No Response
3/30/79 *
3/28/79
4/5/79 *
No Response
No Response
No Response
No Response

2. STATE OF HAWAII

Department of Accounting and General Services 4/12/79
Department of Agriculture 4/11/79
Department of Education 3/21/79
Department of Hawaiian Home Lands 3/15/79 *
Department of Health 3/15/79 *
Department of Land and Natural Resources 4/12/79
Department of Planning and Economic Development 3/16/79 *
Department of Social Services and Housing 4/2/79 *
Office of Environmental Quality Control 3/16/79 *
University of Hawaii, College of Tropical Agriculture
Environmental Quality Commission 3/14/79

* (Denotes "no comment")
3. **CITY AND COUNTY OF HONOLULU**

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4. **ORGANIZATIONS**

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UNITED STATES DEPARTMENT OF THE INTERIOR
DEPARTMENT OF TRANSPORTATION
SOIL CONSERVATION SERVICE
PLANNING OFFICE

P. O. Box 50004, Honolulu, Hi 96850

Dear Dr. Ryukichi Higashionna:

Subject: Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. F-083-I(S), EIS Preparation Notice

We have reviewed the subject EIS preparation notice. It appears you have acknowledged those areas of concern to SCS. We will await the draft EIS review.

Should you need detailed evaluations of prime agricultural areas, soil evaluations, etc., please contact:

Mr. Otis H. Gryde, District Conservationist
Honolulu Field Office
Soil Conservation Service
Br. C130, Prince Kuhio Federal Building
Honolulu, Hi 96850
Phone: 546-8326

Thank you for the opportunity to review this document.

Sincerely,

Jack P. Kamiz
State Conservationist
c: O. H. Gryde

---

DEPARTMENT OF TRANSPORTATION
U.S. ARMY ENGINEERING DISTRICT, HONOLULU
BUILDING 220

Dear Dr. Higashionna:

We have reviewed the Environmental Impact Statement (EIS) Preparation Notice for the Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. F-083-I(S) which was forwarded to our office on 12 March 1979. The proposed project does not affect any US Army Corps of Engineers projects in the Haleiwa District.

We note that portions of the proposed realignment corridor pass through the 100-year riverine flood areas for Anahulu, O'aoa, and Helemano Streams and the 100-year tsunami zone as defined by the preliminary Flood Insurance Rate Maps prepared by the US Department of Housing and Urban Development, Federal Insurance Administration (FIA). A revised map illustrating the proposed highway corridor superimposed over these flood-prone areas is provided (incl 1) to supplement our previous letter of 28 November 1978. Riverine flood elevations within the corridor vary between 10 and 20 feet above Mean Sea Level (MSL). The approximate tsunami elevation at the southern end of the corridor is 13 to 15 feet above MSL. Project plans for the stream crossings should include measures to protect the bridge abutments from flood damage, measures to prevent the aggravation of flood hazards, and damages or losses to adjacent lands and structures by construction of the bridge. These considerations should be reflected in the Draft Environmental Impact Statement (DEIS).

A Department of the Army (DA) permit may be required for the stream crossings and the crossing over the outlet of Ukoa Pond marsh pursuant to Section 404 of the Clean Water Act of 1977. As the EIS Preparation Notice does not provide specific bridge (or alternate crossing) details, we request that plans and design drawings be submitted for our review as soon as possible so that we may determine the need for a DA permit.
In addition, information which identifies the work to be performed in the streams, the type and quantity of fill to be used, the source of the fill material, the presence or absence of toxic materials in the fill (in accordance with EPA regulations 40 CFR 230.4), the erosion controls to be implemented to prevent any fill from being washed into the stream or adjacent wetland, and the measures being taken to prevent the disruption of the natural migratory movements of indigenous aquatic fauna in the streams, should be provided.

The DEIS should also contain a biological and physicochemical description of the affected stream environments. The Ukoa Pond marsh serves an important biological function as habitat for significant populations of the endangered Hawaiian gallinule (Gallinula chloropus sandricensia). Any reduction of suitable marsh habitat or change in the natural hydraulics of the marsh as a result of the proposed highway crossing may have significant adverse impacts on these waterbirds. We therefore urge that filling portions of the marsh be avoided. We further recommend that the DEIS contain sufficient information on the need to locate the proposed highway realignment in the wetland, and data on the basis of which the availability of feasible alternative sites can be evaluated.

Included for your information and use are portions of the report entitled "Wetlands and Wetland Vegetation of Hawaii" prepared by H. E. Elliott and E. H. Iball, 1977, for the US Army Corps of Engineers (Incl 2) and of the report "An Ornithological Survey of Hawaiian Island Wetlands" prepared by Ahuluma Productions, 1977, for the US Army Corps of Engineers (Incl 3) which concern the Ukoa Pond wetland and use of the area by endangered Hawaiian waterbirds.

We appreciate the opportunity to respond to the EIS preparation notice and look forward to receipt of the DEIS.

Sincerely yours,

[Signature]

B. R. Schlapak
Lt Col, Corps of Engineers
Deputy District Engineer

Mr. Kinuk Cheung, Chief
Engineering Division
Department of the Army
U.S. Army Engineer District,
Honolulu
Building 230
Fort Shafter, Hawaii 96858

Subject: EIS Preparation Notice for the Kamehameha Highway Realignment
Way Junction to Halawa Beach Park

Thank you for your letter of March 28, 1979. We are aware of the Department of the Army Permit requirements and will submit an application at the appropriate time.

We appreciate the information provided in your enclosures. The draft EIS will include information regarding impacts of the proposed project on floods, wetlands, and the aquatic life found in the project area.

Very truly yours,

[Signature]

K. H. Higashinona
Honorable Ryokichi Higashionna
Director
Department of Transportation
State of Hawaii
Honolulu, Hawaii

Dear Mr. Higashionna:

Subject: Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park
Project No. F-083-1(5)
Environmental Impact Statement Preparation Notice

We have no comments to make at this time on the environmental issues identified in the Environmental Impact Statement Notice of Preparation for Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. F-083-1(5).

We look forward to reviewing the Draft EIS.

Sincerely,

[Signature]
Alvin K. H. Pang
Area Manager

---

LETTER NO. (P) 1337.9
APR 12 1979

Honorable Ryokichi Higashionna
Director
Department of Transportation
State of Hawaii
Honolulu, Hawaii

Dear Mr. Higashionna:

Subject: Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park
Project No. F-083-1(5)
Environmental Impact Statement Preparation Notice

This is in response to your letter No. LT-PA 2.49735 dated March 12, 1979. We have reviewed the subject notice and have determined that the subject project will have some effect on our Waialua-Haleiwa Civic Center site selection study. However, we feel that the effects will be beneficial rather than adverse, providing the civic center planning can be coordinated with the subject project.

Preliminary studies on the civic center site selection area assume that it would fall along Kamehameha Highway between Weed Circle and Anahulu Stream bridge. Thus, our comments will be based on this preliminary assumption as follows:

1. Accessibility

The civic center will attract clientele from the North Shore and Hokuleia areas. In order for these people to have convenient access to the civic center utilizing the by-pass road, the civic center, if possible, should be located close to the connector road with the Haleiwa town. Thus, it will be important to know the location of the connector road(s) before we evaluate the alternative sites for the civic center.
2. Adverse Effects from Adjacent Activities

The civic center may be adversely affected by a cane haul road that generates noise, exhaust fumes, dust and vibration. Thus, it will be important to know what cane haul roads, if any, will be realigned.

3. Population Distribution

The optimum location of the civic center is largely dependent upon the distribution of the population within the service area. As such, it would benefit us if we know the by-pass roads' impact on the population pattern, if any.

4. Traffic Congestion

In our EIS Preparation Notice for the proposed Waialua-Haleiwa Civic Center, we had identified as a major impact the potential traffic congestion around the civic center frontage. With this by-pass road, traffic will not be a major impact.

This is an example of a beneficial impact to our facility.

We would appreciate it if we could be made consulted parties for the subject project. If you have any questions, please call the Public Works Division at 548-5460.

Very truly yours,

HIDEO MURAKAMI
State Comptroller
MEMORANDUM

To: Honorable Ryokichi Higashionna, Director
   State Department of Transportation

Subject: EIS Preparation Notice for the Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. F-083-155

The Department of Agriculture has reviewed the subject EIS Preparation Notice and offers comments as follows.

We are pleased to see that impacts upon prime agricultural lands, sugar lands, and taro lands will be considered in the EIS.

Additionally, we ask that the EIS address the potential impact of increased urbanization, after completion of the realignment, between the existing Kamehameha Highway and the new realigned highway. Our concern is that not only the acreage actually used for the highway will be lost to agricultural use, but the agricultural lands between the new and old routes will also be subject to loss. A prime example of such loss is the agricultural land between Kamehameha Highway and H-2.

Thank you for the opportunity to comment.

JOHN FARIAS, JR.
Chairman, Board of Agriculture

April 11, 1979

The Honorable John Farias, Jr.
Chairman
Board of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

Dear Mr. Farias:

Subject: EIS Preparation Notice for the Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park
Reference: Your memorandum dated April 11, 1979

Your concerns with regard to the impact of increased urbanization and to remnant agricultural lands will be considered and addressed in our Environmental Impact Statement. Thank you for your continued cooperation.

Very truly yours,

RYOKICHI HIGASHIONNA
The Honorable Charles G. Clark  
Superintendent  
Department of Education  
Liliuokalani Building  
1390 Miller Street  
Honolulu, Hawaii 96813  

Dear Mr. Clark:

Subject: EIS Preparation Notice for the Kamamaha Highway Realignment  
Weed Junction to Halaolu Beach Park

Thank you for your memorandum dated March 21, 1979, regarding information on school bus service. Providing a safer highway with less congestion is our primary objective.

Very truly yours,

James R. Carras

Ryokichi Higashionna
Mr. Ryokichi Higashionna,
Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Higashionna:

SUBJECT: Kamchamæa Highway Realignment, Weed Junction to Haleiwa Beach

Reference is made to your letter LT-PA 249735, dated March 12, 1979, relative to the subject project.

Because it does not affect our lands, the Department of Hawaiian Home Lands has no comments. Thank you for the opportunity to comment.

Sincerely yours,

[Signature]
Georgiana K. Padeken
Chairman

[Document 2]

Mr. Ryokichi Higashionna
Department of Transportation
869 Punchbowl St.
Honolulu, Hawaii 96813

Dear Mr. Higashionna:

Subject: Request for Comments on Proposed Environmental Impact Statement (EIS) for Kamchamæa Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. F-083-1(S)

Thank you for allowing us to review and comment on the subject proposed EIS. Please be informed that we have no comments or objections to this project at this time.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

Sincerely,

[Signature]
James S. Kumaga, Ph.D.
Deputy Director for Environmental Health
April 12, 1979

Honorable Ryokichi Higashionna
Director of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Sir:

We have reviewed the EIS preparation notice for the Ka111 Highway realignment between Weed Junction and Haleiwa Beach Park.

No registered historic sites are known to be located within the alignment study corridor because no archaeological survey has been conducted there. While agricultural development has been extensive in the southern section of the corridor, it is strongly recommended that a reconnaissance survey be conducted over ungraded, uncultivated rock outcrops which are located within the agricultural fields. It is also strongly recommended that a reconnaissance survey which includes selective test pitting be conducted in the northern section of the corridor for the area in and adjacent to Ukoa Pond. The results of this survey should then be incorporated into appropriate sections of the EIS and submitted to this office for final comments and review.

Our records show there are several existing wells within or near the proposed Kamehameha Highway realignment corridor. Two of the wells are presently being used for irrigation and one well is a USGS observation well. Hence, in the determination and design of the new alignment, the location of these wells should be considered and not disturbed.

The forthcoming EIS should discuss mitigating measures to alleviate impacts upon water quality, and marine life existing in Helemano, Opeula, and Anahulu Streams, and in the Waialoa Bay areas adjacent to Haleiwa. Additionally, construction methods should be detailed in the EIS along with discussions of the disposal site location(s) for excavated material.

An assessment of the macrofauna in the three major streams would be essential should the proposed construction plans require channel modifications and alterations. It would then be necessary to address the probable adverse impacts of this project upon the fisheries values of the three streams.

Investigations should address the impact of the proposed highway realignment on water-dependent agriculture such as lotus (hasu) in addition to taro which may be used by waterbirds. Alternate alignments outside of the proposed study corridor (mauka of Ukoa Pond) must be fully examined and evaluated from this standpoint as well.

Thank you for this opportunity to comment on your project.

Very truly yours,

SUSUMU ONO, Chairman
Board of Land and Natural Resources
May 18, 1979

The Honorable Susumo Ono
Chairman
Board of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ono:

Subject: EIS Preparation Notice for the Kamuela Highway Realignment, Weed Junction to Halelua Beach Park

Thank you for your letter of April 12, 1979. As requested, we will conduct an archaeological reconnaissance survey of the project area. This data will be presented in the EIS.

We are aware of the water wells you mention, and are laying out the alternative alignments to avoid them. The EIS will present information on the aquatic life found in the project area, and will evaluate the potential impacts to fish and wildlife. We are also aware of the taro and lotus farming activities in the area, and will be avoiding them.

Very truly yours,

[Signature]

James R. Carroz

March 16, 1979

The Honorable Ryokichi Higashionna
Director
Department of Transportation
State of Hawaii
Honolulu, Hawaii

Dear Dr. Higashionna:

Subject: EIS Preparation Notice - Kamuela Highway Realignment, Weed Junction to Halelua Beach Park, Project No. F-083-1(5)

We have no comments to offer at this time but would appreciate the opportunity to review the EIS document when prepared.

Sincerely,

[Signature]

Hideto Kondo

MEMORANDUM

TO: Department of Transportation

FROM: Franklin Y. K. Sunn, Executive Director

SUBJECT: Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. P-083-1(5), Environmental Impact Statement Preparation Notice

The Hawaii Housing Authority has reviewed the subject Environmental Impact Statement and has no comments to offer.

Thank you for allowing us the opportunity to review the E.I.S.

Executive Director

March 16, 1979

MEMORANDUM

TO: Ryokichi Higashionna, Director Department of Transportation

FROM: Richard L. O'Connell, Director Office of Environmental Quality Control

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR KAMEHAMEHA HIGHWAY REALIGNMENT, WEED JUNCTION TO HALEIWA BEACH PARK, OAHU

We appreciate the opportunity to participate in the environmental consultation process for the subject project. Unfortunately, we are not always available to accommodate every request for consultation we receive. We will, however, plan to participate in the review of the EIS when it is officially filed with the Environmental Quality Commission for public review.
March 14, 1979

Mr. R. Higashionna, Director
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Higashionna:

SUBJECT: EIS PREPARATION NOTICE OF KAMEHAMEHA HIGHWAY REALIGNMENT, WOOD JUNCTION TO HALEIWA BEACH PARK, HALEIWA, OAHU

The subject preparation notice was transmitted to us by the Office of Environmental Quality Control for publication in the EQC Bulletin. The notice of determination will be published on March 23, 1979.

We ask that for proper administrative procedure, notices of determinations prepared in compliance with Chapter 343, HRS requirements be filed with the Environmental Quality Commission.

Further, please be advised that contrary to the statement in paragraph two of the transmittal notice, the period for making written comments regarding the environmental effects of the proposed action is thirty (30) days from the receipt of the proposing agency's written request for comments (EIS Regulation Section 1:41(h)). Note also that the period for requests to be a consulted party in the preparation of the EIS is thirty (30) days from the date the preparation notice is published in the EQC Bulletin (EIS Regulation Section 1:31(d)).

We hope this clarifies Chapter 343, HRS procedural requirements in regard to your transmittal to us of the subject preparation notice. However, should you have any questions on this matter, feel free to contact us. Your cooperation in the Environmental Impact Statement process is greatly appreciated.

Sincerely,

Ken Takashashi
Executive Secretary
Mr. Ryokichi Higashionna
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Higashionna:

Subject: Kamehameha Highway Realignment
Weed Junction to Haleiwa Beach Park
Project No. F-083-1(5)
Environmental Impact Statement
Preparation Notice

We have reviewed the Environmental Impact Statement
Preparation Notice for the Kamehameha Highway Realignment,
Weed Junction to Haleiwa Beach Park, and have no comments.

Thank you for forwarding the preparation notice for
our perusal.

Very truly yours,

Barry Chung

March 22, 1979

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

Dear Mr. Moriguichi:

Subject: EIS Preparation Notice for the
Kamehameha Highway Realignment
Weed Junction to Haleiwa Beach Park

Thank you for your letter of March 21, 1979. Our
response to your comments are as follows:

1. The EIS will be prepared according to the format
developed by the Federal Highway Administration.
These guidelines are in compliance with the EPA
guidelines.

2. The EIS will summarize public input into the project
to date and will relate the proposed action to
this point.

3. The EIS will provide a thorough analysis of
the population projections used for the traffic
assignment.

4. We are aware of the Department of Land Utilization's
plans and will continue to coordinate with them.

5 & 6. The EIS will address all impacts to agricultural
activity in the project area. We are working closely
with the Waihana Sugar Company to insure minimal
disruption of their activities. The alternative
alignments being considered will not affect any
areas of current lotus farming.

Very truly yours,

James R. Carras
March 19, 1979

Dr. Ryokichi Higashionna, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna:

EIS Preparation Notice
Kamehameha Highway Realignment
Weed Junction to Haleiwa Beach Park
Project No. F-083-1(S)
LT-PA 2,49735

We have reviewed the above EIS Preparation Notice and offer the following comments.

In general, the Preparation Notice identifies all the major impacts which might occur as a result of the proposed highway realignment.

We are particularly pleased that major emphasis will be given to visual and aesthetic impacts of the project. In this vein, we hope that undergrounding of utilities will be considered.

However, we feel two areas did not receive sufficient emphasis.

1) Potential growth of the Haleiwa-Waialua area which could be encouraged by the proposed highway realignment; and

2) Consideration of the Oahu Development Plans for the area currently being prepared by the Department of General Planning.

We would like to remind you that portions of the proposed highway corridor are within the Special Management Area. Therefore, a Shoreline Management Permit will be required for the project under Ordinance No. 4529.

Should you have any further questions on this matter, please call Mr. Scott Ezer of our staff at 523-4077.

Very truly yours,

Tyrone T. Kubao
Director of Land Utilization

TTK:sl
Cc: Mayor
Mr. Wallace Miyahira
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Miyahira:

Subject: EIS Preparation Notice for the Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park

Thank you for your letter of March 15, 1979. As requested, we will coordinate our plans for stream crossings with your Department.

Very truly yours,

Ryokichi Higashionna
Director, Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813
Mr. Robert R. Way, Director
Department of Transportation
Services
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Way:

Subject: EIS Preparation Notice for the
Kamehameha Highway Realignment,
Weed Junction to Haleiwa Beach Park

Thank you for your letter of April 3, 1979. Your information
on the bus service is appreciated. As noted in the subject
EIS Preparation Notice, the proposed project will benefit bus
transportation and other public services by reducing congestion.

Very truly yours,

James R. Carras

Mr. Ryokichi Higashionna, Director
State Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Higashionna:

SUBJECT: Kamehameha Highway Realignment
Weed Junction to Haleiwa Beach Park
Project No. F-083-1(5)
Environmental Impact Statement
Preparation Notice (LT-PA 2.49735)

We have reviewed your proposed project and have no
objections, provided, that access to Emerson and Opaeka'a
Roads is maintained to the mauka side of the by-pass.

Very truly yours,

BONIFACE K. AIU
Fire Chief

BKA:JAF:1hc
Subject: EIS Preparation Notice for the Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park

Thank you for your letter of March 23, 1979. Access to Emerson and Opaekua Roads will not be restricted by the proposed project.

Very truly yours,

James R. Carneah

Mr. Boniface K. Aiu
Fire Chief
Fire Department
City and County of Honolulu
1655 South Beretania Street
Room 305
Honolulu, Hawaii 96813

Dear Mr. Aiu:

Ryokichi Higashionna, PhD, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna:

Subject: Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. P-083-1(5), Environmental Impact Statement Preparation Notice

This department has reviewed the proposed Kamehameha Highway Realignment. We find that the proposal has a positive effect on police operations; e.g., alleviate traffic congestion in the business section of Haleiwa town and quicker response time for emergency vehicles.

We hope this information will be of assistance to you.

Sincerely,

Francis Keala
Chief of Police

Harold Falk
Deputy Chief of Police
May 18, 1979

Mr. Francis Keala
Chief of Police
City and County of Honolulu
1455 South Beretania Street
Honolulu, Hawaii 96814

Dear Mr. Keala:

Subject: EIS Preparation Notice for the Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park

Thank you for your letter of March 30, 1979. We appreciate your information on the benefits of the proposed project with regard to police operations.

Very truly yours,

[Signature]

James R. Carras
for Ryokichi Higashionna

Ryokichi Higashionna, Ph.D.
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

March 20, 1979

Dear Dr. Higashionna:

Subject: LT-PA 2.49735

Thank you for the opportunity to comment on the Environmental Impact Statement Notice of Preparation for Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. F-083-1(S).

We have reviewed the subject Environmental Impact Statement Notice and find that the project does not appear to have any adverse impact on Gasco, Inc.

Very truly yours,

[Signature]

Francis T. Tanaka
Manager of Environmental Affairs
Mr. Ryokichi Higashionna
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Higashionna:

Subject: Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Project No. F-083-1(5), Environmental Impact Statement Preparation Notice

I am writing in response to your request for comments on the EIS Preparation Notice for the Kamehameha Highway Realignment Project. A substantial portion of our Waiawa-Kahuku 46 kv circuit will be affected by the proposed project. This circuit provides the major source of power along the North Shore on Oahu. The line is now located on perpetual easements; therefore, any relocation of the lines due to the project will be funded 100% by the State under the provision of a civil suit. If substitute perpetual easements cannot be obtained from private property owners, generally parallel to the present alignment alongside the new highway right-of-way, Hawaiian Electric Company will either have to condemn in order to obtain the easements or be allowed to relocate the lines to within the new highway right-of-way.

In addition, the Wahiawa to Waimea 46 kv circuit crosses the right-of-way of the proposed project near the western end of the highway and, therefore, may require relocation. Hawaiian Electric also has a perpetual easement in this area and the State would be required to bear 100% of any relocation cost.

At the eastern end of the new highway alignment near its intersection with the old Kamehameha Highway, distribution circuits on Kamehameha Highway may also require relocation. This work would probably be accomplished by cost sharing under the provisions of HRS 264-3.

Thank you for the opportunity to comment on the EIS Preparation Notice. If you have any questions, please do not hesitate to call me at 548-6880.

Yours truly,

Dr. John C. McCain, Manager
Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Dr. McCain:

Subject: EIS Preparation Notice for the Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park

Thank you for your letter of April 3, 1979. We appreciate the information you have provided regarding your electrical circuits and easements. You may be assured that we will coordinate our plans with you to avoid any conflict.

Very truly yours,

Ryokichi Higashionna
Dear Mr. Higashionna,

Hawaiian Telephone Company Cable Facilities

Hawaiian Telephone Company’s equipment building is located at the mauka, Kamea Point corner of Waialua Beach Road and Haleiwa Beach Road. There are two feeder cable routes from this office that pass the proposed project area. One route runs east along Waialua Beach Road to Weed Junction then north along Kam Highway to Anahulu Place. The feeder cables along Kam Highway on this route are outside the project area and will not be disturbed. However, the distribution cables along Paluhi Road and Emerson Road will be affected. These distribution cables are small and the cost of relocating them should be minimal if they can be reconstructed to cross over the new highway close to its present location.

The second cable route runs north along Haleiwa Beach Road, meets Kam Highway near Anahulu Stream, then runs north along Kam Highway to Waialua, Waimea and Sunset Beach. The feeder cable on this route, especially near Waialua Beach Park, and a distribution cable along Lokoma Place will be close to the proposed construction and may be affected by the project.

We have reviewed your Environmental Impact Statement, Preparation Notice, and have comments as follows:

Joint Trunking System Cables

Joint Trunking System (JTS) cables are U.S. Government military communication cables which are maintained by HTCo. One of these cables is buried on the mauka side of Kam Highway and may be affected near Waialua Beach Park where the proposed highway connects to Kam Highway. The location of this cable is shown in green on the attached map.

Future Land Use

An open wire facility along Kam Highway near the traffic "rotary" at Weed Junction may also be affected. These locations, where HTCo’s facilities may be affected, are shown in red on the attached map.

Impact on the Environment

Hawaiian Telephone Company does not foresee any adverse effects on the environment resulting from our work requirements.

If we can be of further assistance please call Mr. G. Kaneko at 836-6121.

Sincerely, [Signature]

Hawaii Telephone Company

April 24, 1979

Page Two
Subject: EIS Preparation Notice for the Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park

Mr. Merl W. Hawthorne
Chairman
North Shore Neighborhood Board No. 27
P. O. Box 697
Haleiwa, Hawaii 96712

Dear Mr. Hawthorne:

Thank you for your letter of March 30, 1979. We are in the process of refining the alternate alignments. Your comments regarding aesthetics and noise impact are appreciated.

Very truly yours,

James R. Carres

Mr. RYOKICHI HIGASHIONNA, DIRECTOR

Subject: Kamehameha Highway Realignment - Weed Junction to Haleiwa Beach Park

Project No. 1-083-1 (5)

Dear Mr. Higashionna:

The North Shore Neighborhood Board has reviewed the Environmental Impact Statement Preparation Notice forwarded with your letter of March 12, 1979. We concur in the need for the proposed project and agree on the alignment study corridor proposed.

We have listened to presentations on various routes and at this time are favorably impressed with the most makai alignment since it appears to offer the least objections to the Malualu Sugar Co., one of our constituents and the one over whose land the bypass road is to be installed. Of the numerous environmental design constraints listed, we are particularly concerned with the aesthetic impact and the impact of noise on adjacent areas. The other environmental design constraints appear to apply equally to each of the alternate routes but we agree they should be explored.

Please be assured of our desire to be kept informed on the progress of this project and willingness to cooperate in your efforts.

Yours very truly,
Ryokichi Higashionna  
State of Hawaii  
Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813

March 26, 1979

Dear Mr. Higashionna:

The Waialua Community Association appreciates your information concerning the ENVIRONMENTAL IMPACT STATEMENT, PREPARATION NOTICE on the RANCHO HANA HIGHWAY REALIGNMENT, WEEF JUNCTION TO HALEIWA BEACH PARK, Project Number F-003-1(5). (LT/PA 2.49735, reference number.) The Waialua Community Association, in a united community effort, supports the concept of the Rancho Hana Highway Realignment.

The Association agrees that the proposed project will decrease the traffic congestion in Haleiwa Town. We are concerned with several areas that could adversely impact our community. These areas of concern are briefly outlined as follows:

1. Prime Agricultural Land. We realize that the proposed route necessitates the use of prime agricultural land, but we prefer such use be minimal. We concur with the proposed route developed by the Waialua Sugar Company which minimizes the use of agricultural land by routing the highway through two existing gravel areas. The Waialua Sugar Company will be submitting its proposals to your office.

2. Other Agricultural Land. We are concerned with the disruption of other agricultural lands where taro and husu can be grown.

3. Haleiwa Town. Noise and pollution caused by the realignment could have an adverse effect on Haleiwa Town, both business and residential areas. We would prefer a route further away from the town that would have a minimal effect.

4. Aesthetic Impact. There is concern in the community about the visual impact of a bridge over Nahulu Stream. A preferred route would be one where the newly constructed bridge would not be seen from Nahulu Bridge.

The Environmental Impact Statement Preparation Notice seems to be a comprehensive proposal that addresses all areas of concern of the Waialua Community Association.

Sincerely yours,

Laura Bolles  
Vice President

Jacob Y.L. Ng  
President
Ms. Laura Rolles, Vice President
Waialua Community Association
P.O. Box 604
Waialua, Hawaii 96791

Dear Ms. Rolles:

Subject: EIS Preparation Notice for the Kamehameha Highway Re-alignment

Thank you for your letter of March 26, 1979. We greatly appreciate your support of the project's concept. Our ongoing alignment studies are taking advantage of the excellent community input we have received, and we are confident that the various concerns can be handled to everyone's satisfaction.

We are evaluating an alignment through the rock outcrops, and it does appear to offer a good compromise. We are also taking into consideration taxo and basu plots and will attempt to avoid wetland areas.

We are evaluating an alignment across the bend in the Anahulu River, in terms of engineering feasibility and visual impact.

The EIS will evaluate the noise and air quality impacts of the alternative alignments.

Your cooperation in our planning efforts has been very helpful.

Very truly yours,

James R. Carras

Waialua Sugar Company, Inc.
P.O. Box 665
Waialua, Hawaii 96791

May 31, 1979
Mr. F. C. Gross, Director
Civil Engineering and
Environmental Standards
Waialua Sugar Company, Inc.
P.O. Box 605
Waialua, Hawaii 96791

Dear Mr. Gross:

Subject: EIS Preparation Notice for the
Kamehameha Highway Realignment
Weed Junction to Haleiwa Beach Park

Thank you for your letter of March 28, 1979. Your endorsement of the proposed project is appreciated.

We are presently evaluating an alignment through the two waste areas, and it appears to offer a viable compromise. Your comments regarding alignments farther mauka will be considered and evaluated in the EIS.

As in the past, we will give you frequent opportunity for input on our plans with regard to the cane haul roads and irrigation system.

Very truly yours,

James R. Carras

May 31, 1979

Mr. Douglas Orimoto
Department of Transportation
Land Transportation Facilities Division
Planning Branch, Room 301
600 Kapahulu Boulevard
Honolulu, Hawaii 96813

Dear Mr. Orimoto:

Thank you for sending us a copy of the Environmental Impact Statement Preparation Notice for the proposed realignment of Kamehameha Highway between Weed Junction and Haleiwa Beach Park. As I indicated in my letter to you, we are consultants to a number of landowners in the North Shore area and want to make sure that we keep abreast of the Department of Transportation's plans in that region.

There are a number of questions and/or topics related to the proposed realignment that we believe should be addressed in the EIS, and they are stated very briefly below.

1. Project Justification. From the EISPN, it appears that the justification for the proposed project is based largely on the present and expected levels of weekend traffic. We would like to see the detailed analysis supporting this conclusion, including the specific weekend traffic counts that were used. Is it the Department of Transportation's general policy to base decisions regarding highway widening and realignment on peak traffic periods regardless of whether they occur during the normal weekday rush hour or on weekends? Is there an exception being made in this case? If so, why?

2. Other Bottlenecks. How do the traffic flow/capacity and accident situations at Haleiwa compare with those at other bottlenecks, especially Waimea Bay? How will highway improvements at Haleiwa affect traffic flow past Waimea Bay? Are highway improvements planned for that location as well as at Haleiwa? If so, what would they consist of and when would they be made? In particular, will the changes referred to in a 1975 memorandum from E. Alvey Wright to the Office of the Governor (Reference HWY-72/24960) be implemented within the foreseeable future?
3. Regional Population Growth. The EISPW notes that the project would probably "... promote North Shore growth." We would very much like to see the growth estimates quantified. I presume this has already been done during the preparation of the traffic projections on which the need for the project is partially based, and it would be helpful if you could send us a copy of the growth patterns on which the traffic projections are based.

4. Effect On Agriculture. I believe the realignment could affect lands designated by the Department of Agriculture as being of agricultural importance to the State. Will the removal of some 40 to 45 acres of prime agricultural land have a significant detrimental effect on agriculture on Oahu?

5. Secondary Growth Effects. In specific terms, how will the population growth induced by the proposed project affect the semi-rural lifestyle that now prevails on the North Shore? Can either the magnitude of the increase or the type of people who would be attracted to and/or retained in the area as a result of the project be expected to significantly alter the existing situation? If so, how? What evidence is there that supports these conclusions?

Thank you very much for your attention to these questions. The information you provide will be of great help to us in advising our various clients. If any clarification of the points listed here is needed, please call me at 521-5361.

Sincerely,

Perry J. White

cc: Office of Environmental Quality Control

Mr. Perry J. White
Belt, Collins & Associates
514 Hawaii Building
745 Fort Street
Honolulu, Hawaii 96813

May 24, 1979

Mr. Perry J. White:

Subject: EIS Preparation Notice for the Kamehameha Highway Realignment
Weed Junction to Haleiwa Beach Park

Thank you for your letter of April 12, 1979. The questions you have raised are important ones, and will be addressed in the EIS. Our specific responses follow:

1. The nationally accepted criteria for design volume is the 30th highest hourly traffic volume, which in the present case falls on a weekend. However, the proposed project is also justifiable using peak week-day traffic, since congestion such as found at almost all hours through Haleiwa is highly undesirable. The EIS will present our traffic projections and supporting data.

2. Haleiwa is, at present, the most critical segment on the North Shore due to the high volume of through traffic mixed with local traffic movement. The proposed project will improve circulation in and around Haleiwa by separating these movements. The proposed project involves only Haleiwa. Plans for improvements in the vicinity of Waiman Bay are beyond the scope of this project.

3 & 5. The EIS will thoroughly address the growth issue.

4. The impact to agricultural lands will be covered in the EIS.

Very truly yours,

James R. Carras

Ryokichi Hipasihena
Mr. Doug Orlmoto
State of Hawaii Dept. of Transportation
Planning Department

Dear Mr. Orlmoto,

In response to the Environmental Impact Statement preparation notice for the Ka4neha-Kalama alignment (Weed junction to Haleiwa Beach Park) EF-083-15, we would like to state that we agree in theory to the project. However there are some important factors that need to be addressed.

Specifically;

How are the accesses to the proposed by-pass from Waialua and Kahuku to be situated? We would strongly recommend that the access be designed in such a way as to promote the Haleiwa business district. Also that signage be placed to promote the area. (i.e. directional signs reading "Historic Haleiwa Town" and "Kawela by-pass"). This would provide for residents, who are going to be the primary users of the by-pass, while still promoting the business district as a place for tourist and residents to do their shopping.

We would like to see a detailed study done on the economic impact that this proposed by-pass would have on all forms of business in Haleiwa. If your projections are correct and 50% of the traffic would be rerouted that would affect all forms of business and not just the tourist related ones.

Finally, what would be the overall impact on the North Shore in regard to future land use? Would the future of Haleiwa as a business community be threatened by easier access to areas that are not presently developed? What could be done to forestall such development?

We would appreciate being kept up to date on the study and allowed to comment and make suggestions regarding this project.

The future of the Haleiwa area depends heavily on a strong economic business community. To develop ways to insure the quality of life and to improve it for residents and businesses is of primary concern to us, as we are sure it is to you.

We await further study and developments.

Sincerely,

Gary A. Powell
secretary North Shore Business and Professional Association
P.O. Box 606, Haleiwa, HI 96712

---

Mr. Gary A. Powell, Secretary
North Shore Business and Professional Association
P. O. Box 606
Haleiwa, Hawaii 96712

Dear Mr. Powell:

Subject: EIS Preparation Notice for the Ka4nemaha Highway Realignment
Weed Junction to Haleiwa Beach Park

Thank you for your letter which we received on April 9, 1979. Our response to your comments are as follows:

Access. The intersections at either end of the project will be designed to channel through traffic to the new highway segment. However, ample left and right turn pockets will be provided to simplify access to Haleiwa. These turn-offs will be clearly signed and lighted.

Economic Impacts. Our social, economic and environmental consultant, VTN Pacific, will be evaluating the potential effects of the proposed project on the economy of Haleiwa. They will be contacting you in the course of their study.

Land Use. The EIS will examine this important issue; however, the scope of this project is to provide a bypass road for just Haleiwa town. Access to and through Haleiwa will be improved. Improvement of access beyond the limits of the project will be limited to the existing two-lane roadway.

Very truly yours,

James R. Carras
B. DRAFT EIS MAILING LIST AND RESPONDENTS
(The Draft EIS was published on May 8, 1980)

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Department of General Planning  5/12/80
Department of Housing and Community Development  5/12/80
Department of Land Utilization  4/30/80
Department of Parks and Recreation  5/15/80
Department of Public Works  4/30/80
Department of Transportation Services  5/15/80
Neighborhood Commission
Office of the Mayor
Police Department
Fire Department

4. ORGANIZATIONS
Alliance of North Shore Associations
American Lung Association
Bishop Museum
Conservation Council
Haleiwa Businessman's Association
Haleiwa Community Association
Hawaii Audubon Society
Hawaiian Electric Company
Hawaiian Historical Society
Hawaiian Telephone Company  5/14/80
Hawaii Sugar Planters Association
Life of the Land  6/3/80
North Shore Business and Professional Association  6/24/80
North Shore Neighborhood Board No. 27  6/24/80
Pacific Resources, Inc.  4/29/80
Sierra Club
Sunset Beach Community Association
The Outdoor Circle
Waialua Community Association
Waialua Sugar Company  6/9/80

5. LIBRARIES
Hawaii State Library, Main Branch
Waialua Library
University of Hawaii (Sinclair and Hamilton)
DPED Library
Municipal Library
State Archives
Legislative Reference Bureau

6. NEWS MEDIA
Honolulu Advertiser
Honolulu Star Bulletin
North Shore Community Review
June 2, 1980

Mr. Ralph T. Segawa
Division Administrator
U.S. Department of Transportation
Federal Highway Administration
P.O. Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

The Council has reviewed your draft environmental impact statement (DES) for the Kamehameha Highway Realignment, Keahehikona to Kailua Beach Park, circulated for comment pursuant to Section 102(2)(C) of the National Environmental Policy Act. We note that the undertaking will affect properties which may be eligible for inclusion in the National Register of Historic Places. Circulation of a DES, however, does not fulfill your agency's responsibilities under Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320).

The Council staff, in reviewing the DES, commend the preparers of the document for their efforts to survey and identify the cultural resources which are significant not only from a scientific standpoint, but also from the less tangible aspect of cultural attitude. In the area of cultural resource management, the staff believes that the selection of alternative "C" appears to avoid impact of the sites surveyed. Our office also encourages your office to consider, in consultation with the State Historic Preservation Officer (SHPO), measures which recognize and protect the cultural significance of Laie Fishpond, the agricultural terraces, sites 1439, 1440, and 1442 (Emerson Homestead).

Finally, the staff suggests that a multiple resource National Register district be considered for the project area. Such a district would recognize the cultural diversity of the resources which are found in close proximity to each other. It would also provide your office and the SHPO with a means of addressing cultural resource mitigation from the collective standpoint of a district and not on a site by site basis.

Prior to the approval of the expenditure of any Federal funds or prior to the granting of any license, permit, or other approval for an undertaking, Federal agencies must afford the Council an opportunity to comment on the effect of the undertaking on properties included in or eligible for inclusion in the National Register of Historic Places in accordance with the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800). Until these requirements are met, the Council considers the DES incomplete in its treatment of historical, archeological, architectural, and cultural resources. You should obtain the Council's substantive comments through the process outlined in 36 CFR Sec. 800.9. These comments should then be incorporated into any subsequent documents prepared to meet requirements under the National Environmental Policy Act. Mr. Robert Fink may be contacted at (303) 234-4946, extension number, for further assistance.

Sincerely,

Louise D. Hall
Chief, Western Division of Project Review
A. Alternate C has been recommended as the preferred alternate.

B. Consultation with the SHPO has been pursued, and he concurs that Alternate C will not endanger the cultural significance of the identified sites (see page V-3).

C. Your suggestion of a multiple resource National Register district will be forwarded to the SHPO's office for their consideration.

D. Since the identified properties or sites of actual or potential historical significance are not affected by the preferred bypass Alternate C, Section 106 of the National Historic Preservation Act does not apply.

NO EVALUATION REQUIRED
May 21, 1980

Mr. Ralph Segawa
Division Administrator
Federal Highway Administration
P. O. Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

Subject: Draft EIS - Kamehameha Highway Realignment
PAP Route 83, Weed Junction to Haleiwa Beach Park

We have reviewed the subject draft EIS and note that you have addressed the issue of losing prime and other important agricultural lands as a result of installing any one of the proposed alternatives. We have no other comment to offer on this draft.

Thank you for the opportunity to review this document.

Sincerely,

JACK P. KAHALII
State Conservationist

June 23, 1980

Mr. Ralph Segawa
Division Administrator
Federal Highway Administration
U.S. Department of Transportation
P.O. Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

This is in reference to your draft environmental impact statement entitled "Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park, Hawaii." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving three (3) copies of the final statement.

Sincerely,

Bruce R. Barrett
Acting Director, Office of Environmental Affairs

Enclosure Memo from: Robert D. Rollins
National Ocean Survey
National Oceanic and Atmospheric Administration
TO: PP/EC - Joyce M. Wood
FROM: OA/C5 - Robert B. Rollins
SUBJECT: DEIS #8004.38 - Haleiwa Bypass Island of Oahu, Hawaii

The subject statement has been reviewed within the areas of the National Ocean Survey's (NOS) responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

2A. If any geodetic control survey monuments are encountered, NOAA will be given at least 90 days notification. The cost for relocation will be included in the construction budget.

Attachment
DEIS #8004.38 (File Copy)
I
3A
3B

3A

3B

Dear Mr. Segawa:

We have reviewed your Draft Environmental Impact Statement (DEIS) for the "Kamehameha Highway Realignment, Weed Junction to Hailua Beach Park" forwarded to us by your agency on 18 April 1980. We have prepared the following comments for your consideration.

3A The proposed project does not affect any U.S. Army Corps of Engineers projects. A Department of the Army (DA) permit may be required for the stream crossings and the crossing over the outlet of Ukaa Pond marsh pursuant to Section 404 of the Clean Water Act of 1977. As the DEIS does not provide specific bridge (or alternate crossing) details, we suggest that plans and design drawings be submitted for our review as soon as possible so that we may determine the need for a DA permit. In addition, information which identifies the work to be performed in the streams, the type and quantity of fill to be used, the source of the fill material, the presence or absence of toxic materials in the fill (in accordance with EPA regulations 40 CFR 230.4), the erosion controls to be implemented to prevent any fill from being washed into the streams or adjacent wetland, and the measures being taken to prevent the disruption of the natural migratory movements of aquatic fauna in the streams, should be provided.

3B Line 10 of paragraph 1 on page IV-9 states that "... require the placement of fill in the floodway, ..." If the proposed revisions to the

Honolulu City and County Comprehensive Zoning Code are adopted as planned (by 3 September 1980), no fills will be permitted in the floodway. We appreciate the opportunity to respond to your DEIS.

Sincerely,

[Signature]

Chief, Engineering Division
DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY SUPPORT COMMAND, HAWAII
FORT SHAFTER, HAWAII 96855

APZU-EN-E

23 JUN 1980

US Department of Transportation
Federal Highway Administration
P.O. Box 50706
Honolulu, Hawaii 96850

Gentlemen:

The Draft Environmental Impact Statement (DEIS) for the Kamehameha Highway Realignment from Wood Junction to Kahuku Beach Park has been reviewed. As stated in the DEIS, traffic congestion occurs on weekends and is caused by visitors from Honolulu. The Army occasionally uses that portion of Kamehameha Highway to gain access to the Kahuku Training Area. However, Army use of the highway is primarily on weekdays and we do not expect it to be affected by the proposed project.

Thank you for the opportunity to comment on the DEIS. We look forward to receiving a copy of the final document.

Sincerely,

PETER G. STEARNS
COL, EN
Director of Engineering and Housing

NO EVALUATION REQUIRED
Mr. Ralph T. Segawa, Division Administrator
U.S. Department of Transportation
Federal Highway Administration
Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

Subject: Hawaii F-083-1(5), Draft Environmental Impact Statement, FHWA-HI-EIS-80-01-D,
Kamehameha Highway Realignment, West Junction to Haleiwa Beach Park

The proposed realignment of Kamehameha Highway that would bypass the town of Haleiwa was reviewed for its impact on HUD programs and projects in the area.

We find that the proposed action will not have an adverse impact on HUD activities in Haleiwa, however, we would appreciate receiving a copy of the Final EIS.

Sincerely,

Frank L. Johnson
Community Planner

NO EVALUATION REQUIRED
Division Administrator  
Federal Highway Administration  
U.S. Department of Transportation  
P.O. Box 30206  
300 Ala Moana Boulevard  
Honolulu, Hawaii 96850

Dear Mr. Segalla:

The Department of the Interior has reviewed the Draft Environmental Impact Statement, for Hanauma Bypass, Kamehameha Highway Realignment from Sea Junction to Hanauma Beach Park, Oahu, Hawaii (ER-80/406) and offers the following comments.

General Comments

Preparation of a Section 4(f) statement may be appropriate for the proposed project because of potential adverse impacts on the Emerson Homestead Historic Site. The proposed project may also involve the taking of proposed park lands in the Anahulu River area.

Since fishing and nesting habitat for the Hawaiian gallinule and feeding habitat for the Hawaiian stilts, both endangered species, are involved in the project area and a biological opinion has been issued by the Fish and Wildlife Service, these aspects should be fully covered in the Final EIS. Of particular concern is Alternate D which would eliminate up to 3.5 acres of wetland habitat used by both endangered species and which would not appear to meet the requirements of Executive Order 11990 (Protection of Wetlands).

We are pleased to note that bridge piers, rather than permanent fills, would be used where the proposed highway crosses existing streams and wetland areas. Piers would be constructed on either side of existing channels to ensure that normal stream flows are unrestricted and to permit unimpeded migration of diadromous aquatic fauna.

However, we are still concerned that temporary fills, if necessary for highway bridge construction, could restrict flows through the outlet of Uko'a Marsh. The backwater created thereby could have serious adverse impacts on nesting gallinule, due to inundation of nests, especially during the peak nesting season from March through September. Measures must be taken to avoid these impacts during this critical period.

Specific Comments

Cultural Resources

4D The conclusion that no direct impact on the Emerson Homestead will result from any of the proposed alternatives (Page IV-41) is subject to question. Figures 14A, B and C depict the boundary of the Historic site in relation to the alternate Emerson Road Connector proposals. Alternate A would clearly involve taking of a portion of the site for highway construction. Alternate C may result in a significant increase in noise and pollution levels at the Historic site due to the proximity of the highway corridor. Selection of Alternate C for the proposed project would likely require the preparation of a Section 4(f) Statement and approval by the Secretary of Transportation for taking of a portion of the Emerson Homestead Site, considered eligible for the National Register of Historic Places.

Recreational Resources

4E Figure 24, the Detailed Land Use Map for the North Shore Neighborhood, indicates that a portion of the Anahulu River Area is zoned for future park development. The City and County of Honolulu Department of Parks and Recreation has indicated that improved utilization of existing parks and improved traffic circulation in the area is more important than loss of potential park lands. Development of the park lands in the Anahulu River area is not contemplated in the near future.

4F We suggest that the Department of Parks and Recreation be included in the corridor selection process to minimize loss of potential park lands.

4G Page IV-19 cites improved bicycle travel in the Haulua area as a direct beneficial impact of project completion. We suggest that inclusion of recreational facilities, such as bike-bikeways or rest areas, be evaluated for addition to the proposed project.

Fish and Wildlife Resources

4H In accordance with Section 7 of the Endangered Species Act of 1973, as amended, the Federal Highway Administration initiated formal consultations with the U.S. Fish and Wildlife Service regarding the proposed realignment of Kamehameha Highway from Wood Junction to Hanauma Beach Park. On May 23, 1980, the Service rendered its biological opinion on the impacts of the proposed project on Federally-listed endangered species which inhabit Uko'a Marsh and adjacent wetlands.
Although this opinion was not issued prior to publication of the Draft Environmental Impact Statement, it serves as the basis for recommendations which the Service deems necessary to avoid adverse impacts on these species, particularly the Hawaiian gallinule (Cellulina chloropus sandvicensis). This document should be included as an appendix to the Final Environmental Impact Statement, and the recommendations therein addressed in the body of the Statement.

Foremost of these is the recommendation that alignment Alternative D be eliminated from further consideration because of its greater potential for adverse impacts on endangered species habitat than either Alternatives A or C.

Alternative D would cross the outlet of Ukoa Marsh at a wider point than A or C and would pass in closer proximity to the marsh proper. In addition, it could result in the elimination of up to 2.3 acres of wetland habitat on the south bank of the Anahulu River, now cultivated in lotus and taro. This area is known to provide valuable feeding and nesting habitat for the Hawaiian stilts (Himantopus sandvicensis knudseni). As described in Chapter V (Approvals and Clearances) of this FEIS. The USFWS Biological Opinion on this project is included in the Final Environmental Impact Statement. The State Historic Preservation Office has also concurred that site 1442 will not be directly or indirectly (e.g. noise) affected by the recommended Alternate C. A driveway and a row of houses, a distance of 130 feet, separates site 1442 from the proposed roadway (see Figure 14A, page 11-14). The State Historic Preservation Office has also concurred that site 1442 will not be affected. Secondly, the area designated for park use at the Anahulu River as shown on the Detailed Land Use Map (Figure 24) will be greatly reduced when the Development Plan Map (Figure 25) is adopted by the City and County of Honolulu. When this occurs, none of the alters will affect existing or proposed park lands. For these reasons, a Section 4(f) Statement is not justified for this project.

A. The site boundaries indicated for the "Emerson Homestead" on Figures 14A, B, and C of the DEIS were informally proposed by the State Department of Land and Natural Resources prior to conducting a thorough site or archival research. Consequently, these recommendations were included in the body of the Final Environmental Impact Statement. The State Historic Preservation Office has also concurred that site 1442 will not be affected. Secondly, the area designated for park use at the Anahulu River as shown on the Detailed Land Use Map (Figure 24) will be greatly reduced when the Development Plan Map (Figure 25) is adopted by the City and County of Honolulu. When this occurs, none of the alternates will affect existing or proposed park lands. For these reasons, a Section 4(f) Statement is not justified for this project.

B. The USFWS Biological Opinion on this project is included in Chapter V (Approvals and Clearances) of this FEIS. The endangered waterbirds and their habitat are discussed on pages III-10 to 13 and on pages IV-6 to 8. Alternate D is no longer being considered.

C. Surface flow out of Ukoa Marsh is controlled by a weir at the Loko Ea fishpond, and by the dense aquatic vegetation in the lengthy outlet channel. Under these existing conditions, a backwater effect will occur from a major storm. When temporary fill is placed in the channel during construction, culverts will be provided to accommodate storm flows. However, backwater from the remaining vegetation clogged channel is still likely. Correction of this problem is beyond the scope of this project. The changes in the channel resulting from removal of the fill will be so minor as to have virtually no effect on its hydraulic behavior.
4D. With respect to the "boundaries" of the Emerson Homestead site, refer to the evaluation of comment A. The noise level at Site 1442 resulting from Bypass Alternate C will not exceed 65 dBA. For these reasons, we feel that the conclusion is still valid that there will be no impact on the Emerson Homestead. Therefore, a Section 4(f) Statement is not justified in this case.

4E. Refer to the evaluation of Comment A.

4F. The City and County Department of Parks and Recreation, and the State Division of Parks were consulted prior to circulation of the DEIS (see pages VI-1, 2, 10, 18, and 19), and were included in the DEIS mailing list (pages VI-34, 35). The City and County states that the project will not have any detrimental impact on their recreational facilities.

4G. Bicyclists will be able to utilize the paved shoulders of the Bypass. Hiking can not be promoted outside of the right-of-way since it passes through private property. Due to the relatively short length of the bypass and the proximity of Haleiwa with its parks and other amenities, rest areas are not justified.

4H. Alternate C has been selected, see evaluation of Comments B and C. The specific name of Likelike has been corrected. The reference to the marsh crossed by Alternate D has been revised.
U.S. Department of Transportation
Federal Highway Administration
Region Nine
Hawaii Division
Honolulu, Hawaii 96850

Gentlemen:

The Coast Guard has reviewed the Environmental Impact Statement on the Construction of Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park and has no objection to the plan or constructive comments to offer at the present time.

Sincerely,

Commander, U.S. Coast Guard
District Planning Officer
Fourteenth Coast Guard District
By Direction of the District Commander

Copy to: COMDT (G-WEP/7)

NO EVALUATION REQUIRED

We have reviewed the draft EIS for the Kamehameha Highway realignment, a proposed bypass around Haleiwa. We have the following comments:

Land Use Impacts: The final EIS should discuss actions which will be taken to control new highway-oriented commercial development at the southern end of the project, since such development might adversely impact the existing Haleiwa business district. If Alternative B is selected, consideration should be given to eliminating the intersection at Emerson Road in order to minimize new development in areas currently zoned for agricultural use.

Endangered Species Impacts: The final EIS should reflect the results of consultation with the Fish and Wildlife Service, including FWS’s biological opinion on the impacts of the project on the Hawaiian stilts, Hawaiian coki, and Hawaiian gallinules. These endangered water birds are found in the Uaina Marsh near the proposed project.

Permits: We note that the project will require both bridge permits and Section 404 permits. The final EIS should reflect coordination with the Corps and the Corps of Engineers. The recently signed Memorandum of Agreement with the Corps provides for close coordination with the Corps prior to EIS approval. The final EIS should indicate the general location and amount of fills and estimated construction grades.

Agricultural Lands: The proposed project will impact cane fields classified as prime and important agricultural lands. The selected alignment should minimize agricultural land taken by the project and leave unoccupied parcels (served from cane fields).

We appreciate the opportunity to review this draft EIS.
Dear Mr. Nishiohonna:

The Environmental Protection Agency (EPA) has received and reviewed the Draft Environmental Impact Statement (DEIS) titled HALEIWA BYPASS, KAMERAMEA HIGHWAY REALIGNMENT FROM HALEIWA TO HALEMA BEACH.

The EPA's comments on the DEIS have been classified as Category LO-2. Definitions of the categories are provided by the enclosure. The classification and the date of the EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal Actions under Section 309 of the Clean Air Act. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and the adequacy of the environmental statement.

The EPA appreciates the opportunity to comment on this DEIS and requests three copies of the Final Environmental Impact Statement when available.

If you have any questions regarding our comments, please comment Susan Sakaki, EIS Coordinator, at (415) 556-7850.

Sincerely yours,

[Signature]

[Name]
Director
Surveillance and Analysis Division

Enclosure

Air Quality Comments

51. The DEIS uses the same traffic volumes to predict air quality impacts for the "with bypass" and "without bypass" cases (page C-6). Traffic volumes are, however, likely to be greater in the "with bypass" because: (1) traffic volume will be restricted by capacity constraints for the "without bypass" case during peak hours; and (2) as congestion is relieved and traffic flow speeds are increased, new traffic will probably use the new facility. Traffic volume predictions should be reanalyzed in the Final Environmental Impact Statement (FEIS) in light of the above comments.

52. The DEIS does not address the impact of the proposed project on the Federal and State 8-hour lead concentrations and the quality standards.
5.1. The traffic projections include all anticipated growth in traffic to the North Shore. This same traffic volume was then applied to the "with" and "without Bypass" situations to obtain extreme worst case conditions. The Bypass is not anticipated to have significant impact on growth (see page IV-1). Capacity of the highway will still be constrained by the adjacent two lane sections. It is pointed out in several places in the DEIS (pages I-11, and C-7) that the projected volume for 2001 will probably never be reached. Since this figure is used for the air quality analysis, and the results indicate that CO concentrations exceed the standards at worst only four times per year, it can be concluded that air quality is not a critical concern. Improved air quality is a benefit of the project, but the somewhat inflated values used in this analysis are not presented as a justification for the project. The serious congestion through Haleiwa at the present time is the primary justification for the project.

5.2. The air quality assessment has been revised to include a discussion on 8-hour CO.
status as a consulted party for the subject project. If you have any questions, please call the Public Works Division at 548-5450.

Very truly yours,

HIDEO MORAKAMI
State Comptroller

6A. Emerson Road will be provided with an at-grade crossing at the Bypass, not an underpass.
Dear Mr. Segawa:


Although we have no comments to offer at this time, may we reconfirm our earlier comments contained in our letter of March 21, 1979 as cited on page VI-8 of the EIS document.

Thank you for the opportunity to review and comment on the subject Draft EIS.

Sincerely,

CHARLES C. CLARK
Superintendent

CC: HL-ji

cc: Central Oahu District
Dept. of Transportation
Mr. Ralph T. Segawa, Division Administrator
U. S. Department of Transportation
Hawaii Division
Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

SUBJECT: Kamehameha Highway Realignment
Need Junction to Haleiwa Beach Park
Comments on Draft EIS

The Department of Hawaiian Home Lands has reviewed the draft EIS on the subject project and has no comments, as the proposed action would not have any effects on the lands under our jurisdiction.

Thank you for the opportunity to review and comment on the proposed action.

Sincerely yours,

[Signature]

Georgiana K. Padeken
Chairman

cc: Office of Environmental Quality Control

NO EVALUATION REQUIRED
7A. A discussion of construction-related air quality impacts is included in the Final EIS on page IV-11.

Mr. Ralph T. Segawa
Division Administrator
Federal Highway Administration
Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

We have reviewed the Waiawa Bypass Draft EIS and find that the archaeological resources have been adequately addressed. We would like to note that if Alternate D is chosen, it would have an effect on Site 1441, a site likely to be eligible to the National Register of Historic Places based on the criteria set forth in 36 CFR 63 and 36 CFR 600. It is recommended that the U.S. Department of Transportation request an opinion, in writing, from the Secretary of the Interior respecting the eligibility of this site for inclusion in the National Register before any further determination of effect is applied, if this route is chosen.

The draft EIS adequately covers the concerns for Hawaii's endangered waterbirds found utilizing Ukoa Marsh except that there is no assurance that the bypass would not cause a change in the water level at Ukoa Marsh, such as clearing or widening the outlet, especially during the construction phase. Also, there was no mention of an alternate route that would entirely bypass Ukoa Marsh. As a reminder, it is not clear whether the U.S. Department of Transportation has met with the USFWS Endangered Species Office for consultation in accordance with the 1973 Endangered Species Act, a necessary procedure when Federal funds are to be used on a project that may affect endangered species or their habitat.

Very truly yours,

[Signature]

SUSUMU OHO, Chairman
Board of Land and Natural Resources
Alternate D has been rejected in favor of Alternate C, which will have no effect on the identified cultural resources.

Surface flow out of Ukoa Marsh is controlled by a weir at the Loko Ea fishpond and by the dense aquatic vegetation in the lengthy outlet channel. The minor changes in the channel resulting from construction will not affect either of these factors, so no effect on the water level in the marsh is expected.

There is only one route that would circumvent the marsh and still meet the traffic engineering criteria of the project. This would be to extend the Bypass along the inland side of the marsh, rejoining Kamehameha Highway beyond Kawailoa Road. This would add approximately one mile to the length of the project and increase the cost by at least 40%. Furthermore, it would place the highway upstream from the marsh (as opposed to the proposed downstream location), where there would be a potential for intercepting surface flow to the marsh and introducing roadway pollutants into the primary waterbird habitat.

The USFWS Biological Opinion is included in Chapter V of this Final EIS.

Mr. Ralph T. Segawa
Division Administrator
Federal Highway Administration
U.S. Department of Transportation
Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

Subject: Haleiwa Bypass Draft Environmental Impact Statement

We have reviewed the subject draft EIS and offer the following comments for your consideration.

9 1) The narrative discussion on potential environmental impacts and proposed mitigating measures within Chapter IV does not specify the anticipated duration of construction activity for the proposed alternative alignments. The omission of a construction time framework makes it difficult to adequately assess the permanence or severity of identified impacts to the environment and community.

9 2) As the draft EIS indicates that the proposed project may significantly impact various coastal ecosystems and resources near Haleiwa, may we recommend that the final EIS assess pertinent objectives and policies of the Hawaii Coastal Zone Management Program, as contained within Chapter 285A, Hawaii Revised Statutes.

For example, it is an objective of the Hawaii Coastal Zone Management Program to “protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems” (Chapter 285A § 2(b)(3)). Chapter 285A also contains objectives and policies dealing with Scenic and Open Space Resources, Coastal Hazards, and Historic Resources. Appropriate policies should be assessed, and where required, mitigating measures proposed to ensure that the subject highway construction project conforms with Federal consistency provisions of the Hawaii Coastal Zone Program. For a list of Federal licenses and permits...
Mr. Ralph T. Segawa  
Page 2  
June 24, 1980

subject to Consistency Review, refer to Appendix 14 of the Final EIS for the Hawaii Coastal Zone Management Program.

Thank you for the opportunity to review and comment upon this document.

Sincerely,

[Signature]

cc: Dr. Ryokichi Higashimura, Director  
Department of Transportation  
State of Hawaii

Mr. Richard O'Connell, Director  
Office of Environmental Quality Control

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9-1. The duration of construction activities has been included in a revised discussion of air quality and noise impacts in Chapter IV, Section B, Paragraphs 6 and 7.

9-2. The objectives and policies of the Hawaii CIM Program are included in an expanded discussion of Government Policies in Chapter IV, Section G.
Mr. Ralph Segawa
Division Administrator
Federal Highway Administration
U.S. Department of Transportation
300 Ala Moana Boulevard
Honolulu, Hawaii 96850

Dear Mr. Segawa,

SUBJECT: EIS FOR KAHEIALEI HWY REALIGNMENT, WIDE JUNCTION TO HALEMAU BEACH PARK, OAHU

This EIS was officially received by the EQC on May 5, 1980. Availability of the EIS was published in the May 8, 1980, EQC Bulletin. The deadline date for comments was noted as June 25, 1980, although according to EQC Rules and Regulations (1:61), the 30-day review period would end on June 7, 1980.

Please send us a copy of the Final EIS when it becomes available.

Sincerely,

Donald A. Bremner
Chairman

cc: OEQC

NO EVALUATION REQUIRED
10 5) Page III-8. We believe that the tsunami inundation area is further inland than that shown in figure 17, 17A and 17B. Previous tsunamis have impacted portions of Haleiwa south of the Anahulu River Bridge. Also, the realigned shoreline at the mouth of the Anahulu River has decreased the river’s length by approximately 1,000 feet. This shortening of length and realignment does not appear to have been considered in the planning for this project. The potential effects of a tsunami on the proposed project should be closely examined in light of the shoreline modifications that have taken place. We also note that the civil defense tsunami inundation maps show a larger area of tsunami inundation than do figures 17, 17A and 17B (see attached sheet).

10 6) Page III-17. It might be mentioned that the Haleiwa area was formerly served by a railroad which brought visitors to the Haleiwa Hotel.

10 7) Page IV-3. The potential use of the remnant agricultural parcels for agricultural or aquacultural uses other than sugar should not be overlooked, especially if the zoning is for agriculture.

10 8) Page IV-8. The flood hazard evaluation should also discuss potential tsunami inundation as mentioned above.

10 9) Page IV-10. Will a reduction in sugar lands have any effect on Ko‘ola marsh through a reduction in water pumping?

10 10) Page IV-15. The visual impact of the proposed Anahulu Stream bridge structure for alignments A and C can be mitigated in part by providing planter boxes along the downstream side of the bridge structure. Another mitigation alternative is to paint the bridge green on the downstream side to blend with the existing vegetation.

10 11) Page IV-22. We believe that the values for sugar and molasses have recently increased, making the economic impacts understated. Will the abandoned cane haul roads be put back into cane cultivation?
10 1. Reference to HBS 343 has been added to the FEIS title page.

10 2. The shoreline on Figure 2 has been revised to show the Haleiwa Boat Harbor, and a notation referring to this correction has been added to the remaining figures.

10 3. This comment has been added to the FEIS.

10 4. DHV refers to Design Hourly Volume; in this case the peak weekend one-hour traffic volume in the year 2001.

10 5. The recently-adopted U.S. Department of Housing and Urban Development "Flood Insurance Rate Maps" were used for the design parameters on this project, and were the source of Figures 17, 17A, and 17B. It is felt that these maps are more appropriate for the purposes of this project than the generalized Civil Defense maps.

10 6. Thank you for this information.

10 7. Future use of the land is obviously, in the hands of the owner. In discussing the conversion of the land to urban use, the EIS brings to light the "worst case" situation from the standpoint of the community's expressed desire to retain a rural atmosphere. Conversion to urban use would require changes in both State and County zoning designations which would require some measure of community support to be successful. Therefore, it is most likely that, for the time being, the remnant parcels will remain in some form of agricultural use, if they are used at all.

10 8. According to the current Flood Insurance Rate Maps, the Bypass is not subject to tsunami inundation.
10 9. The cane lands affected by the project are irrigated from the Wahiawa Ditch, which is fed by Wilson Reservoir.

10 10. These ideas will be considered during the design phase. However, they may pose a very costly maintenance problem.

10 11. The calculations on cane land value have been updated. The abandoned cane roads below the bypass will be part of the remnant parcels, but those above the bypass may eventually be included in the cane fields.

10 12. This concern of some Haleiwa store owners is based on the assumption that people do much of their shopping in Haleiwa on their way home from work in Wahiawa and Honolulu. Some merchants felt that if these customers can bypass Haleiwa, it might be more convenient to stop in Pupukea.

11 A Traffic Accidents

The DEIS states, in the chapter dealing with purpose and need for the project, that "a clear indication of the need for improving traffic flow through Haleiwa is the high rate of accidents that have occurred in town as opposed to adjacent highway segments" (p. I-1). The document goes on to state, "The reasons for the relatively high accident rates in Haleiwa are the mixture of through traffic with cross traffic, turning movements, and other distractions that occur in town but are not as frequent on the open highway" (p. I-4). The assumption that a bypass will resolve this basic problem deserves closer scrutiny. The increased speeds at which motorists will be traveling on the bypass, combined with the left-turn traffic at the three proposed intersections connecting the bypass to Kamehameha Highway may well create a significant accident rate of its own. There should be a statement that addresses the accident potential associated with the proposed bypass and how the new combined rate compares to the rate without the bypass.

11 B Congestion

The DEIS states that one major problem with the highway, as it exists, is that its capacity through Haleiwa is not adequate for the present traffic volume. The Anahulu River bridge is cited as a significant constraint to traffic flow, because it is barely wide
enough for two autos, and not wide enough for an auto and a truck or a bus to pass. It is questionable as to whether the proposed bypass will alleviate this traffic hazard. As it is the expressed desire of the Haleiwa business community to maintain its position as a tourist attraction, tour bus traffic will most likely be encouraged to continue utilizing the present route through town, thereby perpetuating the traffic congestion and resultant traffic hazard at the Anahulu River bridge.

11 C Vegetation Surveys

In the Vegetation Section, the report states, "with the exception of some of the marsh plants, virtually none of the vegetation encountered by the bypass is native to Hawaii, likewise, rare endangered plants are not found in the project area due to the long history of cultivation" (p. III-10). Is this determination an assumption or was a field survey actually performed? A paragraph concerning the methods utilized to make this determination would be appropriate.

11 D Remnant Agricultural Lands

An expanded discussion should be included as regards the future use of the remnant agricultural lands that the proposed bypass will create. The nature of the use to which these lands are put may result in significant secondary social and environmental impacts.

11 E Impact on North Shore Residents

The DEIS states that, "while the increased accessibility of the North Shore will be a benefit to weekend travelers seeking escape from the urban environment of Honolulu, increased use of beaches, parks, and roadways of Haleiwa will not have a negative impact on North Shore residents" (p. IV-18). However, the residents of Kahuku may be the indirect beneficiaries of the proposed Haleiwa bypass. The bypass design suggests a four-lane roadbed but a two-lane design—accommodating a future expansion capacity based on projected growth in Kahuku. As was stated in the DEIS (p. III-39), North Shore residents would like to maintain their rural character which may suggest that having the bypass would disturb this possibility. Was input solicited from residents of Kahuku or other areas on the North Shore in the preparation of this document?

11 F Alternatives

It appears that Alternatives A and C will have fewer potential negative environmental impacts. Alternative D eliminates several small lotus and taro terraces and infringes more extensively upon Kualoa Point. This could result in further disruption to the habitat of the endangerd species of birds that frequent or reside on the area. As was stated in the DEIS, a 1977 State Senate Concurrent Resolution urges preservation of agricultural lands where taro can be grown, and also that the removal of wildlife habitat should be minimized, and any disturbance of endangered species should be strictly avoided.
11 A. Higher speeds do not necessarily result in accidents if the roadway is designed for higher speeds. The intersections will be provided with protected left-turn lanes with adequate sight distances in all directions. The accident rate on the Bypass and the resulting overall improvement is addressed on Page 1-7.

11 B. No claim is made that the Bypass will alleviate the hazards of the Anaehoomalu River Bridge. Rather, it will circumvent those hazards.

11 C. Observations on the vegetation were made by VM Pacific's staff environmental biologist. The judgment on the likelihood of rare or endangered plants in the area was derived from these observations and from informal consultation with USFWS botanist Derral Herbst.

11 D. Future use of the land is, obviously, in the hands of the owner. In discussing the conversion of the land to urban use, the EIS brings to light the "worst case" situation from the standpoint of the community's expressed desire to retain a rural atmosphere. Conversion to urban use would require changes in both State and County zoning designations which would require some measure of community support to be successful. Therefore, it is most likely that, for the time being, the remnant parcels will remain in some form of agricultural use, if they are used at all.

11 E. A four lane right-of-way is proposed so as not to foreclose the option of expansion should it prove necessary in the future. No proposal is being made to widen adjacent highway sections to four lanes. Therefore, the Bypass, in itself, will not have a significant growth inducing impact. It will only eliminate one of the bottlenecks along the North Shore. Although the EIS Preparation Notice was not sent directly to the Kahuku Neighborhood Board, its availability was published in the EDC Bulletin, and that community has had notice of all public information meetings through legal notices published in the major newspapers.

11 F. Alternate C has been selected as the recommended alignment.
Mr. Ryokichi Higaahiona
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Higaahiona:

Subject: Haleiwa Bypass Draft EIS
Kamehameha Highway Realignment
Need Junction to Haleiwa Beach Park

In reference to your letter HDA-HI, dated April 18, 1980, the Building Department has no comments.

Thank you for the opportunity to comment on the draft EIS.

Very truly yours,

Director and Building Superintendent

AF:lo
cc: J. Harada

NO EVALUATION REQUIRED
Later, it is indicated
"If alternative D is selected, the State policy to
preserve wetland cultivation (e.g., taro and lotus)
will be infringed upon. A formal wetlands finding
pursuant to E.O. 11990 will be included in the
Final EIS, if it is warranted" (DEIS, p. IV-6).

The draft EIS appears to contradict the response from the State
Director of Transportation.

12B Relationship to County Development Plan

The DEIS recognizes that the preliminary Development Plan Map
does not show the proposed bypass highway or other proposed
roadways. But it indicates

"Transportation guidelines in the Development Plan
state that the land transportation system should
conform to the Oahu Metropolitan Planning Organiza-
tion's Long Range Transportation Plan" (DEIS, p. III-47).

This reference to OMPO's Transportation Plan is no longer in the
Development Plan Ordinance, dated April 1980, now being considered
by the City Planning Commission.

12C Impact on Marsh

The impact of Alternate D is discussed in the DEIS.

"Constructing a viaduct across this area would
unavoidably eliminate some, but not necessarily all,
of the cultivated terraces. The viaduct will be
located downslope from the springs that feed this
marsh, but there is the possibility that highway
construction could decrease their flow. It is
difficult to predict the nature of this potential
impact without test borings and detailed plans for
the viaduct footings (see Ground Water, below"
(DEIS, p. IV-7).

In view of ground water problems and community concerns, is
Alternate D a viable alternative?

12D Connection to Emerson Road

What is being proposed at this time is a two-lane highway,
extending for about 2.3 miles, a relatively short distance.
Ultimately, a four-lane facility is planned. Grade separations
are presently proposed for the cane haul road or roads that may
have to cross the proposed bypass.
12 A. At the time the response to your letter was written, it was thought that only taro was being cultivated in the marsh under question. Subsequent investigation revealed that hamu is also present.

12 B. This reference will be deleted.

12 C. For these and other reasons, Alternate D is no longer considered a viable alternative.

12 D. A grade separation is only proposed for the cane haul road. Emerson road will have an at-grade crossing. Emerson Road was selected as the intervening connection in order to serve the existing residences in Anahulu Valley. Any other road would have meant mixing residential and cane haul traffic.
Mr. Ralph T. Segawa, Division Administrator
U.S. Department of Transportation
Federal Highway Administration
Region Nine, Hawaii Division
Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT
KAMEHAMEHA HIGHWAY REALIGNMENT,
WEED JUNCTION TO HALEIMA BEACH PARK

The proposed action will not have any detrimental impact on our
recreational facilities in the area.

Thank you for the opportunity to comment on this project.

Sincerely,

Gilbert Scott, SR.
Acting Director

NO EVALUATION REQUIRED
Mr. Ralph T. Segawa  
Division Administrator  
U. S. Department of Transportation  
Federal Highway Administration  
Region Nine  
Hawaii Division  
Box 50206  
Honolulu, Hawaii 96850

Dear Mr. Segawa:

Subject: Your Letter dated April 18, 1980 (HWA-16) Regarding  
Hawaii F-003-1(5), Draft Environmental Impact Statement,  
HWA-HI-615-80-01-0, Kamehameha Highway Realignment,  
Iheo Junction to Haeulani Beach Park

We have reviewed the Environmental Impact Statement for this project and have  
no comments or its contents. However, we call your attention to Chapter II  
which is brouh backwards.

Please send us a copy of the final Environmental Impact Statement for our  
files.

Very truly yours,

CHE C. H. FUKUDA  
Acting Director

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U.S. Department of Transportation  
Federal Highway Administration  
Box 50206  
Honolulu, Hawaii 96850

Gentlemen:

Hawaii F-003-1(5), Draft Environmental Impact Statement, FWA-HI-615-80-01-0, Kamehameha  
Highway Realignment, Iheo Junction to Haeulani Beach Park

We have reviewed the subject Draft Environmental Impact Statement and have  
no other comments to offer or changes to make to our April 24, 1979 letter  
which is shown on Page VI-25 of this Draft EIS.

Sincerely,

RICHARD MAU  
Engineeering and Construction  
Staff Manager

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NO EVALUATION REQUIRED
June 3, 1980

Dr. Ryokichi Higashionna
Director, Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna:

Thank you for allowing us the opportunity to comment on the Mailiwa Bypass Environmental Impact Statement, #FHWA-HI-EIS-80-01-D.

As stated previously, Life of the Land supports the Bypass project. We feel that the final choice in routes should be made by the affected community.

However, we still have concerns as to the project's effects on endangered waterbirds and habitat in Ukoa marsh, and the long-range impacts on growth and land use along the highway, especially at access points.

Generally, the EIS is well-written and comprehensive, and appears to meet the necessary criteria as outlined in IS Regulations #2.

Mahalo for your consideration.

Sincerely,

Dee Dee Letsis
Executive Director

13A. We have taken every measure possible to minimize harm to Ukoa Marsh. Please refer to the USFWS Biological Opinion on Page V-13.

13B. Frontage on the bypass will not be permitted. Future land use authorizations elsewhere will, of course, be subject to zoning regulations.
June 24, 1980

U.S. Department of Transportation
Federal Highway Administration
Ten: 50206
Honolulu, Hawaii 96850

Subject: Kamehameha Highway Realignment, Haleiwa Bypass,
Project No. F-083-1(S), Island of Oahu

Attention: Ralph T. Segawa

Dear Mr. Segawa:

The North Shore Neighborhood Board supports Route C for the proposed Haleiwa Bypass with modification to the river crossing with respect to minimizing displacement of residents. The Board is concerned with the seven families and one firm that will be affected by route C. The Board recommends that modifications be made in the populated area to decrease the displacement of those families as in route B. The Board also recommends limiting the bypass right-of-way so that a two-lane highway, rather than an eventual four-lane highway, is the result.

Sincerely yours,

Laura Rolles
Chairman

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April 29, 1980

Mr. Ralph T. Segawa
Division Administrator
U.S. Department of Transportation
Region Nine
Hawaii Division
Box 50206
Honolulu, Hawaii 96850

Dear Mr. Segawa:

Subject: Hawaii F-083-1(S), Draft Environmental Impact Statement, FHWA-HI-80-01-D, Kamehameha Highway Realignment, Weed Junction to Haleiwa Beach Park

Thank you for allowing us the opportunity to review your Notice of Preparation for the proposed construction of approximately 2.3 miles of new roadway by-passing the town of Haleiwa.

We have no comments at this time.

Very truly yours,

Francis T. Tanaka
Government Affairs Coordinator

FTT:skk

cc: Chuck Fong

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EVALUATION

NORTH SHORE NEIGHBORHOOD BOARD NO. 27 6/24/80

14A. Your concern for the displacement has been taken into account, and Alternate C has been revised accordingly. The present alignment will now remove only one house on Emerson Road, and one on the other side of the Anahulu River. A four lane right-of-way is proposed as not to foreclose the option of expansion should it prove necessary in the future.
June 9, 1980

Dr. Rukkichi Higashinomna
Director
Department of Transportation
State of Hawaii
369 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashinomna:

The Waialua Sugar Co. wishes to restate its agreement with the need for and support of constructing a Waialua Bypass road.

Our comments on the Draft Environmental Impact Statement (DEIS) must be somewhat general at this time since a specific route has not yet been selected and details of construction not determined. However, the location of the Bypass will have a great impact on the Waialua Sugar Co. (WSCo) since the major portion of the Bypass will go over lands now cultivated by WSCo and the Bypass will require relocation of about 5,000 feet of our caneland roads.

Three alternate routes are presented in the DEIS - A, C and D. We have reviewed these with a view toward insuring that the relocated caneland roads continue to be functional for their primary use. It appears that the 250-foot radius on curves that we must have been met. However, the 6% grades we find necessary are exceeded if the roads are located on the ground surface. The 6% grades can be obtained by cuts and fills, but this quickly leads to much greater area loss with the 2:1 maximum cut and fill side slopes.

It appears that the further downslope the Bypass is located, the better the terrain on which to relocate the caneland roads. For this reason, we favor a combination of Alternates C and D - B to the point where it crosses C and then C crossing Anahulu Stream. The difficulty with D beyond crossing C is that its location further up (a knoll) Anahulu gulch would make the caneland road route nearly impossible considering the steep rocky gulch shoulder above the canehaul road in this area. It also appears that with route B, the proximity of the canehaul road, the Emerson Road connection and the Bypass is undesirable.

We cannot overemphasize the need for acceptable grades and curves for the relocated caneland roads. Any change from the present will mean less desirable canehauling conditions resulting in increased canehauling costs which will continue to the future for half of our total caneland area. Approximately 400,000 tons of field cane are divided annually over the canehaul roads. In 50 ten-truck loads, this represents 17,000 borer trips.

Besides the approximate 26.5 acres of caneland that will be lost to the Bypass itself, an additional 3 plus acres will be lost to relocation of the caneland road and both new road locations will result in approximately 40 acre of caneland that will become remants because of the difficulty of irrigation, cultivation and harvesting certain areas below either of the roads. The differences in cane area lost in selecting any one of the three proposed routes are small.

Each of the three alternate routes for the Bypass will impact the WSCo powerline paralleling the Hawaiian Electric Co. powerline shown on the plan. Relocation of a portion of the powerline will be necessary.

We understand that relocation costs for the roads, powerline, water conveyances, etc. are part of the costs of the Bypass project. We do not expect any facilities to be upgraded but it will be necessary that roads are fully stabilized for our truck weights with equivalent surfaces.

Sincerely,

WAIALUA SUGAR COMPANY, INC.

F. C. Cross, Director
Civil Engineering and Environmental Standards

EVALUATION

WAIALUA SUGAR COMPANY, INC. 6/9/80

15A. The grade on the canehaul road will be improved by moving Alternate C slightly north. The State Highway Division will coordinate the design of the canehaul roads with the Waialua Sugar Company. Relocation costs will be part of the construction budget.
C. SUMMARY OF PUBLIC HEARING TESTIMONY

A combined highway corridor and design public hearing was conducted by the Department of Transportation in the Waialua Elementary School Cafetorium on June 10, 1980, at 7:50 P.M., to receive testimony and evidence relating to the location and design of the project. Approximately 85 people were present at the hearing.

The public was given up through June 25, 1980 to submit written testimonies.

James Carras, Deputy Director, Department of Transportation, State of Hawaii, was moderator for the hearing.

Mr. Carras briefly discussed the history of the project, the purpose of the public hearing, the guidelines for the hearing, the relocation program and the procedures relating to a final decision following the public hearing.

Yoshie Fujinaka, of Fujinaka & Fujinaka, Engineers, made the presentation for the Department of Transportation. Slides were used to describe the project and to summarize the major social, economic and environmental impacts associated with each of the proposed alternative alignments. Alternate C was mentioned as the preferred solution of the State.

The following is a summary of the testimonies received at the public hearing and of written testimonies received subsequent to the hearing, through June 25, 1980. An evaluation follows each testimony.

1. Testimony: Kenneth Asano, representing North Shore Neighborhood Board No. 27.

The Board generally endorses Alternate C, but reserves the right to make a final statement after the public hearing, until June 25, 1980.

Evaluation

Alternate C is the preferred solution of the State, and community support will enhance the State's position.
2. **Testimony:** Merl Hawthorne, representing Waialua Community Association.

The Association agrees that the proposed bypass is needed to relieve traffic congestion in Haleiwa and supports the construction of Alternate C. The Board of Trustees favors "providing the necessary flexibility of modifying Route C which will maximize the needs of the community".

**Evaluation**

Alternate C is the preferred solution. If selected for final design, the vertical and horizontal alignments will be refined to minimize impacts.

3. **Testimony:** Fred Gross, Manager, representing Waialua Sugar Company.

The Waialua Sugar Company agrees on the need for a Haleiwa Bypass road. The location of the Bypass will have a great impact on cane land and roads, requiring approximately 24.5 acres of cane land for the Bypass, over 3 acres for relocated cane land roads plus approximately 40 acres of remnants, and the relocation of about 5,000 feet of cane land roads. Acceptable grades and curves for the relocated roads (6% maximum grade and 250-foot minimum radius) are important to maintain desirable cane hauling conditions and costs. Relocated roads must be fully stabilized to support truck weights. Relocation of a portion of the Waialua Sugar Company's power line paralleling the Hawaiian Electric Company's power line will be necessary. The Waialua Sugar Company prefers a combination of Alternates C and D, but if a combination route is at variance with the DEIS, Alternate C is acceptable.

**Evaluation**

The alignments of the relocated cane haul roads shown are preliminary. Once an alternate is selected, details of cane haul road design and power line relocation can be worked out with the plantation engineers to minimize the impact on plantation operations. A pavement structure equivalent to the existing cane haul roads will be provided for the relocated road.
4. **Testimony:** Robert Reeves, Resident.

The traffic projections do not take into account rising gasoline prices and decreasing automobile sales, and the possibility that vehicular traffic may decrease by the year 2001, so that a highway may not be needed. The speaker objects to a highway cutting through Haleiwa to provide freer transportation to the North Shore which would encourage development at Kuilima. He suggests that the highway be placed somewhere else. He does not want Haleiwa to change.

**Evaluation**

The North Shore area will continue to grow, and the Haleiwa Bypass is a feasible solution to the traffic congestion problem in Haleiwa. Community support for this project indicates that a problem does exist.

5. **Written Testimony dated June 24, 1980:** Laura Bolles, Chairman, North Shore Neighborhood Board No. 27.

The Board supports Alternate C, but recommends that it be modified at the Anahulu River crossing to decrease displacement of seven families and one farm affected by the route. It also recommends limiting the bypass right of way to a two-lane highway rather than for an eventual four-lane highway.

**Evaluation**

(See Evaluation 2).

By the year 2001, the proposed bypass may reach its design capacity, based on traffic projections. With land values escalating at present day rates, it would be more economical to initially acquire sufficient right of way to accommodate future needs.

A question and answer period followed the testimonies.

1. A question was raised in regard to relocation allowance and whether it included the price of the affected property. In the discussion that followed, it was explained that the relocation allowance does not include the price of property, and that property value would be set at prevailing market prices determined by two independent appraisers. It was also explained that the State would try to find comparable housing in the neighborhood for the displaced families.
Evaluation

Displacement of families by the bypass is of great concern to the community, as well as to the people directly affected by it. Although only a few families will be displaced by the proposed project, relocation assistance and financial compensation will not fully make up for the loss of the homes. The right of way requirements of the selected alternate should be refined during the design stage to impact as few families as possible.

2. Gordon Lorenzo, property owner, raised a question on what was considered peak hours in Haleiwa. It was explained that traffic projections were based on holiday and weekend traffic and that the peak hours were not the usual peak hours of downtown traffic. Mr. Lorenzo suggested that left turns be banned during peak hours in Haleiwa on Saturdays, Sundays and holidays, because he thought that vehicles making left turns at shopping areas caused much of the traffic congestion, and that traffic would flow freer if left turns were allowed only at Weed Junction and at Haleiwa Beach Park.

Evaluation

Weed Junction and Haleiwa Beach Park are almost 2 miles apart. Local traffic would be forced to travel a circuitous route to accommodate through traffic.

Allowing U-turns at Haleiwa Beach Park during times of heavy park use could create additional problems of traffic circulation and safety.

There being no further questions, Mr. Carras closed the public hearing at 9:05 P.M.
D. UNRESOLVED ISSUES

At this stage of the project (Final EIS), there are no major unresolved issues. Alternate C is clearly a superior alignment, since it avoids the archaeological sites and wildlife habitat impacted by Alternate D, and is less costly than Alternate A. A number of project clearances are yet to be obtained (see Chapter V), but these can not be processed until construction plans are developed in more detail. The various concerns of the reviewing agencies that handle these permits have been addressed in this EIS. As indicated by the public hearing testimony, the proposed project has broad community support.

E. PREPARERS OF THE EIS

This Environmental Impact Statement was written under contract with the:
State of Hawaii
Department of Transportation
Highways Division
  Project manager; Douglas Orimoto, P.E. Civil Engineering, Highway planning.

ENVIRONMENTAL CONSULTANT
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  Project Manager; Fred Proby, B.A. Environmental Biology
  (8 years experience in environmental analysis and planning)
  Social Economist; Otis Ginoza, B.A. Economics and Environmental Studies (2 years experience in socioeconomic studies).

SPECIAL STUDIES
Stream Survey; Amadeo Timbol, Ph.D. Zoology (10 years experience in fisheries studies and one of the State's foremost authorities on native stream fauna).
Archaeological Survey; Chiniago, Inc. William Barrera, Jr. President, M.A. Anthropology (10 years experience in archaeological research in Hawaii).
Historical Survey; Spencer Leineweber, A.I.A. Architect and Planner (5 years experience as an Architectural Historian).

Haleiwa Business Inventory; Hawaii Business Directory, Inc. John Witwer, President (20 years experience in data processing and compiler of exhaustive tabulation of Hawaiian businesses).

Economic Analysis; Otis Ginoza (2 years experience).

Noise Assessment; Fred Proby (6 years experience in noise monitoring and prediction, and State Dept. of Health certified for noise level measurements).

Air Quality Assessment; Fred Proby (4 years experience in air pollution studies), assisted by State DOT Materials Testing Branch, Gary Choy, P.E. Services and Development Engineer.

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Project Manager; Ivan Fujinaka, P.E. Civil and Structural Engineering.
Project Engineer; Yoshie Fujinaka, P.E. Civil and Structural Engineering.

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Rob Shallenberger, Ornithologist

US Fish and Wildlife Service
Maury Taylor, Field Supervisor, Div. of Ecological Services
Ernie Kosaka, Endangered Species Coordinator

US Soil Conservation Service
Dean Renner, Soil Scientist

Hawaii Division of Fish and Game
Tim Burr, Wildlife Biologist
Dave Woodside, Wildlife Biologist

Hawaii Historic Sites Office
Pat Beggerly, Archaeologist

City and County of Honolulu
Department of General Planning
Bennet Mark, Planner
Department of Land Utilization
Scott Ezer, Planner
Benjamin Torigoe, Planner

American Lung Association
Jim Morrow, Air Pollution Specialist

Waialua Sugar Company
Fred Gross, Chief Engineer
APPENDIX A

RELOCATION PLAN
APPENDIX A

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION
CONCEPTUAL STAGE RELOCATION PROGRAM PLAN, KAMEHAMEHA
HIGHWAY REALIGNMENT, WEED JUNCTION TO HALEIWA BEACH PARK
PROJECT NO. F-083-1(5), REVISED

The following is a discussion of our findings, the relocation problems we may encounter, if any, and their probable solutions for the various alternates under consideration for the project. Field inspections of the proposed alternates were conducted on September 18, 1979 and September 12, 1980.

The proposed project is located between Weed Junction and the north end of Haleiwa Beach Park, Haleiwa and is about 20 miles from Honolulu. It is within Census Tract 99-02-100. This area resembles a sleepy plantation town of the past.

The population of the area is approximately 9,171 with an ethnic composition of 32% Filipino (2,934), 31.8% Caucasian (2,195), 24.1% Japanese (2,211), 6.7% Hawaiian/Part Hawaiian (617), 2% Chinese (181) and the rest Koreans, Black and others (313).*

Of the various alternatives under consideration, Alternate "A" will affect seven (7) residences and a backyard piggery operated for home consumption; Alternate "C" will affect two (2) residences and Alternate "D" will affect one residence.

The backyard piggery is situated on a portion of a parcel within the caneland and is operated for home consumption. There are twelve pigs in all. The operation was confirmed with the owner of the piggery.

The number of parcels affected and the number of displacements of the various alternatives are shown on the following page.

## PROPERTIES AFFECTED

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Part. Whole</th>
<th>Agriculture</th>
<th>Part. Whole</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>12</td>
<td>11</td>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>&quot;D&quot;</td>
<td>8</td>
<td>1</td>
<td>7</td>
<td>25</td>
<td>22</td>
</tr>
</tbody>
</table>

## DISPLACEMENTS

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot;</td>
<td>7</td>
<td>1 (Piggery)</td>
<td>8</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>&quot;D&quot;</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
ALTERNATE "A"

This route, one of three under consideration, involves the acquisition of twenty-six (26) parcels of land of which four (4) are whole takings and the other twenty-two (22) are partial takings. Eight (8) of the parcels are residential-zoned land and the others are agricultural-zoned land. It is anticipated that seven (7) families—two (2) owner-occupants and five (5) tenant-occupants and the backyard piggery will be affected by this route. The families and individuals to be affected include two Filipinos, four part Hawaiians and a Caucasian family. It is apparent that relocation problems will be encountered for the following reasons:

1. The presence of low to moderate income families.
2. The presence of elderly persons among the potential displacees.
3. The low inventory of available rental houses.

It is not anticipated that any problem will exist for the piggery as there is enough area to move the pens to.

A survey for presently available and probable availability of replacement housing was conducted from September 20, 1979 to October 6, 1979. Classified newspaper advertisements, multiple listing information and governmental agencies were the sources used. The survey data is shown as Attachment "A".

In addition to the data, there is an elderly housing project called Kupuna Home located on Goodale Avenue in Waialua. This project is composed of 24 studio units and 16 one-bedroom units. The rental is 25% of the tenant's income. The turnover rate on this project is very small.

A study of the data compiled (Attachment "A") indicates that rents being asked on private rentals range from $325 a month for a two-bedroom to $550 a month for a four-bedroom, 2-bath dwelling. Rentals are not readily available in this area. There are quite a few homes for sale ranging from $63,500 (leasehold) to $210,000 (fee simple) for three-bedroom dwellings.

ALTERNATE "C"

This alternative involves thirty-three (33) parcels of land of which one is by whole taking and thirty-two (32) by partial takings. Most of the land involved is agricultural-zoned land. Twenty (20) of the parcels are zoned agricultural and twelve (12) are residential-zoned land. One parcel is a roadway. It is
anticipated that there will be two (2) residential displacements on this route. One is an owner-occupant and the other is an individual (elderly). As indicated on the inventory of available houses for sale, there is an adequate supply of houses for sale to accommodate the owner-occupant. The elderly individual, tenant-occupant, will qualify for the Hawaii Housing Project Kupuna Home-O.

ALTERNATE "D"

This route also involves thirty-three (33) parcels of land of which ten (10) parcels are whole takings and twenty-three (23) are partial takings. Eight (8) of the parcels are zoned residential and twenty-five (25) are agricultural-zoned land. Most of the agricultural-zoned land is cultivated with cane by the Waialua Sugar Company. It is anticipated that one residence (owner-occupant) will be affected by this alternate. The indications are that there will be no problems anticipated in the relocation of this family to another dwelling in the area.

The indications provided by our study are applicable as of the present. Future surveys might indicate otherwise at such point in time.

CONCLUSION

Our survey indicates that of the three (3) alternatives under consideration, one will affect only one family (residence), one will affect a family and an individual (elderly) and the other will affect seven (7) residences and a backyard piggy. Alternate "A" will definitely have sociological impact, but Alternates "C" and "D" will have a lesser degree of impact.

All Federally aided highway programs must comply with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. The State of Hawaii has appropriate enabling legislation and the State Department of Transportation has an organization equipped and staffed to administer a relocation assistance program in accordance with the Federal and State laws.

INDIVIDUAL AND/OR FAMILIES

An examination of the Federal law as well as the State program which is described in the Relocation Advisory Assistance and Relocation Payments Brochure (available at the State DOT Highways Division Rights of Way Branch) reveals that certain statutory limits exist with respect to replacement housing payments that can be made to tenant and owner-occupant displacees. Under the typical relocation assistance program, a displaced tenant will be eligible for up to a maximum of $4,000,
In addition to the above alternatives, if justified, the replacement housing payment can be increased beyond the statutory limits to allow a relocatee to purchase on his own or rent a dwelling within his financial means. Under this procedure, the owner-occupant relocatee would simply be aided by an amount in excess of $15,000 on a lump sum basis toward the purchase of a comparable DSS replacement dwelling, or in the case of a tenant, the maximum of $4,000 would be exceeded. In either case, the amount to be received will go directly into escrow in owner-occupant situations and to the landlord in cases of rentals.

Federal and State procedures also have additional safeguards in the sense that construction cannot be authorized to begin on any project until such time as all displacees have satisfactorily relocated to comparable DSS housing within their financial means or such housing is in place and has been made available to the relocatee.

At the time an alternative alignment is selected for this project which would involve the creation of utilization of Last Resort Housing, a detailed study for Housing of Last Resort will be initiated so that the relocatees can be accommodated in a manner compatible with the scheduling of the highway project development of construction.

BUSINESS, FARMS AND NON-PROFIT ORGANIZATIONS

Our relocation assistance program also has the following benefits available for this type of displacees:

1. Actual moving costs up to 50 miles will be paid.

2. Searching costs incurred in connection with the obtainment of a new business site can be reimbursed.

3. In lieu of items 1 and 2 above, a fixed payment based upon net income of the business not to exceed $10,000 or a minimum of $2,500 can be paid if the business cannot be re-established without substantial loss of existing patronage.

4. Benefits of the small business disaster loan program under Section 7(b)(3) of the Small Business Act (15)U.S.C. 636(b)(3) may be available to eligible business relocatees and to those businesses outside of the project (but not displaced) where substantial economic injury results because of the highway project.

5. State relocation advisory services are available.
which, in actuality amounts to a maximum of $83.33 per month rental subsidy covering a period of four years, or in the case of an owner-occupant a lump sum payment of up to $15,000 including increased interest and incidental expenses can be made to enable him to purchase a comparable, decent, safe and sanitary replacement dwelling. These payments are in addition to moving payments and other services to which the relocatee is entitled to receive.

Due to the high cost of rental and "for sale" homes in Hawaii, the above benefit maxima sometimes are insufficient to accommodate the satisfactory relocation of families displaced by public projects. State and Federal regulations require that a person or family must be relocated within his financial means. This simply means that a tenant must be relocated in such a way that the replacement dwelling will not increase his "out of pocket" costs in terms of rent over and above what was paid at the property relocated from, considering the rental subsidy paid by the State.

The treatment of homeowners is similar although the payment, if any, is made on a lump sum basis to enable him to buy a house comparable to what he had, and therefore, be no worse off financially in terms of housing costs that he had before.

The conceptual relocation study made for this project shows there is indication that the statutory requirements would have to be exceeded to satisfactorily relocate families. Where this is the case, a procedure called "Housing of Last Resort" Section 206 of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970) can be relied on to satisfactorily relocate displaced families.

Housing of Last Resort can take several forms as follows:

1. Land improved with an existing dwelling can be purchased.
2. Existing dwelling can be rehabilitated.
3. New dwellings can be constructed.
4. State-acquired dwellings from the right-of-way project can be relocated and refurbished.

All these various methods are accomplished under the auspices of the State highway agency and such housings so provided are either rented to the highway displacee or made available for sale to him, depending on his occupancy status.
## HOUSING AVAILABILITY SURVEY

### RENTALS

<table>
<thead>
<tr>
<th>Address</th>
<th>Bedrooms:</th>
<th>Rent:</th>
</tr>
</thead>
<tbody>
<tr>
<td>67-211 Kahaone Loop</td>
<td>2-bdrm 1 bth (dpl)</td>
<td>$350</td>
</tr>
<tr>
<td>66-214 B. Kam Hwy</td>
<td>2-bdrm 1 bth</td>
<td>325</td>
</tr>
<tr>
<td>68-040 Au Street</td>
<td>2-bdrm 1 bth (4 plx)</td>
<td>350</td>
</tr>
<tr>
<td>66-138 Kunahele Street</td>
<td>4-bdrm 2 bth</td>
<td>550</td>
</tr>
</tbody>
</table>

### SALES

<table>
<thead>
<tr>
<th>Address</th>
<th>Bedrooms:</th>
<th>Rent:</th>
</tr>
</thead>
<tbody>
<tr>
<td>66-481 Kililoe Pl.</td>
<td>4-bdrm 2 bth</td>
<td>5,058 sq. ft.</td>
</tr>
<tr>
<td>66-381 Haleiwa Rd.</td>
<td>3-bdrm 1 bth</td>
<td>6,300</td>
</tr>
<tr>
<td>67-267 Kiapoku St.</td>
<td>3-bdrm 1 bth</td>
<td>7,831</td>
</tr>
<tr>
<td>Kapuwai/Kam Hwy</td>
<td>3-bdrm 2 bth</td>
<td>10,800</td>
</tr>
<tr>
<td>61-489 Kam Hwy</td>
<td>3-bdrm 1 bth</td>
<td>10,800</td>
</tr>
<tr>
<td>61-427 Kam Hwy</td>
<td>3 bdrm 2 bth</td>
<td>7,653</td>
</tr>
<tr>
<td>66-409 Paalaa Rd.</td>
<td>3-bdrm 1½ bth</td>
<td>20,455</td>
</tr>
<tr>
<td>66-409-A Paalaa Rd.</td>
<td>3-bdrm 1½ bth</td>
<td></td>
</tr>
<tr>
<td>59-508 Kam Hwy</td>
<td>3 bdrm 2 bth</td>
<td>5,040</td>
</tr>
<tr>
<td>59-415 Alapio Rd.</td>
<td>3 bdrm 1½ bth</td>
<td>1.5 acres</td>
</tr>
</tbody>
</table>

Attachment "A"
APPENDIX B
STREAM SURVEY
Aquatic Macrofaunal Survey of Pa'aukua and Anahulu Streams
and Ukaa Marsh in Haleiwa, Oahu

by

Amadeo S. Timbol, Ph. D.

AUG 21 1979

Aquatic Biologist

Introduction

This limited biological reconnaissance was undertaken at the request of VTH Pacific, in connection with the Department of Transportation's plan to realign Kamehameha Highway at Haleiwa. The proposed realignment will cross two tributaries of Pa'aukua (Helemano and Opa'ula), Anahulu Stream and Ukaa Marsh. This survey will identify aquatic macrofauna (fishes, crustaceans, and mollusks) and describe some physiochemical features of the immediate vicinity of the planned highway. The resulting list of resident aquatic animals will be checked for threatened, rare or endangered species. If such a species be present, what aspects of its life cycle might be sensitive to highway construction activities will be considered.

There are no published literature on the biology of Pa'aukua and Anahulu Streams. Ukaa Marsh was identified by the U. S. Fish and Wildlife Service (1977) as of value to waterbirds (gallinules, cranes, stilts). Milledge Hall (1977) described the marsh as well as its vegetation. An insight on impacts of construction activities similar to the proposed Department of Transportation project at Haleiwa on the biology of wetlands is presented by Barnell (1976).

Study Areas and Methods

Study Areas

Pa'aukua Stream

The headwaters of Pa'aukua and its tributaries, Helemano and Opa'ula, originate from the Ko'olau mountain range. The stream consists of approximately 115 km of channel with a drainage basin of about 75 km². Pa'aukua mainstem, by itself, runs only about 2 km before it joins Faisa Bay. Its drainage basin at low elevation consists partly, of Haleiwa town, and partly, sugar cane fields at mid-elevation, of sugar cane fields; and at high elevations, of Kualoa Forest Reserve. Water from both Helemano and Opa'ula tributaries is diverted for agricultural use. Because of these diversions, net flow to the sea in summer, is small.

Three sampling sites were set in this stream: one at Pa'aukua mainstem, one at Helemano tributary, and one at Opa'ula tributary (see Fig. 1).

Anahulu Stream

As with Pa'aukua, its headwaters originate from the Ko'olau mountain range. Anahulu has a total channel length of about 75 km and drainage basin approximately 9.7 km². It has two major tributaries, Kualoa and Kualoa, which join at mid-elevation to form a 10 km mainstem before it flows into Waialua Bay. Its drainage basin consists of Haleiwa town at low elevation, sugar cane fields at low and mid elevations, and Kualoa Forest Reserve at high elevations. Again, water from both Anahulu tributaries is diverted for agricultural use. Thus, the net flow to Waialua Bay in small in summer.

Two stations were selected at Anahulu, one downstream and one upstream of project site (Fig. 1).
layer. The bottom 30 cm (one foot) layer is highly turbid, with visibility limited to 3 cm. Water is brackish; temperature is between 26.0 and 28.9°C at subsurface.

**Station 3, Omaka Tributary**

This station is 2.5 km upstream from the mouth. At this point, the channel is about 15 m wide and between 15 and 45 cm deep. Both banks are lined with riparian trees and shrubs. Water in brackish and there is only a very slow flow seaward.

Substrate is of sand and silt on a base of gravel and small boulders. Green and blue-green algae coat the surface of boulders and gravel. Water is highly turbid with a visibility of only about 15 cm at the upper 30 cm (one foot) layer and about 5 cm at the bottom 30 cm (one foot) layer. Water is brackish and has a temperature between 26.5 and 27.0°C at subsurface.

**Station 4, Lower Anahulu**

This station located just upstream of the present Anahulu bridge is only about 0.7 km from the stream mouth. The channel at this site is about 94 m wide and 150 cm deep. Riparian trees, shrubs as well as residential houses line both banks.

Substrate is of sand and some silt, characterized by small mounds of mud (about 5 to 8 cm diameter) dotting the channel floor. Water is only slightly turbid with visibility about 90 cm at the upper 30 cm (one foot) layer and about 30 cm at the bottom 30 cm (one foot) layer. Water is brackish and the temperature is between 26.0 and 27.5°C at subsurface.

**Station 5, Upper Anahulu**

This upper station is located 2.0 km off stream mouth. At this site, the channel measures about 23 m wide and between 30 and 60 cm deep. Stream banks have only sparse riparian vegetation. Flow was a slow flow downstream on one occasion and no discernible flow another time.

The substrate of mud, gravel and boulders is covered with green and blue-green algae. Water is highly turbid with visibility reduced to about 15 cm at the upper 30 cm (one foot) layer and only about 6 cm at the lower 30 cm (one foot) layer. Water is brackish with temperatures between 27.0 and 27.5°C.

**Station 6, Loko Ia Drainage**

This is only 0.663 km from mouth. At present, the water is slightly brackish and is connected to the sea only at high tide. The seaward flow (and depth) depends on how much water is being let out of the fishpond. During the flood period, water depth was between 5 and 10 cm. Water was clear; water temperature were between 27.0 and 28.5°C. Vegetation in this and the next station has been discussed in a previous section.

Substrate is of sand and mud. Green also grown on channel floor.

**Station 7, Lono Pond**

About 1.9 km from mouth, this station is on open water by Waimanalo Road. Water is clear, with a maximum depth of about 300 cm. Water temperature is between 27.0 and 27.5°C. Unpublished data show salinity at 1.5‰. This summer there is no open channel connection between Lono Pond and the Loko Ia drainage.
In diet components accompany growth - larger wholehoe larger prey.

The species list was checked for threatened or endangered species and not one is in either the Miller (op. cit.) or WEFIS (op. cit.) lists.

**Distribution and Abundances**

**Makahau Stream.** In Station 1 (Makahau main stream), snorkeling and hand netting surveys turned up at least 11 species: 2 prawns and shrimps, 3 crab, and 6 fishes. The most abundant among these is the *ama* (mullet). The wholehoe and *o'opu o'oku* are both common. Of the two prawns (shrimp) present, there are more *o'opu o'oku* than wholehoe. Of crabs, there are more *papa'i mauu* than Samou crabs.

Except for the absence of kaku and the presence of *papa'i mauu,* all species found in Station 1 are also found in Station 2 (Kolemano tributary). The difference is that the animals are lower in abundance in Station 2 as compared with Station 1, e.g., lesser *ama*.

In Station 3 (Opoula tributary), no crabs were found, although an additional crionome (Tahitian prawn) was present. As compared with the Kolemano site, animals are lower in abundance in Opoula.

These data and those for Anahulu and Ukua Parsh (sections that follow) are summarized in Table 2, refer to Table 1 for scientific name equivalents.

**Anahulu Stream.** There are at least 11 species in lower Anahulu (Station 4). Three species are abundant: two fisher (ama, wholehoe) and a prawn (o'opu o'oku). In general, animals are more abundant in this Anahulu station than in Makahau stream stations.

---

**Table 2. Distribution and Relative Abundances of Aquatic Macrofauna in Makahau Stream, Anahulu Stream, and Ukua Parsh (July-August 1979).** Legend: ++ = abundant, = common, + = uncommon, 0 = not seen, probably absent.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Makahau</th>
<th>Anahulu</th>
<th>Ukua</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Prawns, Shrimps</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Macrobrachium granissum</em></td>
<td>++</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td><em>Macrobrachium jar</em></td>
<td>0</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td><em>Allogran memes</em></td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><em>Yocambarus clarkii</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>B. Crabs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Haploparus uskukar</em></td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td><em>Scylla serrata</em></td>
<td>+</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td><em>Ithala crenata</em></td>
<td>++</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>C. Fishes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acanthus flavidus</em></td>
<td>+</td>
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<td>+</td>
</tr>
<tr>
<td><em>Eleotris pacifica</em></td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td><em>Gargus aaffina</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Faula pandicensis</em></td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><em>Maqua capitata</em></td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td><em>Pecilla latipinnia</em></td>
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<tr>
<td><em>Pecilla reticulata</em></td>
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<td>0</td>
</tr>
<tr>
<td><em>Sparraidenes nanus</em></td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td><em>Sparraidenes barracuda</em></td>
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</tr>
<tr>
<td><em>Alectrurus belleri</em></td>
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</tr>
<tr>
<td><em>Alectrurus maculato</em></td>
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<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

1. Probably includes two other unknown species: *Eumyga chelatella* and *Chelon ephraii*.
2. There may be more than three fish species as *T. macrochir, T. melano- pleura, and T. silius* are established in Makahau stream.
Ukum Ranch

Ukum Pond, like the Loko Pa Drainage site, is also brackish. Ukum Pond have about the same salinity as Kamalual Ranch. Blomfang (1974) reported a salinity of 2 °/oo at five locations in Kamalual and unpublished Hawaii Cooperative Fisheries Research Unit data showed 1.5 °/oo for Ukum. Water temperature for Ukum appear to be slightly lower than Kamalual (22 versus 26 °C). This could be due to the deeper water at Ukum than at Kamalual.

Biological

Higher turbidity causing poor visibility in both Nukualua and Anahulu could mean that the stream animals are under represented both in number of species and number of individuals. Ukum Pond was exceptionally clear and results from that pond are representative of the animals there. The possible exception to this is the bias against species that hide during the day as in the Chinese catfish (Harias fuscus) and the dofo (Fistularia maclellandii).

Species Inventory

Stream. There appear to be no significant differences between the sexual populations of Nukualua and Anahulu. Both had the same number and complement of species. However, some species, e.g., shelfhead and ope ope'e, are more abundant in Anahulu than in Nukualua.

Aquatic animals found therein are also characteristic of Hawaiian estuaries and lower reaches of streams. Finfish are organisms that are resident of mid and upper elevations. For example, three native gobies live at mid and upper reaches of streams: o'opu maka (Amevum stenolepis) o'opu mopilli (Glycidiurn stenolepis), and o'opu alamo'o (Lentiger conclor). Also expected to be found in the ope ope alalo (Urva hawaiiensis). Of these four species, o'opu maka and ope ope alalo are expected to be found in the mid and higher elevations of both Nukualua and Anahulu. O'opu maka and ope ope alalo were both found in nearby Hauula-Fomaha stream system which has about the same physical conditions as Anahulu and Nukualua (Kawate 1969, Hawaii Cooperative Fisheries Research Unit unpublished data, see also Appendix B).

Not expected to be found in the rare goby, Lentiger conclor (o'opu alamo'o). It has not been reported on Oahu in the past 50 years or so.
The third rare goby, o'opu mopilli, is also not expected to be present in either Nukualua or Anahulu since it requires fast flow, clear and cool water. Both Anahulu and Nukualua streams are diverted upstream, leaving minimal flow in stream channels except during floods. The lower and middle reaches have been cleared of its original riparian vegetation leaving the stream subject to strong insolation resulting in elevated temperatures.

There are probably at least two snails in small numbers that may be present but were not found due to poor visibility and time constraint. These are the brown snail (Theolodus vesperites, native, not threatened) and an estuarine snail (Planaxis spurios, origin not known). Eleven mollusks were also not found and may be absent due to Snailtini instability. Tinobol (1977) found the same condition at Kahana Estuary, Oahu.
Effects of Construction Activities in Wetland Areas

Human activity has greatly affected wetlands to such an extent that it is difficult to find any wetland which has not been in some way altered. This is especially true in Hawaii where only 14% of its 366 perennial streams (Tibbals and Haialolok 1978) are still physically pristine. There is no comparable statewide study for marshes in Hawaii. A study on the Lonohe Bay watershed area showed that there was a 21% loss in wetland area between 1900 and 1977 (UFWG 1978b). Under these circumstances, especial care is necessary to preserve the few remaining wetland ecosystems, for the more rare they become, the more valuable they become to society as a means of preserving components of a living system.

Going from general to specific, the most damaging effect of construction activities in wetland areas is direct habitat loss. This is accomplished by draining, filling, damming, ditching, and channelization. Habitat loss, especially on such a small (ca. 1.3 km²) marsh as Uko'a should be avoided if the integrity of the marsh as a habitat for endangered waterbirds is to be maintained. Already, in summer, the open water area is less than one-tenth of the total.

The second most severe impact will be the increase of suspended solids to both Pahauima and Auauma streams. With inadequate provision for the prevention of erosion will farther aggravate the already turbid waters. It has been shown by King and Hall (1978) that increased erosion has resulted in great reduction in the invertibrate populations in the Red Cedar River caused by the building of an interstate highway in Michigan. Increased turbidity as a result of erosion will have the same detrimental effect on Uko'a marsh. Increased turbidity will decrease the small and invertebrate larval populations which serve as food for forage fishes and endangered waterbirds. The poeciliid fishes in Uko'a also serve as food for the waterbirds. It has been observed elsewhere that even small amounts of fine washings from quarried sand eliminated some poeciliid and stoneflies (Hamilton 1964).

The Uko'a Marsh may also be detrimentally affected by draining—resulting from the total loss of the marsh if the draining is complete or a partial loss if draining is partial. Even partial draining will result in a decrease of the open water area. Lowering the water level will result in elevated water temperatures. Hathaway (1978) and Norton, et al. (1978) have preliminary results on the effect of elevated water temperatures on freshwater fishes in Hawaii. These studies and that of Darwell (op. cit.) should be consulted for more details.
Literature Cited


Appendix C

Aquatic Macrofauna in Hawaiian Fishponds

Uku Harsh includes one fishpond in operation. Although not studied in this survey, it is important to note that the Loko ‘ula fishpond is more saline than the almost freshwater Uku Pond. This difference in salinity and the intervention in the fishpond, in expected to have an animal population distinct from that of Uku Pond. It is reasonable to assume that most of the fishpond animals will be in the list on Table 4.

Table 4
Checklist of Fishes and Macroinvertebrates found in Puna and Auwai Fishpond onKaneohe Bay Watershed Area, Oahu (adapted from USFWS 1977b)

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name, Hawaiian Name</th>
<th>Origin¹</th>
<th>List²</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. <strong>Holbrook</strong></td>
<td><strong>Crassostrea virilis</strong></td>
<td>Eastern oyster&lt;br&gt; Introduced</td>
<td>none</td>
</tr>
<tr>
<td>B. <strong>Prawns, Shrimp</strong></td>
<td><strong>Palaeomon dobii</strong>&lt;br&gt; <strong>Pericleomena granida</strong></td>
<td>Pupa 'u 'u&lt;br&gt; shrimp&lt;br&gt; Introduced&lt;br&gt; Introduced</td>
<td>none</td>
</tr>
<tr>
<td>C. <strong>Crabs</strong></td>
<td><strong>Metaparapagurus thubhakar</strong>&lt;br&gt; <strong>Thalamia creata</strong>&lt;br&gt; <strong>Portunus eausulcoides</strong>&lt;br&gt; <strong>Podophthalma virilis</strong></td>
<td>Pupa 't alamah&lt;br&gt; Pupa 'i makutu&lt;br&gt; Pupa 'k humah&lt;br&gt; Pupa 'o' o'ala&lt;br&gt; Introduced&lt;br&gt; Introduced&lt;br&gt; Introduced&lt;br&gt; Introduced</td>
<td>none</td>
</tr>
<tr>
<td>D. <strong>Fishes</strong></td>
<td><strong>Acanthurus sandvicciensis</strong>&lt;br&gt; <strong>Albula vulpes</strong>&lt;br&gt; <strong>Chasee clausa</strong>&lt;br&gt; <strong>Gambosa affinis</strong>&lt;br&gt; <strong>Parapla vittata</strong>&lt;br&gt; <strong>Porpila cerdalis</strong>&lt;br&gt; <strong>Pecolla lalalana</strong>&lt;br&gt; <strong>Pecolla mexicana</strong>&lt;br&gt; <strong>Tilapia (Tilapia) sp.</strong></td>
<td>Manini 'alehu&lt;br&gt; Pua 'o'o&lt;br&gt; Ama&lt;br&gt; Ama&lt;br&gt; Paripao&lt;br&gt; Molopo&lt;br&gt; Saka&lt;br&gt; Mexican Molly&lt;br&gt; Mexican Molly&lt;br&gt; Mexican Molly&lt;br&gt; Introduced&lt;br&gt; Introduced&lt;br&gt; Introduced</td>
<td>none</td>
</tr>
</tbody>
</table>

¹Terms used in this column: endemic = occurring naturally in Hawaii only<br> indigenous = occurring naturally in Hawaii and elsewhere<br> introduced = brought to Hawaii either intentionally or accidentally

²Considered as rare, endangered, threatened, or depleted in official registries or scientific publications, e.g., Miller 1972, USFWS 1979a.
APPENDIX C  AIR QUALITY ASSESSMENT

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TABLE 1 AVERAGE DAILY TRAFFIC
(Vehicles per 24 Hours, Total of Both Directions)

<table>
<thead>
<tr>
<th>Segment</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kam Highway Without Bypass</td>
<td>14,500</td>
<td>17,000</td>
<td>23,000</td>
</tr>
<tr>
<td>Kam Highway With Bypass</td>
<td>-----</td>
<td>6,800 (40%)</td>
<td>9,200 (40%)</td>
</tr>
<tr>
<td>Bypass Alignment</td>
<td>-----</td>
<td>10,300 (60%)</td>
<td>13,800 (60%)</td>
</tr>
</tbody>
</table>

Note:
1. Average Weekday traffic = 0.952 x ADT
2. Average Weekend traffic = 1.120 x ADT
3. Average daily truck traffic is 5.6% of ADT.
4. Annual increase is 2.5%.

TABLE 1A PEAK 8-HOUR WEEKEND TRAFFIC IN 1985
(Vehicles per Hour, Total of Both Directions)

<table>
<thead>
<tr>
<th>Hour</th>
<th>1000</th>
<th>1100</th>
<th>1200</th>
<th>1300</th>
<th>1400</th>
<th>1500</th>
<th>1600</th>
<th>1700</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Town</td>
<td>1314</td>
<td>1485</td>
<td>1580</td>
<td>1714</td>
<td>1733</td>
<td>1584</td>
<td>1561</td>
<td>1276</td>
</tr>
<tr>
<td>Outside Town</td>
<td>1268</td>
<td>1432</td>
<td>1524</td>
<td>1593</td>
<td>1671</td>
<td>1452</td>
<td>1586</td>
<td>1231</td>
</tr>
</tbody>
</table>

TABLE 2 PEAK HOUR TRAFFIC VOLUME VS CAPACITY
(Vehicles per Hour, Total of Both Directions)

<table>
<thead>
<tr>
<th>Segment</th>
<th>Capacity</th>
<th>AM PM</th>
<th>AM PM</th>
<th>AM PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kam Highway Without Bypass</td>
<td>1,385-1,440</td>
<td>1,730</td>
<td>1,480</td>
<td>1,535</td>
</tr>
<tr>
<td>Kam Highway With Bypass</td>
<td>1,385-1,440</td>
<td>1,730</td>
<td>1,480</td>
<td>1,535</td>
</tr>
<tr>
<td>Bypass Alignment</td>
<td>1,790</td>
<td>955</td>
<td>1,255</td>
<td>1,255</td>
</tr>
</tbody>
</table>

Note:
1. Morning peak hour is 9.0% of ADT, and afternoon peak hour is 11.0% of ADT.
2. Morning distribution is 60% toward Honolulu and 40% toward Waimea, while afternoon distribution is 45% toward Honolulu and 55% toward Waimea (based on traffic counts).
3. Peak hour truck traffic is 3.0% of HIV.
4. Cold Starts. A "cold start" occurs when an engine is started after being off for a given period of time (4 hours or more for non-catalytic-equipped vehicles, 1 hour or more for catalytic-equipped vehicles). During the first few minutes of engine operation after a cold start, emissions are higher than when the engine has warmed up. For the purpose of measurement, this "cold-start" mode has been defined as the first 585 seconds (8.4 minutes) of engine operation after a cold start. If there is a large percentage of cold-transient vehicles in the traffic flow (as would be found during the morning rush hour near a residential area), the emission rates will be higher than if the majority of the vehicles have been operating long enough to warm up. In the present case, it is evident that the percentage of cold start vehicles will be very low, since the majority of the traffic through Haleiwa on a weekend afternoon originated well outside of town.

To determine the cold start fraction, a method developed by the Alabama Highway Department was employed (Ellis, G.W., et al., 1979, "The Determination of Vehicular Cold and Hot Operating Fractions for Estimating Highway Emissions," U.S. Department of Transportation, Federal Highway Administration, Office of Environmental Policy). This technique requires the proportion of trips in each category (work, recreation, through traffic, etc.), the average length of each trip, and the average fraction of vehicles in each trip category operating from a cold start. Since an origin-destination study has not been conducted for this project, the trip categories and lengths had to be estimated based on the assumption that the majority of trips originated outside of the area (50-60%), and those trips originating in Haleiwa are primarily for recreation (10-25%) and shopping (30%) rather than for work (3-5%). Given that the peak traffic occurs on a weekend afternoon, these assumptions should be valid. Data on the cold start fraction for each trip category was obtained from the referenced publication. Two analyses were conducted, the first using an average of reported cold start fractions for the afternoon, the second using the highest afternoon cold start fractions. The results (Table 4) are low, as expected. Based on this analysis, a cold start fraction of 10% was used with the MOBILE 1 tables for all analysis years and conditions. No attempt was made to speculate whether or not the nature of the trips or the time of peak traffic would change through the study period with or without the Bypass.
light duty trucks using unleaded gasoline in: 1978 = 12%,
1985 = 20%, and 2001 = 90%. Exhaust particulate emissions are
highest for heavy diesel trucks, but these make up a rela-
tively small fraction of the vehicle mix. Tire particulate
emissions (i.e., rubber) remain constant through the study
period. Since light and heavy vehicles differ in tire wear,
a composite EF was derived. To determine the contribution
from heavy trucks, an average of twelve tires per truck was
assumed.

Sulfur Oxide emissions also remain constant through the study
period, since they are not affected by vehicle speed or emis-
sion controls (at least to the level of refinement used in AP-
42). As with the other pollutants (except lead), a composite
emission factor was derived.

8. Summary of Emission Factors. The various emission
factors derived for this study are listed in Table 5 for each
analysis year and condition. With most pollutants, there
is a decrease in the emission factor with time, as various
control programs are applied. Furthermore, there is a sig-
nificant improvement in most EF's with the Bypass, since
vehicles will operate more efficiently. An exception to this
is lead, since the EF increases as vehicle speed increases.
All of these emission factors are estimates (though the formulas
used to derive them are based on fairly extensive sampling),
and are subject to change if the Clean Air Act is amended.
Should the deadlines for various emission standards be ex-
tended, the emission factors used in this study would be un-
derestimated slightly. The effects of the Clean Air Act will
level off by the year 2000, so that no further improvements
in emissions will be realized unless the Act is revised.

9. Pollutant Burdens. The emission factors are expressed
as grams per mile per vehicle. To convert this to a total
pollutant load, the emission factor is multiplied by the vehicle
miles traveled in the project area. Vehicle-miles traveled
per day (VMT) is a product of the average daily traffic (ADT)
and the length of highway. The total VMT with and without
the Bypass is given in Table 6 (the Bypass figures are based
on Alternates A or C; Alternate D VMT would be 1-2% higher,
since it is slightly longer).

### Table 5: Summary of Emission Factors (grams/mile/vehicle)

<table>
<thead>
<tr>
<th>Segment</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kam Hwy without Bypass</td>
<td>76.0</td>
<td>74.6</td>
<td>71.8</td>
</tr>
<tr>
<td>Kam Hwy with Bypass</td>
<td>28.3</td>
<td>16.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Bypass</td>
<td>14.9</td>
<td>9.0</td>
<td></td>
</tr>
</tbody>
</table>

From MOBILE 1

<table>
<thead>
<tr>
<th>Segment</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kam Hwy without Bypass</td>
<td>7.7</td>
<td>7.6</td>
<td>4.4</td>
</tr>
<tr>
<td>Kam Hwy with Bypass</td>
<td>2.6</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Bypass</td>
<td>1.5</td>
<td>0.9</td>
<td></td>
</tr>
</tbody>
</table>

From MOBILE 1

<table>
<thead>
<tr>
<th>Segment</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kam Hwy without Bypass</td>
<td>3.2</td>
<td>2.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Kam Hwy with Bypass</td>
<td>2.3</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Bypass</td>
<td>3.0</td>
<td>2.0</td>
<td></td>
</tr>
</tbody>
</table>

From MOBILE 1

<table>
<thead>
<tr>
<th>Segment</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kam Hwy without Bypass</td>
<td>.0065</td>
<td>.0007</td>
<td>.0002</td>
</tr>
<tr>
<td>Kam Hwy with Bypass</td>
<td>.0008</td>
<td>.0002</td>
<td></td>
</tr>
<tr>
<td>Bypass</td>
<td>.0013</td>
<td>.0003</td>
<td></td>
</tr>
</tbody>
</table>

From EPA Lead Implementation Guidelines

<table>
<thead>
<tr>
<th>Particulates (exhaust)</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.341</td>
<td>.211</td>
<td>.102</td>
</tr>
<tr>
<td>Particulates (tires)</td>
<td>.218</td>
<td>.218</td>
<td>.218</td>
</tr>
</tbody>
</table>

These EF's do not change with speed, so are the same for
all segments. From EPA, AP-42.
1. Organization of Study. The focus of this assessment has been Kamehameha Highway, since it is the point of traffic congestion. It is also important since it passes through Haleiwa, exposing homes and businesses to air pollution. From the pollutant burden analysis, it is apparent that the Bypass will significantly decrease the total pollutant load. Therefore, the objective of this study has been to determine how serious CO pollution can become without the Bypass, and to what extent will the Bypass reduce CO concentrations in Haleiwa.

Using a single set of "worst case" conditions of wind direction, wind velocity, and atmospheric stability, the one-hour CO concentrations from Kamehameha Highway without a Bypass were obtained for 1978, 1985, and 2001. Using the same set of conditions, years, and receptors, the CO concentrations from Kamehameha Highway were derived with the Bypass carrying 60% of the traffic load. Then, the concentration from the Bypass itself was determined. Finally, the average 8-hour CO concentrations were determined for two receptors on Kamehameha Highway that had the highest 1-hour concentrations in 1985. A total of 56 computer runs were made, using 63 different receptor locations (872 calculations). Not all receptors were tested for all conditions, since the fewest computer runs were made to determine the most critical areas, namely, those where the State Carbon Monoxide standard may be approached or exceeded. As a result of this screening, 25 receptors were selected: 18 of these have been plotted to define the area along Kamehameha Highway where the standard may be exceeded, and 7 to detail the CO concentration along the Bypass (Figure 3).

2. Line Sources. The HIWAY model requires a straight highway as the line source, so Kamehameha Highway was divided into seven segments that approximate straight lines. These segments also correspond closely to the highway sections used by the State DOT for the traffic assignment (Figure 1: "KH", "KC", etc.). Using this many segments increased the number of computer runs (each segment is run separately for each set of receptors), but is more accurate than if a fewer number of longer segments were used, since shorter segments can be made to fit the actual highway more closely. The Bypass alignment was divided into two segments. For simplicity, only Alternate C was used in this analysis. With some minor adjustment, the results obtained can be applied to the other alternates, since they all have the same emission rates. It was assumed that the Bypass would still be two lanes in 2001. This produces slightly higher emission rates than if the bypass was 4 lanes, since the projected level of peak hour traffic for the year 2001 will result in slower speeds (Table 3).
the urban environment surrounding Hickam AFB. Therefore, a frequency of 0.25 for stability Class E is assumed for this analysis. The mean mixing height at Hickam with E stability and a 1-3 knot SSW wind is 534 meters, which is assumed to be appropriate for the project area.

E. RESULTS

1. Occurrence of Worst Case Conditions. The critical set of conditions assumed for the determination of CO concentrations was a weekend afternoon from noon to 3 PM, with a SSW wind blowing at 1.9 m/sec during E stability conditions. The total potential time during which the peak traffic can occur is 312 hours (52 weekends x 3 x 3 hours). In the proceeding discussion of wind conditions, it was pointed out that a NNE, N, or S wind would also produce high CO concentrations, so all four winds have been combined into a single frequency. This frequency, for a velocity of 1.9 m/sec in the afternoon, is assumed to be 0.05. Taking 5% of the 312 hours leaves 15.6 hours. Finally, the frequency of E stability is assumed to be 0.25, which leaves 3.9 hours per year in which the worst case conditions may occur. Due to the manner in which the wind data is collected (hourly observations), this does not necessarily yield four 1-hour periods. In fact, it is very unlikely that these conditions would occur together for a full hour, since the total time is so low. But if this possibility is allowed, there is a maximum of four times per year during which the 1-hour CO concentrations obtained with the HIWAY model can be expected to occur. If the CO concentration at a given receptor exceeds the State or Federal 1-hour standard (Table 8) then it may be considered to be four separate violations. There is a strong likelihood that a weekend with peak 1-hour traffic will have peak 8-hour traffic also, so this frequency estimate is valid for both standards.

The strategy of this analysis has been to obtain the maximum feasible concentrations. Because the traffic volume through the project area is relatively low (compared to the major weekday commuter corridors) the assumed conditions had to be very severe in order to obtain significant values. Once the "ceiling" is established, minimizing factors can be applied
When the Bypass shares the traffic load, CO concentrations will drop well below the State standards, even under the extreme worst case conditions used in this study. The highest 1985 one-hour concentration obtained on the Bypass was 4.2 mg/m³ (see the last 7 rows of Table 9). Most C-0 was used in this analysis, but the results are valid for the other alignments. Where Alternate D comes within 500 feet of Kamehameha Highway, the concentration 25 feet downwind from the Bypass would be roughly 0.4 mg/m³ higher than for Alternate C (i.e., 4 mg/m³ in 1985, and 0.3 mg/m³ higher in 2001). At distances greater than 200-800 feet, the CO from Kamehameha Highway makes a negligible contribution (less than 0.2 mg/m³) to the concentration downwind from the Bypass.

### TABLE 9: CARBON MONOXIDE CONCENTRATIONS (mg/m³) *

<table>
<thead>
<tr>
<th>Receptor Hvy.</th>
<th>1978</th>
<th>1985</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without</td>
<td>With</td>
<td>Without</td>
</tr>
<tr>
<td>KAM HWY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>17.5</td>
<td>22.8</td>
<td>3.0</td>
</tr>
<tr>
<td>13</td>
<td>11.9</td>
<td>15.3</td>
<td>2.0</td>
</tr>
<tr>
<td>15</td>
<td>8.0</td>
<td>14.4</td>
<td>2.5</td>
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<td>21</td>
<td>10.2</td>
<td>13.2</td>
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<td>37</td>
<td>11.0</td>
<td>14.2</td>
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<tr>
<td>55</td>
<td>21.3</td>
<td>27.9</td>
<td>4.7</td>
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<td>57</td>
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<td>28.0</td>
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<td>83</td>
<td>12.2</td>
<td>15.5</td>
<td>3.2</td>
</tr>
<tr>
<td>101</td>
<td>20.4</td>
<td>37.0</td>
<td>9.3</td>
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</tr>
<tr>
<td>146</td>
<td>1.1</td>
<td>1.1</td>
<td>4.2</td>
</tr>
</tbody>
</table>

* Background Concentration of 1.1 mg/m³ (1 ppm) has been added.

### 4. Hydrocarbons and Nitrous Oxides

These pollutants are very important in air quality management, since they are the primary precursors to "photochemical oxidant," a class of air pollutants that has serious health implications. Although HC and NOₓ were not analyzed with IIIWAY, a rough estimate of their maximum concentrations can be obtained by comparison with CO results. For any given highway segment and receptor, the pollutant concentration is proportional to the emission rate (grams/sec/meter). Since IIIWAY makes no distinction between the diffusion characteristics of different molecules, the ratio of emission rate to concentration obtained for CO at specific receptors will hold for HC and NOₓ. However, the assumption is made that within the short distances used for this analysis (25-300 feet from the highway), the photochemical reactions typical of HC and NOₓ do not significantly reduce their concentrations. Using this approach, the highest Hydrocarbon concentration obtained in approximately 3560 micrograms/m³, and the highest Nitrous Oxide concentration is approximately 1170 micrograms/m³. These values are for receptor 101 in 1985 without the Bypass. If the Bypass is operational in 1985, the maximum HC and NOₓ concentrations at this receptor would drop to around 310 µg/m³ and 170 µg/m³, respectively. These are 1-hour maximums that may occur no more than four times per year, if at all. However, the State and Federal standards (Table 8) are based on averages over longer periods of time, so direct comparisons cannot be made.
This Appendix presents the data and calculations upon which the discussion of existing noise and future noise impact in the EIS text is based. The assessment of noise in Haleiwa included measurement of existing sound levels and prediction of noise from traffic using several different methods.

The "Ambient Noise Survey Data Sheets" reproduced here are the field notes and analyses of noise level monitoring conducted in Haleiwa. The readings were taken on Saturday, May 26, 1979. Ten readings were made at seven locations with the measurement periods ranging from 10 to 30 minutes. The sites are plotted on Figure D-1 and sketched on the back of each data sheet. Readings were made at intervals from 9:30 A.M. to 3:00 P.M. Automatic traffic counters were set up at the Twin Bridges and at the Anahulu Bridge to record traffic flow during the monitoring period. Traffic was relatively high (due to good beach weather that day), ranging from 645 vehicles per hour (vph) at 9:30 A.M. to a peak of 1,325 vph at 3:00 P.M.

The results of the noise measurements are presented in Table D-1. The morning background noise level was around 45 dBA (decibels on the "A" scale), which is typical of a small town environment. The L10 noise level (the dBA level exceeded 10% of the time) at 50 feet from the highway was around 64-67 dBA, depending on traffic volume. The attenuation rate (drop-off with distance) was found to be around 4.5 dBA for a doubling of distance, which agrees very closely with the theoretical rate.

Predictions of traffic noise were made for two statistical descriptors, L10 and Leq. As previously noted, the L10 noise level is the value exceeded 10% of the time; it is considered to represent "peak" noise. The Leq, or "energy equivalent" noise level equates a variable noise source such as a highway to a steady-state source, taking into account the duration and magnitude of all of the sounds occurring in the time period. The L10 value is more commonly used in noise ordinance and other applications, but Leq is gaining popularity as a universal noise measure.

The "predicted" Leq noise levels for 1978 conditions along Kamehameha Highway (Table D-1) came out approximately 2-5 decibels higher than the measured Leq values. Most of this difference can be attributed to the uncertainty of actual vehicle speeds. The sites close to the highway had the greatest discrepancies, which is to be expected, since the measurements at these sites are not in a steady-state noise environment. The predicted values in Table D-2 can therefore be considered conservative ("worst case") estimates by several decibels.

Noise levels were predicted at two "sensitive receptors" in Haleiwa, the Liliuokalani Church and the Waialua Community Association Building. The exterior L10 noise levels at these locations in 1985 will be 60 dBA or less with or without the bypass. The noise level actually decreases if the bypass is not built, since slower traffic is quieter, even though there will be more vehicles. With the front door of the church closed and the windows open, the peak interior noise level attributable to traffic should be around 15 decibels less than the exterior noise level (6), or approximately 45 dBA in 1985 with the bypass. The Community Building is a wood frame structure with more windows than the Church, so the noise reduction would be around 10 decibels (7). Thus, the peak interior noise level from traffic in 1985 with the bypass should be approximately 50 dBA. These noise levels are within the Federal and the Oahu design standards (Table D-3).

A graphic representation of the existing and predicted noise environment is given in Figures 26 and 27 in the EIS text. These contour maps were prepared from the noise prediction data, attenuated at a rate of 4.5 dBA per double distance (Figure D-2).
### TABLE D-1 NOISE MONITORING RESULTS
Halawa 5/27/79

<table>
<thead>
<tr>
<th>Site</th>
<th>Distance from Edge of Hwy.</th>
<th>Time</th>
<th>Hourly Traffic Volume</th>
<th>DBA* Measured L10 Leq Predicted Leq</th>
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<tbody>
<tr>
<td>1</td>
<td>500'</td>
<td>0932 - 1002</td>
<td>885</td>
<td>50 47 45</td>
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<td>2</td>
<td>150'</td>
<td>1015 - 1030</td>
<td>980</td>
<td>57 54 57</td>
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<td>3</td>
<td>30'</td>
<td>1040 - 1055</td>
<td>1090</td>
<td>64 62 64</td>
</tr>
<tr>
<td>4</td>
<td>50'</td>
<td>1120 - 1135</td>
<td>1334</td>
<td>66 64 67</td>
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<td>5</td>
<td>130'</td>
<td>1145 - 1200</td>
<td>1392</td>
<td>52 50 55</td>
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<td>6</td>
<td>50'</td>
<td>1227 - 1242</td>
<td>1316</td>
<td>65 64 67</td>
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<td>7</td>
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<td>30'</td>
<td>1445 - 1500</td>
<td>1265</td>
<td>64 62 65</td>
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</table>

*Measured L10 levels are all within a 95% confidence interval, and most are within a 99% confidence interval. L_eq is calculated by formula from the measurements, and is thus accurate for the samples taken. The predicted L_eq assumes the following vehicle distribution: Autos 78.6%, medium trucks 17.0%, heavy trucks 4.4%; speed 15-25 mph; flow and speed equal in each direction.

### TABLE D-2 NOISE PREDICTION RESULTS

<table>
<thead>
<tr>
<th>Segment</th>
<th>1978</th>
<th>1985</th>
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<tr>
<td></td>
<td>L10</td>
<td>L10</td>
</tr>
<tr>
<td>Kam. Hwy. Without Bypass</td>
<td>67</td>
<td>64</td>
</tr>
<tr>
<td>Kam. Hwy. With Bypass</td>
<td></td>
<td>66</td>
</tr>
<tr>
<td>Along Bypass Alignment</td>
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b) L10 and L_eq Noise Levels in front of Liliokalani Church, 150 feet from Kamehameha Highway (dBA).

<table>
<thead>
<tr>
<th>Segment</th>
<th>1978</th>
<th>1985</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>L10</td>
<td>L10</td>
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<tr>
<td>Without Bypass</td>
<td>60</td>
<td>57</td>
</tr>
<tr>
<td>With Bypass</td>
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</table>

c) L10 and L_eq Noise Levels in Front of Waialua Community Association Building, 100 feet from Kamehameha Highway (dBA).

<table>
<thead>
<tr>
<th>Segment</th>
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<tbody>
<tr>
<td></td>
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<td>L10</td>
</tr>
<tr>
<td>Without Bypass</td>
<td>62</td>
<td>59</td>
</tr>
<tr>
<td>With Bypass</td>
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</tr>
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</table>
FIGURE D-2
PREDICTED NOISE LEVEL ($L_{10}$) VS. DISTANCE

LEGEND:
1. KAM HWY. WITHOUT BY-PASS 1978
2. KAM HWY. WITHOUT BY-PASS 1985
3. KAM HWY. WITH BY-PASS 1985
4. ON BY-PASS 1985
<table>
<thead>
<tr>
<th>NAME</th>
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<th>PROJECT DESCRIPTION</th>
<th>Hourly &amp; Half Hourly Barriers (G.C.)</th>
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### Table 1: Hourly & Half Hourly Barriers (G.C.)

<table>
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<th>A MT HT</th>
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### Table 3: Hourly & Half Hourly Barriers (G.C.)

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### Table 4: Hourly & Half Hourly Barriers (G.C.)

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### Table 5: Hourly & Half Hourly Barriers (G.C.)

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MARCH 1979
Figure 1. Location of the Survey Area.

Figure 2. Site Location Map
of the rocks, and the entrance then discovered. No mortar had been used, but sharp-edged rocks had been carefully fitted together. There were no artifacts with the burial. The bones had probably been bundled together, but had evidently been disturbed by animals, as several had been recently gnawed. There was one skull but no mandible, one humerus, one radius, two ulnas, four femurs, three tibias, and many fragments.

"Site 199. Piles of stones, near the mouth of Kaumoku Gulch, Waialua.

Near the mountain side of the siphon put in in 1930 by the Waialua Agricultural Company are many piles of stones, as I was told by Mr. Low, who is of the opinion that they are old Hawaiian, were there 24 years ago when cane was first planted on this land. The largest pile is oval in shape, 28 by 15.5 feet by 7 feet high. There are six piles in a group averaging from 50 to 200 feet apart, evenly faced but with the top comparatively level. Just west of this group are a number of stone walls and one or two small enclosures. The whole site is in the mouth of the gulch. The stones may have been cleared away for agricultural purposes before the plantation took over the land. A large field on the mountain side and east of the Bingham ranch which had also formerly been planted in cane has similar mounds of stone. I was also told that these stones were there in 1908 when the plantation took over the land. Hoakala says they were piled in this manner to clear the land for agricultural purposes.


At present one can squeeze about 200 feet into the interior but comes in contact with large stones which obstruct the passage. It is believed that in the nineties the water tunnel just above, the blasting dislocated these stones. Water also constantly drips from the roof making shallow pools in the passageway. Twenty years or more ago the cave is said to have contained skeletal material, though there is no evidence now of such remains, which undoubtedly would have decayed with so much moisture.

"Site 201. Keauau fishing shrine [ko'a] was once located on the beach at Puukiki, at the Kaena end of a long row of ironwood trees. Nothing remains of the site.


In the sand near the present station a number of skeletons have been uncovered at a depth of approximately 4 feet by plantation workers who were removing sand. The skeletons are said to have been in good condition. One skull which I saw was well-preserved.

"Site 203. Helau, near Kaukonahua Stream, Waialua.

It is said that a small helau once occupied the site where the Waialua Agricultural Company has installed their Pump Number 1. This is near the mountain side of the bridge which crosses Kaukonahua Stream near the plantation settlement. The name is not known.

"Site 204. Approximate location of Oahunui, a stone whose outline is said to resemble that of Oahu, in the gulch near the division line between Ewa and Waialua.

The stone was formerly visited by the Hawaiians for no one could say that he had been entirely around the island of Oahu, unless he had been around this stone. In the nineties it seems to have been a favorite expedition for Honoluluans to ride out to Oahunui and walk around this stone. Oahunui is also the name of one of the former chiefs of Oahu. He came under the influence of the cannibal chief, Lo Alakana, and learned to like human flesh. It is reported that he killed and ate his two nephews, the children of his older sister, who shared with him the royal power and prerogative. Lehuanui avenged the death of his children by killing Oahunui and his wife, KiliKiliula, who had it within her power to save her children. It is said that Oahunui and KiliKiliula and the attendants that participated in the killing and cooking of the children were turned into stone and are still to be seen.

"Site 205. Akua stone, Poloa grove, Kamananui.

The grove, once sacred to Pele, has been left
"Site 225. Kapukapuakea heiau, Pala-a-hai, east end of Kalaka Bay, on the sea side of the railroad track. The site is still remembered and pointed out, but nothing remains of the heiau. Thrum has this information: 'A medium sized heiau of traditional menehune construction of kaula wood, long since destroyed, said to have worked in connection with Lonoakeahu. Luau its kahuna. Nothing could be learned of Lonoakeahu. Near Kapukapuakea were formerly salt pans where sea water allowed to evaporate."

"Site 226. Pohaku Lanai, a large balancing stone on Kalaekupuapa Point, Waialua. A large oval-shaped stone 18 feet across is balanced on a smaller base, standing about 10 feet high in all. This is said to have been used as a lookout by fishermen in the region. When fish were sighted, the stone was beaten with a wooden mallet, and the resulting hollow sound was sufficient to gather together the fishermen of the village. Thrum writes: 'Hawaiians know it as pohaku Lanai, and it is said by them to have floated ashore from Kahiki, that vague foreign country of their ancient meles. It is a balancing rock on a somewhat broader base of lime-stone formation, with projecting top, so as to afford material shelter in its shelving structure."

"Site 227. Puupilo heiau, seaward of the Haleiwa Court­house, Paaloa. A slight elevation of land with an old coconut palm on the side is all that remains of this heiau."

"Site 228. The cemetery beside the church in Waialua marks the site of the heiau once known as Kapuawai. It has been completely destroyed."

"Site 229. Kawaipuolo spring, south of the Anahulu stream, mountainward of Haleiwa. When strangers passed here and asked for water, it was given to them in a taro-leaf cup; therefore, according to Hookala, it was called 'Bundle-of-water.' Thrum notes that the spring suddenly disappeared at one time. After long search and enquiry therefor, it was discovered by the seer (kilo) at Hakaula, near Kaena Point, on the hilltop now of the same name, Kawaipuolo. From here it was conveyed in one night by the menehunes in bundles of ti and taro leaves; hence the name, 'The-bundled-water.'"

"Site 230. Two stones known as moo, on either side of the Anahulu Stream above the old Haleiwa Seminary. One was named Poo o Moo and the other was known as Wawae o Moo. They are in no way different from ordinary stones, and can not be distinguished from other stones in the vicinity unless pointed out by one of the Hawaiians."

"Site 231. Anahulu heiau, Kamanu, at the location of the present Haleiwa Hotel. When the hotel was being built the heiau was destroyed. This, according to the Hawaiians, accounts for the failure of the hotel. According to Thrum, it was an 'Unpaved heiau of large size with lime stone walls, of luakini class.'"

"Site 232. Akua stone, Anahulu river, Waialua. A stone which formerly blocked the entrance of the Anahulu River and was said to be sacred. This stone was just beneath the water and was said to be occasionally exposed. Some years ago when it was removed in order that the glass-bottomed boat and sampans might use the river, much anxiety was shown by the Hawaiians, for fear of evil effects."
Kamakau says of the dog-man Ku-lilo-loa [Ku long dog] that Lono-ka-ahu came to Oahu from Kahiki with his 'great dog' Ku-lilo-loa to seek his brother. He pierced the hill Kane-hoa-lani at Kualoa, cleaved Kahuku and Kahapa apart, and broke Ka-pali-ho'oku'i at Kailua. He found his brother in the heiau at Palaa near Kuone at Waiula and took him back to Kahiki. The heiau named is the ancient heiau Kapukapu-akea said to have been built by Wnehuna out of kaulla wood. The heiau of Lono-ake-ahu [Lono-ka-ahu?] at Kehau is said to have 'worked with' that of Kapukapu-akea and at Kane-lilo at the lighthouse point stood the heiau of Ku-lilo-loa."

From "The Hawaiian Planter" [Handy 1940: 86]

"Paalaa includes Helemano Stream and extends north as far as Opaekua Gulch. There are said to have been many small terrace flats in the bottoms of the gulches, extending inland 4 or 5 miles. The map of lower Paalaa drawn by Francis Gay [dated 1874] indicates that there were terraces both above and below the 'Twin Bridges'.

"Kawailoa. This ahupua'a included the extensive terrace areas north of the Waiula River, along the level land north and south of Anahulu River, in the lower part of Anahulu Gulch, and in the swampy land east of Puena Point. (This swampy land apparently gave the district its name.) In Anahulu Gulch small flats with old mango trees, indicating kuleana, were observed several miles inland, and I am told that small areas were cultivated far up the gulch. Wild taros were seen in the side gulch at least 5 miles inland. The dry gulches between Anahulu and Waimea Streams probably never watered taro."

From "Oahu Sites" [Sterling and Summers 1978]

Mo'olelo Hawaii
Vol. II, Chap 9, p 45

"Lanlwahine was the guardian of Uko'a at Waiula, and Uko'a was regarded as the long house where she lived. She was a native of Uko'a and all her deeds centered about that place. The natives of Uko'a never failed to recognize her deeds, but few of her descendants are now left or perhaps none. Uko'a was a very strange fish pond in which lived extraordinary fishes. A fish might be a kumu fish on one side and on the other side a mullet; or on one side weke pua o and on the other mullet; or one side might be a mullet and on the other side a white cock; when scaled the skin might be striped and variegated inside. It was clear to all her descendants that these strange fish belonged to Lanlwahine and it was not right to eat them. But the mullet of Uko'a were full of fat when, as in all such ponds, the native guardian of the pond was remembered; {at other times) the fish had thin bodies and heads like wood or sometimes disappeared altogether.

Kamakau
Mo'olelo Hawaii
Vol. II, Chap 9, p 47

Ukoa and Lanlwahine

"Ukoa--land and fish pond in Waialua, Oahu. The latter is believed to have subterranean communication with the sea, as its waters are very much disturbed during stormy weather. There are superstitions and beliefs in connection with this famous pond. One gives rise to the common saying, 'Pupuhi ka l'a o Ukoa', 'The fish of Ukoa is blown away or slipped off.' There is a large circular hole at the head of the pond commonly credited as the home of Lanlwahine, the sister of Puhulua, children of a goddess of ancient Hawaiian Mythology.

Dictionary of Hawaiian Localities
Saturday Press
Aug. 25, 1983
ill health. However, they continued to reside in Waialua until their deaths. They visited the United States in 1860 and Mr. Emerson was a mission delegate to Micronesia in 1865.

"During 1835 and 1837 Mr. Emerson translated several books, Daily Food with notes, and First Teacher for Children. He translated letters from A through M in the English-Hawaiian Dictionary and some elementary text books.

"In no part of the Islands had the people been more in the habit of reading the Scriptures than at Waialua under Mr. Emerson. He had so arranged their reading that they were accustomed to read the entire Bible through once in three years. One old Hawaiian said he had read the Bible nine times.

"MRS. [URSULA SOPHIA NEWELL] EMERSON

Born September 27, 1806, Nelson, New Hampshire
Died November 24, 1888, Waialua

"Mrs. Emerson, writing in her journal at Waialua in 1832, said, 'A missionary here must be not only a pastor and spiritual guide to the people, but also a school-teacher, doctor, farmer and mechanic, and this not for a few hundred, but thousands'.

"She knew whereof she spoke. Strong, energetic, wise and loving, she worked among the Hawaiian people for 57 years. She walked hundreds of miles to administer medicines and delicacies to the sick, and give consolation; was a sweet singer and a skilled instructor in this and many branches of education.'

On July 27, 1832, shortly after arriving in Waialua, Mrs. Emerson describes their first home:

"My dear parents, could you now look in upon us, you would see us sitting in a native house, with only one apartment excepting what is made by curtains, with no windows and only one door, instead of the pleasant chamber in Mr. Clark's house in Honolulu, which we have been occupying for the past two months. But we are not unhappy—no, I have not enjoyed myself so well at any time since our arrival at the Islands as at present, and this is the place we expect will be our home." [Emerson 1928: 55]

About a month later, Mr. Emerson writes the following:

"Dear father and mother Newell, this is the first evening in our new house, in which we have lived for about a week, that I have been able to sit in my study and write, for I had first to make my table.

"Ursula has asked me to describe our houses. But how shall I do it? I might tell you that we have a great and splendid establishment built for us, or I might take the opposite tack and tell you that our dwellings look more like the tents of wayfaring men. In either description truth might to some extent bear me out, but avoiding the extremes I will try to give you an idea of their real appearance.

"We have two new native thatched houses, one for Mr. Clark and family, which will be my study after they leave us, and one for ourselves. We have also a cook-house, one old house in which our natives live, and a study for Mr. Clark; in all five houses. The one we live in is the largest, 36 ft. by 24 ft."

"The land on which our houses stand, about half an acre, is enclosed by a sort of palisade of small poles about six feet high, so fastened together with the native cord as to make quite a strong fence. This is necessary to keep the horses and goats from carrying off the houses, in other words, from eating them up, which they would do if they were very hungry. The cost of our establishment, if paid for by us in money, would not exceed one hundred and fifty or two hundred dollars, less by far than you would pay in New England for a small barn" [Ibid: 57-8].

Construction of a permanent residence for the Emersons began in 1833. The progress of the work can be traced in various letters written during 1833 and 1834. Excavation of the cellar commenced on May 8, 1833 and by the fourth of August, this work being almost complete, Emerson began looking for building materials. In September he mentions that he had children collecting sand and eighty men gathering stones, and in a letter dated October 14 he notes that for the prior six months coral had been collected, apparently to be used for both mortar and plaster. On October 14, 1833 he discusses the proposed plan for the house, but
Figure 6. Emerson Homestead ca. 1900 [West end of Site 1442 is visible at left]. [Photo courtesy of Hawaiian Mission Children's Society, Honolulu]
Detailed examination of the potential "old church" was also undertaken on December 28, 1979, but unfortunately, interior access was not permitted. It is a rectilinear wood structure with gable roof facing the road. The wall is wood, single wall board and batten. The only unusual feature consists of fishscale shingles on the weather gable end. Construction dates from the turn of the century, and its condition is dilapidated. The building does not contain enough architectural significance to warrant National Register designation for architectural reasons alone.

The joints between the coral blocks are filled with this high lime mortar, plus small chips of lava rock. This construction technique of adding rock chips to the mortar was a variation on the earliest masonry buildings, which used no chips. Kawaiahao Church, which was constructed in 1841, uses the lava chips in the mortar, whereas Seaman’s Hospital and Hale Pai, both in Lahaina, Maui, and constructed in the 1830s, do not.

The second floor and attached outbuildings are constructed of wood and date from much later than the original masonry walls. Based on the construction technique the front wooden addition, now used as a kitchen, dates from the turn of the century. The rear addition, now used as a wash and toilet facilities, dates from the late 1920s.

In conclusion, it is extremely possible that the masonry structure dates from the Emerson mission period, although it is not the main structure. The location of the windows and doors in absolute symmetry would suggest that the original use may have been two bedrooms or two staff quarters. Interior access to ascertain interior dividing partitions was not permitted by the current occupant, but State Historic Preservation Office research indicates a dividing partition measuring 4 & 1/2" in thickness. Excavation below grade to determine the possibility of a former basement could aid in determining whether this structure was the original homestead. However, even if the building were not the first building constructed at the mission, it is one of the oldest standing buildings in Oahu of this construction technique.
SITE 1440 (Figures 11 and 12)

This is a wall remnant in the middle of a large cleared and plowed field. It measures 25 meters in length, 1.2 meters in width and stands to a height of 1.3 meters, and consists of an alignment of large boulders placed on end with a cap and fill of smaller basalt rocks. The feature continues to the west as a narrow rubble pile which is obviously the result of clearing. In its construction technique it is typically aboriginal, and probably represents the remains of a large structure that has been destroyed. However there is a notable lack of cultural materials (midden remains or artifacts) in association with the feature, the only such remains found consisting of two shells of a nerite (Nerita plicata), a marine mollusc commonly used prehistorically by the Hawaiians as food. Several test probes adjacent to the feature revealed only shallow sterile deposits.

Figure 10. Cross-Section of Excavation at Site 1439.

Figure 11. Site 1440.

Figure 12. Plan of Site 1440.

Figure 13. Site 1441.
Figure 14. Taro Growing at Site 1441.

Figure 15. Pu'epu'e Cultivation at Site 1441.
VIII. SIGNIFICANCE OF THE SITES, AND RECOMMENDATIONS

When attempting to determine the significance of historical or cultural remains it is necessary to look at two broad areas of interest, the scientific information which is present and the existing cultural attitudes towards the remains located. The overall significance of the area surrounding an archaeological project area is therefore an important factor to consider when determining the significance of the sites.

The published information [McAllister, Handy, etc.] and the information elicited from informants leaves no doubt as to the present-day cultural significance of Helelwa. The presence of numerous heiau, shrines, and places of legendary and/or spiritual importance testifies to this fact, and this should be taken into account as an integral part of the planning process. As our published sources are not of very recent vintage, an effort was made to determine the feelings and attitudes of present day residents of the area concerning the impact of the project on the spiritual and cultural values which are presently held by these people. Our attempt to do this by means of interviews was necessarily a small-scale effort, and hopefully will be supplemented by information provided at the public hearings.

In order to make any definitive statements concerning the scientific value of archaeological sites, it is necessary to refer to previous work in the area so as to provide background information and a foundation for the discussion. With the exception of McAllister's (see Section III), previous archaeological research in the Helelwa area consists entirely of Kirch's recent work in the interior of Anahulu Valley. The aims of this project were:

"...to determine the physical correlates--artifacts in the broadest sense--of the socioeconomic picture revealed through archival analysis. While the archival data are restricted to a few decades bracketing the Wahiawa or great land division of 1848, it was predicted that the archaeological investigations might extend this picture back in time, providing a continuous sequence through the prehistoric-to-historic transition" (Kirch 1979: 2).

Even though fiscal and scheduling constraints prevented the execution of the ambitious research project that had originally been envisioned, valuable information concerning this previously almost unknown area of Oahu was nevertheless forthcoming:

"From all indications, the settlement landscape of middle Anahulu Valley in the late-prehistoric period was a relatively uncomplicated one. For habitation, abundant overhang rockshelters provided a convenient facility, and we have no indications of terraced house platforms as found in Halawa, Moloka'i, or C-shaped shelters as in Makaha, O'ahu. Likewise, on the admittedly narrow evidence of pondfield stratigraphy and surface configurations (and lacking absolute age determinations), it is doubtful that the larger irrigation systems were yet in existence. Rather, disturbed soil horizons and charcoal flecking stratigraphically underlying the pondfield constructions suggest that the practice of shifting cultivation involving firing was fairly widespread in the mid-to-upper valley at this time..."

"In general terms, then, the late-prehistoric utilization of middle Anahulu Valley was probably of a transient nature, as a resource zone or area exploited by a permanent, coastal-dwelling population" [Kirch 1979: 51].

In contrast to this pattern, the evidence from the historic period indicates that a shift to permanent habitation of small localized areas of the valley had occurred. In summation, Kirch concludes:

"Constrained by unavoidable sampling limitations, the results of our research in Anahulu are intriguing as to their wider implications, yet necessarily inconclusive. The Anahulu data suggest a considerable disjunction between prehistoric and historic phases of the local sequence, with a rather striking modification of the settlement landscape in historic times. Responding perhaps to intrusive pressures of a chiefly bureaucracy, Anahulu's traditional irrigation complex appears to have increased considerably in the historic period, only to fall into rapid decline and abandonment less than a century later under new economic pressures and the needs of the more demanding irrigation associated with plantation agriculture. Elucidation of the transitional settlement-subsistence se-
Itions. Such data as rainfall patterns could be inferred from the presence or absence of alluvial flood deposits, and data concerning shifts in the level of the water table could be forthcoming from chemical analyses of various soil horizons. This sort of information would of course also be important in terms of much broader concerns regarding the entire range of prehistoric systems of adaptation to the Hawaiian ecosystem through time. Any information which might be retrieved would also be a valuable addition to the data collected by Kirch, most especially if archival information is also present regarding the area.

SITE 1442

This structure is entirely outside of all of the proposed rights-of-way of the highway realignment and thus is in no immediate danger, but its high value requires National Register status so as to provide a measure of protection from inadvertent alteration. It is one of the few buildings of its type left in the State and should be nominated to the National Register of Historic Places on the basis of its architectural merit. It is recommended that further archival research be conducted to determine its precise date of construction and any historical information relating to it which might augment its architectural significance.

SITE 1443

Insofar as the highway realignment project is concerned this site is in no danger, as it lies immediately outside of one of the the proposed rights-of-way. Archival research should be undertaken, however, to determine whether or not it has any historical interest which might make it eligible to the National Register of Historic Places, even though it is of no architectural interest because of its condition.

Emerson Homestead

Our research unfortunately revealed that this important historic site no longer exists; therefore, the proposed highway cannot have any effect upon it and there is no need for developing a mitigation strategy for its preservation.

References Cited

Beckwith, Martha Warren

1970

Emerson, Oliver Pomeroy

1928
Pioneer Days in Hawaii. Doubleday, Doran and Co., Garden City, N.Y.

Handy, E. S. Craighill

1940

Kirch, Patrick V.

1979

McAllister, J. Gilbert

1933

Missionary Letters

n.d.
April 23, 1980

The Honorable Ryokichi Higashionna
Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna:

Subject: Kamehameha Highway Realignment
Haleiwa Bypass Reconnaissance Survey
TMK 6-2-02:3, 4, 5, 6, 7, 12
   6-2-04:18, 19, 20

In response to your letter of April 7, 1980, requesting our review of the Chiniago Inc. reconnaissance (REV March 1979) of the Kamehameha Highway Realignment, the following is offered:

It appears from the revised reconnaissance report that four sites were located within the study area boundary: Site 1439, 1440, 1441, and 1443. Of these, only Site 1441 appears to be potentially threatened by the proposed development, and then only if alternate B or alternate D were to be chosen for the highway alignment.

If either alternate Alignment B or Alignment D are chosen for development, it will be necessary for the Department of Transportation to initiate the National Register Eligibility Determination Process (36 CFR 63) for Site 1441 in consultation with the Historic Preservation Officer as the second step of conformance with 36 CFR 800.

It is our understanding that the realignment design furnished us and included in the reconnaissance are of a preliminary nature and do not necessarily reflect actual areas of impact. We therefore request that when you finalize your design for this proposed development that you transmit these final plans to this office for our review and comment.
For Haleiwa, the Future Is Now

By Susan Yim
Star-Bulletin Writer

A rental car drives up, stirring up red dust clouds in the moon heat, and parks in the unpaved lot in front of the Haleiwa Theater. The old building, dated 1931, looks like it should be showing John Wayne westerns rather than surfing flicks and be the backdrop for rinky-dink tourist stalls.

A tourist family gets out of the car and strolls over to Island Lady Produce fruit stand and studies the pineapple, half-ripe mangoes, starfruit, passion fruit, apples from Washington, oranges, nectarines and peaches from California. A 19-year-old, bearded, pony-tailed California transplant named Mikal says he takes in $600 on a good weekend day and $100 on a good weekday.

Between sales he doodles in a leather-bound scrapbook filled with Kodakoloid snapshots of Haleiwa. He has been in Hawaii about half a year, he is crazy about Haleiwa. "It reminds me of Chico in California. I remember being there and Sandy Spickler are real estate agents at James Salmon Realty, headquartered in the very California-looking Haleiwa Shopping Plaza. "I have a friend who said this area reminded him of home," says Janet McElhenny, who moved to the North Shore 10 years ago from Long Beach, Calif. She and Sandy Spickler are real-estate agents at James Salmon Realty, headquartered in the very California-looking Haleiwa Shopping Plaza. "I have a friend who said this area reminded her of home." McElhenny adds. "She's from Long Beach and I wanted to say, "Then why are you living here?" I remember 10 years ago sitting on Rocky Point and no one was there, there was no line for shave ice."

"Tell me what Haleiwa needs," says Spickler. "We need a good drug store. One thing we don't want is any fast-food operations to open up here."

"The day we have McDonald's and Kentucky Fried is the day I move out," says a secretary, on the other side of the file cabinets.

"If we get one, that's it," agrees McElhenny. "I will be boom, boom, boom, down the road. But you know, I heard Pizza Hut is coming in."

Leif Andersen calls off the two black dogs that hunt with him in the Koolaus. He is 23, born and reared in Haleiwa on a reclaimed piece of land that used to be a taro patch. The old Haleiwa bridge is in his front yard and Andersen and his buddies used to spend their summers engaged in the Haleiwa pastime of "bombing" cars that passed over the bridge. "You jump off the bridge into the water at the right time and the water will splash all over a car. The police discourage a new generation of water bombers and "about the only thing left from before is the shave ice, and even that's going," Andersen says, dryly, referring to Matsu moto's Grocery Store which operates under a six-month lease "Haleiwa's changed."

Sunlight daces through Sue Hegle's blonde braided hair, highlights her blue, doe-like eyes. She moved to Haleiwa a few years ago from California and started making prints of Hawaiian scenes for tourists. They sell well at Paradise Gallery, a storefront redone in wood with airbrush paintings in the window.

"People started saying why don't you do the Haleiwa Theater, the old Haleiwa bridge, Chinaman's Hat? There's so much subject matter in Hawaii to draw and the market here is better for me. I never would have been able to do this in California. There's no market."

We—"it doesn't matter whether we were born here or moved here—our business want Haleiwa to stay the same," says Janet McElhenny, who moved to the North Shore 10 years ago from Long Beach, Calif. She and Sandy Spickler are real-estate agents at James Salmon Realty, headquartered in the very California-looking Haleiwa Shopping Plaza. "I have a friend who said this area reminded her of home." McElhenny adds. "She's from Long Beach and I wanted to say, "Then why are you living here?" I remember 10 years ago sitting on Rocky Point and no one was there, there was no line for shave ice."

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A slight breeze floats across the ponds of hasu or lotus root plants on Juan Ballesteros farm. At first glance, the ponds look like taro fields, but the leaves are too large and round and sturdy. It could be a scene from Asia, acres of hasu, squash, string beans, cucumber vines shimmering green in the afternoon sun.
Leif Andersen: not much left from the past.

Sue Hogle: the subject matter is endless.

Hymie Ballesteros: like father, like son.

Sandy Spickler: no thanks to fast-food.
The face of Haleiwa's buildings may have changed, but the side views are still downhome.

Hymie Ballesteros loads cucumbers grown on farms bordering Haleiwa Shopping Center.—Star-Bulletin

Photos by Bob Young
Haleiwa is the little town that wouldn't.
Wouldn't what?
Wouldn't hold still for "reckless development."
For 25 years, Haleiwa held some kind of a record: Only one new building was constructed along the main drag of the North Shore "town between two bridges."

Now half of a $4 million shopping plaza has nestled in next to the the historic Walalua Court House, with more to come.

Before any of it got off the drawing board it had to pack the Haleiwa image or no dice.

When they build, Haleiwans copy their old buildings. When they remodel something, usually it comes out looking older than the original structure.

And why not?
"It's the last community on Oahu that's still got its architectural heritage intact," said Dick Gushman of Gushman & MacNaughton, developers of the Haleiwa Shopping Plaza.

Gushman defined the look as early Hawaiian, Oriental-country store and plantation camp.

"There's the Hawaiian roof, which we've used on both buildings in the shopping plaza," he said.

"Then there's the straight up and down false-front building with a shed roof overhang and little columns to hold it up.

"In Haleiwa the old buildings are set out right next to the road because, in early plantation days, they didn't have parking.

"They had automobiles, yes. But not like two to a family. It was more like two to the community."

He said the new buildings designed by architects Anderson/Reinhardt, Ltd. and Robert M. Fox preserve the architectural features of old-time Haleiwa.

Down the road a piece, a 1953 structure which strayed slightly from the pattern was brought back into line by a renovation job.

This was the old Haleiwa IGA supermarket which, two years ago, was replaced by a Hawaiian-roofed market center in the shopping plaza.

"The Sakai family (store keepers, for 50 years) had a building..."
Haleiwa Protests Highway's Route

By Toni Withington
Star-Bulletin Friday

When you want historic preservation of a community, how close do you allow progress to come?

This is a question that State transportation planners must answer about the North Shore community of Haleiwa.

It was posed to them by a cross-section of Haleiwa and Waialua residents last week at a public hearing on the proposed Haleiwa bypass.

A SEVERAL COMMUNITY groups asked the Department of Transportation to move the highway even farther up Anahulu Stream than it is now planned.

In its proposed location, the four-lane modern concrete bridge would be visible from the old-fashioned bridge that has become a landmark in Haleiwa.

When the town begins its historic preservation, the bridge and the stream are expected to be the focal points for the old Hawaiian atmosphere.

"WE DON'T WANT the State to build the highway too close to the town because it will detract from the aesthetic interest of the place," said Andrew Andersen Jr., who represented the Waialua Community Association at the hearing.

"But I am afraid we are crying over a dead horse when we talk to highway engineers." A resident of Haleiwa, Andersen is treasurer and a trustee of the Waialua Community Association and a member of the community's Transportation Department.

A SPokesman for the Transportation Department said the hearing was an "information gathering session," and is only one part of the $650,000 job of planning meha Highway will start at and engineer the high-Weed Junction between Waialua and Haleiwa and bypass.

Residents and community the old fishing community to groups still have until Aug. 6 Haleiwa Beach Park.

Construction is scheduled to be continued on to Kualoa, but there are no specific plans and no funds recommended yet by the department.

Until that extension is added, the department plans to build a four-lane access road from the new highway into town.

THE COMMUNITY association also objects to the four-lane road feeding back into the existing two-lane road.

"Once the State gets a four-lane highway down by the shoreline, it will probably be continued into the town and spoil all of the plans for the historic preservation of Haleiwa," Andersen said.

A highway ending in the two-lane access road would encourage the State to complete the highway in short order, Andersen added.

Also speaking at the hearing were the Lions Club, the Waialua Businessman's Association, the Waialua Sugar Plantation and Bishop Estate.

The Anahulu River in Haleiwa

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Hawaii and The Pacific
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BULLETIN
B-6 7/29/70
This is the ninth in a series of 15 articles by Herald Hostetter about the small towns of rural and semi-rural Oahu—that vague "out there" area that most of us glimpse only occasionally and partially on trips around the island.

The series is neither a sociology nor a sociological report, but more nearly a traveling social commentary. It's intended to bring the "out there" land a little closer to the rest of us.

"This is strictly country living," she said. "We'd like to keep the old atmosphere and to keep the street frontage the same as it is now."

Mrs. Anderson said that Haleiwa was Queen Liliuokalani's country home, and the local Congregational Church was named after her. Haleiwa was once a Hawaiian village, later became a business and residential community for the Orientals working their way up from plantation labor. The town still has a large Oriental and Filipino population, but with a broad mixture of all races.

The Community Association is working to save all the buildings of historical significance—but already some have disappeared beyond hope.

One way Mrs. Anderson figures Haleiwa's preservation can be accelerated is for the State to get busy with its H-3 Freeway, which will eventually bypass the town and relieve it of traffic congestion on weekends. Then we can really go ahead with preserving the town's character," she said.

Another who feels the way Mrs. Anderson does is Robert Jobes, a real estate man who has lived in Haleiwa for 34 years and now heads the Waialua Community Association.

This is the way I feel about the Waialua District," Jobes said. "We are situated in a wide valley, protected from the haar trade winds. The major rain is in the uplands as the wind comes over the Ko Olina Range. We have cooling trades and little rain.

We have a beautiful beach from Waimea to Mokuleia and the best surfing in the world on a daily average. The sea can be flat at Maka, and we'll have six-foot waves. We have surfer here more days out of the year than anywhere else in Hawaii."

Still, no one has seen fit to do much in the way of resort development in the area, and the town has been bypassed a number of times when it asked for improvements.

"Our biggest problem is sewers and a sewage plant," Jobes said. "A couple of years ago, the City seemed interested and began looking for an acquisition site, but nothing ever came of it. We have only cesspools, and the town has asked the county for the cesspools on our property and with our small water table.

Jobes feels the only way to get resort development and preserve the rustic charm of Haleiwa would be for some big resort developer to come in and do the job. He said the Bishop Estate is the largest landholder, but although much of that land is "a jungle," the Estates has taken no initiative in putting it to use.

"We need somebody with a lot of dough to come in and set up a development plan for the next 20 to 30 years," Jobes said.

So far, only one resort-type development has been started in the Haleiwa area, and that is the Mokuleia Resort Hotel, an 85-room, seven-story hotel planned for the Mokuleia Beach area west of Haleiwa and Waialua.

Mokuleia is a seceded beachfront community stretching for miles along the shore, with the ocean on one side and cane fields on the other. There are lots of trees, some so dense they hide the houses. With few exceptions, most of the houses are old, simple frame dwellings.

For the most part, Mokuleia is a second-class beach community. It has lots of nice sand, but the swimming is poor because of the predominance of coral.

The new hotel portends to be a unimpressive addition to the community. It will be big, by Mokuleia standards, and will stand seven stories tall. But, according to the pictures—on the sign at the entrance to the lot, the hotel will be nothing more than a long, narrow slab, a monstrosity of unimaginitiveness.

With the hotel is a planned 400-units apartment development of one-bedroom apartments—equally tasteless—to be built in low-rise clusters.

Adjoining the hotel site is a site of subdivision of a single-family dwellings and row-type apartment buildings, with more than half the lots still vacant. These that have been developed offer a mishmash of style; many are ordinary.

Mokuleia has some high-class recreation to offer. However, with a large golf field right on the beach, At nearby Dillingham Field, glider rides are offered by the Hawaii Glider Club.

Coral Spoils Swimming

The City and County has just finished re-landscaping the Mokuleia Beach Park, which may be fine for picnicking but impossible for swimming—again, because of the coral. The park has a new drive and parking areas, a new bathhouse and new picnic tables and barbecue stands. But the bays are only seedlings and saplings, so that for the next few years the park will have almost no shade and will continue to look more like a large football field.

Sandwiched between Haleiwa and Mokuleia, connecting the area into a more-or-less unified residential area, is the old sugar town of Waialua spread out alongside the big mill of the Waialua Agricultural Co., Ltd.

But unlike Kahuku, the town built by the Kahuku Plantation Co., Waialua does not have a company town atmosphere. There is reason. Only a small portion of the town is made up of company-owned houses rented to employees. Genji Santoki, industrial relations director of the company, explained that in the 1930s the plantation decided its main purpose was to produce sugar, not to manage a town. The company town had served its purpose as a place to put the indentured laborers from the Far East, but as they learned the language, they yearned for greater independence.

The company first sold the old company store, then the theater and finally the houses—or most of them.

It is easy to tell the difference between an owner-occupied and company rented house in Waialua. The people who own their own homes have given them an individuality not seen in the company-owned houses. Mostly they are well-maintained, painted in fresh colors, with a variety of landscaping.
The old bridge channels through itself all the life around it. Spanning the Anahulu River, it pulls together the banks of Haleiwa. It remembers the old and sees the new. Its too-narrow arches funnel the tide of progress filtering through the town. “Slow down,” it says, “look at me.” Built in 1921 when Haleiwa was a sleepy town, the bridge tries to lessen the pace of the traffic it channels through the still sleepy town.

The bridge still hears the plop of boots through the taro patches and the lap of waves against the orange and white sampans. The shrill whistle of the cane train is gone, and the clanking rumble of the Tumahauger is fading.

The bridge heard the Big-City folk call its neighboring buildings “delapidated” but only scoffed. “Old things are good things,” it said. “They allow the old to remember and the young to learn.” The bridge feels the surge of the tide below and the stain of red mud on its once-white arched. It feels the weight of small boys fearing the long tour cars or quietly fishing.

As the new small boat harbor was carved into the earth at its side, the bridge watched in wonder. Man diverted its river. Man cut off a chunk of the ocean for quiet waters. Man could easily have blown up the too-narrow bridge. Fortunately, he didn’t.

Beautification once meant to the bridge a new coat of white paint. Now it may mean survival to the matron of Haleiwa, the guardian of the rotting buildings. Like all structures the bridge once faced destruction in the face of bigger and more modern thoroughfares. But plans were changed. The new highway that will bring new faces in search of recreation will pass through Haleiwa near the mountains.

The old Kamehameha Highway will become a scenic route, a roadway of the past, if the young people of Haleiwa have their way.

The rebuilding and new construction in Haleiwa will take on a theme, so have decided the young men who once fished from the bridge. The most dominant scene will be the harbor, the sampans, the fishing village. The other scene, further up the river, will be the taro patches, the small riverside vegetable farms.

The new life that grows up along the shores of the river and beaches will share the laziness and quiet of the old life. And standing as a guardian between the two scenes will be the bridge, listening, seeing, feeling.
Haleiwa folks cannot bypass issue of bypass

On this page is another in The Advertiser's series on rural Oahu communities and their problems. They are run as time and space permit.

By SANFORD ZALBURG
Advertiser Senior Reporter

In Haleiwa the big news is the bypass. For years they've been talking about it—a two-mile-long road that would peel off from near Weed Junction on the Waialua side of Haleiwa, cut across the cane fields mauka of town, ford three streams, and wind up near Haleiwa Beach Park.

It would go around town and thus reduce traffic on two-lane Kam Highway through Haleiwa. “On weekends,” said a resident, “the traffic in town is chaotic.”

Not everyone approves. “If the bypass goes through, we can kiss the North Shore goodbye,” said Steven Gendel, who lives in Honolulu but is a North Shore aficionado. He means that a bypass will encourage people to drive out to the North Shore and he fears their barrels will come in swarms. Now there is at least one bottleneck—Haleiwa.

Some Haleiwa businessmen are concerned about a bypass. Will their business drop off? They wonder. Others, such as Paul Swanson who lives in Haleiwa, have mixed feelings. “Bypassing won’t help materially,” he said. “It will only increase the amount of traffic into town. On weekends sometimes I can’t get out onto my own street because of the heavy traffic.”

The overriding argument, however, is that a majority (92 percent, according to one community count) favors the idea of a bypass and that seems to be that.

The idea was first broached in the late 1960s. At that time Haleiwa folk argued against a plan to build a bypass about 400 feet mauka of and parallel to Kam Highway. They didn’t want a flood of “tourists” from Honolulu. They still don’t.

There are four alternate routes under consideration, all of which would run mauka of Kam Highway through Waialua Sugar Co. cane fields. The higher you go, naturally, the costlier the road. The land climbs quickly—from about 35 feet above sea level to about 90 feet.

Toraki Matsumoto, the area’s councilman, commented: “To me, you have to have the bypass.”

Which route?

“I haven’t made up my mind. I would prefer the one that would be cheapest.”

Douglas Orimoto, of the state land transportation facilities division, who is project manager, said, “Right now we are open to all suggestions. The state doesn’t have any preference.”

Paul Swanson said: “My feeling is that no matter where a bypass goes, it’s going to hurt someone.”

Merl Hawthorne, chairman of the North Shore Neighborhood Association, said, “As far as consensus is concerned, I believe definitely there is a need for the bypass.”

S.E. “Lucky” Cole, often a spokesman for North Shore people, said, “The majority of the people are concerned with the traffic. I think it (a bypass) should be as simple as possible in design and as close to the town as possible.”

The proposed bypass—officially, Kamahemeha Highway Alignment Haleiwa Bypass, F-083-1 (S)—would be a two-lane undivided road initially, and ultimately a four-lane divided road. It would be from 2.2 to 2.4 miles long, depending on which route is selected. The right-of-way would be 150 feet minimum with a designed speed of 60 miles an hour. Bridges would have to be built to cross Halemano and Opaeka’a Streams and the Anahulu River. No cost figures have been tabulated yet.

Two other bypass routes were considered and then discarded. One was that Kam Highway be improved; that is, widened. “The impact on the town would have been devastating,” said Henry Uehara, state Department of Transportation planning engineer. It would wipe out all the old business places which smuggle close to the highway.

The other suggestion was for a makala bypass; that is, a road on the sea side of Haleiwa. Again, impossible.

Uehara believes the most logical bypass would run 400 to 500 feet mauka of Kam Highway. The route is subject to negotiation, as they say. “We won’t be tied to a specific location,” he said.

Frederick C. Gross, a civil engineer who has worked for Waialua Sugar for 33 years, favors a bypass about 400 feet from Kam Highway. He suggests following closely the route suggested more than 10 years ago.

Gross said that some houses on the north end of the bypass would have to be torn down. The plantation would lose some prime cane land—say, 35 to 40 acres. Also a bypass would leave behind what Gross called “remnants”—small strips of land which will have to be written off.

The plantation would also have to consolidate cane fields and canehaul roads, relocate some facilities, and provide for irrigation.

Haleiwa-Waialua has a population of about 9,500. The area is growing very slowly. People like it that way. Haleiwa has some lovely vistas: the sea in front, majestic Mt. Kaala as a backdrop.

The town has a high unemployment rate—double the rate of Honolulu’s. Its isolation is one reason.

continued
Effort to put past into new buildings

"Controlled change," developer Dick Gushman calls what’s happening in Haleiwa. "It’s possible."

He might have added that it takes patience and care planning and is costly. But it’s the only way a rural community can retain its character.

Haleiwa, so far at least, has been able to do that in spite of the construction of a 30-store, $5 million shopping plaza in the heart of town.

The architects are Anderson/Reinhart, Ltd., and Robert M. Fox, who respect the old-fashioned look. The developer is Gushman & MacNaughton.

Dick Gushman said: "We spent a lot of time trying to mimic the existing architecture."

There are, as a result, graceful, wood, low-rise shops, a supermarket (the renovated IGA supermarket), a medical clinic, a bank building, stores. It’s all done in early Hawaiian style: straight up and down false-front buildings with shed roof overhang and columns. The impression is of warm redwood: an old-fashioned look.

"It’s a fragile thing, a community like this," said Gushman. "It can be done — if you have the expertise and the patience you can make it pay off."

Gushman said his firm made a study of the area. They discovered that 80 percent of the money spent by residents went for purchases outside the area. That seemed foolish. Why not keep some of that at home? Haleiwa Shopping Plaza is the answer.

Other changes are on tap. After all, there wasn’t a single commercial building built in Haleiwa in a decade. There is the city-county and Ocean Properties Ltd. 307-home Paalakai Housing Project, for which $21.4 million in federal funds has been appropriated. Off-site work is to begin soon.

There is the two-phased job on the Waialua Court House. The second phase — landscaping — is under way. Total cost is $50,000, according to City Councilman Torakl Matsumoto.

"One of my goals is to really make the area the recreation spot for the people of the island," Matsumoto said.

Shingon Mission plans a $1.25 million, 60-unit housing project for the elderly at Kam Highway and Paalaa Road. It will consist of one story below the road, and three stories of concrete above. But won’t a four-story structure be sort of out of place in Haleiwa?

Sort of. "We want to keep the country look," said Merl Hawthorne, chairman of the North Shore Neighborhood Association. "But who wants to take a stand against housing for the elderly?"

There are other plans: perhaps a small shopping center across from the old Haleiwa gym; some stores near the entrance to town.

Some of the old wooden buildings in town date back to the early 1900s. They should be renovated; or torn down. There is need for a bikeway and sidewalk through town. "There is no shoulder on the highway," said Hawthorne. "It’s dangerous."

Some nice things have happened, such as the nearby 52-acre Kailua State Park. The grounds alongside the ocean are beautifully landscaped. There is a stand of ironwood trees; the wind sings in the treetops. People go fishing, crabb­ ing, camping.

Kailua was almost lost. Developer Herbert Horita, who bought the land from the Bishop Estate, planned to build 1,152 apartments in seven- and eight­story buildings on the shoreline. The townspeople protested vigorously. Citizens packed a community association meeting one night and voted against the proposed development. The site later was condemned for a park.

The town is proud of the Department of Parks and Recreation’s unique Alii Beach Park Surf Center. Lee Kravitz, the ocean recreation specialist in charge, called the center "the only facility of its kind anywhere in the world."

There they teach life-saving, outrigger canoeing, surfing, sailing, skin-diving, snorkeling. "We do everything in the ocean," said Kravitz. Some 5,000 students take courses every year. It cost almost half a million dollars to put the whole thing together. But, as Kravitz, said, "there is no charge for the ocean, and no charge for maintenance on the ocean."

To keep the old-style look of Haleiwa, Councilman Matsumoto has pressed to make the town a Historic, Cultural and Scenic District. That request is making its way through channels, and is still in a preliminary stage, according to William Wanket, deputy director of the city’s Department of Land Utilization.

Something else should be mentioned. What has happened to the kids who flooded the North Shore in the late 1960s and early 1970s? The hippie types, the guys and gals with the lifestyle that rubbed many of the old-timers the wrong way?

Well, many are still there.

But now some are running shops. Some are craftsmen and women. Some work hard in the fields. An old-time resident said many are good, reliable workers. They are not ashamed to work with their hands, he said.

Some have done well indeed.

"I’ve got some tenants who are occupying shops in the last phase of the development of the shopping plaza who stood up and testified against us 10 years ago," said Dick Gushman. "Now they own their own homes on the beach and are successful businessmen."

— SANFORD ZALBURG

Honolulu Advertiser
4/16/79

Woodframe stores and shops of the $5 million Haleiwa Shopping Plaza retain the "old-fashioned" look that villagers want.
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